Toward a Strategic Educational and Research Partnership between the University of Illinois and KTH Royal Institute of Technology

Stage I Research Symposium Report and Recommendations

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Executive Summary

Context

In order to explore a possible strategic partnership, the University of Illinois (Illinois) and KTH Royal Institute of Technology (KTH) in Stockholm, Sweden have agreed to organize two bilateral research symposia with emphasis on all levels of institutional exchange and joint ventures. The Stage I Research Symposium was held on the Urbana campus December 8-10, 2010, and attracted around 80 registered participants, including top university and school administrators from both institutions. The symposium identified common research and educational interests among two dozen departments and research institutes in five colleges at Illinois (Engineering, LAS, FAA, Media, Graduate), with significant additional departmental and college participation projected. It further established that three critical components for the implementation of a successful strategic partnership are in place:

1. The institutions are compatible and there is strong cross-campus faculty and institutional interest in exploring closer collaborations in research and education;
2. Significant trilateral collaborations and third-party funding opportunities can be attained through a strategic partnership;
3. This initiative can be a model for creating strong, comprehensive, and lasting win-win international engagements that serve students, faculty, and the state of Illinois.

The Stage I Research Symposium established that both institutions are compatible in terms of funding, facilities, research merits and output, faculty excellence, and student quality. Both institutions are interested in win-win models that serve both research and educational objectives. There is virtually no language barrier. English is used by KTH administration and faculty and in the upper level undergraduate curriculum (introductory courses feature all course material in English and exams can be taken in English). Swedish is taught at Illinois for students and faculty interested in learning the language; KTH offers introductory to advanced Swedish courses on location. Semester and matriculation systems are compatible.

KTH is an international institution with multiple high level international programs in place, including with National University of Singapore (NUS). NUS has a full-time staff member on the KTH campus. KTH has proven experience in making international collaborations work. KTH operates several high profile large EU-funded research and educational collaborations, into which Illinois has the potential of being included. Possibilities for trilateral educational, research, and funding ventures between Illinois and KTH are strong. Top administrators at KTH are prioritizing their involvement with Illinois. KTH features an open, flat, and nimble organization in which decisions can be made and implemented quickly.

As shown in the chart below, Sweden ranks among the top countries in research and development expenditures in the world\(^1\). As a premier Swedish institution, KTH has been awarded the highest proportion of national research funds in recent years. External grant funding is similarly high. KTH is expected to channel some of its research funds in ways that strengthen its research involvement with Illinois.

\(^1\) 2011 Global R&D Funding Forecast, R&D Magazine, December 2010.
Recommendations

In order for this partnership to attain its full potential, continued Illinois resource commitment and expression of institutional support for the initiative is critical. This will allow for a successful implementation of the scheduled Stage II Research Symposium at KTH in Stockholm, May 4-6, 2011, and a comprehensive implementation of the strategic partnership in the long term. The May symposium will focus on targeted, specific, and concrete measures for collaboration and joint funding, which will be developed for immediate implementation.

Faculty interest in expanding research collaboration has been firmly established. Multiple study abroad opportunities that benefit students in the five represented colleges have also been identified and should be further pursued. These include short faculty-led courses, semester study abroad direct exchanges, graduate student exchanges, and joint degrees on the Master and PhD levels. KTH Stockholm is a strong candidate for becoming a prioritized field site for University of Illinois study abroad engagements.

The partnership should develop core and critical areas of research and education where both institutions have identified strong potential for research and educational collaboration. These include STEM fields and extend to energy, sustainability in design and materials development (engineering/architecture/urban planning), information technology (computer science/NCSA), transport (especially rail), biomedical/life
sciences, and technical and humanistic communication (including history, political science, media studies, and foreign languages). It is recommended that an inventory be developed of related curricula at the two institutions to enable an educational exchange that naturally fits with existing degree programs.

