

## **AC 2009-1518: INOVAED: A MODEL AND RESOURCE TO HELP STUDENTS LEVERAGE LATE-STAGE INTELLECTUAL PROPERTY**

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# **InovaED: A Model and Resource to Help Students Leverage Late-Stage Intellectual Property**

## **Abstract**

InovaED is a successful model in which students and student teams utilize late-stage underutilized or off-strategy intellectual property (IP) that has been donated or licensed by a variety of companies. Much of the IP is platform – it can be used in different ways in many different products. As a result, InovaED has produced a variety of startups and other ventures; thus, it facilitates both entrepreneurship education and economic development. InovaED is expanding to a broader community, including members of the National Collegiate Inventors and Innovators Alliance (NCIIA). Part of this expansion involves a web-based system including a searchable database and document management system containing over 300 industrial patents available for licensing. The system enables faculty and students to request and receive authorization to pursue projects using specific IP. It also enables them to contribute and search student project documents such as marketing studies, financial models, and design documents that could be utilized by other students and student teams, or by entrepreneurs under appropriate licenses. This expansion also includes a user manual for student teams, and workshops to help faculty at other institutions integrate InovaED into their courses. The InovaED model and database are now being used by other academic institutions, and additional institutions are welcome to participate in the project. This paper describes the InovaED model in more detail, including examples of resulting startups and new ventures. It also describes how the InovaED model is evolving based on experiences with other organizations, and the current status of the web-based database and document management system.

## **Introduction**

Technology transfer usually emphasizes intellectual property (IP) from government or university research, which is typically “early stage”—fundamental research relatively far removed from effective commercialization. However, corporations represent about 3/4 of US patenting and 2/3 of applied researching funding; many companies generate tremendous amounts of “late stage” IP. However, much of this IP is shelved or underutilized; most corporations have patent utilization rates of less than 10 percent. There are many reasons for this. For example, a particular idea or technology may not align with strategic goals, or be too small for a large company to pursue. Similarly, companies often focus their products and services on particular market niches. Technologies developed for these niches may be useful in other, noncompeting ways, but will not be of interest to the patent holders.

## Background

University technology transfer (UTT) can provide a variety of benefits<sup>4,8,9</sup>. Businesses and entrepreneurs can access to new or improved technologies without having to bear the full development costs. Universities can benefit directly from equity or recurring revenue, and indirectly from improved relationships with businesses, economic development organizations, and other stakeholders. Faculty can improve their professional reputation through publications, patents, grants, etc, and can also benefit financially (personally, or via research funding). However, these incentives are not always aligned, and participants may not understand or appreciate conditions outside their own environment<sup>4,8,9</sup>, reducing the effectiveness of UTT. Markman, Phan, Balkin, and Gianiodis<sup>6</sup> interviewed 125 UTT directors and found that traditional UTT structures are more correlated with the presence of business incubators than with new ventures, and the UTT offices tend to overemphasize royalty income and underemphasize entrepreneurship. They also found that universities often favor combinations of technology and licensing strategies that are less conducive to new venture creation. Lockett, Wright, and Franklin<sup>5</sup> surveyed UTT staff at 57 UK universities, and found that the most successful have greater expertise, better networks, and clearer strategies for using experienced entrepreneurs (rather than novice academic entrepreneurs) to help create viable businesses.

UTT can also benefit students, including undergraduates, by providing more realistic problems and learning environments, and even financial gain. Stephan<sup>10</sup> reviewed the potential educational impact of UTT and recommended that a portion of UTT revenue be invested in undergraduate programs, and that institutions collect job placement data to better assess the impact of UTT. However, engaging students in such work can be difficult, particularly at institutions with little or no funded research activity and without their own UTT structures, although it is possible to address some of these challenges through partnerships. For example, Pauli<sup>7</sup> describes a partnership between a university and a economic development organization to provide student entrepreneurs with advisors, training, and resources. The National Collegiate Inventors and Innovators Alliance (NCIIA) and other organizations have sponsored and promoted such programs for over a decade, using a variety of models - students can develop their own IP, commercialize early stage academic IP, or work with IP provided by industrial partners. The model described in this paper differs from previous models in that students utilize late-stage underutilized or off-strategy IP that has been donated or licensed from industry.

