High-Level Review of the Directions and Plans Relating to the Peter Kiewit Institute (PKI)

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Submitted to:

J. B. Milliken, President
The University of Nebraska

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EXECUTIVE SUMMARY

This high-level study, focused on the Peter Kiewit Institute (PKI), was conducted in May 2013 at the request of President James B. Milliken who made the following statement to us as a charge for our study:

> ***"The key question is whether we're on the right track for success of PKI, based both on the Washington Advisory Group* [WAG] *report*[1] *from 2008 and what we know about the world today. This would take into account changes in the PKI charter following the WAG report, the plans put in place by Mike McGinnis* [Executive Director of PKI], *and the two deans' strategic plans for growth over the next 5 years and any other plans/developments (our new UARC, for example)."***

We focused our review on the academic programs located at PKI[2], specifically, the College of IS&T and the Omaha programs of the College of Engineering, as well as the governance and administrative structures that guide and support them. The overall objective of these programs as related to us by President Milliken is:

> *"To provide the education, research and outreach to business that a leading 21st century public research university is expected to provide."*

The PKI Charter as revised in 2008, attached as Appendix 1, lists five purposes for PKI, which, in our opinion, make specific the role of PKI as one of enabling and advancing this fundamental objective of the University of Nebraska.

We address as a related issue the question of a second engineering school within the University of Nebraska, suggested to be located in Omaha, since it was raised by many of the people with whom we talked. At a meeting with several key Omaha business leaders, we were asked to address the response to the 2007 Report of the Washington Advisory Group (WAG) and progress made since that report; we provide our high-level assessment of this issue below.

We list without comment our primary observations in this Summary. The remainder of this report will provide examples, commentary, and rationale for our observations and recommendations.

We were able to speak with the relevant leadership relevant to PKI (the Academic Affairs Committee and Chairman of the Board of Regents, NU President, Chancellors and Senior Vice Chancellors of UNL and UNO, both deans with direct stakes in PKI, the Executive Director of PKI, and a selection of senior business leaders). At the same time, we did not meet with department chairs, faculty, and staff whose activities will eventually determine success.

While we spoke with a number of people, the conclusions and the recommendations made herein are solely ours.

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[1] Attached as Appendix 2.

[2] Outreach is also an important part of the PKI mission, but we were not asked to review that aspect.

Primary Observations

1. Although significant progress in student enrollments was made during the early years, the history of PKI prior to 2008 is problematic. This history has depleted PKI's resources and created distrust and disappointment among some stakeholders. No one with whom we spoke believes PKI is meeting expectations or its potential, but most still believe in the vision and that it can be achieved if the proper actions are taken.
2. There are governance, structural, and operational issues that are impeding the current forward motion of PKI, including the reporting structure of PKI.
3. PKI has made modest progress relative to the 2007 WAG Report recommendations.
4. We found a lack of clarity concerning articulated metrics by which PKI progress and success could be evaluated.
5. The College of IS&T is making reasonable improvement as a young unit and has objectives for continued incremental growth and improvement; since this was a high-level review of directions, we did not review any strategic or operational plans for achieving IS&T's objectives.
6. PKI has served as an anchor and catalyst for significant growth in student enrollment during its early phase (1998-2002) and in funded research from 2006 - 2012. The UNO Administration, in particular, views PKI as a very important element of its physical and programmatic growth and improvement.
7. The College of Engineering, with full support of the UNL Administration, has aggressive, aspirational objectives that the UNO Administration welcomes. These objectives include significant expansion of their presence in Omaha. As with IS&T, we did not review any strategic or operational plans for achieving Engineering's objectives.
8. The UNL Administration's view of PKI at present appears to be that it is a physical facility they can use for their Omaha programs, a viewpoint at least partially subscribed to by the Dean of IS&T. At the same time, we observe that the vision for PKI is still one that can be used to further leverage UNL's plans for increased presence in Omaha, further expansion of UNO's growth, and collaborative activities of all kinds between the academic units in PKI.

Overall, we observe that all things point to a high, but unrealized, potential for PKI to help take the UNL engineering Omaha programs and the UNO IS&T programs to the sought after "next level" of excellence.

Second Engineering School

We were made aware of interest on the part of some in developing a second engineering school in Omaha. Evaluating this idea was not our primary charge, but we did review a recent report prepared by the Computer and Electronic Engineering (CEEN) Industry Advisory Board, "Business Case for College of Engineering, University of Nebraska Omaha" and discussed the issue with many, if not all, of the individuals or groups with

whom we met. We know that creating an engineering school is a lengthy and expensive process, and discuss this below. Further, we learned of no compelling local arguments that would counter the reality of such an undertaking. We conclude that it would be in the best interest of Nebraska to invest in, and even enhance, the planned investments in the UNL College of Engineering that will expand its presence in Omaha rather than considering the creation of a second engineering school.

After briefly assessing progress relative to the 2007 WAG Report, the remainder of this Report elaborates our observations on the current status and plans related to PKI and recommends actions to be taken to insure stronger future growth to fulfill more fully the appropriate expectations of stakeholders.

INTRODUCTION

In early May, President Milliken asked us to conduct a high-level review of the status of PKI and of plans focused on it, to be completed by the end of May. On May 15 and 16 we interviewed a number of stakeholders in PKI, as listed in Appendix 2, as well as numerous follow-up communications to obtain further information. In addition, we have had multiple communications with President Milliken throughout the study and, for coherency and accuracy, reviewed a draft of this Report with him before finalization. We were also provided with several documents as listed in Appendix 4 that we reviewed.

It should be noted that one of us (Freeman) was a co-author of the 2007 WAG report and was also one of several experts consulted in 1995 prior to the creation of PKI. Biographical information of the authors of the present review is contained in Appendix 5.

It is important to understand that PKI is *not* an academic unit of the University of Nebraska (i.e., it does not have formal academic standing, faculty, students, or conduct research). It does, however, have a small research staff that it hopes to expand – an expansion that should only be contemplated in support of academic researchers. It is a facility owned by the University of Nebraska and houses the College of Information Science and Technology (IS&T) of UNO, several units of the College of Engineering of UNL, and several service and research operations. It also conducts a number of outreach programs.

The administrative structure of PKI is headed by a talented and energetic Executive Director whose duties and responsibilities include: student support (scholarships, internships, career advising, placement), industry relations and support, media relations and advocacy, facility operations, and the allocation of small research grants.

The governance framework of PKI includes:

- University governance by the Board of Regents and the President of the University;
- Board of Policy Advisors (BOPA) comprised of business leaders. Its chair is Walter Scott, a longtime and strong supporter of NU and PKI;
- A Coordinating Council comprised of senior academic officers and deans from UNO and UNL. It is our understanding that the Council is not currently active.

These organizational arrangements and other aspects are spelled out in the PKI Charter; we encourage the reader to reread the Charter for background. We also stress the complex nature of the relationship between PKI and the academic units it houses, especially the fact that PKI's success is dependent on successful education and research programs that are the responsibility of the academic units engaged in PKI (IS&T and selected Engineering programs). This clearly gives rise to some of the issues observed.

PROGRESS RELATIVE TO 2007 REPORT[3]

We quote from the 2007 Report (*italics added here*) and provide our review (***in script***):

Thus, we recommend that PKI:

- *Bring greater strength and clarity to a small number of focus areas of relevant expertise;*

The IS&T presentation (4/2013) indicates a focus on five sensible areas and in our interview, the Dean of IS&T elaborated on these. Specifically, he noted that three of them fit particularly well with the overall mission of IS&T to emphasize interdisciplinary work. He also mentioned on-going collaborations with UNMC, STRATCOM, and several Omaha industries.

The Dean of Engineering is new and is just starting to refocus his College; in our interview, he listed a number of compelling reasons to be in Omaha and opportunities for interdisciplinary work, including UNMC, STRATCOM, manufacturing, civil infrastructure and food processing.

The PKI plan (8/2011) indicates a good research focus on five relevant areas.

Viewed without reference to the foci of IS&T and Engineering, the PKI focus is good on a stand-alone basis.

- *Develop better synergy between the component units of PKI;*

There may be some increased communication between faculty in IS&T and Engineering, but we were not presented with any evidence of true synergy. For example, it was not evident that the research thrusts noted above of IS&T, Engineering, and PKI have been coordinated in any substantial way.

- *Expand resources and programmatic activities significantly, including the recruitment of star quality faculty who can make dramatic enhancement in the research competitiveness and academic quality of the PKI component units;*

IS&T has hired some reputedly good faculty, but no "stars" in the usual usage of that term. Their research competitiveness and quality have apparently improved as reflected in the new awards data, but not dramatically.

We do not have available hiring data for Engineering. Their research awards have also increased comparably, but not dramatically.

It is our impression that fiscal resources available to PKI have not expanded. We are unable to compare directly to the status in 2007.

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[3] As noted above, the data (two presentations, one strategic plan, our limited observations on-site) and time available to us did not permit a deep evaluation of the progress. It is also *very* important to remember that our requested focus in this study was not on progress to date, but on plans for the future.

- *Expand the number of PKI graduates in the information and computer science-related disciplines and study if more construction engineering graduates are needed;*

IS&T enrollment in recent years appears to be tracking national trends. We do not have data specific to construction engineering.[4]

- *Consider the potential for building two separate but interrelated clusters of strength and innovation located on the UNO South Campus, one in information technology and one in construction to serve both the traditional construction/design/systems integration companies located in greater Omaha and the newer emerging needs for advanced applications of information technology;*

There appears to be a developing "super-cluster" of clusters in information technology, primarily in IS&T. We are unaware of details, but the creation of the Durham School probably also represents such a super-cluster. We were not made aware of any specific interactions between them.

- *Consider developing stronger linkages between PKI and both the University's Medical Center and the UNL College of Agriculture to create a strong cluster in bio-informatics and medical informatics.*

There are now some modest linkages between UNMC and IS&T, but we are aware of none with the College of Agriculture.

- *Work to develop even stronger and deeper ties to organizations that are important economic drivers to the region, including STRATCOM, related defense contractors, Union Pacific, Peter Kiewit Construction and HDR.*

We have no data on this, although the IS&T Dean indicated these were important opportunities. The Engineering Dean indicated current outreach efforts involving several of these and other organizations in Omaha.

To achieve this, we recommend that the University of Nebraska:

- *Take positive steps to help all campuses understand that cooperation via PKI can be a win-win-win situation and develop organizational and policy structures that facilitate and reward collaboration.*

We did not observe any lasting efforts to do this.

- *Augment the PKI organizational structure with the appointment of an Executive Director who would be a strong, scientific and technology leader, with superb research credentials and an impressive track record. This position would supplement the already strong leadership in operations, student support, advocacy, and industry recruitment.*

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[4] Based on data provided to us, from 1998 – 2002 there was a sharp increase in undergraduate enrollment overall at PKI, with the combined total number of undergraduate Engineering and IS&T students almost doubling (approximately 950 to almost 1800). These increases in enrollments contributed to commensurate increases in degrees granted through 2006, from approximately 60 Engineering degrees and no IS&T degrees awarded in 1998 to approximately 270 combined Engineering and IS&T degrees in 2006. One can infer that PKI was a major factor in this growth.

Substantial progress has been made in the appointment of the current Executive Director, but it is too early to evaluate the results completely.