KTH is a technical university where interdisciplinarity across subject areas (including in the humanities and social sciences) is integrated. This makes KTH an ideal partner for Illinois. Through collaboration with KTH, closer connections can be established also with Stockholm University, a large comprehensive tier-one research institution, and with Karolinska Institute, one of the world’s top medical universities, both of which are located within one mile’s radius of KTH.

Discussions of linking Illinois and KTH in corporate relations have also been initiated, and it is recommended that OCR follow up on areas of joint interest, including with NCSA. Large multinational companies such as ABB, Skanska, and Ericsson have close connections with KTH. Leveraging these connections may involve potential for economic development in the state of Illinois. Prioritized areas in this respect include rail transportation, nuclear energy development and waste management, information and communication technology, and sustainability in building and materials design.

Finally, it is recommended that Illinois and KTH consider a development and branding effort for this strategic partnership. This could include a recognizable visual brand, a joint mission statement, and a long-term strategy for funding research, faculty, and student exchange from third-party sources.

This report presents a summary of what has been accomplished before and during the Stage I Research Symposium. It identifies next steps and presents recommendations in preparation for the Stage II Research Symposium. Additional information, including a presentation of KTH and their strategic platforms in research and education, can be found at the INSPIRE website (inspire.illinois.edu) and the INSPIRE wiki (wiki.cites.uiuc.edu/wiki/display/INSPIRE).
Symposium Organization

The Illinois-Sweden Program for Educational and Research Exchange (INSPIRE) is a framework for collaboration between Illinois and partner institutions in Sweden. Its goals are to promote and sustain opportunities for exchange of undergraduate students, graduate students, and faculty and for joint educational and research initiatives. An immediate objective of INSPIRE is to create a strategic partnership with KTH Royal Institute of Technology (KTH) in Stockholm, Sweden.

To identify concrete opportunities for such collaborations, Illinois and KTH have agreed to jointly organize two bilateral research symposia. The Stage I Research Symposium was held on the Urbana campus on December 8-10, 2010 with arrival and group dinner on Wednesday, December 8; workshops, presentations, graduate student poster session, and first break-out session and group dinner on Thursday, December 9; and second break-out sessions, concluding session, and time for individual meetings with Illinois faculty and administrators on Friday, December 10. The Stage II Research Symposium is scheduled to be held on the KTH campus on May 4-6, 2011.

An essential element of the proposed strategic partnership between Illinois and KTH is synergistic and mutually beneficial research collaborations between individual faculty or groups of faculty addressing key areas of strategic importance to the two institutions and their home countries. When recognized at an institutional level, these provide incentives for ongoing faculty participation and generate revenue-enhancing opportunities for long-term faculty, graduate student, and undergraduate student exchange.

In agreement with this vision, the deliverables of the Stage I Research Symposium and its immediate aftermath are

- To identify a select subset of cross-institutional strategic research initiatives and academic program exchanges;
- To explore a pilot effort for graduate-level academic program exchange and/or possible joint degrees.
- To initiate a coordinated effort to seek financial support for these initiatives from U.S., Swedish, and European funding agencies.
- To follow-up at the administrative level on initial memoranda of understanding outlining the envisioned faculty and student exchange programs (graduate and undergraduate).

To achieve these objectives, the Stage I Research Symposium included presentations, a graduate student poster session, and break-out sessions to discuss cross-institutional strategic research initiatives and exchange as well as programmatic issues in undergraduate and graduate education, including student exchanges, possible joint graduate degrees, internships, and corporate relations.

The symposium program and a list of registered participants are included in the appendix to this report.

Organizing Structure

Professors Harry Dankowicz (Mechanical Science and Engineering) and Anna Stenport (Scandinavian Studies, Germanic Languages) co-chaired the Illinois organizing committee for the Stage I Research Symposium. Extensive additional support was provided by Melanie Loots (Office of the Vice Chancellor for Research) and Timothy Barnes (International Programs and Studies).
The KTH organizing committee consisted of Tina Murray (International relations), Charlotte Elfgren (International Relations), and Per Berghlund (Vice-Dean for Faculty).

