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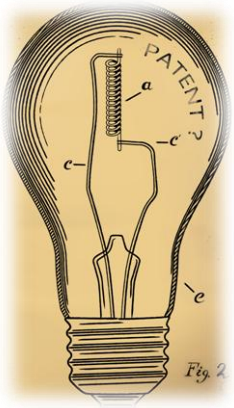
MEETING SUMMARY



A Patent System for a New Innovation Ecosystem

Government-University-Industry-Research Roundtable
February 11-12, 2013

Recent years have seen major changes intended to strengthen the U.S. patent system, including the passage of the America Invents Act of 2011. Still, there is a prevailing sentiment that the system is not operating in a way that optimizes innovation and productivity in today's technological and economic environment. At this meeting of the Government-University-Industry-Research Roundtable (GUIRR), industry leaders, academics, federal officials, judges, and lawyers presented aspects of the current patent system that are and are not working well, prompting GUIRR members to explore possibilities for improvements.

The keynote address on February 11 was given by **Dr. Stuart Graham,** chief economist for the U.S. Patent and Trademark Office (PTO), who spoke about how the patent system has dealt with disputes that, like the recent "smartphone wars," routinely erupt over time. For more than 235 years, he said, the United States' formal social contract has offered limited patent rights in exchange for full and timely disclosure of new and useful inventions. This period of exclusivity works as an incentive to individuals and companies to make up-front investments in development and discovery.

The PTO's role is to support this system by examining patent and trademark applications, and by granting a patent unless the examiner has a basis to refuse it. To find possible grounds for refusal, the examiner compares the claimed invention to the prior art, consisting of patent documents and scientific and commercial literature.

In 2011, patent examiners received over half a million applications from inventors all over the world.

Critics of the patent system – some of whom would like to see it abolished altogether – have argued that the smartphone wars result from overly broad and improperly issued patents and reflect flaws in eligibility doctrine as well as all-too-permissive treatment of software patents by the patent office. These criticisms are not new, Dr. Graham noted, and they reflect the difficulty the patent office has experienced when facing the legal and market uncertainty associated with technological change.

Over time the U.S. patent system has evolved to respond to new technological and industrial innovations, resulting in refinement of patent law to meet modern needs. The same recalibration appears to be at work in how the system is dealing with the smartphone wars and software patents. When we take the long view, Dr. Graham said, the smartphone wars do not look like a dispute for the ages but rather the kind of controversy that has arisen periodically throughout the history of the U.S. innovation system.

That is not to say that the PTO believes all is perfect in the world of software patents, Dr. Graham continued. There are issues the patent office should address and is addressing through the America Invents Act of 2011. Among the Act's most useful provisions are three post-grant

options – post-grant review, *inter partes* review,[1] and covered business methods patent review – that allow individuals and firms to challenge the validity of issued patents on any grounds, including eligibility and clarity.

All three reviews are handled by a panel of administrative judges highly skilled in technology and patent law issues, and all are mandated by statute to be completed within one year, offering cost savings over litigation and resolving validity disputes far more quickly than the federal courts. The legislation also allows any member of the public to submit documents and commentary to patent examiners, giving examiners access to the most relevant documents when conducting search and examination.

Still, concerns about the patent system remain and policy advocates have made alternative proposals. For example, some have called on Congress to expand the new business methods patent review to include software technologies, thereby giving competitors the ability to challenge existing patents using evidence that has come to light in recent years. Others propose putting the cost of defending a suit on the loser, increasing the disincentive to enforce low-quality patents. And courts continue to be asked to act upon issues such as enhancing scrutiny of patent claims. While the patent office has no official position on these proposals, they reflect the reality that the patent system is just that: a system. Different institutions work together to produce it, said Dr. Graham. Constrained by available resources and laws, the patent office is unable to solve all possible problems. Moreover, it is often called to act before legal and technological uncertainties can be resolved.

The smartphone wars, like other large-scale patent disputes in the past, may not reflect a patent system that is broken, but rather one that has cultivated a groundbreaking body of advances in communication technology, advances that have invited market entry by competitors, said Dr. Graham. The history of the U.S. patent system reflects a cycle of disruption, occasioned by technological change and market adaptation in its wake, and the ensuing search for a new balance in the rules of the game. A common feature of these disruptions has been a return to balance, whether arising from market, legislative, or judicial solutions.