- *Expand the Board of Policy Advisors to include individuals with national and global perspectives;*

There appear to have been some changes in the Board of Policy Advisors, but none that would appear to fulfill this recommendation with the meaning intended in the WAG Report – namely, adding individuals with experience in similar institutes or activities, especially at the national or global level.

- *Reform the functioning of the Coordinating Council by providing permanent leadership and by clarifying the scope of their responsibilities;*

The Coordinating Council has been inactive for close to a year.

- *Secure additional resources from both the State and the private sector to implement and empower the strategies to bring PKI to the next level of success.*

The new Executive Director has raised private money for needed building renovations, but from a small number of sources and those funds are not for operations.

Overall, we characterize this as modest progress.

OBSERVATIONS and RECOMMENDATIONS

We next explain, support, and expand as needed on the observations listed in the Executive Summary and provide a recommendation for each:

1. *Although significant progress in student enrollments was made during the early years, the history of PKI prior to 2008 is problematic. This history has depleted PKI's resources and created distrust and disappointment. No one with whom we spoke believes PKI is meeting expectations or its potential, but most still believe in the vision and that it can be achieved if the proper actions are taken.*

As a framework for our observations, it is useful to consider the period of 1996-2008 as the startup **Phase 1** of PKI. Some of the positive legacy of Phase 1 includes creation of PKI, building of the physical facilities – which now serve as an anchor for a very important expansion of the UNO campus, initiation of the Scott Scholars program, movement of UNO and UNL academic units into the facilities, establishment of important linkages to Omaha industry, aggressive student recruitment programs, and sharpened focus on education important to Omaha's and Nebraska's economic future.

Phase 1 provided a base for a regrouping **Phase 2** (2009-2013) in which efforts led by Mike McGinnis, the Executive Director hired in early 2009, appear to have been focused on building on the positive legacy of Phase 1, expanding in the areas of research and collaboration, and addressing some of the operational issues that were not working well when he arrived. Two aspects of the legacy of Phase 1 have revealed overall issues that have hampered these regrouping efforts, based on what we have learned in this study.

Perhaps the most important negative legacy is distrust and disappointment among the faculty toward the goals of PKI, making future cooperation and collaboration problematic. One way of looking at this is that the different faculty groups have apparently retreated from a broader, PKI-centered, point of view to one of working with and trusting only the members and leaders of their respective groups. We won't try to analyze or substantiate this here, but note that several people mentioned this and it is a very common reaction to external situations that threaten or disappoint the individuals in a cohesive group (such as an academic unit).

A second legacy we were told about and that has apparently taken some time to fully understand is that the depletion of the initial financial largess of the stakeholders has left very few fiscal resources with which to address needed actions to build a stronger research activity, increase collaboration among the various units in PKI, and seed expanded external relations. This is overlaid with a variety of organizational and governance issues that must now be addressed.

History cannot be rewritten, but it can be acknowledged and dealt with:

> **Recommendation 1**: Develop an effective "reset program" to renew the considerable potential of PKI. Such a "reset" should refresh the expectations of stakeholders, replenish the depleted resources, and communicate accurately the objectives of PKI and its resident academic units to all stakeholders, including the public.

This will permit PKI in **Phase 3** to move forward to achieve more robust accomplishments aligned with the original visions of the founders and current stakeholders.

The PKI Executive Director should continue his efforts to build an internal community at PKI, identify and develop external funding and support opportunities, publicize PKI and its constituent academic programs, and aggressively take the lead in developing more collaboration among multiple individuals, groups, and academic units. He should increase his efforts to support the research programs of the academic units and their faculty.

We believe it is imperative to do this, as well as most of the other recommendations below, without delay. This can and should be accomplished by the end of 2013, although budgetary issues could delay full transition to Phase 3 until July 1, 2014. At the same time, many changes, including reporting and organizational structures, can be effected now. Universities normally don't move this quickly, but in this case the stakeholders are appropriately weary of waiting to see PKI fly on its own in the context of being an integral part of NU. Further delay could be highly detrimental.

2. *There are governance, structural, and operational issues that are impeding the current forward motion of PKI, including the reporting structure of PKI.*

We believe that the current governance arrangements for PKI create a large part of the dysfunctionality that remains from Phase 1. The President of the University clearly supports, believes in, and demonstratively wants PKI to succeed. Because the Executive

Director reports directly to the President, some view him as having the rank of Chancellor even though he does not. The opinion of everyone with whom we discussed the issue was that the governance of PKI is not working to anyone's satisfaction.

UNO appears to be dealing with this relatively well, as does the Executive Director, by including him in the working cabinet of the UNO Chancellor. We believe that this and the clear buy-in of the UNO leadership has enabled IS&T to prosper relatively well.

There are no similar arrangements or focus by the UNL leadership that we could see. The full and enthusiastic participation of UNL is essential to make PKI a success. At the same time, this change in their attitude should be seen as enabling a greater leverage by PKI in Engineering's Omaha programs.

We believe that the Board of Policy Advisors understands that their role is one of policy stewardship of the generous donations of fiscal resources that have been made and of advising on overall strategic policy. They are not and should not be advisors on operational issues and directions; that is the responsibility of the PKI Executive Director in coordination with the Dean of IS&T and the Dean of Engineering and the NU Administration and its designated representatives. The current governance structure – formal and implied – may be impeding that.

The most important structural issue that is obvious from a simple organizational chart of NU is that a single institute should not be reporting directly to any busy senior executive on a day-to-day basis. Essentially everyone with whom we spoke, including the President, sees this in one way or another as suboptimal. Several people have ideas on a potential restructuring of PKI. At a minimum, any rearrangement should insure that the leadership of both UNO and UNL, especially at the operational level, as well as the Executive Director of PKI have a stake in the success of, and responsibility for, PKI as an entity.

Over and above the depletion of the fiscal "endowment" of PKI and the loss of trust by many of those who ultimately must do the work that will bring about success, we became aware of two operational issues that have impeded progress in Phase 2 up to now: lack of returned overhead to PKI (there was some indication that this has very recently been modified) and lack of access to University fund raising staff. Based on our experience elsewhere, there may well be other operational issues that need correcting.

> **Recommendation 2**: Initiate a review of and, where needed, improvement of the current PKI organizational situation (governance, operational policies, structural issues, available functional resources, fiscal resources, and other factors).

Clearly, implementation of this and Recommendation 1 must go hand in hand.

3. *PKI has made modest progress relative to the 2007 WAG Report recommendations.*

The line-by-line comparison in the previous section provides our analysis.

Recommendation 3: To the extent that the 2007 recommendations are still relevant and not covered in this report, they should be added as additional action items.

4. *We found a lack of clarity concerning articulated metrics by which PKI progress and success could be evaluated.*

This was evident in our discussions with all individuals and groups. Progress and success of PKI seems to mean something different to almost everyone. While this is a common situation in many organizations, the best way to address this is to have clearly articulated and communicated metrics and objectives for PKI, including ones that cannot be measured numerically.

Recommendation 4: Develop a coherent vision and mission for PKI to which all relevant parties agree.

A set of metrics, ranging from the number of graduates produced each year to reputational measures of "peer standing," can then be developed which will permit systematic evaluation of the plans of the academic units in PKI and those of the Executive Director. Only then can true progress be measured at the operational level.

This sounds simple, but at present after seventeen years, it does not exist as far as we can tell. It cannot be imposed top-down without the engagement of those who will have to make it happen – the Deans, Department Chairs, and Faculty.

5. *The College of IS&T is making reasonable improvement as a young unit and has objectives for continued incremental growth and improvement; since this was a high-level review of directions, we did not review any strategic or operational plans for achieving IS&T's objectives.*

The Dean of IS&T expressed a desire for more robust growth than is currently planned in order to take advantage of the educational, research, and collaborative opportunities of which he and his faculty are aware. In short, there appears to be an opportunity for more significant growth of this important component of PKI.

Any organizational unit that has goals aimed at growth, improvement in quality, outreach, or other measurable goals needs a strategic plan – not just target numbers – for achieving their goals. The strategies in the plan can then guide operational plans and decisions. This is common in industry, but not followed often enough in academe, although it should be.

Recommendation 5: IS&T should obtain external reviews of its objectives, and market data and expectations for demand for graduates, and then consider more aggressive modifications of plans if warranted. It should then develop a small set of strategies to achieve them over a reasonable planning period (typically five to ten years), along with an annual operational plan that uses the strategies in planning annual activities, paying particular attention to how the college can leverage on PKI.

This is not an impossible task, but it takes leadership and the willingness to seek broad inputs and reviews, as well as the understanding that the strategies need to be revisited frequently to weed out those that are no longer effective or relevant.

6. *PKI has served as an anchor and catalyst for significant growth in student enrollment during its early phase (1998-2002) and in funded research from 2006 - 2012. The UNO Administration, in particular, views PKI as a very important element of its physical and programmatic growth and improvement.*

The numbers speak for themselves. While we did not analyze the complete funding and enrollment picture of UNO, IS&T was identified as one of the top colleges at UNO and as one that is well-received for at least partially filling the needs of the Omaha business community for professionals in the computing area. The physical aspects of PKI are quite obvious not only visually, but in the context of the growth plans for UNO and the fact that other organizations are moving significant facilities adjacent to PKI.

Recommendation 6: UNO should continue to utilize the potential of PKI to expand its campus and orient its programs to the future needs of Omaha and Nebraska, and consider enhanced support and expansion of IS&T.

7. *The College of Engineering, with full support of the UNL Administration, has aggressive, aspirational objectives that the UNO Administration welcomes. These objectives include significant expansion of their presence in Omaha. As with IS&T, we did not review any strategic or operational plans for achieving Engineering's objectives.*

The goals and initial plans presented to us would normally be difficult to attain both because of the availability of resources and the difficulty of adding a large number of faculty in a short period of time. However, the Senior Vice Chancellor of UNL assured us that the faculty positions are available and the operational issues are surmountable with good leadership, hard work, and resources including available space (in which PKI could play an important role).

The Omaha-focused parts of the plan appear to be appropriate, but in the absence of demand data and more specific plans, we cannot completely judge the extent to which they will address any deficiencies perceived by some. As with IS&T, a more coherent set of strategies and operational plans are called for.

At the same time, in our conversation with the Dean of Engineering he gave the distinct impression that he views PKI as a provider of space but is not currently an entity that could leverage his planned allocation of Engineering resources to Omaha-based programs. The Dean of IS&T in a later interview, echoed this sentiment about PKI, at least as far as research activity is concerned.

- **Recommendation 7:** The College of Engineering should obtain external reviews of its objectives, market data, and expectations for demand for graduates, and then consider modifications to enhance the focus on Omaha, if warranted, paying

attention to opportunities afforded by PKI. It should develop a small set of strategies to achieve its goals over a reasonable planning period (typically five to ten years), along with an annual operational plan that uses these strategies in planning annual activities.

8. *The UNL Administration's view of PKI at present appears to be that it is a physical facility they can use for their Omaha programs, a viewpoint at least partially subscribed to by the Dean of IS&T. At the same time, we observe that the vision for PKI is still one that can be used to further leverage UNL's plans for increased presence in Omaha, further expansion of UNO's growth, and collaborative activities of all kinds between the academic units in PKI.*

Our observations indicate that there are a variety of reasons for this state of affairs, several of which we have identified in this report. There is no silver bullet and no guilty party. As we have noted, PKI is a complex organization within a complex organization. It was created to encourage and support new and bold things, a laudable objective in its own right.

