Engineering College Council Meeting

March 31-April 1, 2011

401 Physical Sciences Building

Members Present: Jim Becker, Lance Collins, Sarah Fischell, Sam Fleming, Greg Galvin, Mike Goguen, Geoff Hedrick, Frank Huband, Jim McCormick, Evelyn Pearson, Bob Shaw, Bill Shreve, Dan Simpkins, Roger Strauch, John Swanson, Sophie Vandebroeck

Emeriti Members Present: Dick Aubrecht, Jay Carter

The meeting presentations and materials can be found at:
https://confluence.cornell.edu/display/ECC/2011+Spring+ECC+Meeting

Username: eccmeeting@gmail.com
Password: eccmeeting#

Desired Outcomes:

To report on the progress of the ECC industry relations working group and define course of action that will advance Cornell Engineering Industry Relations and Tech Transfer.

Welcome, Introductions and Overview of the Meeting - Bob Shaw and Sarah Fischell

Bob Shaw and Sarah Fischell welcomed the Council to the Spring '11 ECC meeting. Bob Shaw indicated that the focus of this meeting would be to discuss industry relations and tech transfer at Cornell's College of Engineering.

Capital Campaign Update – Jim Mazza and Kathi Warren

Jim Mazza, Assistant Vice President, Alumni Affairs & Development, gave an update on the Capital Campaign. He pointed out that the Physical Sciences Building is an example of what Cornell is doing to attract the best and brightest faculty and students to this campus. He gave an update on the status of the University's capital campaign and its impact on the College of Engineering. Jim mentioned that he was impressed with the number of faculty in the College (including the department and school directors and chairs) whose collaborations promote the mission of the College and University in ways that would otherwise not be possible. He gave the example of the partnership between the College and the College of Engineering Alumni Association (CEAA) which have sponsored a number of mini-conferences over the last year, including one focused on energy. The work of the AAD staff has contributed to this success. He announced that the University surpassed the $3 billion mark earlier this year towards its $4 billion goal. He pointed out that we are one of the few institutions in the world that has been so successful in fundraising. He mentioned that due to the economic situation over the past

couple of years, the Provost and President will recommend to the Board of Trustees at their May meeting that we extend and expand our campaign goal through 2015, with the idea that we will increase the goal (the number is yet to be determined), as well as to focus on this key set of priorities that span the University, including the specific priorities of the colleges. Some of the College's and University's priorities include: faculty renewal, undergraduate scholarships, graduate fellowships, and support for engineering programs such as biomedical engineering and energy programs. These programs are essential not only for engineering, but for other programs across the University. He pointed out that the University's upcoming sesquicentennial in 2015, is another opportunity for the University to leverage additional engagement. Jim indicated that another major change we are making is how we use volunteers at Cornell. Cornell is well known for its engagement with volunteers across campus. He mentioned that we are fortunate to have the ECC's involvement as well as the involvement of alumni from across the world. The University wants to take an additional step to connect the college advisory councils at Cornell with the University's major gifts committee and the trustees. He gave the following example: Lance will be receiving a request over the next two months to recommend someone from the ECC to serve as an ex-officio member of the trustee committee on development, which is the policy committee that determines the policies on fundraising and philanthropy at Cornell. Through this committee we will have a voice in every decision made about philanthropy at Cornell in a way that we have never had before. It will also increase communications and collaborations of the various advisory boards on campus. An announcement of this expansion of the campaign will be made at the Trustee Council Weekend in October. He indicated that all ECC members will be invited to attend Trustee Council Weekend and he hoped that they would be able to attend.

Questions/comments:
Question: What role should AAD play in industry relationships in the College?
Jim: University-wide, AAD has played a smaller role than you might see at other colleges and universities across the country. There's a solid coordination in engineering between AAD and Corporate and Foundation Relations, however, at the University level, we have not had a comprehensive strategy to address corporate relations with AAD.

Question: With the constraint in federal dollars, how does AAD plan to fill that hole?
Jim: As it relates to the University's research program, our guidance which comes from the Provost is not to replace those dollars. However, he indicated that we will work very hard to seek dollars in support of programs and students. Lance added that one exception is graduate fellowships. Start-up and bridging funds have been supported through AAD gifts, and federal dollars often follow later.

Comment: Most faculty don't realize the relationship that the alumni have with the University so they don't think about the alumni as a resource. The ECC should consider having a more active role with the faculty and informing them of the contacts with which the council can provide them.

Jim: Gates Hall had a $15 million funding gap that needed to be filled which was met with the help of AAD. Our industry relationships have opened doors for us to have conversations with people that would not have occurred otherwise.

Kathi Warren, Assistant Dean for Alumni Affairs and Development, followed by thanking the Council for helping the College achieve its goals related to the Classroom Project, which demonstrates the Council's commitment to this very important priority. She indicated that the College is working on its Strategic Plan which will help us focus on achieving our goals and will be discussed at the October ECC meeting. She also pointed out that a funding summary sheet (based on cash gifts only to Cornell during the fiscal year noted) was placed in each member's packet which shows if they have given in any of the following four categories: the College of Engineering Annual Fund, other College of Engineering funds, the Cornell Annual Funds at the University, or other non-College of Engineering funds at the University. This is the result of the feedback we received from the Fall'10 ECC Meeting. The funding sheet was meant as a starting point to give members a summary reflecting their personal giving. Kathi concluded by thanking the Council for its generosity and support to the College of Engineering and to Cornell.

Comments:
It's important that alumni become more connected to the engineering faculty. It was suggested that perhaps a role of the ECC could be to meet with faculty the afternoon when they arrive for ECC meetings. This is something that the trustees do all the time. This would be an opportunity for the Council to make connections with faculty.