Sessions on February 12 opened with a presentation by **Ms. Suzanne Michel,** senior patent counsel for Google, who spoke on "Improving Patent Law to Promote Innovation." The patent system is critical for promoting innovation, said Ms. Michel, but there are always areas that can be improved and some areas with significant problems right now. For example, the increasing patent litigation brought by patent assertion entities, otherwise known as "patent trolls," is creating problems in the tech industry.

Ms. Michel defined "innovation" as not just invention, but also bringing the product to market. Inventions are critical first steps, she said, but development is needed, and the product needs to get to consumers.

The patent system promotes innovation by protecting inventions, but we cannot assume that more patenting will automatically lead to more innovation. According to Ms. Michel, the patent system should not reward every new idea with a patent when those ideas would have been created without the inducement of a patent, but the patent system currently leans toward "false positives" – granting patents in cases where they should be denied. As evidence of this, Ms. Michel cited the arsenals of 10,000 to 40,000 patents some companies are building up. Patent litigation has constantly increased over the past eight years, a symptom of a problem from Ms. Michel's perspective.

One reason the system leans toward false positives is a belief that there is little harm in granting patents for inventions that are fairly trivial; if an invention is a dud or trivial, the assumption goes, it has little economic value, and the inventor won't be rewarded by the marketplace. But for that to be true, the value that the patent owner can extract from the patent has to align with the value of the invention. Problems in the patent system can distort that alignment, and the value of a patent can outstrip the value of the invention – a problem we're seeing in the tech space, said Ms. Michel.

When the patent has value beyond the value of the invention it covers, Ms. Michel stated that we can expect to see more patent assertion, more patent litigation, and patent litigation blossoming as a business model. Between 2005 and 2011, lawsuits by patent assertion entities quadrupled. Big companies like Google now carry over 100 suits of this type at a time, which strain resources even at a large company. And over the past few years, more small companies and start-ups are being hit. The purpose of the patent system is to encourage innovation, and this type of activity hurts innovation, Ms. Michel said. One problem that disconnects the value of the patent from the value of the invention is the high cost of litigation. This is what drives settlements on invalid patents and many nuisance suits; a patent assertion entity says: It's cheaper to pay me to go away than to fight, and a small company that cannot afford to fight has no choice but to pay.

[1] Lawsuits in which all interested parties have been served with adequate notices and are given a reasonable opportunity to attend and to be heard are referred to as *inter partes* proceedings or hearings. (Source: USLegal.com)

What improvements do we need to see? We want a more efficient patent litigation system; efforts are underway, and we can see improvements, said Ms. Michel. There are also proposals to pass fee-shifting legislation so that the loser in the suit would pay the winner's legal fees, and this could change the risk assessment that drives this litigation. Research to develop economic tools for valuing patents is also needed from Ms. Michel's perspective, especially for those situations in which one patent is asserted against a complex product covered by thousands of patents; currently, requests for damages from warring parties sometimes vary by two orders of magnitude – a sign that something is wrong.

It would also be great to see better alternatives to litigation, Ms. Michel added. Google and other companies have suggested expanding the patent office's business methods review system to deal with these problematic areas. We have had 15 years of allowing very broad patenting on pretty basic ideas just because they were in the Internet, said Ms. Michel. It would be helpful to be able to challenge those patents for being vague, overbroad and abstract, and be limited to making prior art challenges in the current system.

Next, in the first of two industry perspectives on the patent system, **Mr. Justin McCarthy,** chief counsel for Pfizer's worldwide R&D division, described how the pharmaceutical industry is increasingly using multi-party collaborations to address scientific questions and develop new therapies. The pharmaceutical industry is in the middle of what the keynote speaker referred to as a "cycle of disruption" right now, said Mr. McCarthy. In the last ten or fifteen years, the pharmaceutical industry has not made significant strides in bringing new products to market, and the cost and time required to bring products to market has escalated dramatically.

In Mr. McCarthy's view, this happened for many reasons, one of which is that industry is dealing with complex diseases in which the biological pathways are not well defined, such as Alzheimer's disease and certain cancers.