The creation of PKI has already had a tremendously positive impact on UNO, the growth of IS&T and Engineering enrollments in Omaha, and the provision of the type of workforce education that Omaha desires and deserves.

> **Recommendation 8:** After the reviews of IS&T and Engineering recommended above are completed, PKI should take positive steps to unlock its potential to support and enhance the plans of IS&T and Engineering.

We do not believe further reviews of the directions of PKI are needed at this time in order to achieve the vision of an institute effectively providing 21st Century, collaborative, workforce education and relevant research in Omaha. The issue is one of fully engaging the participatory, academic cultures of IS&T and Engineering while at the same time articulating and accommodating a somewhat different, but appropriate, culture of PKI as a supporting organization.

THE QUESTION OF A SECOND ENGINEERING SCHOOL

Although our focus was on PKI and the plans of the academic units there, we heard a good many comments about the perceived need, among some, for a second engineering school that would be located in Omaha. We heard or read no compelling arguments for building a second engineering school, especially given the charter and investments already made in PKI and the Engineering programs of the University of Nebraska. The resources of time, attention, and money needed to create an engineering school are very substantial and most likely not feasible for the state under current or foreseeable conditions.

Creating a new engineering school includes the following major factors:

- Facilities – new, expensive buildings containing state-of-the art laboratories and classrooms must be built. From initial specification to first usage can easily take four to five years.
- Leadership – new administrators, especially a dean, must be hired. Attracting the right people to lead such an effort is a multi-year and expensive activity that will require extensive attention of the existing NU and UNO leadership.
- Faculty – many new faculty must be hired, relocated, and given time to establish themselves in a new environment. The time to do this is variable but probably is a minimum of five years just to reach full staffing.
- Programmatic development time – many new schools of various sorts have been created in the past fifty years in this country, and we are unaware of any of any stature and quality that have achieved a reasonable operational level in less than ten years.
- Accreditation – accreditation of engineering degrees by ABET is extremely important for an engineering program, and this process requires experienced faculty, significant investment (e.g., educational laboratories, library holdings, computing facilities), and commitment by the upper administration to provide long term support.
- Cost – creating an engineering school of good quality can approach the cost of creating a medical school. We won't attempt an estimate, but it is in the hundreds of millions (or more) of capital and startup cost, plus many millions in annual operating expenses.

Nebraska continues to be one of the most solid economic and population centers in the Midwest. It deserves a top engineering school to serve and promote the economic and personal objectives of its citizens. Diluting the resources needed to expand and improve an existing, long-established engineering school that is striving to serve the entire state or order to create a second school flies in the face of common sense and good investment policy. The argument that we heard most often was that Omaha as a major metropolitan area needs its own engineering school. This appears to ignore the fact that in a number of major metropolitan areas the nearest major engineering school is farther for many residents than the separation between Omaha and Lincoln (e.g. Los Angeles, Chicago, Washington, Atlanta, etc.), and when travel time is the measure (given the congestion in larger cities), many, if not most, people in cities must travel longer to reach a strong engineering school than it takes to drive between Omaha and Lincoln. We note that the Durham School and the Civil Engineering Department appear to operate successfully as single units located both in Omaha and in Lincoln.

Based on our experience and on the circumstances in Nebraska, we believe that enhancing the existing College of Engineering both by investments in Lincoln and, particularly, by expansion in Omaha using the enabling role of PKI, is the best path forward for Nebraska and Omaha.

CONCLUSION

A number of very positive things have happened because of the existence of PKI. This needs to be recognized and applauded by all. Nonetheless, high-level issues, problems, and challenges with PKI persist, including:

- It was created in response to a variety of pressures, perhaps as a compromise between them, but at the same time with some excellent, substantive concepts: (i) UNL should have more presence in Omaha and (ii) enhanced collaboration of engineering disciplines with computing disciplines;
- This history of perceived compromise seems to persist in the minds of some, which is understandable, but not entirely helpful;
- There appears to have never been a clear, operational vision of just what PKI should be and, thus, no clear, agreed-upon, objectives/goals;
- Management of and oversight of PKI and the two colleges involved has been uneven at best and after considerable time has not been effective overall in achieving PKI's potential as an organization supporting the academic units;
- A variety of operational and structural dysfunctionalities have developed and persist.

We recognize that:

- The original two concepts are very valuable and should be pursued;
- Considerable resources (money and time) have been invested;
- A number of good things have happened, not the least of which is the significant expansion of the UNO campus, creation of the Scott Scholars program, Scott Village, increases in enrollment, and creation of the Durham School;
- A number of conditions are different from what they were in 1995;
- Academic and business cultures, while different, can be modified to work cooperatively with each other.

We recommend that:

- A clear vision and set of goals for PKI be developed that all stakeholders will support and work toward in their organizations;

- If needed, the PKI Charter once again be amended to insure that the two campuses and the management of PKI are working toward a common set of PKI goals and that, most importantly, the Charter be implemented and enforced;

- PKI and the academic units involved with it be led and managed with a more active form of leadership that will take account of the agendas of PKI and of the units and people involved in PKI so as to marshal their combined resources for a greater degree of success by all;

- Structural, attitudinal, and fiscal issues must be dealt with promptly and positively.

We cannot guarantee that these actions will bring success, but we are certain that without them (or similar actions that take into account local issues of which we are unaware) dissatisfaction will continue.

The ultimate success of PKI depends on two overriding things:

> *First, the focus and dedication of IS&T and the College of Engineering to the purposes as stated in the PKI Charter are absolutely essential and must be coupled with adequate resources guided by appropriate strategies.*

PKI as an organization has no inherent programmatic resources for research or teaching and should never develop them independently of the academic units. Not only is the success of PKI dependent upon this, but also it is also critical for realizing good success for the University of Nebraska to fulfill its mission. It is clear that this was the original and is the continuing purpose of PKI.

> *Second, the organizational and resource issues and factors impacting PKI, some of which we've identified, must be made more effective and supported financially and operationally to the extent needed to permit its leadership to be effective.*

We have made a number of recommendations above aimed at enabling a third phase in order to meet more fully the expectations of all stakeholders.

The 2007 WAG Report concluded by noting that:

> *"PKI is an outstanding expression of generous, cohesive, civic purpose focused on the economic health and future of Omaha and Nebraska. It is clearly very important as an economic driver for the future and as a primary vehicle by which the University of Nebraska can fundamentally contribute to a secure future."*

We believe that is still a very relevant and accurate statement.

> ***The future of PKI is still bright and a path forward seems evident.***

APPENDIX 1
PKI Charter (Revised in June, 2008)

The following seven pages list the PKI Charter in its entirety.

THE PETER KIEWIT INSTITUTE OF INFORMATION SCIENCE, TECHNOLOGY, AND ENGINEERING of the UNIVERSITY OF NEBRASKA

CHARTER
December 1, 1995
Revised, June 1, 2008

I. INTENTION AND PURPOSE

The University of Nebraska ("University") has created the Peter Kiewit Institute of Information Science, Technology and Engineering ("Institute") which is a university-wide institute, comprised of the University of Nebraska at Omaha ("UNO") College of Information Science and Technology and the University of Nebraska-Lincoln ("UNL") College of Engineering. It is contemplated that other University colleges, departments or other units may become affiliated with the Institute upon a determination that such affiliation advances the goals of the University. The Institute currently works in collaboration with the Peter Kiewit Institute Technology Development Corporation ("PKITDC"), Holland Computing Center, Inc. ("Holland") and the Scott Technology Transfer and Incubator Center ("Scott Tech Center"), and may in the future collaborate with other entities.

The Institute provides an administrative structure that allows creation of synergy among these two colleges and other units and/or disciplines to expand educational opportunities in information science, technology and engineering at the undergraduate and graduate level, increase the level of competitive research in these disciplines, provide continuing education programs for professionals in these fields, serve as a magnet for attracting private sector research-based companies, and facilitate outreach to business and government. The Institute and programs in the Institute are authorized to contract with the private sector and the government to achieve its goals. These interactions lead to new developments of importance to business and industry. Enhanced economic development in Nebraska and the region, improved stature for the University, and direct support for the business community are among the results realized from formation of the Institute.

The purposes of the Institute are:

- to create an international center of excellence in information science, technology and engineering by development and support of the highest quality programs in each college and through the cooperative use of resources from each college, from other colleges or departments within the University, and from the private sector;

- to provide the Omaha metropolitan area, the State of Nebraska, the region, and the nation with a unique resource for the education of current and future employees, support of existing and developing technologies, and the creation of partnerships to develop new business opportunities through advancing innovation and technology;

- to build a research center of excellence at the University that will help establish the University as a national leader in the academic units that comprise the Institute and to foster innovation and attract economic development;

- to exploit the advantages of cooperative programming among colleges and departments of the University, and the potential for mutually beneficial interactions with the private sector and government; and

- to create, through cooperative efforts, the achievement of common goals and a common environment for the success of the Institute.

II. THE INSTITUTE

A. PARTNERS OF THE INSTITUTE

The Peter Kiewit Institute of Information Science, Technology and Engineering of the University of Nebraska is an institute of the University, designed to facilitate cooperation and the development of joint programs and activities among disciplines at the University and in particular between the UNO College of Information Science and Technology and the Omaha-based programs of the UNL College of Engineering. The two colleges shall be full participants in the Institute. The Institute currently works in collaboration with PKITDC, Holland and the Scott Tech Center and may in the future collaborate with other entities.

B. PROGRAMS WITHIN AND OF THE INSTITUTE

1. **Degree programs.** Degrees at the University are awarded by the faculty of the various colleges. The Institute will not award degrees in its own right. The Institute will serve as a structure to facilitate joint and cooperative degree programs between its participants. Degree programs may be at both the graduate and undergraduate levels.

    a. **Information science and technology degrees.** Information science degree programs offered in Omaha shall be the primary responsibility of and administered by the UNO College of Information Science and Technology.

    b. **Engineering and engineering technology degrees.** Engineering and engineering technology degree programs offered in Omaha shall be the primary responsibility of and administered by the UNL College of Engineering.

c. **Joint degrees.** Joint degree programs are programs offered and administered jointly by more than one college or department. Colleges or departments involved in joint degree programs participate equally in administering these programs. Joint degree programs may be developed between the participants of the Institute or between a participant and another college or department of the University.

d. **Graduate degrees.** The UNO College of Information Science and Technology and the UNL College of Engineering may offer Masters and Ph.D. degrees.

e. **Cooperative degrees.** Cooperative degree programs are programs whose primary home is a department or college with faculty from more than one department or college. The primary home department or college administers the degree program.

2. **Research programs.** The Institute shall encourage, promote, fund, and facilitate research conducted by the participating colleges and their faculties, and encourage and facilitate interdisciplinary, intercampus, and other joint research programs between the two colleges and between the colleges and other units within the University or in the private sector.

3. **Outreach programs.** The Institute shall facilitate outreach programs involving non-degree instructional programs, technology transfers, joint public-private research, consulting and other extension services, and such other programs as might be appropriate. Such outreach programs may be conducted by the colleges alone or on a joint basis.

C. FACULTY OF THE INSTITUTE

1. **Permanent University faculty.** Permanent faculty associated with the programs of the Institute shall retain their principal academic home in their academic department or college. Either participating college, or any other unit of the University, may assign one or more of its faculty members to perform responsibilities relating to programs of the Institute. It is expected that any faculty housed in the Institute will have responsibilities for Institute programs and contribute to the mission of the Institute.