Update on Tech Transfer at Cornell University – Lance Collins

Lance gave an overview of tech transfer at Cornell. He indicated that his primary motivation on discussing this topic was that there has been a shift in our faculty with respect to the newer faculty. The younger faculty is far more interested in tech transfer than the older ones. He pointed out that there has been an incredible level of interest in tech transfer which will only grow in time. Lance mentioned that the time between the invention of an idea and its commercialization has become a shorter and this can happen numerous times in a faculty member's career. There's something powerful about being able to have the ability to impact the world and that is something we care a lot about. As dean he feels responsible for being the caretaker of faculty to solve the tech transfer problem. He pointed out that the budget crisis in Washington will mean diminished funding over the years, which creates a vulnerability that has also been recognized.

Lance emphasized that tech transfer is an important issue for the college to address, and a bullet point on this should be added to our strategic plan to highlight its importance. He indicated that one of the complexities we face when trying to improve tech transfer is that the federal government is putting more and more onerous reporting requirements on all of us (and not just for Cornell), which creates the need to try to balance the requirements imposed by the government and our interest in improving services. He emphasized that we need to reduce the administrative burden on researchers. Bob Buhrman is working

very hard to keep these requirements to a bare minimum and is trying to keep the right balance. Bureaucracy is a problem because it's not compatible with the flexibility that is needed to get the work done.

Question: Is the time that it takes to get a license been measured? This would be very valuable data to extract.
Lance responded that it's probably easier to get that data from the outside rather than internally. Simultaneously we also need to look at our success rate in getting a license. Then we would also be able to track the number of failures in getting a license.

Lance also gave an overview of the tech transfer breakout session at the BOT meeting in March. He showed a graph on industry funding trends (Cornell's ranking among the top 20 engineering colleges in terms of percent of research supported by industrial funding) and it looks like we are going in the wrong direction. He indicated that we have made progress, but other universities have made even more progress. Comparatively, we have slipped in the rankings. It is possible that our federal dollars have gone up faster than that of our peers and that this or other positive things are making the trend look negative, but on the other hand, he would love to see the trend remain at least flat. Lance pointed out that we need to use the right metrics to understand these trends.

Comments: The focus of the metrics should be on the results that occur after licensing. There's no place at the University where you can get the aggregate information needed. If you don't license a patent, then you'll never know its potential. If you are not focusing on minimizing your legal fees, and you are trying to maximize your licensing fees, then you start to realize that you've spent a lot of money on attorneys, which is more money than you're bringing in. Some of the behavior of Alan Pau's office (CCTEC) is that they are trying to get to a neutral status where they are covering all of their expenses. There are a lot of functions at the University that we're aware we have to pay for. Perhaps that is creating some weird incentives that perhaps are not productive which is something that might be solved by the Provost's office. If we viewed CCTEC as a service center that might be more productive than viewing it as a profit center.

Comment: The NYC Proposal might put some pressure on the system to solve these problems. The vector of that opportunity is perfectly aligned with the direction that we are pushing in the College.

Question: How many people in the room have done business with CCTEC (several raised hands)? How many have had positive experiences dealing with CCTEC (only one hand was raised).

Comment: At a meeting several years ago when John Hopcroft was dean, John Hennessy, who was an ECC member at that time and is currently the president of Stanford, discussed this topic and made a recommendation and emphatic plea to Cornell to not worry about these contracts, but to make them easy so that it could enjoy the benefits and fruits of its labors and create goodwill. Hennessy added that to the extent that you press for that last dollar, you're probably going to pay for it philanthropically.

Comment: So the issue is not tactical, but a value system issue. It's a value system that in spite of all of this advice people say they're listening, but fundamentally they disagree with the advice. They don't truly understand it or in spite of all the words this simply isn't a priority for the leadership of the University.

Lance mentioned that if we can't address tech transfer with our current president and provost who understand the problem (the President was commissioned by the governor to write a task force report to look at this particular issue, the provost is the former dean of engineering that struggled against this issue) then he feels that this problem can't be solved, and we should move on.

Comment: You need the right people in that position to make any changes.

Lance responded that it isn't necessarily just the people. If we change the metrics, then we might change the behaviors. He added that we have the right people, but that OSP needs to function in a different way. Lance indicated that his approach to this issue is to identify the metrics that would better drive the behavior.

Comment: We need to support Lance in this effort. The problem needs to be addressed to the leadership in a way that they can do what needs to be done (whether it's the process or people, etc.). We can't declare failure. We have to put together the information we have in a way that it has an impact on what needs to be done. And hopefully through this meeting and the subcommittees we can make progress on this issue.

Lance addressed some of the questions asked at the Board of Trustees strategic planning breakout session, one of which was "Should Cornell follow its peers, or should we be more or less willing to make concessions to close a deal?" There is a sense that we are more permissive than other institutions that are perceived as higher performers in this phase. And the question is where do we want to be as an institution? Should we be more willing to make concessions to close a deal or less willing? Lance summarized the discussion at the session by indicating it was agreed that Cornell should retain IP in alignment with the Bayh-Dole Act (which gave IP to the university) and that there are many "acceptable" models of tech transfer: private industry, entrepreneurial activity, royalty or royalty-free licenses.

Comment: The Bayh-Dole Act has created a culture where there are no other options. We need multiple models (not just NSF and NIH models) and we need to develop alternate ways of doing things. Sam Fleming's committee put forth that recommendation.

Lance continued by stating that Cornell should emulate best practices, recognizing our unique characteristics. He added that return on investments can be measured in many ways and we are overly focused on the licensing.

Comment: We should also focus on improving society and that should be the driver. Cornell should be a center for improving society, not just be focused on how much we

can make on the IP. Anything funded must be of the public domain. Lance indicated that this is an ethos of the younger faculty and that it is probably as big a driver as any.

Lance added that at the BOT breakout session it was also recommended that we create an environment for tech transfer throughout Cornell by:
- identifying a senior administrator to support tech transfer throughout Cornell
- supporting faculty whose interests include tech transfer
- including tech transfer activity in a positive evaluation for tenure and other assessments
- recognizing that younger faculty recruited as part of Cornell Faculty Renewal initiatives may have greater interests in tech transfer than older faculty, and
- by celebrating tech transfer success at the student, faculty and institutional level.