The way out of this productivity problem, said Mr. McCarthy, involves developing a connected R&D ecosystem: collaborations that bring stakeholders and scientists together to share the best science and solve the hardest problems, with all parties sharing in the scientific and financial rewards. This is where the pharmaceutical industry is headed, and it is a big sea-change for the industry, which historically has taken a very controlled approach to intellectual property.

Some of the first forays into this new collaborative ecosystem are precompetitive consortia, Mr. McCarthy said. In these consortia, parties come together to focus on a particular problem, or to develop a common set of standards, or to validate a target, and each party involved can use the consortium's findings in their own research programs. These collaborations take many forms – they may be industry- or government-led, or made up of a combination of industry, government, and academia – but the heart of it is that all parties share scientific expertise, funding, and work in order to solve a problem and share the rewards.

Mr. McCarthy described Pfizer's 18 Centers for Therapeutic Innovation, which are a new model of collaboration with academic institutions. In these centers, the academic institutions provide ideas, and Pfizer provides its technology and resources; together they develop products and advance them in the clinic. Academic and Pfizer scientists sit side-by-side in the labs to do the research, and any intellectual property developed is jointly owned between Pfizer and the academic institution.

Figure 1 Pfizer Centers for Therapeutic Innovation Model
SOURCE: Presentation by Justin McCarthy, Pfizer, February 12, 2013

To continue to advance in this new connected R&D ecosystem, Mr. McCarthy concluded, we need to keep advancing ways to share data between health care researchers and regulators, to build on those relationships, and to have flexible policies and practices in areas such as intellectual property and regulatory approval. The days of a new medicine being discovered, developed, registered, and commercialized solely within one company's walls are over, he said.

What we will see in the future – and are already seeing – is a Pfizer compound, developed in association with a private foundation, discovered together with an academic partner. This is where the industry is headed, and it is the reason it is important to have a networked ecosystem for R&D.

A second industry perspective was offered by patent attorney **Ms. Heidi Keefe**, a partner in Cooley LLP, who has litigated on behalf of Facebook, e-Bay, and LinkedIn. One of the things industry needs most is *certainty*, she said, and the tech industry is having a difficult time with uncertainty about patent claims. She used a metaphor to illustrate the problem of overly broad patent claims, which contribute to that uncertainty.

Suppose I decide to get a patent on a brownie, Ms. Keefe said. During my in-person, off-the-record interview with the patent examiner, in response to questions about how the brownie differs from other sweet treats, I say "No, it is not a cookie," and "No, it is not like other desserts." When I get my patent, the title says "Brownie," and the abstract says "An amazing sweet treat that doesn't fall apart in your hands; it's gooey and chocolaty and wonderful." But the claim at the end says "I claim: something to eat, comprising very sweet stuff that makes me feel good after dinner."

Well, subsequently my bakery fails, and my patents go into foreclosure, said Ms. Keefe. Years later, someone has purchased the brownie patent, and this new owner sues "Berries and Sugar" for violating the brownie patent. How can the owner do this? Even though throughout the brownie patent's specifications it says things like "chocolate" and "gooey," those words are not used in the actual claim.

Unfortunately, said Ms. Keefe, that's where we are right now, and we need to go back to a place where we hold people to their words. She has been in many cases where the file history says the invention is not a cookie, but the inventor now says, "Well, maybe it means cookies after all," because cookies sell better and the inventor wants a piece of those sales. Ms. Keefe advocated that patent officers should make inventors put the detail in the claim, and inventors getting patents need to make sure that their claim matches their description. Be honest about what you have invented, said Ms. Keefe, and don't try to claim every sweet treat on the planet. And in court, said Ms. Keefe – who noted she has been on the plaintiff's side as well – we should not try to walk away from what's written in the file history and specification.

In order to help tech patents, Ms. Keefe said in closing, we need to have certainty that the public can understand what the patent was granted on, because it can rely on what was said in the disclosure, and what was said in the file history.

Next, **Mr. James Bessen,** lecturer at the Boston University School of Law, spoke on the economic impact of patent assertion entities, commonly known as "patent trolls." When writing their book *Patent Failure,* Mr. Bessen and his colleague Michael Meurer reviewed research and found that in the biotech field, the patent system is providing very strong incentives to innovate, while in the software and IT industry there are actually disincentives to innovate. Patent assertion entities, or trolls, are a sector-specific problem, he said.