2. **Temporary Institute faculty.** The Institute or its participants may retain individuals on a temporary basis to participate in programs of the Institute. Such individuals might include visiting scholars from other universities, visiting teachers or researchers from the private or public sectors, consultants, or other individuals appropriate for the programs of the Institute.

D. STRATEGIC PLAN OF THE INSTITUTE

The strategic plan of the Institute shall include the following: (1) the academic priorities of the Institute, (2) the manner and means by which the participating colleges will support the achievement of those priorities, (3) the resources available or required to meet those priorities and the likely source of those resources, and (4) the metrics to be employed to measure progress in meeting those priorities. Among the areas to be addressed in the strategic plan are: (1) student enrollment, (2) academic programs, (3) research agendas, and (4) outreach programs. The strategic plan shall also address the general funding of the Institute with respect to public and private support.

E. PUBLIC OR PRIVATE GRANTS OR CONTRACTS

The Institute may apply for and accept public or private grants or contracts to fund its programs. The University of Nebraska Foundation ("Foundation") may accept private donations on behalf of the Institute.

III. ADMINISTRATION OF THE INSTITUTE

A. THE EXECUTIVE DIRECTOR. The Executive Director shall be the chief executive officer and chief science and technology officer of the Institute, responsible for all aspects of its leadership and administration. The Executive Director shall be appointed by and responsible to the President of the University and shall report to the President through the Executive Vice President and Provost.

The Executive Director shall:

1. serve as the chief science and technology officer of the Institute;

2. lead the development and oversee implementation of the Institute's strategic plan which shall provide for teaching, research and outreach that achieves national recognition and serves the interests of Nebraska;

3. prepare an annual consolidated budget for the operation of all aspects of the Institute, which shall be presented to the Institute's Board of Policy Advisors ("BOPA") prior to the fiscal year; the budget relating to private funds subject to the authority of the BOPA shall be approved by the BOPA;

4. consistent with policies of the University, the BOPA, the Foundation and with the annual Institute budget, have the authority for expenditure of all Foundation funds held for the benefit of the Institute, and shall submit an annual report to the BOPA with regard to expenditure of such funds;

5. consistent with University policies and oversight, have authority for expenditure of funds (other than those described in "4" above) designated specifically for the Institute regardless of source, and shall seek the advice of the BOPA and report annually to the BOPA with regard to expenditure of all such funds;

6. pursue initiatives that will contribute to the success of the Institute;

7. meet annually with the Academic Advisory Council ("Council") with respect to the planning and administration of the Institute and the development of programs within the colleges related to the Institute and other related matters;

8. support the mission of the Institute by implementing the goals and intentions of this Charter;

9. establish policies and procedures for the Institute;

10. have responsibility for Institute programs and initiatives which include student recruitment, student placement, intern programs, and business relationships;

11. in coordination with the Foundation and consistent with University priorities, have primary responsibility of fundraising for the Institute;

12. be an ex officio member of the BOPA and other affiliated and/or related entities such as PKITDC and Holland.

B. **THE DEANS OF THE COLLEGES.** The Deans of the UNO College of Information Science and Technology and the UNL College of Engineering shall administer their respective colleges. Under the leadership of the Executive Director, the two Deans shall participate in the development of the Institute's strategic plan, and develop and implement integrated college plans to support and advance the Institute's goals and objectives set forth in the Institute's strategic plan.

C. **THE ACADEMIC ADVISORY COUNCIL.** The Academic Advisory Council ("Council") shall provide advice and support with regard to collaboration between the colleges and other academic units of the University relating to the achievement of Institute goals and objectives.

1. The membership of the Council shall consist of: the Executive Vice President and Provost of the University, the Associate Vice President for Research, the Executive Director of the Institute, the Senior Vice Chancellor for Academic Affairs at UNO, the Senior Vice Chancellor of Academic Affairs at UNL, the Vice Chancellor for Research at UNL, the Associate Vice Chancellor for Research at UNO, the Dean of the UNL College of Engineering and the Dean of the UNO College of Information Science and Technology, and other such members who may be appointed by the President.

2. The Council shall be chaired by the Executive Vice President and Provost of the University.

3. The Executive Director shall brief the Council on goals, planning, issues regarding policies, procedures, or other matters that may arise in the course of leading the Institute.

D. BOARD OF POLICY ADVISORS. A Board of Policy Advisors ("BOPA") shall assure participation by the public and private sector in the plans and programs of the Institute.

1. The membership of the BOPA shall be appointed by the President of the University after consultation with the private sector and shall consist of eleven leaders from the private sector, government and/or academe. A majority of the members of the BOPA shall be selected from the private sector, and shall be broadly representative of the business and commercial enterprises likely to interact with and support the work of the Institute. Members of the BOPA shall serve staggered terms and may be reappointed when their term expires.

2. The BOPA shall:

   a. provide the Executive Director, the Council and the Deans with recommendations relating to the strategic plan of the Institute in order to ensure responsiveness to the needs of the private sector and government;

   b. provide an external evaluation of the extent to which the priorities adopted in the strategic plan have been achieved;

   c. review and comment on policies and procedures of the Institute;

   d. advise the President on the performance of the Executive Director;

   e. advise the Chancellors and the President on the performance of the Deans;

f. assist the Executive Director and the Foundation in seeking private financial support for the Institute;

g. establish policies and procedures for exercising its responsibilities;

h. provide oversight over all current funds held in the Foundation for and on behalf of the Institute.

IV. PARTNERSHIPS WITH PRIVATE AND PUBLIC SECTORS

A. PKITDC is a 501(c) (3) corporation which exists to support and facilitate Institute and faculty outreach with the private sector and government, including the support of basic and applied research supported by the private sector.

B. PKITDC may enter into agreements with individuals, organizations, and agencies from both the private and public sectors. Consistent with the policies established by the Board of Regents of the University of Nebraska, PKITDC shall maintain policies and procedures for such activities, and report regularly to the BOPA on its activities.

C. Institute and PKITDC agreements with outside partners may include but not be limited to:

1. research, including joint research activities;

2. development of educational programming tailored to the needs of a particular industry or sector;

3. implementation of student internships, residency programs for private sector personnel, and consultantships;

4. development of incubator capabilities for the conduct of research and the support of innovations in the private sector;

5. provision of specific contractual services by the Institute or by the other party;

6. any other activity that will enhance the programs of the Institute or assist in economic development; and

7. the extent to which information developed during the course of the agreement is proprietary in nature.

APPENDIX 2
Washington Advisory Group Review of PKI (June 2007)

The following twenty-eight pages list the Report in its entirety.

The Washington
Advisory
Group
An LECG Company

Report

of

The Washington Advisory Group
an LECG Company

Taking the

Peter Kiewit Institute

to the Next Level of Accomplishment

Submitted to:

J.B. Milliken, President
The University of Nebraska

June 12, 2007

The Washington Advisory Group
an LECG company

The Washington Advisory Group, founded in 1996, serves the science and technology advisory and institutional needs of U.S. and foreign companies, universities, governmental and non-governmental organizations, and other interested and affected parties. The Advisory Group provides authoritative advisory and other services to institutions affected by the need to institute and improve research and education programs, by the press of the competitive marketplace, and by changing programs and policies of the federal science and technology enterprise. In October 2004, LECG Corporation, a provider of expert services, acquired substantially all of the assets of The Washington Advisory Group, which continues to operate as a company within LECG.

University consulting is a major field of activity for The Washington Advisory Group. A common thread in our university engagements is the improvement of an institution's national standing as a university that engages in both education and research so it can thereby contribute more to the cultural and economic growth of their community and the nation. Concomitant with this goal is improved ability to raise funds from federal and state agencies, philanthropic foundations, and industry.

The directors of The Washington Advisory Group are:

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C. Thomas Caskey, M.D.	Mitchell T. Rabkin, M.D.
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EXECUTIVE SUMMARY

While we spoke with many different people, the conclusions and the recommendations made herein are solely those of the study team.

Our brief study focused on the Peter Kiewit Institute (PKI) and its chartered role to "provide an administrative structure that allows creation of synergy among these two Colleges [UNO/IS&T, UNL/Engineering] in order to expand educational opportunities in information science and engineering." To answer the primary question posed to us "*What is needed to help bring the PKI to the next level of accomplishment?*" we also looked closely at the Colleges, other academic units in the Nebraska system, and the Omaha business and technology setting.

PKI has made substantial progress in the past ten years in fulfilling its stated mission, enabling the strong growth of the academic units it supports, producing an increasingly talented stream of graduates, and establishing relationships with a wide variety of companies and governmental organizations. Building on this success and using the experience of the past ten years, there are policy changes, administrative adjustments, and programmatic actions that will help carry PKI and its associated academic units into a successful future.

We found that:

- PKI is highly regarded in Omaha, but is largely unknown outside Nebraska; is well-regarded by UNO faculty and administrators; is understood differently by academics than by the broader business community; and is experiencing a suboptimal environment for its success as a result of the historical competition between Omaha and Lincoln, specifically by not utilizing some of the resources in the Computer Science & Engineering (CSE) Department at UNL.
- Graduates of the PKI programs, especially from IS&T do not meet the demand of local industry in quantity, but are credited with significant hands-on experience provided by access to many laboratories and internships that are available to students who are part of PKI.
- Most of the interactions with industry do not involve significant basic research, either with faculty or students; some companies have provided valuable resources including state-of-the-art laboratories, as well as student and faculty project opportunities.
- Research activity in the academic units at PKI is respectable, but the relatively low level of federal research support suggests that PKI has not yet reached a sufficient critical mass to be competitive nationally as a unit even though some individual faculty are.
- There are multiple opportunities for future growth in research and educational activities that could serve Nebraska well in the future.

- Utilization of PKI funds and connections with local industry has served the growth objectives well to date, but needs expansion and focusing going forward.
- The two primary academic units (IS&T and Engineering) have yet to exploit fully the potential for collaboration within and between academic departments, but there is clearly good potential.
- There is a clear need to engage in the development of a strategy and implementation plan aimed at identifying a few overarching directions for guiding PKI over the next five to ten years.

We were impressed with several things about Omaha, including: its capacity for sustaining a stable, employable population when other nearby regions are losing population; the presence of a number of major industry and governmental headquarters; and its civic-minded, strategically focused, and generous leadership cohort.

Of the two types of synergy anticipated when PKI was launched, one seems to be working nicely, namely the connection that each college has independently developed in support of the mission of PKI. The desired collaboration between the colleges of Engineering and IS&T has not fully developed as of this time. Although our recommendations are focused on PKI, not the academic units, there are obvious and important impacts on the units and the University.

Thus, we recommend that PKI:

- Bring greater strength and clarity to a small number of focus areas of relevant expertise;
- Develop better synergy between the component units of PKI;
- Expand resources and programmatic activities significantly, including the recruitment of star quality faculty who can make dramatic enhancement in the research competitiveness and academic quality of the PKI component units;
- Expand the number of PKI graduates in the information and computer science-related disciplines and study if more construction engineering graduates are needed;
- Consider the potential for building two separate but interrelated clusters of strength and innovation located on the UNO South Campus, one in information technology and one in construction to serve both the traditional construction/design/systems integration companies located in greater Omaha and the newer emerging needs for advanced applications of information technology;
- Consider developing stronger linkages between PKI and both the University's Medical Center and the UNL College of Agriculture to create a strong cluster in bio-informatics and medical informatics;
- Work to develop even stronger and deeper ties to organizations that are important economic drivers to the region, including STRATCOM, related defense contractors, Union Pacific, Peter Kiewit Construction, and HDR.