The issue of proof of concept was also discussed at the session. Some of the questions posed were: should we try to bridge basic research and broader investment commitments as has been done successfully at other institutions? Should Cornell follow its peers, or should we be more or less willing to make concessions to close a deal? Should establishing "proof of concept" center be the next priority for moving Cornell forward in tech transfer?

Lance mentioned that at the BOT breakout session it was pointed out that ethics compliance should be mandatory and that the current metrics used by the Vice Provost and CCTEC were considered useful. Pending IP guidelines for faculty were seen as positive and that risk remains in research monitoring. The mood at the session was very constructive and positive.

Comment: There is a message of failure and hope. The best role the Council can play here is to accept that change is happening adopt one of the interesting ideas currently being shared that we can get behind. One place where we have not made much progress is with our industrial relationships. It is great that the committee has pointed out what more needs to be done to support this effort.

Comment: Cornell needs to focus on how to enhance the philanthropic base of this university and how to legally structure its agreements and to promote relationships with industrial partners that will lead to counting on the goodwill of those partners if they enjoy success with that technology. I believe we have not yet made that valuable step at the top.

Comment: The President, Provost and VP of Research are in a new place and are willing to listen to accept this change. The NYC campus could give us a fresh initiative since this proposal will give us a reason to look at how we operate.

Cornell Industrial Relationships - Bill Shreve, Rajit Manohar, Dick Aubrecht

Bill Shreve gave an overview on the industrial relations subcommittees. The dean charged them with creating a clear policy with rules and boundaries and with creating

templates for mutually beneficial interactions. He decided that the best approach would be to focus on how industry views Cornell (the opposite of what we have done in the past). The tasks were divided into 3 parts:

1. Document current policies and processes. Summarize work of earlier studies – Led by Rajit Manohar.
2. Look at peers for best practices – Led by Bill Shreve.
3. Research experiences working with Cornell to document what is working and what might be improved – Led by Dick Aubrecht.

Rajit Manohar discussed Cornell's 2011 Policy Statement which describes its interest in IP and tech transfer. One of the tasks of his subcommittee was to find out what is needed to acquire a license. He spoke to CCTEC staff extensively. The first step is to call CCTEC, sign a NDA to discuss technology, negotiate the license term, agree on evaluation license terms and then negotiate the full license agreement.   Sample agreements are provided, but all the financial terms are absent. No ranges are provided and when asked why that is the case, he was told that it is done on a case-by-case basis. That is all they were willing to commit to. He pointed out that the real problem is that CCTEC is not usually part of the loop early on when you are trying to get a research grant with a company. At that point you are working with OSP and they are not connected, except at the level of the Vice Provost for Research. From the company's perspective, they don't know what they're negotiating for, and that's the complaint that he received directly from his sponsor, because you don't know what IP might arise. Rajit also noted that until he sees the claims, how does he know what that IP is worth?   How can he say up front how much he's going to pay for the IP when he doesn't know how much it's worth? The problem is that since the terms are so nebulous, there's a wide range of possibilities and it's hard for them to know up front what that range will be.

Comment: Companies like to negotiate non-exclusive, royalty-free licenses. However, companies should probably not ask for exclusively free licenses.

By way of example, Rajit noted that he had contrasted Cornell with Berkeley. The Berkeley website is a one-stop shop where an individual or company can go to find out process and costs. The Cornell process has too many free variables. CCTEC thinks it already has a process and template in place.

Comment: CCTEC needs to understand what a good process and template are. Perhaps they could get the document from John Hennessy at Stanford and cut and paste different parts of it.

Rajit stated that perhaps CCTEC is poorly incentivized. CCTEC has tried to cut and paste some parts of other institutions' templates, however, this becomes an issue because there's a lot of judgment; complex policies (i.e., Cornell does not want a faculty member to negotiate on its own behalf, at Stanford you can).

Lance mentioned that the template idea is a starting point for negotiations. It would be great if we could identify good templates for the different areas and choose a template for each type. That would be an excellent outcome of today's meeting.

Comment: Until you address the value system issues, you won't succeed in solving this problem.

Question: Have any of the trustees involved in the strategic planning breakout session ever done business with the University or was it only intellectual.
Response: Yes, four or five trustees have done business with Cornell.

Comment: there's a disconnect between this policy statement and the reality of the experience by people who try to form industrial relationships. The ECC can help Lance put meat on the bones of this topic.

Rajit outlined some of the prior recommendations such as: best practices; ensure top-level commitment and leadership; facilitate commercialization pipeline; and create a clear and uniform policy for access to University resources. Currently, it is very ad hoc, almost on a department by department basis. He also pointed out that Cornell's policy on faculty consulting is that if you consult, the University still might exercise ownership rights on any IP that results from that consulting. Therefore, if you are consulting for a company, and a patent results from that consulting, you are required to disclose that to CCTEC and Cornell is entitled to ownership rights. Stanford's policy is that the faculty member, who's doing the consulting, if they feel there's an overlap, can let their dean know this and then the dean on the academic side can determine if there's an overlap between what they're doing in their consulting job and what they're doing at Stanford. At Stanford the technology licensing defers to the academic side of the colleges to determine if there's an overlap in the research; the technology office might accept ownership rights.

Lance added that this can be really awkward if a faculty member signs a non-disclosure agreement with a company and then has to disclose to Cornell the research agreements which create conflicts. He indicated that he is currently in discussions with Bob Buhrman regarding this topic. The issue from Bob Buhrman's perspective is that there may have been federal funds used in steps towards a particular invention that have flowed out of the work done with a particular company. There's an element of trust missing at Cornell. It's a question of oversight.

Comment: There's a disconnect between policy statement and the reality that is experienced by people trying to put together industrial relationships.
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Comment: Stanford relies on the ethics of the professor, of the researcher, to make sure that he or she, when using university and/or public funds, is appropriately disclosing publically the results of that research. He or she may use that proprietary material, but it's a big ethics issue.

