

BILATERAL RESEARCH COLLABORATION BETWEEN KIM
CHAEK UNIVERSITY OF TECHNOLOGY (DPRK) AND
SYRACUSE UNIVERSITY (US) IN THE AREA OF
INTEGRATED INFORMATION TECHNOLOGY

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Abstract

The paper provides an overview and progress report for the ongoing bilateral research collaboration between Kim Chaek University of Technology (KUT) and Syracuse University (SU) in the area of integrated information technology. The program involves researchable questions which can be investigated jointly between researchers at KUT and those at SU within the general theme of systems assurance (including digital libraries, machine translation, and decision support). Thus far the KUT research team has visited SU three times and the SU team has been to KUT once. The paper discusses the process by which the collaboration developed as well as some of the benefits and challenges which flow from university-university programs between the Democratic People's Republic of Korea (DPRK) and United States (US) institutions.

Overview

Syracuse University, with participation and counsel from The Korea Society (TKS), began discussions regarding possible research collaborations in the area of integrated information technology in late June 2001 with DPRK United Nations Mission representatives in New York. The following month DPRK Ambassador Li Hyong Chol and Counselor An Song Nam together with Ambassador Don Gregg and Fred Carriere of TKS visited SU to continue discussions and to see SU facilities.

Bilateral Research Collaboration

Ultimately, these meetings led to SU issuing an invitation in December 2002 to Kim Chaek University of Technology to send a delegation of four KUT researchers together with two representatives of the Flood Disaster Recovery Committee (FDRC) to visit Syracuse University (seven days) and New York City (three days) in March 2002. A primary purpose for this visit was to ascertain the degree of 'fit' between KUT and SU interests and, assuming a match, to begin identifying the specific areas of collaboration. The KUT delegation was led by KUT Vice Chancellor Jong Kwang Chong. During that visit SU and KUT scholars spent considerable time sharing research interests, visiting laboratory facilities, initiating discussions of desired joint labs to be located in Pyongyang and Syracuse, and, most importantly, beginning to build the interpersonal trust that all collaborations require. The achievements during that visit included enhanced resource commitments to collaboration by both sides.

At the invitation of KUT, SU sent a delegation to Pyongyang in mid-June 2002. During this time, SU researchers met again with their KUT counterparts and were given tours of research labs and facilities and provided an overview of KUT research priorities in information technology. Areas of particular interest included a secure fax program (this is now being marketed through a Japanese company), machine translation programs, digital copyright and watermarking programs, and graphics communication via personal digital assistants.

Bilateral Research Collaboration



Photo 1: Graphics Demo, KUT

Paralleling some of the field trips in the US, the sessions in Pyongyang provided interesting examples of the ways in which information technology is being developed in the DPRK. The Pyongyang Informatics Center (PIC) included among its foci the commercialization of software. The <<Children's Palace>>, a special school in Pyongyang, demonstrated the ways in which children are being educated in the use of IT. Indeed, while not the purpose of the KUT/SU collaboration, it became clear over the various visits that the participants shared an interest in how information technology and mathematics was taught in both the US and the DPRK.

Bilateral Research Collaboration



Photo 2: A Computer Classroom,
Pyongyang



Photo 3: Child Computing

Finally, the Pyongyang visit provided the opportunity to develop a formal structure for shared governance of the project. After considerable discussion,

Bilateral Research Collaboration

KUT and SU researchers jointly proposed establishment of a Joint Coordinating Group (JCG) comprised of representatives from the DPRK and the US. The preamble of the JCG read:

“Research delegations from Syracuse University (SU) and Kim Chaek University of Technology (KUT) have met in Syracuse, New York, USA (March 2002) and again in Pyongyang, Democratic Peoples’ Republic of Korea (June 2002). During these scholarly meetings, delegation members developed mutual friendship, trust, and respect. As a consequence, they have continuously deepened their research relationship.

It is agreed that a key outcome of this collaboration will require twin research laboratories to be set up at KUT and SU. These labs will provide the physical infrastructure needed to support the research collaborations.

It is acknowledged by both KUT and SU that these labs must be consistent with the laws of the DPRK and the US. Both SU and KUT will continue to keep their respective governments informed about the development of the collaboration so as to maximize the likelihood of acquiring the needed permissions and to provide a concrete evidential basis for eventual easing of constraints which limit what we can accomplish together.”