In the 1980s, when Mr. Bessen started his own software company, neither his company nor others at the time pursued patents; lawyers told them that you could not patent software. Legal changes in the 1990s made it easier to get software patents, and the number of patents has soared. When Mr. Bessen went back into economic research, one question that puzzled him was: Why would we want to introduce patents into a highly innovative industry? Most software developers – 70 to 90 percent, according to surveys – do not want patents. Most people in the industry see little benefit and substantial cost, and most software firms do not get any patents.

The costs related to patents come from litigation, including the costs of paying lawyers and diverting business. The most worrisome thing, said Mr. Bessen, is that these costs might undermine the incentive to innovate, and thus undermine the very reason we have patents. The number of lawsuits involving software patents has soared and is still soaring, largely because of uncertainty about what is covered in patent claims, as previous speakers have pointed out, said Mr. Bessen.

A patent troll is a business model that takes advantage of weaknesses in the patent system, Mr. Bessen said. Patent trolls sell only one thing: the promise not to sue you. Seventy to 90 percent of patent troll suits involve software patents, and 82 percent of firms defending against troll suits are small. Catherine Tucker at MIT reportedly did a study of medical imaging companies being sued by a troll. The companies' business unit revenues fell 30 percent, and they stopped providing updates and innovation for two years. This is an

example of where this litigation had a direct, measurable effect on innovation.

What is the cost to the defendant per troll defense? One survey of settlement plus legal fees found an average of about $5 million; the median settlement, though, was in the $100,000 range. The mean loss in stock value for larger, public companies was an average of $62.5 million, with a median of $7 million. Put together, the middle estimate of direct costs paid to trolls totaled $29 billion in 2011.

Including loss of business revenue and diversion of management time, the amount companies paid to trolls equals perhaps 20 percent of their spending on research and development. These costs are acting as a tax on R&D, argued Mr. Bessen. Someone who is thinking about investing in an R&D project needs to save 20 percent to pay a future troll whose identity is unknown, leaving less money to invest in research.

Some argue that inventors cannot afford to enforce their patents on their own, and that these patent assertion entities actually protect inventors and innovation. But of the money trolls took in, only about 18 percent went to royalty payments to inventors, and only about 10 percent to small inventors – a very small part of the pie. What trolls are costing defendants is much greater. Parts of the patent system are working well, but this is a part that isn't working well, said Mr. Bessen in conclusion; we are approaching a point where in order to save the patent system and the parts that are working, we need to fix parts that are not.

A different view on the role of patent assertion entities was given by **Dr. Jay Kesan,** a professor at the University of Illinois, College of Law. Why do patent assertion entities (PAEs) exist? These entities serve a market need, said Dr. Kesan, functioning as intermediaries for some patentees who don't have resources to pay attorney fees and who would otherwise be shut out of enforcement actions. PAEs take on the burden, cost, and risk of enforcing the patents for them.

Certain criticisms are commonly made of PAEs, noted Dr. Kesan – for example, that they are opportunistic players who settle for nuisance amounts, that the patents they enforce are overbroad or marginal, and that there is a "leaky bucket" problem where the rewards of suits do not go to the inventors.

Dr. Kesan noted that he and a colleague, David Schwartz, have looked at research on the role of PAEs. They have tried to understand whether the outcomes of PAE-driven litigation differ from those of suits initiated by practicing entities (inventors or companies who pursue litigation on their own patents). Furthermore, they have looked at settlement rates, summary judgment loss rates, and win rates for three different types of litigants – individuals, practicing entities, and monetizers (another term for PAEs) – and have found no statistical difference in outcomes among the types of parties in the study. Kesan and Schwartz are also beginning to look at the "leaky bucket" phenomenon; data reported by the Acacia Research Group, arguably the largest publicly traded PAE, in 2011 showed that the company paid more to inventors than to lawyers.

Part of the issue is not the actors, but the merits of the disputes and the patents themselves, said Dr. Kesan: Are these claims valid? Is the allegation of infringement completely untethered from the original claim? In Dr. Kesan's opinion, there is a critical need to pay attention to low-transaction-cost ways of determining things like patent validity. He suggested that *inter partes* review may be an efficient mechanism to contest patent validity as it is shorter and has the potential to be cheaper.