Comment: CCTEC is not really qualified to make these determinations. It's astonishing to think that CCTEC thinks that they can. They may understand the legal stuff, but how could they possibly understand the technical aspects.

Bill Shreve pointed out that CCTEC is taking a legalistic view of these contracts. It's not taking into account a trust relationship or a larger picture in terms of the value of the relationship. Companies are taking the approach to become more involved in creating relationships and not to create a one project deal at a time. The cost of the deal rarely justifies a lot of effort.

Rajit indicated that in his case it was very clean because he took a one-year leave of absence from the University to create his company. Since he did not receive any benefits from the University that year, they agreed that they did not have any ownership rights on his company. He is not aware of any other faculty member who has taken that step. He knew this was going to happen, so he decided to take the leave, because there are 25 patents from that year and he's sure that Cornell would have said that they own all of them. His graduate students would love to know what he did, however, he cannot tell them.

Comment: Rajit is unable to tell his grad students what he was working on and the whole purpose of the institution is education. And if this is interfering with education, you need to tell somebody that this is not right. With start-up companies you go through all of these entanglements and with corporations, they're not interested. Also, if Rajit left and went to another university, Cornell would have no claim over anything that he did there.

Question: What can the ECC do to help change this process?

Lance responded that part of the reason that he wanted to have this conversation is that people who have routine relationships with other universities do not have to fight this particular battle, and this issue is interfering with the free and open transmission of ideas. This is something Buhrman listens to and he is a real believer of this for the publication process. Lance added that he would like a comparison on what other institutions are doing.

Bill Shreve described his role which was to look at best practices. He divided them into two parts: start-ups and larger companies. Almost all of the successful start-ups that he talked to said that what was critical to them was a partnership from day one with the University and that the professor with whom they were working, became part of their team which made their company successful. They weren't just doing licensing agreements, but were also creating partnerships and they had shared equity between the investors who funded the small company, the founders who were some of the university people and the faculty. The whole focus was to minimize upfront costs, because the start up has a limited amount of money. Having the professor engaged during the entire process was important. University's flexibility in payments was important. He knows of a faculty member who's a one-man company and who spends a great deal of time negotiating with Cornell instead of working on his company, which creates a financial

burden. Early stage payments are important for the start-up. And once you finish the negotiations, you don't want the relationship to break off. Building a positive relationship helps to foster future relationships and opportunities. These companies want to establish strategic partnerships. Having the professor engaged throughout the process was absolutely critical. And many of them had minimum payments. Technology and commercialization is not an exact science and so the universities that remain flexible do better in the end. The real importance is not the initial deal, but the relationship that you are building. And if you build up positive relationships, the companies will keep coming back again to the research teams and they'll extend to other research teams, and the snowball effect will happen. This is how Stanford became so successful. Rajit added that he's actually been able to get funding for friends at other universities through his relationship with the company with which he worked.

Bill mentioned that when he talked to people from the big companies, he received one of two responses: they really wanted to strive to pick a few universities they could partner with strategically, and they tended to pick those universities based primarily on the number of graduates that they hire whose success within their company provided them with very strong technical people. This gives them an inside track to hiring that talent. Very few companies said that they care much about licensing. Cornell needs to think of royalties in a different way.

Comment: If you are stacking royalties, you end up with no product left. So a company will just say forget it. CCTEC starts with the premise that they are going to want to stack royalties.

Question: Why does CCTEC approach this as if royalties are going to stack?

Lance responded that he has the sense that their performance is being measured by the licenses they bring in. Perhaps we can invite CCTEC to the Fall Meeting. He would like to approach them first before inviting them to speak at the next meeting.

Bill indicated that most big corporations are looking for a few strategic partners at a few universities. All of the relationships that were successful started relatively small and grew. What if we provided not only a template for a project but also a template for a relationship with Cornell and give them a model on how they might grow their relationship. The College could be selective and build relationships with the companies that would benefit it most.

Comment: Perhaps the compensation of CCTEC staff could be tied to the success of IP and their salaries could be paid based on their results, to encourage the nurturing of relationships.

Abby Westervelt pointed out that at MIT there are about 50 people in their industrial relationships office who manage relationships. You need more than 1 person to manage these relationships. We need to implement a structure to create strategic relationships.

Lance added that we need to think about this situation in a way similar to the way AAD thinks about its alumni and donors, which is to foster long-term relationships.

Dick Aubrecht led Industrial Task 3: The assignment of this group was to interview some companies to get their perspective on tech transfer. He indicated that he agreed with everything stated by the first two task forces. The objective of his group was as follows: "to develop an Industrial Perspective on their Cornell experiences aimed at commercialization of Intellectual Property. To do this, we will identify experiences aimed at commercialization of Cornell technology either through direct collaboration, licensing or launching of new businesses that led to productive interactions, that failed to produce results after being initiated, and that never got started despite efforts by the industrial entities to collaborate." His group conducted anonymous interviews with 6 companies (4 big, 2 small) and made the following conclusions:

- Contacts originate primarily directly with the professors.
- Most projects have not achieved objectives.
- Knowledge sharing and access to leading-edge thinking are the primary objectives. Licensing IP is not often an objective.
- Cornell is not easy to deal with relative to contracts. It takes a long time.
- Cornell should focus on increasing research funding and forget IP licensing as its financial objectives.
- Cornell's reputation for industrial-funded research is not positive relative to the 20-25 top research universities.
- Cornell has much more potential to develop broad multi-faceted industrial relationships.