To achieve this, we recommend that the University of Nebraska:

- Take positive steps to help all campuses understand that cooperation via PKI can be a win-win-win situation and develop organizational and policy structures that facilitate and reward collaboration;
- Augment the PKI organizational structure with the appointment of an Executive Director who would be a strong, scientific and technology leader, with superb research credentials and an impressive track record. This position would supplement the already strong leadership in operations, student support, advocacy, and industry recruitment.
- Expand the Board of Policy Advisors to include individuals with national and global perspectives;
- Reform the functioning of the Coordinating Council by providing permanent leadership and by clarifying the scope of their responsibilities;
- Secure additional resources from both the State and the private sector to implement and empower the strategies to bring PKI to the next level of success.

In the body of this report we will explain, expand, and detail these observations and recommendations. Appendix 1 offers some additional observations and suggestions.

INTRODUCTION

The Peter Kiewit Institute (PKI) is an ambitious initiative to bring together business, university research, scientific and technical education programs and technological development. The original charter for PKI was developed in 1995 in response to concerns about the future economic vitality of Nebraska expressed by the Omaha business community. The multi-function, multi-faculty, multi-disciplinary and multi-campus character of PKI, inevitably, has produced both complexity and ambiguity in roles, organizational arrangements and authority in guiding the operation of PKI, leaving the management of these issues to the good will and good sense of those occupying the leadership positions at PKI.

PKI is *not* an academic center of the University of Nebraska (i.e. it does not have formal academic standing). It is a facility owned by the University of Nebraska which houses the following units:

- All faculty in the College of Information Science and Technology (IS&T) at UNO. Their courses are taught at the PKI facility.
- Faculty in Computer Engineering, Construction Management, Civil Engineering and Architectural Engineering from UNL. Approximately one third of the students in engineering programs at UNL are undertaking their degree programs in the PKI facility and at other facilities in the adjacent area.
- The administrative structure of PKI is served by a talented and energetic director whose duties and responsibilities include: student support (internships, career advising, placement), industry relations and support, media relations and advocacy, facility operations, and the allocation of small grants.

The governance framework of PKI includes:

- University governance by the Board of Regents and the President of the University and through the President, delegated to the respective Chancellors;
- Board of Policy Advisors (BOPA) comprised of 11 business leaders. Its chair is Walter Scott. The BOPA has fiscal authority over an endowment created for the support of PKI and held in a University Foundation account.
- A Coordinating Council comprised of senior academic officers and deans from UNO and UNL.

We assume that this history and the various organizational arrangements are well-known to the readers of this report and are recounted here only for clarity. The *PKI Self-Study, March 2007*, provides a ready source of more detail.

President Milliken, in cooperation with the Board of Policy Advisors, asked The Washington Advisory Group, an LECG Company to perform a short study to answer the question:

What is needed to help bring the PKI to the next level of accomplishment, as measured by contribution to Omaha and Nebraska and enhancement of the overall quality and reputation of the University?

A team of four senior professionals, all with mixed academic and industry/government experience have carried out the study with a mixture of in-person interviews, telephone interviews, and analysis of a large amount of printed and Web-based material provided by the University and some of the interviewees. A description of The Washington Advisory Group, the study approach, and the backgrounds of the team members can be found in Appendix 2. A list of the interviews and the major documents studied can be found in Appendix 3.

We focused on PKI. It was not within the scope or the resources of our study to analyze deeply or make detailed recommendations about the academic units, construction-related programs, technology incubator, housing, connections to the University Medical Center, Agriculture, and other University programs, or other organizations. At the same time, because of the fundamental purpose of PKI, the planned, synergistic relationship between PKI and the academic units, and the overlapping spheres of responsibility/authority, we had to develop some understanding of the full environment in which PKI exists. Similarly, recommendations addressed to PKI in the first instance will, per force, have impact on one or more of the related organizations.

The Executive Summary above is intended to be an abstraction of our most important findings and recommendations, but it does not contain everything. The remainder of the Report proceeds from our observations on the current status of PKI to actions we recommend PKI take, actions that the University of Nebraska will need to take, to some concluding remarks about the importance of the PKI mission and its centrality to the University and the future economic vitality of Nebraska. As noted above, the Report is written assuming the reader has substantial personal knowledge of PKI and its setting.

GENERAL OBSERVATIONS

Nebraska and Omaha: Nebraska is one of those states, in contrast to some in the U.S., whose population is essentially static or declining and which is not subject to the same pressures of rapid growth, or neither decaying nor exploding industries, and other socio-economic issues faced by many. Thus, the state has both strengths and weaknesses, and our impression is that the leaders we encountered have a clear understanding of the strategic circumstance and of the point of inflection they now face. .

In a state in which agriculture accounts for about one-third of the employment and economic activity, Omaha is almost an anomaly. It is the home to five Fortune 500 corporations, some of which have international operations, a major, strategic facility of the military, and a nascent high-tech activity. Because of unique local conditions Omaha has an unparalleled base of personal financial wealth. Continuing the solid, civic-minded tradition of this part of America, much of that wealth has been or is expected to be devoted to activities that will materially benefit the city and the state. This is a truly important and unique advantage that can be used to prepare seriously for the economic well-being of future generations of Nebraskans. The example of Norway's use of substantial oil revenues to secure the future comes to mind.

UNO: The University of Nebraska, Omaha has a long history as a municipal university, serving the local community with basic higher education, falling onto hard times financially and affiliating with a larger state-wide university or system, now trying to keep up with the rapidly changing workforce, demographic, and economic conditions of the late 20th/early 21st century period.

The UNO leaders that we spoke with uniformly believe that the development of PKI has helped to build their reputation, enabling them to recruit more and better students and faculty, not just in IS&T, but across the campus. As one faculty member put it, PKI has "sharpened the focus on metro engagement and raised the bar for the whole campus." "The MOUs with private industry, the expansion of collaboration with other departments and the quality of incoming students have enriched the campus." "We now have more math and philosophy majors, in part because they are enrolled at PKI." They are proud of PKI and fully support its efforts.

The emergence of PKI has provided new opportunities for UNO to grow and to develop its metropolitan mission. Campus leaders view the launching of PKI and related activities at Ak-Sar-Ben as a watershed event in the life of the campus. The initial anxieties about UNL "moving onto UNO's turf" have been overcome by the belief that "Omaha is where the action is" and PKI is the vehicle securing new opportunities and increased funding to expand their campus' mission.

UNL: The College of Engineering at UNL is on a positive trajectory, having moved in recent years from a rank order position of 116th among engineering programs nationwide to a rank order position of 86th. The volume of extramurally funded research stands

today at $25M/year with $3M of that in Omaha. The Computer Engineering program in Omaha is undergoing what the Dean describes as a long-term process of rejuvenation.

A major initiative to improve the research capacity of UNL is under way with emphasis shifting from single Principle Investigator grants to multi-disciplinary initiatives. Recent efforts to incentivize faculty with seed grants and with proposal writing assistance have proven very successful. The volume of sponsored research at UNL has doubled in the past 6 years and has grown to three times its level of 10 years ago.

The view of UNO that we encountered at UNL reflected an underlying concern that in a climate of scarce resources, any attempt to strengthen UNO would take away resources needed by UNL. In other words, funding for higher education in Nebraska could be perceived as a zero-sum game.

The view of PKI that we encountered at UNL reflected some puzzlement about why PKI does not do more to encourage collaboration with UNL faculty in relevant areas. It is also clear that UNL is proud of its own fairly extensive and successful interactions with industry, with other major research universities, and with the great success of the J.D. Edwards program, including its Presidential Honors College and its Scholarships.

Peter Kiewit Institute: PKI stands today as the poster child for the commitment of the local business community and the University of Nebraska to partner in providing leadership in sustaining the economic vitality of Nebraska. The creation of a progressive new College of IS&T, the construction and creation of a state-of-the-art building, creation of the related facilities and programs (Scott technology center, Scott village, Scott Scholars), the building of initial programs and relationships, and the recruitment of outstanding students (many of whom were formerly lost to Nebraska) are impressive accomplishments for ten years of which all should be proud. The emergence of the Durham School of Architectural Engineering holds even greater potential for catalyzing the University with important industrial sectors in Omaha and the state.

Not surprisingly, PKI has grown and evolved in ways that are more organic and opportunistic than as a result of a carefully developed strategic plan. Given the differences in character between industry and academe, initiatives like PKI that have attempted to meld the intellectual fire power of universities with the bottom-line focus of business have encountered the inevitable clash of cultures. The Omaha business community feels great passion about the importance of PKI to the future of Omaha and the region. Yet, on a national scale, PKI must take major steps to earn credibility and recognition in the university research and technology transfer communities. Thus, the agenda to meet fully the vision of the founders is both ambitious and challenging. This Report focuses on that agenda specifically.

STRATEGIC RECOMMENDATIONS FOR PKI ACTION

We recommend five major strategic actions to help take the Peter Kiewit Institute to the next level of accomplishment. The consulting team believes that it is both worthy and achievable to grow and strengthen PKI. Our conviction that this objective can be accomplished is based upon the demand for talent in these key fields, the opportunities to expand the economic base in greater Omaha and beyond, as well as the potential financial resources available to tackle this challenge.

These recommendations are made in terms of "PKI" but clearly they cannot be accomplished without the academic units that comprise PKI. For each recommendation we will provide a brief rationale and discussion of considerations that should effect their implementation.

> **Strategic Recommendation 1:** ***Significantly strengthen and focus the technical and educational activities of PKI on no more than three areas initially, growing to perhaps five.***

Rationale: When considering a research and educational organization in the fields represented at PKI – whether that consideration is by entering freshmen, government funding managers, or a company wishing to hire graduates or establish collaborative research activities – the quality of the people in the organization and of their work is paramount. Focus is the primary strategy for gaining the initial resources and for creating a synergistic environment that will attract more resources and people.

Considerations: There are many and we simply list them here with little or no explanation:

- The areas chosen must have relevance to Omaha and to Nebraska.
- There is near-term and long-term relevance, and a balance must be maintained.
- Areas must change over time in response to changing technology and changing local needs.
- The people involved must be of the highest obtainable quality and must include leaders.
- The choice of programs and activities on which to focus must be academically acceptable and earn respect in that domain while at the same time being strongly relevant to local industry.
- Strong general education (developing critical thinking skills, the ability to communicate in writing and orally, problem solving skills, etc.) and respectable research activities must be maintained in all relevant areas while special attention is paid to the focus areas.

- PKI encompasses both IT and non-IT disciplines, which immediately creates a certain loss of focus at the highest level, but this can be turned into an advantage (a sub-strategy) by helping the non-IT disciplines to better utilize IT.
- Choice of focus areas depends on a number of factors which our study did not have time to consider in depth, but based on what we know at this stage, we recommend that at least the following areas be further evaluated for potential focus:
  - Security and information assurance
  - Datamining, handling of large data sets
  - Medical informatics[1]
  - Bio informatics
  - Construction informatics
  - Agricultural informatics
- Implementation of these focus areas will require many subsidiary actions, all of which will require careful and strategic action (e.g., faculty hiring) including downplaying some areas and/or forgoing some potential opportunities (e.g., accepting an industry contract that is focused purely on short-term work).