Symposium logistical support was provided by the Office of Continuing Education through the direct assistance of Elaine Wolff and Nancy Simpson. The INSPIRE website (inspire.illinois.edu) and the INSPIRE wiki (https://wiki.cites.uiuc.edu/wiki/display/INSPIRE) were created jointly with Julia Stackler and Debra Bolgla (Creative Services) with additional assistance with site registration by Matthew VanderZalm (International Programs and Studies).

Video recording services were provided by Atlas Digital Media. Symposium photos were taken by Brian Stauffer (Illinois News Bureau).

Local Illinois funding for the Stage I Research Symposium was provided by the Office of the Vice Chancellor for Research, International Programs and Studies, and the Graduate College.

Dissemination and Media

The Illinois organizing committee sent out individual e-mail invitations to selected faculty, department heads, unit directors, and unit heads to encourage their participation in the Stage I Research Symposium. Members of the International Advisory Council as well as the Council of Deans were informed about the Symposium by e-mails sent by Wolfgang Schlör. In addition, the Illinois organizing committee sent out a broadcast e-mail to remaining heads of relevant departments, units, schools, and institutes as well as to associate deans.

Jeff Unger (Illinois News Bureau) sent news releases about the symposium to all local media (TV, radio, newspaper(s)) as well as the Chicago Tribune and the Associated Press.

Information was also sent out by Matt VanderZalm in International Programs and Studies to the subscribers of the online Illinois International Update newsletter.

Detailed symposium information was also made available through the INSPIRE website (inspire.illinois.edu) which went live on December 1, 2010. Video recordings and PowerPoint presentations from the symposium were made available through the INSPIRE website on December 23, 2010.

Updates about the symposium and other INSPIRE-related news and information have been posted to the INSPIRE Twitter account (inspireillinois) since December 8, 2010. In addition, the e-mail alias inspire@illinois.edu was created on December 21, 2010.

Graduate Student Poster Session

To showcase Illinois research and to demonstrate the value of a significant involvement of graduate student exchange, a graduate student poster session constituted the concluding daytime event on the first full day of the symposium. 26 posters were presented by graduate students from the College of Engineering, the College of Liberal Arts and Sciences, and the College of Agricultural, Consumer and Environmental Sciences. These included the following selected subset.

- Economic analysis of thermochemical conversion of swine manure to oil, Zhichao Wang, Agricultural and Biological Engineering.

● Uncovering cryptic biosynthetic pathways using synthetic biology, Yunzi Luo, Chemical and Biomolecular Engineering.

● Engineering a novel orthogonal gene switch for human therapeutics, Jing Liang, Chemical and Biomolecular Engineering.

● Image analysis of fiber reinforced concrete, Amanda Bordelon, Civil and Environmental Engineering.

● Combined solid-state superionic stamping and metal assisted chemical etch for Si nanofabrication, Bruno Azeredo, Center for Nanoscale Chemical-Electrical-Mechanical Manufacturing Systems.

● Comparing parallel programming models for random remote updates, Van Bui, Computer Science.

● Oil retention and return of R1234yf in suction pipes, Ankit Sethi, Mechanical Science and Engineering.

● Low temperature chemical vapor deposition of conformal thin films from novel precursors, Shaista Babar, Material Science and Engineering.

● Intrusion detection for AMI, Robin Berthier, ITI.

● Analyzing heterogeneous traffic delay in single track railway networks, Sam Sogin and Greg Munden, Civil and Environmental Engineering.

● Full-scale railway concrete crosstie and fastening system research and testing at UIUC, Mauricio Gutierrez, Civil and Environmental Engineering.

● Targeting DNA/RNA recognition motifs related to myotonic dystrophy (DM) diseases, Chun-Ho Wong, Chemistry.