The document then went on to identify a concrete draft plan for furthering collaboration. The JCG document was ultimately signed by KUT Vice Chancellor Jong and SU Vice Chancellor Deborah A. Freund.

It is worth noting that the JCG document has played a critically important role in the early stages of our collaboration. First, the joint writing of the document forced the SU and KUT researchers to make specific their expectations. In several cases this process led to revisions of objectives and/or the development of important new goals. For example, even though the DPRK Mission in New York had been doing an excellent job of

Bilateral Research Collaboration

conveying communications between KUT and SU, the SU team initially was requesting direct communication between SU and KUT researchers. The rationale was that collaborative research works best when communications are direct and immediate. These efficiency concerns flew in the face of political realities. Once that was understood (and only after considerable discussion), SU representatives began to see that communicating through the Mission actually enhanced the possibilities for collaboration. This point was subtle and would probably not have been successfully conveyed in the absence of context provided by drafting of the JCG document.

Second, the JCG document has served as a concrete check-point and set of milestones against which we have been able to benchmark progress and maintain momentum. This latter point is critical in any collaboration-at-a-distance but is especially so in one where face-to-face meetings are infrequent and communication is complicated due to linguistic and cultural differences.

Finally, the establishment of the JCG provided a venue for participation by US and DPRK representatives who are not themselves information technology researchers. For example, the Vice Chancellors of both universities are members of the JCG. Their participation along with that of a representative from TKS and the FDRC helps to ensure that the researchers work appropriately within institutional constraints.

The JCG is co-chaired by the Project Directors from SU and KUT. The SU Project Director is Prof. Stuart J. Thorson, Director of Information

Bilateral Research Collaboration

Technology at SU's Maxwell School of Citizenship and Public Affairs. He leads a University team of researchers from SU colleges including the Maxwell School, the L.C. Smith College of Engineering and Computer Science, and the School of Information Studies as well as the Systems Assurance Institute, the English Language Institute, and the University Library. The KUT Project Director is Prof. Sin Thae Song, Director of the KUT Information (Computer) Center. Both Professors Sin and Thorson have been a part of all joint delegation meetings.

In December, 2002, KUT sent its delegation again to SU for a meeting of the JCG. The December meetings were scheduled to be very brief; only three days in Syracuse. Unfortunately, sand storms in China and a snow storm in the US conspired to delay the arrival of the KUT delegation by almost a full day. In spite of the exhausting travel schedule, the KUT researchers worked very diligently, and an outcome of the meetings was agreement that KUT would send a team of Research Scholars to SU for the month of April, 2003 to work with SU researchers on joint projects within the general theme of systems assurance (including digital libraries, machine translation, and decision support). These topics were an outgrowth of the Pyongyang meetings where KUT researchers demonstrated their IT and software development research programs. We also learned during the meetings that the Henry Luce Foundation had agreed to provide significant financial support for the KUT/SU collaboration.

Bilateral Research Collaboration

On April 8, 2003 a team of five KUT researchers together with one protocol officer/translator arrived in Syracuse for one month of intensive research collaboration with SU scholars. On the SU side thirty faculty, graduate students, and professional staff from SU participated in program activities. The KUT delegation was led by Prof. Sin who has participated in every joint KUT/SU meeting to date. All research meetings were conducted in English and focused on systems assurance issues including digital libraries; lab design and maintenance; decision support; and formal methods for proving correctness. The visit included field trips to New York City, Niagara Falls, and the SU area to see examples of integrated information technology in use.

Given the political relations between the DPRK and the US, delegates on both sides were pleased that the April visit happened at all. The US State Department provided the SU Project Director good information about the processing of the visas for the DPRK scholars. At the same time, the DPRK delegates showed admirable flexibility in dealing with the uncertainties that preceded the formal approval of visas. In many ways, the results here demonstrate the value of trusted communications. The SU team, primarily Thorson and SU Vice President Thomas D. Harblin, worked closely with TKS, the US State Department, and the DPRK Mission to make certain that information regarding the process was as transparently available as possible. On their parts, Ambassador Han and Counselor An (DPRK Mission) continued to play in a superb manner their absolutely critical role of intermediary between SU and KUT.

Bilateral Research Collaboration

Outcomes of the April sessions include a KUT computational lab design, presentations in English of research results by KUT and SU participants, and the outline of an academic paper to be written jointly by representatives of KUT, SU, the DPRK Mission, and TKS. The next joint research sessions are tentatively planned for October 2003 and will continue to refine the research emphasis already underway.