Most companies found Cornell a very disappointing place with which to work. Companies want to come to Cornell for free flowing intellectual engagement. For that to occur, we need to get IP issues out of the way. Two of the companies interviewed were small start-up companies. Dick indicated that large companies are a continuum of small start-up companies. He also pointed out that the people at CCTEC are knowledgeable but just not easy to work with. Several complemented Abby Westervelt on the relationships that she has established. They all said that they wanted multifaceted industrial relationships. Contracts will come out of these relationships but that is not the objective at the front end. Cornell should forget the IP licensing as far as the financial objective and do royalty free licensing. The main point is getting IP out of the way, which is a major hurdle. Another comment during one of the interviews is that there's a very rapid trend of companies to go offshore to avoid these problems. We need to think of this as a global competition. Dick indicated that his company is moving in that direction. Bill Shreve added that Agilent Technologies is also increasingly working with universities abroad. These universities were more concerned with relationships rather than IP. The U.S. model is totally different than what you see abroad. He also pointed out that the front end at the College of Engineering is Abby. Many of our peer universities publish opportunities to partner with their faculty on their websites. This marketing piece could be helpful for creating opportunities for companies to make connections with our faculty. Lance added that MIT has a searchable database which focuses on making connections.

Dan Simpkins was part of this task force and described his interview at Kodak with John Spoonhower (who once ran the University liaison program with Kodak.). He tried to reach him several times before John finally agreed to speak to him. One of the last questions Dan asked him was what actions should be taken. John distilled this down to a few very simplistic things. He indicated that it takes too much effort to figure out who runs the process and makes the decisions. The decision making is a critical factor in order to get any action taken. Start-ups move very quickly. The rules about how to get a deal done were nebulous. College silos make the process harder. Cornell needs to offer a guidepost site which would be very powerful and fairly easy to execute. It also should provide a checklist of steps a company must take, with all the necessary forms, and different templates depending on the type of company, etc., as well as a database of all the research.

Dan added that the generational gap matters. Younger professors are more interested in this than older professors. Use social networking to provide a place for interested professors who desire to work with outside companies. Reverse the trend and make the process straight forward. He indicated that the patent process in the U.S. is going to change dramatically and that is something that will change this whole process. He pointed out the first to file system versus a first to invent system. This was essentially between pharmaceutical and software tech giants. Software tech giants want patents to be weaker and to basically win on the success of their products. However, for the pharmaceuticals, the patent is everything, and if you don't protect that very strongly you don't have a business. These two sides were at odds with each other on this. Someone told Dan that as a start-up he has probably filed more patents than anyone else in the U.S., almost 300 patents to date. He added that in the pharmaceutical area patents are everything. The amount of time that it takes to process a patent is quite lengthy. In the U.S., the patents for most start ups take 4-8 years. Patents are going to come under attack much more easily with the new rules and the University's role in the prosecution process is going to matter a lot. So if professors are filing patents, it is potentially a much more difficult prosecution process. However, if you can partner with industry and get them to pick up prosecution costs, that could be particularly valuable. It is also important to realize that the manner in which a patent is prosecuted dramatically affects whether or not it is valuable to a company.
Question: Will this first to file have a negative impact at the University?

Comment: We need to file patents that are valuable not just interesting. The University needs to foster these relationships because they will help us determine what is valuable.

Dan emphasized that this matter of licensing is going to become very important. Companies will determine what is valuable and this will drive the patent process. You're going to want to say, you, Mr. company "X", you know what's valuable, help me file this, help me figure this out through the relationship with the professor, file the patents, take the ownership of prosecuting those patents and then I will give you a royalty-free license to that IP and go forth and make money and then later the money comes back for philanthropic means. He heard through his conversations that people are frustrated with

the current process and that it is critically important, given what's going on governmentally, that we succeed at this or we are going to greatly diminish the value of the University's IP.

Comment: Cornell does not seem very interested in establishing entrepreneurial relationships.

Dan described his personal experience, saying he came to Cornell 8 years ago and had a particular technology area that was a focus of his company and was introduced to a professor. He met with that professor, and the attitude was extremely negative. It was -- I'm a professor at Cornell and you are a nobody. The professor couldn't imagine that Dan could generate any value for him but, on the other hand, the professor could generate a lot of value for Dan, and so there was no interest whatsoever. The process died on the vine. He believed that the University lost a great opportunity.

Dick Aubrecht pointed out that these interviews made him think about this in a couple of ways. There is a long-standing culture at Cornell which values NIH and NSF research. Some of them have been thinking about how they can change the culture at Cornell, and he's come to the conclusion that you don't want to change the culture, that's not possible. What you can do is add to the culture and create a new culture that makes startups and industry relationships an acceptable part of the Cornell culture. Universities have had a trend towards multiculturalism, which takes on several meanings. He indicated that there are 3 basic cultures: 1. IP -- NSF related research. 2. Large companies. 3. Startups. We should leave one culture the way it is and add 2 new cultures.

Presentations by Engineering faculty on their experiences connecting to industry while at Cornell

Uli Wiesner, Professor of Materials Science and Engineering, gave a presentation on Nanomaterials for Nanomedicine and described the technology that he has developed and spun into a start-up company. He indicated that his company has been working for the last 15 years on organic and inorganic hybrid materials with nanostructures. The issues they are interested in are energy conversion and storage, clean water, diagnostics and nanomedicine. His presentation focused on diagnostics and nanomedicine. He pointed out that if you have a tumor and go into surgery, there's no engineering parameter that helps surgeons determine what to take out and what not to. This is entirely based on their experience of what they take out and how much they take out. Chemotherapy is often used in cancer patients but has substantial side effects. He noted that his research bridges the physical distance between the Cornell and New York City Weill campuses and bridges the disciplines of science/engineering and medicine. He mentioned that there is a trend toward minimally invasive surgery, using small instruments that can be inserted in the body with small incisions, integrating optical imaging in surgical instruments. A revolution is taking place in optics which will make imaging much easier in the future. What's missing is effective optical imaging probes for surgeons to use. There are hardly any engineering tools that help the surgeon know what tumors to remove. Uli indicated that they decided to go with silicone particles with dyes incorporated in them and over

the years they have learned how to engineer them to very small sizes. This is important if you take in consideration the high cost of dyes ~$200/mg (almost as expensive as a diamond in terms of mass). He pointed out that if you can make dyes per molecule 10 times brighter, you have just cut the cost by a factor of 10. That was the platform for the diagnostics company. He added that there is a whole diagnostics industry that is optimized to these dyes. His company does not change the dye characteristics, they just make them brighter.