Platforms for Cross-Institutional Exchange

Six synergistic strategic multidisciplinary research platforms were identified around which collaborative research activities with significant societal impact should be organized:

● Energy

● Humanities and Social Sciences

● Information and Communication Technology

● Materials Development

● Medical and Biomedical Technology

● Transport

These research platforms constitute a natural opportunity for defining cross-institutional faculty, research, and graduate and undergraduate exchange initiatives between the two institutions. Such exchange initiatives may also further interdisciplinary research and educational opportunities involving more than one platform area.

To meet the symposium objectives, a carefully coordinated sequence of breakout and joint discussion sessions were organized around and across these collaborative research platforms.
Breakout Sessions

There were two open-ended breakout sessions on Thursday, December 9. The first of these focused on research exchange. The second focused on educational exchange.

Each breakout group was moderated by two moderators, one from Illinois and one from KTH. The moderators facilitated the discussion and jointly arranged for a record of the discussion to be entered in real time onto the wiki site (wiki.cites.uiuc.edu/wiki/display/INSPIRE) for later editing.

It was recommended that each session consist of three (possibly overlapping) parts, namely,

i. Brief informal presentations of the research/educational areas represented by the participants,

ii. Brief informal discussion of best practices/models for collaboration,

iii. Development of concrete proposals for collaborative exchange arrangements that leverage complementary strengths.

For the research exchange breakout session, each breakout group was asked to target the formulation (without judgment) of three to five possible collaborative initiatives that involve research collaboration, faculty exchange, graduate student research exchange, and/or joint programmatic funding.

For the education exchange breakout session, each breakout group was asked to target the formulation (without judgment) of three to five possible collaborative initiatives that involve undergraduate exchange, graduate education exchange, joint curriculum development, dual/joint degree programs, class visits, internships, and/or joint programmatic funding.

Finally, each breakout group was asked to summarize each possible initiative in a single sentence and accompany this by two to four additional sentences that described the strengths at each institution that could be leveraged and the opportunities that might result from such an initiative.

One strategic planning breakout session was held on Friday, December 10. The moderators again facilitated the discussion and jointly arranged for a record of the discussion to be entered in real time onto the wiki site for later editing. Each breakout group was asked to identify and justify i) next steps, ii) action items, and iii) concrete recommendations that will allow the partner institutions to proceed with two to three collaborative initiatives in research and/or education with the highest likelihood of success in a reasonably short time frame.

Review Sessions

In addition to the breakout sessions, there were two review sessions on Friday, December 10. During the morning review, one moderator from each breakout group summarized the concrete proposals for possible exchange and partnership formulated in the open-ended breakout sessions on Thursday and referenced on the wiki. Feedback was solicited from the participants as to cross-disciplinary aspects that may not have been addressed in the previous day's breakout groups.

During the Friday concluding discussion, one of the moderators from each breakout group summarized the concrete recommendations formulated in the strategic planning breakout session on Friday and referenced on the wiki. Feedback was again solicited from the participants as to schedule of implementation, contributors, and implementation strategy.
The material in the following sections summarizes the discussions held during the symposium and in its immediate aftermath. For additional detail, including a listing of individuals with particular responsibilities, please see the wiki site (wiki.cites.uiuc.edu/wiki/display/INSPIRE).

**General observations**

In the area of student and faculty exchange, the following observations apply to varying degrees across all platforms.

- KTH degrees and courses are divided into three successive cycles that culminate in a bachelor degree (three years), a master degree (two years), and a doctorate degree, respectively. All courses at the master and doctorate levels are taught in English. At the bachelor level, most courses are taught in Swedish, but much of the course material is in English. For Illinois student wishing to take courses at KTH offered in Swedish, advantage could be taken of Swedish language courses offered through the Scandinavian Studies program as well as intensive Swedish-as-a-foreign-language courses offered in the summer at KTH.

- Illinois and KTH academic calendars are generally similar. The fall semester runs from late August through mid-December. The spring semester runs from mid-January through mid-May. KTH has an additional exam period for undergraduate and master degree students, which extends into early June. KTH has relatively little activity on campus in July.