Even the strongest universities are not equally good at everything, and they don't try to be.

Strategic Recommendation 2: ***Increase the number of graduates from PKI-based programs in IT and, if justified, in construction disciplines.***

Rationale: It appears that the demand for PKI graduates routinely exceeds the supply. Given the general growth in the use of IT in all areas of the economy, we believe that all of the projections of continued need for IT graduates nationally will certainly apply to Nebraska. Having a steady and well-trained supply of IT people is increasingly essential for any business activity, regardless of any special considerations such as may be created by the focusing recommended above. The case for construction-related graduates is unknown to us, but given the prominence of Omaha-based companies in the construction-

[1] "Informatics" is used here to indicate research and educational activities that combine solid work in both computer science-related disciplines and another area such as medicine, construction, or agriculture (sometimes called "CS+X"). It is generally understood that informatics is more than just "application" of information technology and in the most advanced situations will involve the most sophisticated thinking in each field and result in advances in each of the component disciplines. For example, bio informatics generally refers to analysis of genomes and proteomes, whereas medical informatics refers to hospitals and lab systems. It is also the case, however, that each field named above is very broad so that a specific focus must be chosen.

related industries and the ever-broadening scope of companies like Union Pacific, we certainly see a potential business opportunity.

Considerations: There are several:

- The largest numbers needed will always be at the Bachelor's level, but appropriate attention should be paid to graduate levels also.
- Master's degrees in IT-related subjects are often the desired route in producing informatics graduates.
- Doctoral degrees are essential in most disciplines to support the research agendas of the faculty, to help establish a national presence, to insure that the educational programs are as advanced as possible, and potentially to produce startups.
- Demand in IT-related disciplines is cyclical, but consistently trending upwards, so planning and a mid- to long-range perspective are essential.

To a certain extent, a steady supply of graduates that is not too far separated from current demand can create their own demand.

Strategic Recommendation 3: ***Significantly broaden and increase the financial base of PKI.***

Rationale: The financial support of PKI by the business community and the University (and State) so far has been truly phenomenal and has provided PKI a clear advantage. Moving forward, however, support must be diversified and strengthened in order to accomplish the other strategic objectives.

Considerations: This is not simply a recommendation for more money, especially from those that have already given so generously:

- Competitively awarded research funding is essential for faculty, most especially in the focus areas, since it exposes their work broadly, helps guide them to cutting edge topics, and validates the quality of their work (in computer science, $200-$300,000/year/faculty of competitively awarded funding is not uncommon nationally).
- Seed funding for research and assistance with the development of proposals for federal funding opportunities are essential to any aspiration to ramp up competitive awards.
- The amount of funds available annually from PKI for discretionary investments in the academic units is fairly modest by national standards (a single new faculty startup package can run several hundred thousand dollars).
- PKI should seek to recruit established or superstar junior and senior professors by offering generous startup packages allowing for relocation and lab build out as well as provision for post-doctoral scholars, and staff. If a group or center can be

recruited "en masse" through the importation of an entire research group, this can greatly accelerate the establishment of a world-class center of excellence. Attracting major senior leaders can run $1 million or more each, and ideally several will be needed to implement the strategy of focusing.

- Expansion of student production will require more faculty and more space as well as more financial aid to recruit students from Nebraska and beyond.
- Graduate fellowships are needed to enable quality work at advanced levels.
- Locally-based companies need to invest in PKI just as they invest in physical resources to insure the workforce they need.
- Expansion of the number of sources of funding for PKI and its constituent units will help provide long-term stability as funding from any single source expands or contracts.
- PKI funds should be allocated in a transparent manner that is consistent with the stated objectives of PKI and in the best interests of faculty and PKI.

Money is always necessary, but as in most endeavors it is not sufficient to guarantee success.

Strategic Recommendation 4: ***Develop deeper, strategic, and lasting partnerships with several local organizations.***

Rationale: Education and research are long-term activities; the University and PKI will still be in operation many years from now. To be effective partners of outside organizations while at the same time meeting the objectives of the University and faculty, the best relationships are those that are the most substantive and advance both organizations.

Considerations: Some of the more important characteristics include:

- A few very solid relationships can be more effective in the long run than a number of short-term, shallow, and non-strategic relationships.
- Research relationships should advance the research agenda of the faculty involved while at the same time fulfilling a need of the outside organization.
- Pure development or routine (strictly applied) research relationships should be avoided unless they provide needed opportunities for practical student involvement.
- Relationships should be enabled by the PKI administration, but driven by the faculty involved.

- Care must be taken to insure that outside relationships, no matter how interesting they appear to be, do not unduly distract faculty and students from their primary responsibilities.
- The nature of most industry relationships will necessarily be fairly short (a few years at best) in most cases, but two possible strategic partnerships seem very important to us – namely with UNMC and with STRATCOM; to deepen those partnerships will require access to star faculty and scientific support personnel.

Relationships are rarely easy to develop and maintain, and the value of skilled relationship builders should not be underestimated.

Strategic Recommendation 5: ***Develop strong and truly synergistic interactions within PKI and between the academic units in PKI and other NU academic units in Omaha and Lincoln***

Rationale: The PKI charter clearly envisions the strength that can emanate from good interactions. That was true in 1995 and even more so today. PKI must re-double the efforts to build a culture of collaboration and interaction. This is arguably the best, if not the only way, PKI can develop a strong and distinctive reputation

Considerations: Among the more important are:

- Most of the possible focus areas suggested above demand interactions among IS&T faculty and others.
- If interactions between significant numbers of residents of the PKI building are not possible for whatever reason, then the non-interacting people or units should be moved elsewhere to make room for others that do want to interact.
- Quality in one area will rub off on others if they are exposed to it on a daily basis.
- Interactions, whether external or internal, require leadership.
- Everything noted about interactions between different units (e.g., IS&T and Architectural Engineering) applies to interactions within units.
- Cross disciplinary collaboration cannot be forced from the top down. It must develop from the natural curiosity of university faculty. The presence of energetic world class faculty will be a magnet that draws others to them. Synergism among different disciplines is hard to achieve and not needed in all cases, but it is clearly needed to tackle many of today's technical, business, and societal problems. PKI was founded on the principle of doing this and it is needed now more than ever.

RECOMMENDED ENABLING ACTIONS AT THE UNIVERSITY LEVEL

The strategic actions recommended above are things that PKI as an organization should do/lead/enable to move to the next level of accomplishment. There are several actions that need to be taken at the level of University administration which is ultimately responsible for the success of PKI.

Recommended Action 1: ***Take positive steps to change attitudes on both campuses and within PKI. Rewards and incentives can be effectively used to improve the culture and to create new opportunities for cooperation.*** We observed the deleterious effect of the current stove piping and lack of cooperation in almost every interaction we had.

Rationale: At the end of the day, it is in everyone's interest to make PKI a true success academically and in the eyes of outside organizations. Because cooperation can expand opportunities and available resources in most instances, it is usually outdated and non-strategic attitudes and lack of leadership that prevent cooperation.

Considerations: This sounds like a simple task, but change is hard:

- A range of leaders must be involved starting with the President and Regents and involving deans, department chairs, and faculty leaders.
- It will take time and will not be 100% successful.
- There will always be – and should be – a tension between the demands for cooperation with others and the imperative of individual agendas and achievement; that is the curse and the promise of university leadership.
- To create a truly win-win environment for both campuses and for the region that encompasses both Omaha and Lincoln, it might be highly desirable to plan for the development of a branch of PKI in Lincoln that would not duplicate the main location in Omaha but would be complementary (a not-uncommon situation with institutes in a multi-campus system). One could imagine that these two cities and these campuses (including UNMC as well as UNL and UNO) might form a "bar bell" with an easily traversed connector.

Recommended Action 2: ***Bring the actual mission and operation of PKI into better alignment with the visionary mission stated in the Charter and update the Charter to recognize the realities of 2007.***

Rationale: The charter developed in 1995 envisioned that PKI would be run by academics (the two deans) with appropriate oversight by senior campus and university executives (the Coordinating Council); that if needed, the deans would hire a non-faculty

Administrator; and that external advice on plans and operations would be provided by a mandated, external group (the Board of Policy Advisors). Every successful university operation of which we are aware, including many with significant external inputs, operates with a structure such as this. We repeatedly were told that the actual operation and mission are to some extent at variance with these principles, and we believe that this is holding PKI back from moving forward.

Considerations: In the following, we are referring to PKI as an organizational entity, *not* including the academic units that are a part of PKI since their activities and authority are governed by University and campus structures. We recommend specifically modifications of the Charter to effect this appropriate alignment:

- A new position, not envisioned in the original Charter, of Executive Director of the Institute who would bring impeccable academic credentials in science and technology should be created as a complement to the current Director of Operations. The Executive Director and chief science and technology officer should report to the Executive Vice President and Provost of NU and be responsible for the overall academic policies, programs, and operation of PKI. He or she should work closely with the Coordinating Council. The position should be held by someone with senior faculty rank in one or more fields relevant to PKI who has demonstrated leadership qualities relevant to carrying out the strategies discussed in this Report and who has a record of building collaborative enterprises. The incumbent in the position should have at his or her disposal sufficient resources, primarily financial and space, to insure seed grants for faculty development of research proposals, support for administering a competitive grant program, stipends, remitted tuition and related financial aid for graduate students as well as other related conditions for achieving the mission of PKI.
- The Coordinating Council should be comprised as stated in the Charter, with the replacement of the "Assistant Vice Chancellor for Education and Information Services at UNO" with the Associate Vice Chancellor for Research and Graduate Dean at UNO. The Executive Vice President and Provost of the University should serve as the permanent chair of the Council.
- The Board of Policy Advisors should remain as chartered, but the membership should be brought into line as quickly as possible with the original vision of "eleven leaders of business, government agencies, and industry from Omaha, Nebraska, and the nation."
- Any other necessary wording changes to the Charter should be effected to make it consistent with these changes.

An organization based on the activities of faculty can only be truly successful when led by someone with faculty credentials. The structure recommended above is consistent with almost all university-based centers or institutes. The nature of PKI and the desire for strong interaction with outside organizations argues for an empowered leader who is sensitive to the needs and protocols of both faculty and business organizations and who is

able to work closely with both cultures and bring them together for mutual benefit. The multi-campus, multi-faculty nature of PKI argues for someone that is organizationally independent of either campus. By reporting to the Office of the President, the importance of PKI to the entire university is emphasized and enabled. The mandated interaction between the Institute Director and the three entities most intimately involved (the academic units and BOPA) insures that the synergistic nature of the operation is emphasized.

CONCLUSION

PKI is an outstanding expression of generous, cohesive, civic purpose focused on the economic health and future of Omaha and Nebraska. It is clearly very important as an economic driver for the future and as a primary vehicle by which the University of Nebraska can fundamentally contribute to a secure future. PKI has achieved a lot in the first phase of its existence. Of critical importance for the future is the need to determine the small number of academic areas of focus in which to make investments that will leverage current expertise, build niches that can gain a national reputation, and capitalize on growth markets where PKI can be competitive. While the necessary growth and strengthening required for the future will not be easy, the economic resources of Omaha coupled with its strong tradition of effective civic leadership clearly open the path to continued success.