## The CATI Model

The Center for Advanced Technology and Innovation Inc. (CATI) leverages underutilized IP to create, build, and reinvigorate businesses using both push and pull modes. In the “push” mode, IP is collected first and then moved to market; patents are obtained by donation (now less common due to changes in tax law), and now primarily through joint ventures with the corporate IP owner. The process involves significant data mining. CATI has a staff of five consultants with

a wide range of technical backgrounds, who comb through patents offered for license by major corporations. The expertise of these individuals derives from backgrounds in chemical engineering, organic chemistry, biotechnology and drug development, and instrumentation development; all have industrial management backgrounds and can thus see the both the technical and the business/commercial aspects of each technology. Once promising IP is identified, CATI negotiates a license agreement, which includes the right to market the IP in exchange for a license fee if commercialization is successful. These agreements may or may not be exclusive. A percentage of royalty revenues are then paid back to the originating corporation. CATI thus develops and continues to build a portfolio of IP, and has agreements with firms and government organizations across the country to create parallel efforts. In the “pull” mode, CATI works with existing firms or startups in need of technologies to improve their products or processes, or to create new products or services. CATI associates then search for IP relevant to these companies. CATI negotiates a license for the use of the IP and initiates a sub-license to the venture or company. Thus, firms or new ventures can identify and obtain IP without the costs of their own research and development, and are able to obtain implicit protection for their own products and services. CATI and its relationship to regional economic development are described in more detail elsewhere<sup>3</sup>.

### Industry and Academic Partnerships

CATI has partnered with Carthage College’s ScienceWorks Entrepreneurial Studies in Natural Science Program so as to develop and share resources for entrepreneurship education and to develop new products, services, and companies. This collaboration has generated effective projects for over twenty senior business plan students, supported in-class exercises that have resulted in market analyses for new products, and provided the grist for the launch of several new companies, contributing to the regional economy. A major advantage of this approach is that smaller academic institutions, without engineering programs, an IP portfolio, or substantial research programs, are able to provide students with experiences in product development, design, and commercialization.

Students in the ScienceWorks<sup>1,2</sup> minor complete two four-credit courses, during which they develop a product or service concept, conduct the market studies and develop product designs, and develop full business plans including management and operations plans, financial projections, and risk and competitive analyses. These projects have evolved from partnering students with regional startups or new ventures, or with established organizations launching new product lines or new services, to the current model in which students base their plans on CATI patents. A key feature of the partnership is that one of the authors is both a key faculty member and one of the CATI associates, actively bridging between the two components of the program.

In the first course, students are introduced to the concepts of creativity and ideation, and one or more of the CATI patents are used as the basis for in-class and team-based exercises. Students

ideate the patent(s) and identify potential products and services. It is particularly useful to use patents that are “platform” in nature; that is, that are broadly applicable, as opposed to a particular method of use or narrow area of applicability. When market research and marketing plans are covered, students take product concepts and conduct both primary and secondary source market research on products and services they develop based on CATI patents. The course culminates with team-based business plan projects, and student teams utilize the product ideation and market research units to create first-cut business plans. The results of the ideation sessions, market analyses, and business plan projects have been utilized in several different ways. Students have on some occasions chosen to take on these ideas as full-scale projects in the senior business plan courses. Project results are also turned over to CATI and incorporated into CATI’s library of information available to the community for business development (see below).

In the senior-level business plan course, students individually create a full-scale business plan for a new product or service, although they are assigned to groups to share the experience and support each other through the process. These business plans are expected to be (and generally are) of a quality and at a level suitable for actually obtaining financing and launching a venture. The program has been successful in doing so on several occasions. IP from CATI has been very helpful in this process. First, the IP is late stage, and therefore amenable to developing realistic products that can go to market quickly. Second, the IP originators provide technical and business expertise the program can tap on a regular basis to support the students. Since the originating organization has, in general, licensed the IP to CATI for commercialization, it is in their best interest to support the student projects, since successful commercialization will result in revenue for their firm. Third, the course goal is to motivate students to do the work of actually evaluating, analyzing, and presenting a business model and business plan. Students are drawn from across the campus, and have a wide range of technical abilities. Utilizing existing IP gives the students a starting point where the primary-level research and development is completed and the students can concentrate on commercialization.