- Both institutions place great emphasis on the integration of research and practice in education and on the development of innovative instructional programs, for example the iFoundry program in the Illinois College of Engineering and the KTH effort to implement the Worldwide CDIO Initiative throughout its curricula.

- Mechanisms for student exchange include
  - Short, possibly multi-locational, undergraduate or graduate student visits ranging from a few days to several weeks that draw on specialized expertise and include various special educational activities, study visits, and excursions. Such opportunities could be part of identical courses taught at the partner institutions and supplemented with regular web-based discussions and project presentations.
  - Undergraduate summer research internships.
  - Simulcasting of web-based courses.
  - Semester- or year-long course exchange, including opportunities for undergraduate and graduate thesis work. This could be particularly desirable if credit could be given for bottleneck courses at the home institution.
  - Certificate programs.
  - Joint or dual degree programs, for example by combining a one-year non-thesis Illinois master degree with some additional course and thesis work at KTH.

- Mechanisms for faculty exchange include
  - Short courses taught by visiting faculty, including in conjunction with short undergraduate or graduate student exchange programs.
  - Reciprocal program of semester-long faculty exchange to teach in areas complimentary to visited institution curriculum and expertise.

- An effective student exchange program, possibly including joint certificate and/or degree programs, requires i) a set of complementary courses at the exchange institution that provide
training that cannot otherwise be obtained at the home institution and/or ii) a set of matching courses that allow for a direct credit transfer to the home institution without delaying graduation. **Recommendation:** Each platform should establish a curriculum liaison at each institution with responsibility for i) collecting and exchanging information about available matching courses, credit equivalencies, and degree programs, ii) identifying complementary courses and opportunities for leveraging resources and expertise to support specialized concentrations and certificate programs, and iii) exploring an alignment of scope, content, and prerequisites for a course package that could constitute the foundation of a joint certificate and/or degree program.

- An effective faculty exchange program requires i) access to information about complementary expertise and research resources, ii) institutional support for release from departmental commitments during absence, and iii) close integration with graduate student exchange and efforts for joint funding. **Recommendation:** Each platform should identify a list of platform participants at the two institutions to enable meaningful and productive collaborative interactions and explore mechanisms for bringing groups with complementary strengths together, for example, through jointly organized workshops and symposia. Collaborative teams should be formed that draw on complementary strengths and enhance the competitiveness of applications for third-party funding.

- An effective long-term strategic partnership between the two institutions requires i) sustained commitments of resources from the two institutions, ii) identifiable joint ventures that project the complementary strengths of Illinois and KTH in seeking third-party funding and iii) a clear branding strategy that attracts corporate investments and philanthropic contributions and enhances the competitiveness of both institutions in attracting high-quality undergraduate and graduate students. **Recommendation:** The two institutions should consider possible trilateral exchange arrangements with other international institutions, for example, leveraging already existing bilateral partnerships with Singapore. The two institutions should identify European Union initiatives, for example the Erasmus Mundus programs, for enhancing each institution’s access to international research and education funding. Named scholarships, even with small financial rewards, should be instituted to attract doctorate degree student participation. A corporate affiliate program should be created to fund travel scholarships and white-paper competition.

**Action Items**

The following summarizes action items formulated by the breakout sessions.

**Energy and materials development**

- Plan a half-day research focused component of the Stage II Research Symposium, possibly including real-time online streaming of presentations.

- Explore the creation of a named, short-term (2-3 weeks) sabbatical faculty exchange program.

- Pursue a collaborative Erasmus Mundus PhD program in energy systems/sustainable cities that would include Illinois as a non-EU partner.

- Plan a joint presence at a Materials Research Society conference during 2011.

- Develop inventory of complementary research expertise at the two partner institutions.

**Medical and biomedical technologies**
• Develop inventory of complementary research expertise at the two partner institutions.

• Find opportunities for exchange of graduate students between the two institutions.