Uli pointed out that they started working with the Cornell Nanofabrication Facility and later with people in the Veterinary College and they started to think about injecting them into animals. The idea was to make the dyes excreteable from the kidneys into the bladder to minimize exposure to the human patient. The excretion pathway is the most efficient pathway to get stuff out. If you don't get it right it goes through the liver and takes weeks and months to be clear through other pathways. If you do it right, nothing sticks to the liver. Everything goes through the kidney into the bladder. So at that point they started to work with people at the Sloan Kettering Cancer Center. Last December they were the first to ever receive FDA IND approval to use an inorganic nanoparticle approval to get into human trials. This was only possible because there was a very intricate interaction between the campus here, a start-up company and the campus down in NYC. He also mentioned that his start-up company, Hybrid Silica Technologies (HST), obtained a licensing agreement with Cornell in 2004. His company is currently under negotiations with Cornell to form a new company: CST. To date, no venture capital money has been invested in HST. However, he emphasized that you can't do this without venture capital. Venture capital takes at least 2 years behind what the field is doing because a) the only way they know about it is by talking to a lot of prime experts in the field so that takes a while. But if you're in the field, and you go to all these conferences, you see it a lot faster than they are. Eventually, they will probably need venture capital for CST. His conclusion after his experience over the last 10 years is that there is a very urgent need to improve Cornell's support for entrepreneurial activities. Universities will increasingly become centers for innovation. Universities will either need to embrace this or will be left behind. Rankings will also be based on how many start-up companies and technologies come out of universities. If we don't embrace this change, Cornell will slip in the rankings. We can either put our heads in the sand or we can do it. Cornell, in particular, needs to be proactive because of its location (it's not in NYC or Silicon Valley). We're sitting in the middle of nowhere. So if we are not proactive, things will not happen automatically. Therefore, the University has to put itself into the driver's seat, embrace it and go for it. All of this is intimately linked to faculty hiring and retention. He emphasized that if you want to get the best people, then you have to do it and want it. The constituents that we serve, the faculty and students, also want this. So the new faculty that we're hiring are coming from very successful groups and all of these groups are starting companies and one of the first things they ask is how do we do this, how do we make this work? He referred to a paper written by the Entrepreneurial Faculty Working Group (EFWG), an informal group of Cornell faculty from across campus, which identified an urgent need for action in order to improve Cornell's support of entrepreneurial activities, and presented this document to the upper administration. In conclusion, the College of Engineering should lead these efforts. We need a $100 million

commitment to build a leading-edge research and commercialization center as a nucleus. Uli gave the example of the University of Utah which has made a financial commitment to establish a commercialization center. At Cambridge, where his start-up company is located, they are surrounded by an exciting intellectual environment, where there are companies that share the same environment, which is missing at Cornell. North Carolina is another example of where this has worked (because of the interaction between the state and university). He noted that if there's a will, there's a way.

Question: What was the reaction to the white paper?
Uli responded that the Vice Provost of Research was invited to come speak to the EFWG and the group wanted to discuss the University's vision on this topic. The Vice Provost came to their meeting, but rather than having a discussion with them, they got a one-hour monologue on compliance issues. When asked about leadership, the Vice Provost responded that he was not responsible for leadership. He added that when Kent Fuchs was dean, he was very supportive and encouraging of start-ups. But now, as Provost, he thinks that he is understandably preoccupied with other things, and encouraged the group to talk to the deans, etc. President Skorton came to the departments and seemed quite receptive of the whitepaper; however, Uli noted that he needs to be since he's the chair of the task force report to the state which has all the right words when you read it. However, it's not clear how much he wants to be the driver of this effort.

Question: Have you had any negative feedback on this paper from the faculty?
Uli responded that the report was written by people that are interested in this topic so we have not distributed it to a larger group of faculty. He's not sure how they would react. Lance added that he has not seen anybody push back, including on the administrative side. The other deans do not want to lead this charge, but are supportive of it.
Uli mentioned that some of the faculty has also talked to the Board of Trustees and to Peter Meinig. Meinig, as well as several members of the Board of Trustees, are also supportive of it. The constituents of the students, faculty, and BOT want it, and he hopes that the College also wants it.

Question: If Cornell was able to get this commercialization center, how would it replicate the kind of interactions you are talking about like what you have at Cambridge, here in Ithaca?
Uli indicated that he does not have all the answers but when he compares the situation right now to what it was 10 years ago when he first came, there's a lot going on, in particular with the Johnson School of Management. They would like to see a commitment from the upper administration to aggressively push this forward.

Bill Shreve mentioned that the subcommittees have been looking at some studies over the last 6 months and at successful startups that have come from other universities from years past. He noted that one critical success factor has always been the continuing involvement of the faculty member who was the founder of the idea or one of the inventors that started it. They don't necessarily have to be part of the company. It can be consulting to move things forward, although many of them take place when a professor is

on sabbatical or leaves completely to make the company successful. If you go to Cambridge, they're basically forcing the professor to disengage or leave the university.

Uli added that he does not feel less engaged because his company is in Boston than before.

Bob Shaw asked Uli if he could find a leader who could cause this group to coalesce around some action planning, pushing agendas every day, and if Uli or someone could lead this effort? He added that everyone is frustrated and that we need to find a solution to this problem.

Uli indicated that neither does he have the time nor does he know who might be able to lead this effort. He added that he's not as frustrated as one might think. He noted that he is very grateful for the environment at Cornell and for all of the opportunities he has had here. He worries about the people who will come here in the next 10-30 years and expressed concern for the long-term impact this will have if the University doesn't do something. He wants the upper administration to understand that the next generation will suffer if something isn't done.

Lance volunteered to take the lead in this effort with the EFWG as consultants. He agreed that it is difficult for faculty to have the time to dedicate themselves to leading this effort, and suggested that creating a fund might be a better model

Question to Greg Galvin: Do you think there's an opportunity to build a greater infrastructure, address retention issues, etc.
Greg Galvin responded that yes, it's possible to have a successful start up here. He indicated that things are drastically different than they were 17 years ago when he started; however, it has a long way to go before it has an ecosystem like the one in Cambridge or Silicon Valley. His company has never had any recruitment or retention issues, and agrees that the ecosystem is not here, but it's improving.