## Case Studies

This section includes examples (described in more detail elsewhere<sup>3</sup>) that show how students can gain valuable experience in many aspects of technology business development while at the same time creating valuable products that can significantly impact regional economic development.

Yokit was founded to commercialize a powdered, instant yogurt derived from US Patent No. 4,624,853, donated to CATI by SC Johnson. Students organized a focus group for double-blind taste testing of Yokit versus other yogurt products. The students conducted the focus group, obtained product data, and produced a report that provided Yokit with valuable market data quickly and at minimal expense. In contrast with earlier years when a “model” focus group was used, students were far more engaged and took the exercise far more seriously.

Another team evaluated a Kraft patent (US Patent No. 5,378,487) for a process to remove cholesterol from dairy products. One of the student team leaders identified a valuable market, namely Hispanic cheeses, taking advantage of his particular heritage and experience. The student led his team in a full market study, leading to a business plan that included broad surveys of Hispanic cheese purchasers, producers, and vendors, as well as financial projections and a marketing and promotion plan. Using these results, CATI identified and attracted a regional cheese producer (also Hispanic) to launch a new venture to produce and market low-cholesterol cheese to the Hispanic market. In less than 18 months the company has completed the construction of a \$2.5 million pilot production and R&D center to develop and commercialize the technology. The company is currently engaged in a regional test market with Wal-Mart.

A new firm, Genisys, was formed to develop new products and market opportunities derived from a proprietary technology originally developed for fuel injection. CATI staff identified a number of alternative market opportunities, with one being application of the technology as an advanced air conditioning compressor. A student began his study with the output of the ideation session and contacted and engaged in extended discussions with senior design engineers at eight different automobile and truck manufacturers, as well as the primary manufacturers of automobile air conditioning compressors, obtaining information that might have been difficult or impossible to obtain by a commercial enterprise. The student identified a rich target market (hybrid vehicles), and developed a full business plan, including engineering specifications, market research and a promotion plan, management plan and full financial projections including sales projections, cash flow, and balance sheet. These documents were provided to the Genisys principals and were instrumental in the founding of the firm.

Another team researched US Patent No. 5,314,929, for a UV-sensitive polymer, donated by International Specialty Products, Inc. They developed a concept for a UV-sensitive wrist bracelet that could be used to monitor sun dosage to prevent sunburn. They started their own venture based on this IP, and applied for funds to complete research and development and begin marketing. They were able to develop a new product idea, have the benefit of IP protection, have access to chemistry experts at ISP, and develop a business model that was sufficiently advanced for a new venture to be launched directly out of the class.