• Explore opportunities for collaboration in the areas of metagenomics, bioenergy including biofuels, systems biology, enzyme engineering, diagnostic devices for personalized medicine, and miniaturization of medical devices, for example using microfluidics.

**Information and communication technology**

• Create a joint inventory of best practices, resources, and tools that will be exchanged and shared, including through actual on-site installation and training.

• Develop a joint undergraduate course track for the first semester of the senior year called "Advanced Preparation for a Career in Research" with course credits that are mutually accepted by KTH and UIUC.

• Recruit KTH undergraduate students through a competitive application process to the 10 week, NSF-funded, ITI-managed Summer Internship Program in Cyber Security.

• Establish a reciprocal “Distinguished Lecture Series” with key speakers from each partner institution.

• Explore opportunities for collaboration in the areas of high-performance computing, cloud computing, security of vehicular networks, smart-meter deployment, sustainable infrastructure.

**Transport research**

• Develop collaborative research in areas related to rail transportation, such as railway bridge designs and high-speed rail designs; on wheel surface contact and interactions; on sustainable infrastructure.

• Receive KTH students for summer internships, possibly as early as summer 2011.

• Receive KTH undergraduate students for exchange programs.

• Pursue joint Master degree programs and identify or develop specialized and complementary classes at each institution that would benefit students from the partner institution.

• Develop mechanisms for short- and long-term exchange of faculty.

**Humanities and social science**

• Jointly develop a six week, advanced, undergraduate, interdisciplinary, KTH-based summer course on ‘The Changing Arctic’. Course will include field trips to Abisko and Jukkasjärvi in northern Sweden, as well as in the Stockholm vicinity of Linnaeus’ Hammarby, the Swedish Museum of Natural History, and the Ethnographic History Museum. Course expected to include a research component, emphasizing methods and case study approaches. Possible topics include glaciers, policy, preservation, (hydro) energy production and environmental/social implications, atmospheric science, climate modeling, indigenous peoples, arctic biology, arctic geology.
• Establish a reciprocal “Distinguished Lecture Series” with key speakers from each partner institution.

• Institute exchange program for summer 2011 Illinois language students at KTH.

• Use Mark Safstrom’s visiting lectureship to teach Swedish at KTH and a recently awarded grant from the Illinois Study Abroad Office as an opportunity to explore a short faculty-lead KTH-based study abroad program for Scandinavian Studies that dovetails with other exchange initiatives.

• Create an inventory of courses in English offered by the Division of History of Technology at KTH, including courses on “energy and geopolitics”, “media, culture, and technology”, and “environmental history.” In addition to providing easily transferable course credit for Illinois advanced undergraduate students in the humanities and sciences, such courses could offer an attractive option for satisfying general education requirements.

• Explore a collaborative multi-site educational initiative between Illinois and KTH in the area of architecture and urban planning, for example by leveraging existing study-abroad opportunities at Versailles for Illinois and KTH students. This could include students at either institution working on the same design problem and combining short-stay physical visits with regular web-based communication to discuss and develop design solutions.

• Explore arctic-themed collaborative grant opportunities between KTH and the newly launched Illinois Center for Transformative Climate Solutions.
Appendix

**Symposium Program**

The following schedule highlights the activities that took place at the Stage I Research Symposium. Video recordings of the Thursday morning sessions as well as access to the slide presentations are available through the inspire website: inspire.illinois.edu

Unless otherwise noted, all sessions took place at the Illini Union.

**Wednesday, December 8:**

- KTH delegation arrival, mid-afternoon
- Dinner, 6:30 pm, Beckman Institute, by invitation only. Hosted by the College of Engineering.