The KUT researchers worked very hard during the month they were in residence, and team members from both the US and the DPRK were quite pleased with the amount of work that had been accomplished. The burden on the KUT people was increased when they learned that the SARS outbreak in China would necessitate their spending ten days in quarantine in the DPRK before they would be able to be reunited with their families. Unfortunately, there was insufficient time to obtain the necessary visas to re-route their return trip via Moscow.

Research Focus

The collaboration's research focus is in the general area of systems assurance. To us this means the use of information technology to foster trusted communication. *Communication* here could involve anything from the design of machine to machine protocols to the development of procedures for design of a digital library in such a way as to ensure that access satisfies formally pre-specified constraints with regard to integrity, safety, and reliability.

Bilateral Research Collaboration

During the April visit, researchers spent about thirty per cent of their time learning to use a publicly available computer language tool, HOL (Higher Order Logic). The notion here is to specify conditions under which a set of communications can be termed 'trusted' and to then use HOL to prove, if possible, that a particular communications regime satisfies those conditions. SU Prof. Shiu Kai Chin led the HOL efforts.

The use of HOL was desirable for several reasons. First, it is consistent with the overall research emphasis on systems assurance. Second, HOL uses computer language concepts already familiar to DPRK and SU researchers. Third, HOL is publicly available and thus does not create special difficulties with regard to the export restrictions presently in place in the US against the DPRK.* The formal base of HOL makes it a useful tool for collaboration-at-a-distance. Assuming similar lab facilities at KUT and SU, researchers can monitor progress and move between the two institutions with minimal disruption to their ongoing research. The focus on HOL had the side-effect of exposing the view, shared among the SU and KUT researchers, of the centrality of formal methods to computer science. Finally, the present lack of Internet communications between SU and KUT means that the ability to communicate research progress in a compact formal manner is extremely valuable.

* In this context it should be noted that the entire April program was reviewed by attorneys for SU to ensure compliance with US law. The program was also reviewed by the DPRK Mission together with KUT researchers prior to the arrival of the KUT delegation.

Bilateral Research Collaboration

Another twenty per cent of the time was devoted to discussing issues relating to the digital library being developed at KUT. Issues of interest here included everything from hardware architectures to international standards for data sharing and cataloging. It is likely that digital libraries will continue to be a strong area of research collaboration.

A central objective of the research collaboration is development of twin research facilities at KUT and SU. This approach permits sharing of support issues and also, as indicated above, facilitates distance collaborations. About thirty percent of the time was devoted to very precise discussions of desired architectures, possible policies for maintaining and enhancing labs, and budget issues. An outcome of the month was a formal design for the labs, which has now been signed by representatives from both KUT and SU. The labs remain the most problematic component of the collaboration since under existing US regulations much of the desired equipment will require special licenses from the US Department of Commerce before it can be exported to the DPRK. For example, export of computers operating at or above six million theoretical operations per second (MTOPS) require a special license which is issued on a case-by-case basis. Here we are hoping that relations between the DPRK and the US will improve and thereby reduce the difficulties in obtaining the required export licenses.

Bilateral Research Collaboration



Photo 4: Lab Design Session at SU

Finally, the KUT researchers spent about twenty per cent of their time enhancing their technical English writing and speaking skills at the SU English Language Institute (ELI). The reviews of this process were uniformly positive. The excellent instruction provided by ELI staff together with the hard work of the KUT delegates permitted all research sessions to be conducted in English with only a very limited need for translation.

Project Funding

In order to meet projected costs of hosting visits of KUT Scholars and delegations at SU and reciprocal visits to KUT, it was necessary to invite a variety of private sources to provide assistance. The goal has been to secure support for at least the direct costs in early phases and eventually to cover the considerable on-going subsidy provided by Syracuse University.

Bilateral Research Collaboration

The Korea Society played an active role in identifying potentially interested private sources, such as the Henry Luce Foundation and another private major Foundation, facilitating introductions, and endorsing SU's request for support. The Society itself provided financial assistance at key times that enabled the University to plan with confidence and meet commitments.

Throughout the funding development process, representatives of the DPRK UN Mission have played a significant role in several ways. They commented favorably to funders on the successful experience of KUT Scholars and delegates in their visits to Syracuse, and they expressed their confidence in the University's management of the collaboration. Most notably, they have provided timely continuity in communications between Syracuse and Kim Chaek University and have been thoroughly reliable in delivering on commitments.