Dr. Kesan examined how *inter partes* review and the post-grant review process in the U.S. compare in scope, availability, etc., with invalidation trials handled by the Japan Patent Office (JPO). Each of these three processes lasts roughly one to two years. The costs for JPO's invalidation trial are between $25,000 and $120,000 – close to the costs of the U.S. processes, though on the lower end. The cost difference between a JPO invalidation trial and going to court in Japan is roughly the same as in the U.S.: it is about 30 times more expensive to go to court. However, very few people in Japan go only to JPO, he found; they typically also pursue their cases in a district court. But in over 80 percent of the cases, JPO and the district court agree, said Dr. Kesan; so why not just use the JPO, the low-cost mechanism?

By looking at regimes in other countries, we might see reforms we could institute to reach our goal of a relatively cheap, relatively swift, and reasonably accurate patent challenge regime, concluded Dr. Kesan, noting that our focus should be on awarding patents that are commensurate with innovation.

Next, **Mr. Dan Burk,** professor and founding faculty member of the School of Law at the University of California, Irvine, spoke on how the patent system can promote innovation in widely varying industries.
The costs of innovation differ by industry, he noted. For example, bringing a new pharmaceutical to market easily takes $100 million or more, while even the most complex software will cost an order of magnitude less. Similarly, different industries have very different patent profiles; in the pharmaceutical industry, for example, there's typically one molecule and one patent, while semiconductors can contain thousands of inventions covered by thousands of patents.

With patents we have a Goldilocks problem, said Mr. Burk; we want enough patents, but not too many patents, and we want patents with the right scope rather than patents that are too broad. How do we find that "just right" balance, given the varying requirements of different industries? We could enact different patent legislation for different industries, he suggested, but history tells us that this is not a very good idea since particular technologies covered by statutes have become obsolete almost immediately.

So it is better to write statutes that cover many technologies, said Mr. Burk, but how do you write a statute that can promote innovation in many different sectors? Our current statute is somewhat brilliant in providing flexible policy levers that allow the party applying the statute to modulate the scope and availability of patents in the face of different contexts and industries, he said. The courts are typically the authority that does this, which is not a bad thing from his perspective, since they have the benefit of seeing how an innovation has performed in the marketplace, which can reveal whether a patent is valuable and important.

Mr. Burk gave an example of how the courts are already modulating the statute in these ways. For example, in *eBay Inc. v. MercExchange,* the Supreme Court offered an analysis to help courts determine when they should use a particular policy lever, a permanent injunction. The case happened against the backdrop of complaints about PAEs getting permanent injunctions and having too much leverage in negotiations. Since the eBay case was decided and its analysis has been applied by the lower courts, data show that PAEs are not getting injunctions and that those who are producing products are getting them. The district courts are basically getting this right, and this example shows that existing statutory tools can be used to fix some problems in the patent system.

Next came two judicial perspectives on the patent system. **Judge Pauline Newman**, circuit judge for the United States Court of Appeals for the Federal Circuit, began by noting that judges live in the past, and it is not their job to innovate or to envision where the patent system is going or should be going.

Judge Newman offered some historical perspective, observing that every 30 years the nation's patent system goes through an upheaval. In the late 1970s, President Carter put together a group of leaders in industry, the academy, and the administration to think about the patent system and where it was going. That group created the patent law we have today – including the Court of Appeals for the Federal Circuit, reexamination, maintenance fees to sustain the patent office, and the Bayh-Dole Act. Judge Newman was a member of President Carter's committee.

Technology and IP-based industry now comprise around 60 percent of the nation's economy. At the time of the Carter commission it was 17 percent, and yet dramatic changes were made in patent law. Some of the issues now in the courts do not fit easily into statute or precedent. For example, one area that has gotten the attention of the Supreme Court recently is: What is patent-eligible material? In other words, at what point does research move from being basic to applied? Some countries have enacted measures to ensure that basic science is available to all. However, the boundary between basic and applied is fuzzy, said Judge Newman, and this is an area where it is difficult for judges to draw bright line rules.