Michael Spencer, Professor of Electrical and Computer Engineering, gave a presentation on Widetronix: High-Power Density Betavoltaic Nuclear Batteries. His company was founded in 2003. One of the things they learned quickly was that a materials-based company is really not an attractive way to go. He felt that if you put a materials-based company with a unique device, then it becomes part of a very unique opportunity. And materials are one of the things that we do very, very well at Cornell. He added that we have a history of collaborative research going back to the '60's. If you can couple a unique material with a unique device, you have a protectable piece of technology. It takes about 10 years for a start-up company to be successful. He noted that his company was fortunate to interest a Cornell MBA to manage the group, and the core group was formed. At that particular time, he was in a conflicted position. He received a call from Lockheed Martin in Florida, which expressed an interest in their technology (anti-tampering). He began to realize that even a potentially larger market existed and that was medical implant technology, specifically pacemakers. Mike noted that there were two market places: one small but immediate, anti-tampering; the other large, that was willing

to pay for performance. Widetronix won several business competitions, including one held by TFG Ventures. However, the company was still not secure in its funding position. Through a lot of efforts they began to have several important conversations with industrial players. These are conversations in which the university can play a critical role. His company is involved in smart isotope technologies that have the possibility of being ubiquitous and smart nanogrid technologies (where you can manage power from many potential energy sources). Mike continued with an overview of the technology of Betavoltaic Devices. These devices produce power in the tens of nanowatt to the 100 microwatt range and operate in a very small footprint, less than 1-5 mm^2 and have long lifetimes because of beta decays of the shortest 2 years and the longest 25 years. With these cells you can produce an exquisitely small amount of power and have some excellent applications. The applications are specific to areas in which you need high-energy densities and long-battery lives and in places where lithium cells are either difficult to change out or whose efficiencies changes with the environment or the temperature. He mentioned that certain applications include not only anti-tampering circuits, but also sensor networks which are a ubiquitous class as well as intelligent microprocessors and medical applications, particularly MEMs which is such a low-powered technology.

Mike concluded by talking about where Cornell was at any of these particular starts. He indicated that they could not have done this technology without Cornell's help or the nanofabrication center. In the beginning stages, the bureaucracy around doing SPIR's was very well developed. Furthermore, in the second stages, Cornell has several ways to introduce you to the language of entrepreneurship. There is Pre-SEED workshop which they found exceedingly useful and brought all of the elements of entrepreneurship so they at least could talk about things in a credible way and could understand the language one needs to know in order to participate in this process. The later stages were more difficult – negotiating a license was a very adversarial process. He went to Cornell as an undergrad and as a Ph.D. and thought he was the good guy. He also had the issue of while being on sabbatical he developed additional patents related to betavoltaics. He disclosed all patents as required with the expectation that they would be property of the company that was developed during the sabbatical. There's an arc of development. You start out with a great deal of involvement, then you either choose to make that your life or you choose to be a consultant and advisor. And he indicated that that's where Widetronix is today. He is a technical consultant and advisor on technical matters and the company is being well managed and run as it now gets closer and closer to the product demonstration. They have an issue with the nature of consultancies and ownership of IP, and they still don't have clarity on that issue which is very significant when it comes to the company's future. For Widetronix, ownership of IP is still an issue. Mike agrees that there should be an entrepreneurial center at Cornell not only for the reasons expressed by Uli, but also because there's so much to learn about how to improve the entrepreneurial process. Right now, we only get 1% of the ideas through the so-called "valley of death" to become venture capital funding. We have technology at Cornell that's probably on the shelf that if seen with the right eyes could be tweaked and could happen.

Question: With respect to developing IP – what should the university do differently for you and others?

Mike responded that Cornell is in need of a culture change. It would be nice if there was an advocate for that change. The entrepreneurial faculty are perfectly willing to have Cornell as a partner. And as a partner, you're ultimately on the same side. That environment should be in place. He agreed with Uli who said if you don't embrace this, you're going to lose the battle.

Lance added that this adversarial relationship is not in Cornell's best interest. You want this to be successful then reap the benefits of it.

Comment: What Cornell does is profoundly dysfunctional. Negotiating around the fringes about something that hasn't happened is much less important than working to make the thing be huge. Because if this thing happens, it's going to be huge, and it doesn't matter what percentage you've negotiated. The University shouldn't be using this as a way to make money, but as a way to change society.

David Erickson, Assistant Professor of Mechanical Engineering, gave a presentation on My First Start-up. He gave an overview of his company from the perspective of a junior faculty member with no experience in starting a company and what it looks like from someone like him, and what the process took. His first startup began operations on Jan.1, 2011. His research is related to microfluidics and biophotonics, which is the idea of creating chips that move around light and fluids on small scales to do interesting things, usually biological (medical or biological nanotechnology). His lab group is between 15-20 Ph.D. and post-docs and there are funded by several federal agencies (NSF, NIH, DARPA, DOE, etc.). He stressed that he has zero experience with entrepreneurship. The company they started is Optofluidics, Inc. What led him to get started was a combination of having a number of unexploited technologies at CCTEC and looking for something to do on his sabbatical. He became incorporated in June 2010 with the help from Big Red Legal. He applied for and was awarded NSF and NIH SBIR's on a technology called "Molecular NanoTweezer". He partnered with a graduating student and began operations in Philadelphia as of January 1, 2011. They moved to Philadelphia for two reasons: 1. the infrastructure in Ithaca is not great and; 2. he got incubator space across from the University of Pennsylvania. He invented and published in *Nature* in 2009 the Molecular Tractor Beam which is an invisible force that reaches and grabs a piece of DNA or a molecule. This technology is applied to being able to do single molecule analysis. The product is an implementation tool that will be sold to labs. They have received $150K from NSF (which goes until July 1) which pays for facilities, CNF, people, consulting and himself. The lab space is in Philadelphia, but half of the work is done here in Ithaca because they rely so much on CNF. They expect to receive additional $50k in seed funding from the State of Pennsylvania (+ $25k NSF match). They were unable to get any New York State funding. He added that they are in the process of negotiating a license deal with Cornell for a suite of "Optofluidic" technologies. He indicated that he has not encountered some of the issues that the other presenters described; however, he did not expect to be in competition with anyone else. He wrote the ideas, funded it and

over the years worked on it. As soon as he discloses it to Cornell, they own it and you could license it as easily as he could. Cornell is pursuing an exclusive license.