From the beginning, SU's goal was to arrange a variety of funding sources, including private individuals who support Syracuse or wish to encourage engagement of the DPRK. They recognized the historic and unique opportunity represented by this bilateral research collaboration. Major private foundations such as Henry Luce Foundation, Ford Foundation, and another which supports initiatives with Asian participants, played important roles not only in providing needed funding, but in providing external validation that a US university collaboration with a DPRK University was a timely and welcome relationship in the global community of scholars.

Bilateral Research Collaboration

Several factors enabled the funders' risk taking. Among these was the support of Syracuse University's leadership, especially its Chancellor, Kenneth A. Shaw, who hosted several DPRK Mission Ambassadors during exploratory visits to campus and provided warm and welcoming occasions that signaled the University's respect and appreciation for KUT's interest in collaborating with Syracuse. Several University Trustees provided private financial support at the outset and have recognized the complexity and challenges of the undertaking. The University's Vice Chancellor and Provost endorsed and participated in meetings, ceremonial occasions, and discussions on U.S. academic structure, process, and operation. Key Deans of participating schools also contributed their support for the collaboration and participated in visit events. And, a variety of faculty and staff at both KUT and SU have made the actual visits workable, enjoyable, and productive.

In important respects, the U.S. Department of State and other reviewing agencies were significant facilitators by the way they managed the visa review and granting process. Their consistent and reliable work, while not intended as explicit endorsement of the collaboration during a challenging geopolitical time, served nonetheless as "tacit approval" and enabled both sides to be reliable in meeting their commitments. The same can be said for government officials in Pyongyang, who even at a distance, have played a seminal role in what could transpire between the two Universities.

Bilateral Research Collaboration

Funding the collaboration is an on-going challenge, but each successful KUT-SU contact reinforces the hope and trust that funders have invested to date. Many potential funders have listened and welcomed information on the collaboration, but for a variety of known and unknown reasons have not yet chosen to commit support. The bilateral initiative challenges the definitions and assumptions of many established program categories of foundations. It is perceived as being a significant uncontrollable risk by major corporations, even those doing business in the region, who have the US Government as a customer. And, there are funders who simply have difficulty believing that what has occurred is even possible, let alone desirable. Fortunately, enough have believed and enough have taken risks to enable a most meaningful and hopefully sustainable and expandable collaboration to achieve significant outcomes and hold the promise of results as yet undreamed. The authors of this paper are extremely grateful to those whose courage and convictions have enabled what we report here.

Some Lessons Learned

While the collaboration is still in its fairly early days, it is possible to identify some lessons learned to date. Though these must be understood as being quite tentative, it is our hope that some of them might be of general use. And, of course, while it is doubtful that any of these 'lessons' is unique to a DPRK/US academic relationship, for the reasons discussed above in the

present political climate they may be particularly relevant to the DPRK/US situation.

- **Institutional commitment:** The willingness of KUT Vice Chancellor Jong, SU Chancellor Kenneth Shaw, TKS President and Chairman Don Gregg, and DPRK Ambassador Han Song Ryol to visibly commit key resources of their organizations to the collaboration helped greatly to provide a 'safe' environment in which the scholarly work could move forward.
- **Face-to-face is critical:** The early 'in person' discussions between SU, TKS, and DPRK Mission people provided a context in which priorities and constraints could be discussed in an increasingly open manner.
- **Trusted communications:** Over time, moving as slowly as necessary enabled the two teams to increasingly trust the communications between them. This meant that we were able both to negotiate difficult issues with generally good humor (e.g., the JCG document) and to ask clarifying questions as issues arose rather than waiting until questions became problems. The DPRK Mission in particular has worked tirelessly to keep communications open and on task.
- **Benefits flow:** All participants have been pleased to see how, in the context of trusted communications, unanticipated benefits flow to all parties. In a sense this is what distinguishes collaboration from a *quid pro quo* agreement.
- **Maintain focus:** It has often been tempting to let our collaboration spill over into other substantive domains. While yielding to such temptation might at some time prove worthwhile, to date our experience has been that keeping our attention centered on the bilateral academic research relationship has enabled us to remain largely unentangled in, though not unaffected by, the political relations between the DPRK and the US. In turn this has helped to provide a fairly safe context within which to engage cooperatively.
- **Informal communications are very important:** Often the unplanned discussions are as significant as the formal planned ones. Meals have provided a congenial and productive environment for such conversations. At Syracuse, a local Korean restaurant provided a private room for use during the times KUT researchers were in Syracuse. This turned out to be a very successful venue for informal meals and impromptu conversation.