**Thursday, December 9:**

- Registration, 8:00 am – 8:30 am
- Opening remarks, 8:30 am – 9:00 am
  - Welcoming remarks, Wolfgang Schlör, Interim Associate Provost for International Affairs and Director of International Programs and Studies, University of Illinois at Urbana-Champaign
  - Welcoming remarks, Tina Murray, Head of International Relations, KTH
  - Official signing ceremony of mutual Memorandum of Understanding
- Overview on strategic research and educational initiatives, 9 am – 10.15 am
  - Melanie Loots, Associate Vice Chancellor for Research, University of Illinois at Urbana-Champaign
  - Debasish Dutta, Dean of the Graduate College, University of Illinois at Urbana-Champaign
  - Björn Birgisson, Vice President for Research Structure and Content, KTH
  - Tina Murray, Head of International Relations, KTH
  - Stephen Nussbaum, Director of Office of Student International Academic Affairs
- Coffee break, 10:15 am – 10:45 am
- Presentations of center and institute success stories, 10:45 am – 12:15 pm
  - University of Illinois at Urbana-Champaign
    - James Stubbins, Nuclear, Plasma, and Radiological Engineering
    - Kuan Chong Ting, Agricultural and Biological Engineering
    - John Abelson, Initiative on Energy and Sustainability Engineering
    - Narayana Aluru, Center of Advanced Materials for the Purification of Water with Systems
    - Huimin Zhao, Chemical and Biomolecular Engineering
    - Robert Wilhelmson, National Center for Supercomputing Applications
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- Scott Pickard, Information Trust Institute
- Jeffrey Roesler, Illinois Center for Transportation
- Nancy Abelmann, Office of the Vice Chancellor for Research, Social Science and Humanities

  KTH
  - Stefan Östlund, Energy
  - Björn Birgisson, KTH Research Structure
  - Leif Kari, Transport
  - Joakim Lundeberg, Medical and Biomedical Technology
  - Carl-Gustaf Jansson, Information and Communication Technology
  - Nina Wormbs, Humanities and Social Science
  - Jakob Kutenkeuler, Engineering Pedagogies

- Lunch, 12:15 pm – 1:30 pm, Illini Union, by invitation only
- Research exchange opportunities. Best practices, past and current exchange programs, models for collaboration. Open-ended break-out sessions, 1:30 pm – 3 pm
  - Energy
  - Materials
  - Medical and Biomedical Technology
  - Information and Communication Technology
  - Transport
  - Humanities and Social Sciences

- Coffee break, 3 pm – 3:30 pm
- Undergraduate and graduate education exchange opportunities. Models for collaboration, study abroad programs and joint degree programs. Open-ended break-out sessions, 3:30 pm – 5 pm
  - Energy
  - Materials
  - Medical and Biomedical Technology
  - Information and Communication Technology
  - Transport
  - Humanities and Social Sciences

- Graduate student poster session, 4:30 - 6 pm
- Dinner, 6:30 pm, Levis Faculty Center, by invitation only. Hosted by the College of Liberal Arts and Sciences.

Friday, December 10:

- Review of Thursday break-out sessions and discussion of priorities, 8 am – 9 am
- Strategic planning break-out session, 9 am – 10:30 am
  - Next steps
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- Action items
  - Concrete recommendations

- Coffee break, 10:30 am – 11 am

- Concluding discussion, 11 am – noon
  - What do we want to do?
  - Who is going to do it?
  - When is it going to happen?

- Closing remarks, noon – 12:15 pm
  - Anna Stenport and Harry Dankowicz, co-chairs, INSPIRE (Illinois Sweden Program for Research and Education Exchange)

- Lunch, 12:30 pm – 2 pm

- Tours of research facilities and visits with individual faculty, 2 pm – 5 pm
  - Beckman Institute
  - National Center for Supercomputing Applications
  - Materials Research Laboratory
  - Micro and Nanotechnology Laboratory

- Dinner, 6:00 pm, Timpone’s, by invitation only. Host: KTH

Symposium Participants
The following list contains names and affiliation for participants at the Stage I Research Symposium from Illinois and KTH.

From KTH:

1. Margaretha Andolf, andolf@kth.se
   Head of Unit for Language and Communication
   http://www.language.lib.kth.se/first_en.asp

2. Per Berglund, perbe@kth.se
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3. Björn Birgisson, bjornbir@kth.se
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