APPENDIX 1

Additional Observations and Suggestions

1. **Intellectual Property Policy Review**: PKI and the University should initiate a review of intellectual property practices to insure that such policies are conducive to the creation of new businesses and maximizing the societal impact of PKI/UN inventions. Creation of flexible policies that allow for low or nominal licensing fees in exchange for equity positions can make it easier for new companies to get up and running. Certain technologies, such as those that enable industrial standards, should be put in the public domain in order to maximize the impact and reputation of PKI/UN.
2. **Create Seed/GAP funding mechanism**: PKI should investigate the establishment of a seed/GAP capital funding mechanism to support creation of new businesses in the Omaha region. Funding can be used for early stage commercialization work (prototyping, feasibility demonstrations), as well as more traditional angel or seed stage investments. Intellectual property and/or manpower will undoubtedly come from PKI for these new ventures, and the establishment of such a fund will allow the Scott Technology Transfer Center to more completely fulfill its potential.
3. **Review Impediments to New Company Formation**: In concert with establishment of the GAP fund, PKI, NU, and the State of Nebraska should conduct a review of impediments to new technology business formation in the state and region. Policies such as R&D tax credits or grants, business plan or proposal assistance funding, and creation of entrepreneurship recruitment and development programs should be assessed.
4. **Improve PKI Outreach**: PKI has good relations with many companies in the Omaha area, and is considered very receptive and accommodating to companies that have established relations. However there is a perceived need for additional outreach activities to area companies, in particular less established and smaller players in the Omaha economy. Possible programmatic options include:
    a. Establishment of an industrial liaison program where, for a small annual membership fee, companies can gain early access to research results, students, and intellectual property;
    b. PKI sponsorship of symposia on technical or business topics of interest to the local community;
    c. Establishment of one or two PKI ambassadors who would visit local companies seeking opportunities for collaboration/interaction.
5. **Develop output measures**: The deans of units in PKI should create better output metrics to allow them to accurately portray their growth and success in PKI-related areas.
6. **Create graduate fellowships**: Consistent with the need for having the required research and scholarship to ensure PKI-related programs are of top quality, some

attention should be placed to trying to duplicate ideas like the Scott Scholarship program for graduate students.

7. **Step up recruitment efforts for computer science students**: Consistent with national trends, enrollment in CS is down by 300 vs. the bubble peak. This may be reversible sooner in Omaha and could be of significant local advantage given what seems to be a shortage of IT technical skill in the Omaha area. Strong marketing of the cooperative/internship program (that inevitably leads to good local job prospects) is likely to increase applications.
8. **Rationalize the UNO and UNL Civil Engineering programs**: Significant thought should be given to insuring that these two programs do not just duplicate each other.

APPENDIX 2

Proposal to the University of Nebraska

March 28, 2007

James B. Milliken
President
University of Nebraska
3835 Holdrege Street
Lincoln, Nebraska 68583

Dear President Milliken:

Based on your discussions with Molly Corbett Broad and Peter Freeman, The Washington Advisory Group, an LECG company, is pleased to present you a formal proposal of engagement to provide outside assessment and advice on how to take the Peter Kiewit Institute (PKI) to the next level of accomplishment.

The team that we propose has deep experience in academe and industry-academic relationships of the type on which the PKI focuses. Subject to previous commitments and your guidance, they will be available to work with you and others at the University of Nebraska over the next three months in order to meet your objectives for the study by June 1.

This letter outlines our proposed approach. As soon as I receive a signed acceptance, we can begin work, including the initial visit on March 18/19 that you have discussed with Dr. Freeman.

Key Questions to be Addressed

Based on your discussions with Molly Broad and our experience in similar situations, we believe that the single, key question to be answered is:

> ***What is needed to help bring the PKI to the next level of accomplishment, as measured by contribution to Omaha and Nebraska and enhancement of the overall quality and reputation of the University?***

In our experience, there are a number of factors involved in answering this question, including:

- **How can PKI best fulfill its mission to provide outstanding education for students, collaborate most effectively with the private sector, and contribute to the economy of Omaha and Nebraska?**
- **What types of education and outreach programs are most needed?**

- **What areas of research are most promising and appropriate for PKI?**
- **What scale of resources (people, funding, access to industry, etc.) is needed to attract first-rate faculty and students and to enhance competitiveness for extramural research funding?**
- **What do the faculty and campus administrations at UNL and UNO believe is needed to take PKI to the next level of accomplishment?**
- **What does industry believe is needed to needed to take PKI to the next level of accomplishment?**
- **Based on our team's experience with leading universities, businesses, and collaborations between the two, what best practices or models might have application for taking PKI to the next level of accomplishment?**
- **Does the current PKI Charter (developed in 1995) need updating in light of changes in the ICT industry, in the economy nationally, and in the situation in Nebraska?**

These are very general questions, of course, and we expect you to refine them to best suit your objectives at the start of the project. At the same time, we would note that while many detailed, specific questions will eventually need to be answered, the type of limited, quick study we are proposing will at best be able to provide some general answers to these or similar questions.

Study Approach

The Washington Advisory Group has assembled a team of four highly qualified individuals to visit the PKI, both campuses, you and your staff, and others in Nebraska. We will review documents available to us; talk with administrators and faculty; talk with the Board of Policy Advisors and the staff of PKI; meet with others as suggested by you; and prepare a written report to you detailing our findings and our recommendations. We assume we will have a primary liaison on each campus. We will accomplish this work in several visits of team members outlined below, an offsite report-writing session of the team, and a final visit to present the report. We suggest that this final visit be in the context of a short retreat with a leadership group chosen by you.

Proposed Project Plan

Target Dates/Activity:

March 18/19: Initial visit by Peter Freeman and Molly Broad to refine objectives, approve the Washington Advisory Group team and project plan;

March/April/May: Visits by team members to carry out interviews with all identified interviewees. Our initial plan is to have a minimum of two team members in Nebraska on each trip; most interviews will be done by one team member, but in

some cases, two may participate (groups, senior people). We are planning on two trips of approximately two days each.

May 18: Delivery of Draft Report to you for review, after team meeting in Washington, D.C.

May 31: Delivery of Final Report.

Team Members

Dr Peter Freeman, a Director of the Washington Advisory Group, will be the Team Leader. He is well-known for his success in building a college-level computing unit at Georgia Tech that is known for its close work with industry, his service as a senior executive at the National Science Foundation, and his many years of experience advising universities and industry on strategic directions in information and communications technology.

You are well-acquainted with President Molly Broad, an Affiliate of the Washington Advisory Group. Her experience as a senior university system administrator and industry board member will be extremely helpful on this project.

Dr. John Breese, an Affiliate of the Washington Advisory Group, has many years experience working at the interface of academe and industry as a senior executive at Microsoft and on other Washington Advisory Group projects.

Dr. Alfred Spector, a recently retired executive of IBM and a highly successful entrepreneur, will join the team as an Expert.

Biographical summaries of all four Team Members are attached.

Peter A. Freeman
Director
The Washington Advisory Group, an LECG Company

Peter A. Freeman is Emeritus Professor and was Founding Dean of Computing at the Georgia Institute of Technology in 1990. He was Assistant Director of the National Science Foundation (NSF) from 2002-2007, leading the Directorate for Computer and Information Science and Engineering (CISE). He has consulted with numerous corporations, governments, and universities in a number of countries.

As an Assistant Director of NSF he was part of the senior management team that helped formulate national science policy and that operated the NSF. As AD/CISE, he oversaw a staff of approximately 100 and a funding budget of over $500M/year. CISE is responsible for over 85% of the Federal funding for fundamental computer science research in U.S. universities.

During his time as AD/CISE, Dr. Freeman was responsible for leading the Information Technology Research Program, helping lead the elevation of cyberinfrastructure to a major activity across NSF, initiating the GENI Internet Research project, coordinating homeland security research across NSF, and starting several key CISE programs. As a division director at NSF in the 1980's he was part of a small team that drafted the Government's influential High-Performance Computing Initiative.

Dr. Freeman held the first endowed dean's chair at Georgia Tech. Under his leadership, the College of Computing became one of the strongest and largest computing research and education groups in the country. From 1992 to 1995, he also acted as the university's Chief Information Officer and was a key part of the team that prepared the campus to host the 1996 Olympics.

As a consultant he has engaged in a wide variety of projects over the past 30 years with domestic and foreign universities, governments in several countries, and corporations ranging from start-ups to top executives of Fortune 50 companies. His work has included advising universities on creating advanced computing organizations, helping governments establish information and communications technology (ICT) research directions, and working with corporations on developing ICT R&D expertise.

He is a Fellow of the IEEE (Institute for Electrical and Electronics Engineers), ACM (Association for Computing Machinery) and the AAAS (American Association for the Advancement of Science).

Dr. Freeman received his Ph.D. in computer science from Carnegie-Mellon University.

Molly Corbett Broad
Affiliate
The Washington Advisory Group, an LECG Company

Molly Corbett Broad advises on management and leadership issues for universities and university systems.

President Broad is Professor of the Practice in the School of Government at the University of North Carolina at Chapel Hill and President Emerita of the University of North Carolina. She served as President of the 16-campus University from 1997 to 2006. The oldest public university in America, UNC is a $6 billion a year operation that enrolls more than 196,000 students.

An economist, Broad came to UNC from the California State University system, where she had served as senior vice chancellor for administration and finance (CFO) from 1992 to 1993, and as executive vice chancellor and chief operating officer from 1993 until her election as UNC President. Earlier in her career, Broad had served as the chief executive officer for Arizona's three-campus university system (1985-92) and in a succession of administrative posts at Syracuse University (1971-85).

Molly Broad has written and spoken widely on strategic planning for higher education, information technologies, research and technology transfer, globalization, bio-technology and K-16 partnerships.. President Broad has served as a member of the faculty of the Salzburg Seminar and is immediate past chair of the National Association of State Universities and Land-grant Colleges (NASULGC) board of directors, Chair Emerita of the Internet 2 corporation board of directors and past president for the International Council for Distance Education. She has served on the boards and executive committees of the Business-Higher Education Forum, the Council on Competitiveness, the National Association of University System Heads, the Association of Governing Boards Presidents' Council, MCNC (Micro-electronics Corp of North Carolina), the North Carolina Biotechnology Center, the North Carolina Economic Development Board and the Maxwell School at Syracuse University. She currently holds seats on the boards of RTI International, the Institute for Defense and Business, Elms College, North Carolina Citizens for Business and Industry, and the Partnership for Public Service as well as the executive advisory boards of the Monster.com, SunGard SCT. A member of the First Centenary Consultative Committee for Fudan University in Shanghai, China, she also serves on the Parsons Corporation Board of Directors and its audit and nominating/governance committees.

John (Jack) Breese
Affiliate
The Washington Advisory Group, an LECG Company

Dr. John (Jack) Breese advises on university and corporate R&D management, especially as it concerns technology transfer, commercialization, and management of intellectual property. Dr. Breese was a Director of Microsoft Research in Redmond Washington from 1998 to 2005, and previously lead research in the areas of adaptive systems, decisionmaking, and datamining at Microsoft. His responsibilities at Microsoft included facilitation of technology transfer efforts to commercial operating divisions, coordination with Microsoft's overseas research labs, and various activities related to university relations, intellectual property management, and customer interaction. He has held positions with Rockwell International Science Center, ICF Incorporated, the RAND Corporation, and several technology start-up companies.