Question: Does anyone know what other universities do?
Abby responded that Stanford actively markets technology before it discloses it.

David continued by saying that the Dean, the Director of MAE and his colleagues have been "supportive" about his efforts (e.g. agreement that some equipment in his lab could be used for testing company prototypes). Prior to starting his company, he received little encouragement and had no "framework" to follow on how to get started. He indicated that there was no path to follow. There were few mentors in his department of MAE. This lower level of activity discourages people from staying here. When students are about to graduate, it isn't on their radar to start a company. It's on their radar to look for academic positions. He added that there isn't a central lab or incubator space on campus for students.   (Langamuir is a lab, not incubator space). At their space in Philadelphia, there is central area where all the different companies are located. There's a lot of industry presence around them, which is not happening here.

Some suggestions he made to improve this situation were as follows:
  - develop an infrastructure for those interested in starting a company.
  - Create a step-by-step website, i.e. "So you're interested in starting a company, here's what you need to do…"
  - Create vibrant incubator space on campus.
  - Publicize success stories better. Make other faculty/students aware of start-ups that are around.
  - Encourage more interaction with industry in general. We're good at getting federal funding, but we're very poor, compared to our peers, at getting industry funding.

Question: There's an entity called Cornell's Entrepreneurs Network, and the annual Entrepreneurship@Cornell Celebration is taking place in two weeks. Does this have any relevancy to you in terms of the framework?

David responded that there are a lot of activities that sound like that but he hasn't found anything that reaches down deep enough to be helpful. (i.e., mentoring provided by the Johnson School) and he's hit roadblocks. Recently, they attended an event at Cornell where there was a venture meeting and his company was not allowed to present or show their poster or present themselves as a start-up company because they didn't have an exclusive license with Cornell). He was allowed to present his company's general area of interest, but not as a start-up.

The ECC members found the faculty presentations inspiring.

Bill Shreve and Dick Aubrecht will write a report on this topic and will issue it at the end of the academic year.

Lance indicated that he would appreciate guidance from the council on the best way to proceed so that we do not have to start this effort from scratch.

Dick Aubrecht indicated that we need to look at this issue on three levels and write a report on the following factors:
- Cultural
- Strategic
- Packaging

We need to decide who can make a change (i.e., the President, Provost, VP Research, Deans, CCTEC, TTAC), and then determine an approach. We need to put a new decision-making process in place. We need a consistent set of approaches to engage the various constituencies.

Bob Shaw pointed out that decisions need to be made at the top and that with the right leader in the VP Research position, these problems would be solved. Using templates might not be the answer. If there was someone at OSP who could speak the language and understand it and was action oriented, we could solve this problem. His gut feeling is that with the right leadership in that office, this situation could change. He indicated that perhaps having a VP for Industrial and Entrepreneurial Activities might be the answer, and the ECC could be part of the interview process.

Bill Shreve added, why shouldn't the top be President Skorton?
Comment: because Cornell doesn't operate like the corporations.
Sarah Fischell asked how we can communicate with the trustees formally and informally so that they really hear this message. She added that until you give the VP for Research the mandate, and value statement, nothing will change.

Dick Aubrecht indicated that he would be uncomfortable talking to the other trustees about it without Lance first articulating where he'd like to go with this issue.

Lance pointed out that this meeting is very valuable because the Council is educating him on this topic. On the topic of culture, he indicated that we need to repeat the message over and over again. He needs to fight to get his message heard by the upper administration because they have a lot on their mind. And he needs to repeat this message so that it gets on their radar. Other things are competing for their time and energy. He also needs to let the Provost know that this topic is so critically important to the institution that he should be one of his top three priorities, so that anytime he's giving a speech, that this will be one of the messages that he expresses.

Greg Galvin mentioned that using the NYC Proposal is a good way to make a bid for changes to be made.

Bill Shreve noted that we need to admit there's a problem, so that this issue can be resolved. This topic has been brought up several times in the past, but nothing has been done to address it.

Sarah Fischell indicated that if Lance gives the Council the green light to write a report with recommendations for him, then he can decide the next steps. She added that he should create a cohesive message to present to the administration.

Bill Shreve noted that another way to do this would be to write the report with the 3 levels for Lance. And also write a report that would be in parallel to that, but more focused on how could Cornell respond more effectively to the challenges presented by the Skorton report, which plays right into this. If we focused on doing those things that we're not doing today or if we could do them better than we're doing today, then we could really improve.

Roger Strauch pointed out that this is what has been missing for the 20 years that he's been part of this discussion. The objective is a new value system. We need to dislocate the value system of today. We need to be extremely easy to deal with for professors and companies in transferring technology, when the benefits are not associated directly with contracts and those agreements, but with the goodwill and the valuable relationships that are established between the University, its faculty and with its corporate partners. And we need to earn a reputation drastically different from the reputation that was measured in a non-statistically significant fashion during the course of this day. We need to earn a reputation for Cornell being easy to deal with…as a place where I can do business…as a place where I'd like to start a company, and that we're better than others. And in two paragraphs we need to communicate the new value system. And the entire University needs to change to it.

Bill Shreve added that if we change that value system then we will see our rankings in the US News and World Report go up.

Lance noted that the higher level message needs to be articulated by the upper administration. The more tactical things (i.e., organizing ourselves, creating a websites, searchable databases), can be done by us.