Judges do not have a balanced view of the patent system, Judge Newman noted. She said what judges see are the intractable disputes that can't be settled for whatever reason. We do our best, she said, but the last word for how the conflicts get resolved has to be in others' hands. We do see some appeals involving so-called patent assertion entities, and the parties tell us how bad these people are. Judge Newman noted something she finds curious: If there are as many abuses as people claim, why hasn't there been some sort of change or control? For example, she has seen no movement to adjust the law of damages.

In another situation, it became clear that a patent provision – one that gave a person reporting the use of an expired patent $500 per violation – was problematic. A cottage industry of reading patent numbers and bringing suits blossomed, and because it was seen as an abuse, the statute was changed last year, and no new suits have been filed since then. "I cite this example because as I hear the hand-wringing over problems, I encourage you to think of remedies before abandoning the system," said Judge Newman; "it's clear to all of us that there's a purpose that we don't want to readily abandon."

Chief Judge Paul Michel, formerly of the United States Court of Appeals for the Federal Circuit, offered another judicial perspective. Since leaving the court, he has traveled around the country, speaking and working on think-tank-type efforts to improve the patent system. He has also done mediation in patent cases, during which he learned a lot about litigation at the ground level. It is at the ground level – the level of district courts, patent examiners, and trial judges – where there is the greatest potential to do good, he said.

Contrary to the meeting's title, we do not have a new ecosystem, he stated. Rather, it has been constantly changing and evolving for decades, maybe for centuries. In the past five to seven years, huge progress has been made on some of the very points complained of during the morning session. "The America Invents Act was a mixed bag, but even in my

most critical view, it includes many good things," he said. While serious problems remain, there will always be problems, and no system would be immune to abuses and bad behavior, Judge Michel cautioned. Noting the dynamism of both the problems and the fixes, he cautioned meeting attendees to be patient and not to expect Congress to fix things in one fell swoop, or the courts to fix things in two or three decisions. "Change is going to be incremental."

It is better to have a patent system than no patent system, if for no other reason than that it greatly minimizes the reliance on trade secrets, Judge Michel said. From his perspective, what we need to do is optimize the system. The biggest problems in his opinion are excess delay, excess cost, excess uncertainty, and excess disruption of ongoing operations of companies, universities, and other players. The America Invents Act did some good things, he added, but it did not address those problems.

If examiners were adequately trained and supervised in the law of claim construction, the world would change dramatically, he continued. Improvements are being made, but we still need to emphasize all conditions of patentability, including an adequate written description and claims commensurate with the size of the invention. This is a ground-level function, he said, and it improves examiner by examiner. According to Judge Michel, the most important documents affecting the patent system are not the America Invents Act or most federal circuit opinions; rather, they are Guidelines to Examiners and Best Practices for Federal District Judges. Going forward, *inter partes* review is going to be the way to clean out the bad patents that are being asserted or litigated, Judge Michel predicted. Practitioners, the patent office, industry, universities, and the courts need to have ongoing conversations to develop better understandings of the respective roles and comparative competencies.

He closed by listing further elements needed to improve the patent system: more people where the numbers are not sufficient, such as in the district courts; better salaries; and more talent.

The day's two final presentations explored novel approaches to intellectual property and patents. **Mr. Jason Schultz**, director of the Samuelson Law, Technology, and Public Policy Clinic at the University of California - Berkeley School of Law, spoke about defensive patent licenses and open innovation communities.

In open innovation communities – such as open source software communities where all code and technology is free and shared – some concerns about the patent system come from trying to keep up with the patent race. The large patent arsenals being amassed seem scary to some in these communities, and people are concerned about getting shaken down for money by patent trolls.

"What strategy do we use if we want open innovation environments, especially given concerns about patents and trolls?", Mr. Schultz asked. The copyright community attempted to create an intellectual property licensing system among people with shared values around openness, agreeing to share certain things for free and provide certain other things for money. Mr. Schultz and his colleague asked: What would a similar system look like for patents? Their response was the defensive patent license (DPL), which is in an early draft stage.

The idea with the DPL is to develop a distributed, standardized patent license similar to the license that exists for the Creative Commons. The license is royalty-free, perpetual, and irrevocable unless there is a breach. It is available to those who agree to:

- Not sue any other member of the DPL network offensively (though patents can still be enforced offensively against non-DPL members);
- Bind any subsequent patent owner to the same obligations; and
- Offer *all* of their own patents under the same conditions.