Dr. Breese received a doctorate from the Department of Engineering-Economic Systems (now Management Science and Engineering) at Stanford University in 1987. He has a Master's Degree in Public Policy Studies from the University of Michigan (1979) and a B.A. in Mathematics from Clark University (1977). Engineering-Economic Systems.

Alfred A. Spector
Technology Consultant

Dr. Alfred Z. Spector is presently a Technology Consultant and was recently vice president of strategy and technology and CTO of IBM's Software Business, responsible for Technical and Business Strategy, various technical/business initiatives, and software engineering across the software group. Prior to that, he was vice president of Services and Software in IBM Research responsible for IBM's worldwide services and software research. Before that, Dr. Spector was the general manager of Marketing and Strategy for IBM's AIM business, responsible for a number of IBM software product families including CICS, WebSphere, and MQSeries, and the general manager of IBM's Transaction Systems software business. Dr. Spector was also founder and CEO of Transarc Corporation, a pioneer in distributed transaction processing and wide area file systems, and an Associate Professor of Computer Science at Carnegie Mellon University. Dr. Spector is a member of the Computer Science and Telecommunications Board of the National Research Council. Dr. Spector remains active in the field of distributed computing, but his interests have inevitably broadened due to his recent job assignments.

Dr. Spector received his Ph.D. in Computer Science from Stanford University and his A.B. in Applied Mathematics from Harvard University. He is a member of the National Academy of Engineering, a Fellow of the IEEE and ACM, and the recipient of the 2001 IEEE Computer Society's Tsutomu Kanai Award for major contributions to state-of-the-art distributed computing systems and their applications

APPENDIX 3

List of Individuals/Companies Interviewed

Board of Regents
Randy Ferlic
Howard Hawks
Jim McClurg
David Solheim
Bob Whitehouse

UNCA
James B. Milliken, President
Linda Pratt, Executive Vice President and Provost

PKI Board of Policy Advisors
John Boyer
Dick Shoemaker
Jim Strand
Lew Trowbridge
Walter Scott

PKI Administration
Winnie Callahan, VP, Univ. of Nebraska Foundation
Doug Bahle, Career Resource Coordinator

UNL
Harvey Perlman, Chancellor
Barbara Couture, Senior Vice Chancellor
Prem Paul, Vice Chancellor for Research and Dean of Graduate Studies
Monica Norby, Assistant Vice Chancellor for Research
David Allen, Dean, College of Engineering
Raymond Moore, Associate Dean for Omaha Programs, Engineering
Gary Cunningham, Dean, Agricultural Research Division, and Bioinformatics faculty (4)

Computer Science & Engineering Department
Rich Sincovec, Chairperson
Informatics faculty (2+)
Systems faculty (4+)
Software Engineering group (5)

UNO
John Christensen, Interim Chancellor (now Chancellor)
Tom Bragg, Associate Vice Chancellor for Research and Dean for Graduate Studies
Deb Smith-Howell, Assistant Vice Chancellor for Academic and Student Affairs
Hesham Ali, Dean, College of Information Science and Technology

Deepak Khazanchi, Associate Dean for Academic Affairs
David Hinton, former dean of IS&T

Blaine Burnham, Research Fellow, College of Information Science and Technology
IS&T faculty (12)
IS&T undergraduate students (6)
IS&T graduate students (8)

Bing Chen, Professor, Computer and Electronics Engineering
CEE faculty (6)
CEE undergraduate students (8)
CEE graduate students (8)

UNMC
Harold Maurer, Chancellor
Kevin Garvin, Chairperson & Professor, Orthopedic Surgery
Byers Shaw, Chairperson and Professor, Surgery (telephone conference)
Steven Hinrichs, Professor, Pathology/Microbiology and Orthopedic Surgery

Companies
AIM Institute - Adam Haeder, Vice President Technology
Booz Allen Hamilton - Skip Quint
HDR – Dick Bell
Mutual of Omaha – Jim Hansen, Executive Vice President Information Services
Pay Pal – Glenda Miller, Vice President Worldwide Operations
Peter Kiewit & Sons – Ken Stinson, Chairman
SAIC – Ted Hardebeck
STRATCOM – Marilyn Bombac and George McMullin
21st Century Systems – Jeffrey Hicks
Union Pacific – Jim Young

Others
Ken Moreano, Director, Scott Technology Center
Brian Halla – National Semi-Conductor (telephone conference)
Jeff Raikes - Microsoft (telephone conference)
Kevin Williams, Director of Global Innovation & Strategy Center and 4 colleagues (telephone conference)

APPENDIX 4

List of Materials Provided for PKI Review

Provided via Federal Express on March 14, 2007:

Notebook: PKI Self-Study, March 2007

Folder 1: PKI – General Information

- UNO 2006-2007 Undergraduate Catalog: College of Engineering and College of Information Science & Technology (pages 156-185)
- Memo dated January 22, 2007 to Winnie Callahan from Marv Sagar (The MSR Group) re: Summary of 2007 Student Survey
- Information Science & Technology brochure
- Information Science & Technology document: "Education Moving at the Speed of Business"
- Information Science & Technology documents: "Upgrade" (Summer 2006 and 2007, Issue 1)
- Scott Technology Center summary document
- PKI Website Printouts:
    - History
    - Learning from the Inside Out
    - Career Resource Center – The Peter Kiewit Institute – Room 391
    - Pre College Programs
    - Student Initiative-Mentoring Program

Folder 2: College of Information Science & Technology

- IS&T Documents
    - Bachelor of Science in Bioinformatics
    - Bachelor of Science in Computer Science
    - Bachelor of Science in Management Information Systems
    - The Information Systems Profession
    - Welcome to the Computer Science Graduate Program
    - New Graduate Certificates
    - Dual Degree MBA/MS MIS
- IS&T Website Printouts:

Folder 3: College of Engineering

- Engineering Website Printouts:

Supplemental Information left at hotel on March 18, 2007:

UNO Undergraduate Catalogs

- 2006-2007 (2 copies)

Folder: PKI Supplemental Information

- Combined Financial Plan for implantation and enhancement of the Omaha Institute of Information Science, Technology and Engineering (1996)
- Website Printouts

Folder: College of Engineering Supplemental Information

- Website Printouts
  - Biological Systems Engineering
  - Chemical & Biomolecular Engineering
  - Computer Science & Engineering
  - Construction Management

Folder: College of Engineering Supplemental Information

- Website Printouts
  - Electrical Engineering
  - Engineering Mechanics
  - Industrial & Management Systems Engineering
  - Mechanical Engineering

A variety of other documents, not catalogued here, were given to individual team members in some of their interviews

APPENDIX 3

List of individuals with whom we talked

Board of Regents
Tim Clare
Bob Whitehouse
Jim Pillen
Kent Schroeder
Hal Daub

NU Office of the President
James B. Milliken, President
Susan Fritz, Interim Executive Vice President and Provost
James Linder, Senior Associate to the President for Innovation and Economic Competitiveness

Senior Business Leaders
Walter Scott
Dick Bell
Gary Gates
Michael Lebens
Joseph Lempka

PKI Administration
Mike McGinnis, Executive Director

UNL
Harvey Perlman, Chancellor (by phone on May 23)
Ellen Weissinger, Senior Vice Chancellor for Academic Affairs
Tim Wei, Dean, College of Engineering

UNO
John Christensen, Chancellor
Burton J. Reed, Senior Vice Chancellor for Academic and Student Affairs
Hesham Ali, Dean, College of Information Science & Technology (by phone on May 29)

APPENDIX 4

List of Materials Reviewed

PKI Charter (December, 1995)
Review of PKI by the Washington Advisory Group (June, 2007)
PKI Charter Revised (June, 2008)
PKI Strategic Plan (August, 2011)
College of Engineering Integration Plan (December, 2012)
Business Case for College of Engineering, University of Nebraska Omaha, CEEN Industry Advisory Board (presentation slides) (February, 2013)
College of IS&T Strategic Plan (presentation slides) (April, 2013)
College of Engineering Strategic Plan (presentation slides) (April, 2013)
Engineering Employment Data from State Department of Labor (email) (May, 2013)
PKI Enrollments, Research, and Faculty Hires (Summary, May 2013)
Press clippings on PKI (2012-2013)
Various scheduling and minor documents

A variety of websites, not catalogued here, were also viewed.

APPENDIX 5

Short Biographical Sketches of Team Members

PETER A. FREEMAN
Emeritus Dean and Professor, Georgia Tech College of Computing

Peter A. Freeman was the Founding Dean of the College of Computing in 1990 and served as the John P. Imlay Dean of Computing until 2002. He is now Emeritus Dean and Professor and continues to work with Georgia Tech on specific projects. He is also a member of the Advisory Group at Huron in Washington, DC. From 2002 to 2007, he was Assistant Director of NSF, heading the Computer & Information Science & Engineering Directorate. He previously held positions at George Mason University, NSF, the University of California, Irvine, and Carnegie-Mellon University. He is a resident of Washington, DC. He has focused his attention for over twenty years on national policy and local action intended to advance science and engineering research and education. For more than thirty-five years, he has been active internationally teaching, lecturing, and consulting overseas for extensive periods. As a member of the Advisory Group at Huron, he advises on university and R&D strategy and management. The Advisory Group at Huron provides strategic counsel and management consulting to the leaders of universities, governments, non-profit organizations, and companies. The group, formerly known as the Washington Advisory Group, was founded in 1996 by a group of leaders in national science policy and research funding, including Erich Bloch, Frank Press, and Ed David. Dr. Freeman is widely recognized for his technical and educational activities in software systems and software engineering, and computer science and information technology more generally. In addition to his academic and research activities, he is an experienced university and government executive and manager, and a seasoned lecturer and consultant to corporations, governments, and universities in more than a dozen countries. Dr. Freeman received his Ph.D. in computer science from Carnegie-Mellon University, his M.A. in mathematics and psychology from University of Texas at Austin, and his B.A. in physics and mathematics from Rice University.

DON P. GIDDENS
Dean Emeritus & Professor, Wallace H. Coulter Dept. of Biomedical Engineering,
Georgia Institute of Technology

Dean Giddens received all his degrees (BAE 1963, MSAE 1965, and Ph.D. 1966) from Georgia Tech and joined the Tech faculty in 1968, after two years in the aerospace industry. In 1992 he left his position as the Chair of Aerospace Engineering to serve as the Dean of the Whiting School of Engineering and Professor of Mechanical Engineering at The Johns Hopkins University until 1997. In 1997, Giddens rejoined Georgia Tech to establish the Wallace H. Coulter Department of Biomedical Engineering, a joint department between Georgia Tech's College of Engineering and Emory University's School of Medicine. He served as the founding Chair until July 2002, when he became the Dean of the College of Engineering. Giddens retired from Georgia Tech on July 1, 2011 and currently continues his research on a part time basis as a professor in the Wallace H. Coulter Department. Dr. Giddens is a member of the National Academy of Engineering (NAE), American Society for Engineering Education (ASEE), Biomedical Engineering Society (BMES), a founding Fellow of the American Institute for Medical and Biological Engineering, and Fellow of the American Heart Association, American Association for the Advancement of Science (AAAS), and the American Society of Mechanical Engineers (ASME). Giddens has served in a variety of professional activities involving engineering education and biomedical research. He is currently Immediate Past President of ASEE, and Chair of the Bioengineering Section of the NAE. He is the author of over 300 publications, book chapters and presentations, and continues an active research program in biomedical engineering.