Photo 5: Dinner

- **Put it in writing:** Even with the best of intentions and good will it is possible for misunderstandings to arise. Sometimes these misunderstandings take a long time to become manifest. Slogging through the development of jointly acceptable written documents is almost always helpful. Here too the presence of people on both the DPRK and the US sides with good language and cultural skills (Pak Song Il and Fred Carriere in particular) has been very important to the development of these documents.
- **Accept that travel is exhausting, especially in the winter:** The SU side made the mistake of scheduling a very brief (three day) JCG meeting in Syracuse. This was an undue burden on the KUT delegates who had to spend a disproportionate amount of time traveling (including time in Beijing awaiting the issuance of visas).
- **Be in it for the long haul and be prepared for bumps:** It soon became apparent to both the SU and the KUT researchers that if this relationship were going to work we all had to be committed to the long haul. This is especially true with regard to the building of the twin labs. Of course, a long time view requires that it be absolutely clear that all parties are completely sincere about the purpose and objectives of the relationship.
- **Share information appropriately:** The DPRK and the US have different philosophies and practices regarding the sharing of information. It has proven to be important to simultaneously respect those differences and, at the same time, be honest brokers of information. Again here the DPRK Mission and TKS have been models of such behavior with regard to this project.
- **Don't over commit:** A sense of trust often flows from a history of reliable interactions. In this regard meeting deadlines, clearly

Bilateral Research Collaboration

identifying risk factors, and establishing clear project milestones have all helped keep the collaboration moving forward. The admonition to not over commit may be especially appropriate to US participants whose enthusiasm and 'will-do' attitude may fly in the face of funding and cultural realities. All that said, it has been important that both KUT and SU team leaders have been persistent in pursuing mutually agreed upon program objectives. The relationship is a complicated one and things which may initially have seemed unlikely (such as the April month-long visit to Syracuse) can sometimes be accomplished through determined and informed interactions with appropriate authorities.

- **Consistency of participation matters:** The collaboration has benefited greatly from the willingness of KUT and SU to permit the continuous participation of key people.
- **Importance of shared governance:** In sustained collaborations questions of priorities, future directions, and resource development are bound to arise. It is therefore very useful to have a shared governance structure in place to systematically, legitimately, and proactively deal with those issues. An example of such an issue arose in the April JCG meeting and involved the question of whether future collaboration should emphasize increasing the number of people involved or should, as possible, try to retain the same core set of participants. The ensuing discussion was quite informative and much was learned about KUT and SU priorities.

Of course these 'lessons' or 'heuristics' are individually less significant than is their overall effect. The goal is to generate and maintain an environment of trusted communication supportive of open and empathetic communications. In this regard the SU team was fortunate to have a member who grew up in Korea (the ROK) but has spent much of his adult life in the US. He was able to play the role of helping us to see potential problems before they became too serious and, on the other hand, also clarifying communications which were culturally, if not linguistically, ambiguous.

Conclusion

To date the SU and KUT teams have developed considerable trust and have, as a consequence, made extensive progress in defining a shared research agenda that is consistent with the laws of the DPRK and the US. However, the collaboration is now at a stage where the establishment of the twin laboratories at KUT and SU is of paramount importance if that agenda is to be carried out by scholars working together albeit often at a distance.

Beyond working toward establishment of the labs, immediate next steps include planning for joint research sessions to be held, hopefully, in fall 2003; translating and sharing relevant course outlines and syllabi; and writing of joint technical reports. In addition there will be a JCG meeting held along with the research sessions to evaluate progress and refine guidelines for future exchanges.

Of course, as discussed earlier, the actual equipping of the KUT lab will require special licenses. Approval of these licenses, in turn, may well depend upon 'high political' relations between the DPRK and the US. Indeed, these relations can ultimately constrain everything from granting of visas and accepting of invitations to our ability to identify needed funding. That said, however, this project already serves as an 'existence proof' of the possibility of serious, sustained, and mutually beneficial collaborations between an institution in the DPRK and one in the US.

Bilateral Research Collaboration



Photo 6: KUT and SU Researchers