What is the benefit for those who join this DPL network? Those in the network get immediate freedom to operate with respect to all the members' portfolios. And it "troll-proofs" the patents in this sense: if a network member sells his patents to a troll, and the troll comes after another DPL member, that member already has perpetual licenses to the patents already, and so they will not sue. The DPL idea may encourage those who have been reluctant to patent to start. In addition, it may force the PTO, which is trying to confront overpatenting quality issues, to look at it in a broader contest and see that there are more players out there. The PTO will also see more prior art.

Next, **Mr. J. Christopher Ramming,** director of the University Collaboration Office for Intel Labs, spoke about the company's newest models for engaging with universities. Intel is the world's largest semiconductor company, and the goal of Intel Labs is to create a 21st century model of industrial research that focuses not just on invention but on innovation: the translation to impact on the company and industry, said Mr. Ramming. His office is interested in extending that model to the university front-end of the process. Intel has a significant ongoing investment in academic work – about $100 million per year, a large fraction of which is research at universities.

Collaboration and cross-licensing are both common in this industry, practices which factored into acceptance of Intel's new open collaboration model, said Mr. Ramming. The new model – the science and technology center – was launched in 2011, and its main purpose is to conduct exploratory research on topics of strategic interest to the company and to the whole computing industry, e.g. big data, social computing, and computational intelligence.

In areas such as these, even the right research questions have yet to be understood. Mr. Ramming suggested that this type of exploratory research is facilitated by rich idea exchange and interdisciplinary collaboration, which means that to be effective we need to assemble teams from multiple institutions.

The main feature of these centers is collaboration across institutions organized as a hub with spokes. There is co-leadership by an Intel principal investigator and a university principal investigator, and both industry researchers and residents work on campus. The centers operate on a five-year timescale, with funding at reasonably significant levels – on the order of $3 million or more a year – so that the researchers can do game-changing research.

The centers use an open IP model, which means that no patents will be filed on the funded research; this applies equally to university researchers and to Intel employees on campus. In addition, the code is open sourced.

Intel does not do this out of altruism, but because the company finds that it is not productive to argue overexploratory IP until it advances to a different stage of development, said Mr. Ramming. In addition, open IP is easily scaled to multiple-institution collaboration. For Intel's purposes, open IP is a good fit.

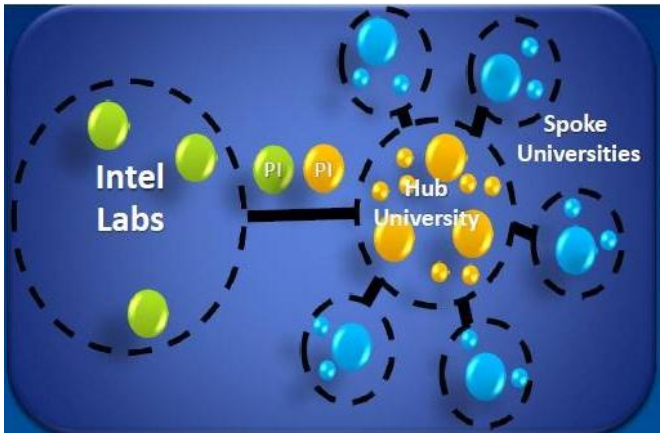


Figure 2 Intel Labs Science and Technology Center Model
SOURCE: Presentation by J. Christopher Ramming, Intel, February 12, 2013

"We are mindful of the costs of this approach," said Mr. Ramming, "but we find them acceptable." Sometimes research goes beyond the exploratory stage – for example, students and staff may want to create a start-up. In these cases, we may be able to find a new kind of mutually beneficial agreement, or we might decide to go our separate ways, having learned from our collaboration. "I've been impressed with the maturity of researchers on both sides when that happens," said Mr. Ramming.

Intel Labs hopes to form these collaborative communities quickly; seven have been established in the U.S. so far and five more internationally, with others to come on board soon. Mr. Ramming's office is preparing a white paper on traps, pitfalls, and best practices, and he expressed interest in working with any roundtable participants interested in this model.

Planning Committee for "A Patent System for a New Innovation Ecosystem": Luis Proenza (Chair), University of Akron; **Lisa Lorenzen**, Iowa State University; **Erik Antonsson**, Northrop Grumman, Aerospace Systems.

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