### The Evolution of InovaED

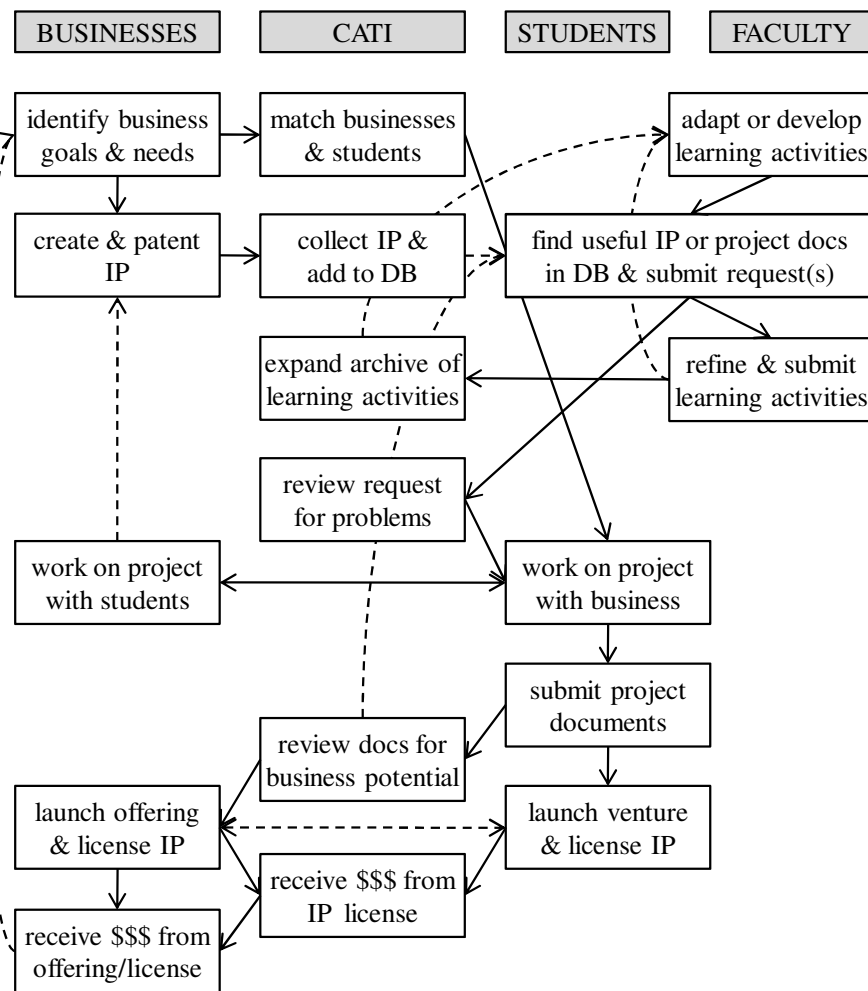
The InovaED model is the result of the CATI – Carthage partnership, and both the InovaED model and the IP database are now expanding to a broader community, including members of the National Collegiate Inventors and Innovators Alliance (NCIIA), and additional institutions are welcome to participate in the project. The partnership is developing a user manual for student teams, and workshops to help faculty at other institutions integrate InovaED into their courses.

Figure 1 below summarizes the workflow interactions and feedback loops between businesses, CATI, and students and faculty. For businesses, their goals and needs drive the R&D that results

in new IP, and that can serve as the basis for student projects which provide both direct and indirect benefits to the company, and may also provide a way to identify potential employees. Documents produced by students may lead to new offerings based on other companies' IP, or may lead to other ventures that produce license revenue for the business owning the IP. Revenue from licenses and new offerings support other business functions, including new R&D.

Like most economic development organizations, CATI is primarily a matchmaker. It connects businesses with student teams that can help address business needs. It gathers, reviews, and maintains the IP database for the benefit of both businesses and academics. It maintains an archive of learning activities so that faculty can adapt and refine approaches that work at other institutions. It reviews requests to explore IP to identify potential conflicts, as well as reviewing the results of student projects to identify potential offerings and applications. CATI is supported in part by licensing IP in the database to new ventures and existing businesses.

Faculty adapt or develop learning materials involving the InovaED database, and share new or improved materials with CATI so they can be used at other institutions. Faculty and students search the InovaED database for relevant IP or documents from previous project to serve as the basis for activities, assignments, and projects. Students benefit by working with real materials on real problems, often in collaboration with business principals and employees. The resulting project documents go back to CATI, where they can be used by future student teams, or used to help businesses launch new offerings. In some cases, student start their own ventures; more often, their experiences play an important role in their careers or ventures they start in the future.



**Figure 1: InovaED Workflow**

This expansion presents some challenges. Processes that could be managed on an informal basis among a few long-time and nearby collaborators must be scaled up and formalized to support larger numbers of people with less shared history, who meet rarely or not at all. Activities and other resources developed and refined at one institution have to be adapted to other institutions with different missions, students, and curricula. However, this expansion also presents opportunities to expand the base of companies and IP, as well as the set of faculty and student interests and skills that can be brought to projects. More participants also mean that it is more likely that a concept developed by one student team can be picked up and expanded upon by teams at other institutions. As the number and diversity of academic participants increases, CATI will continue to expand the portfolio base with additional corporate sponsors. CATI will also work to integrate efforts with capital markets to align talent, technology and capital resources for new venture creation.



## The InovaED Database and Document Management System


Part of the expansion of InovaED involves a web-based system including a searchable database and document management system containing over 300 industrial patents available for licensing. Patents can be searched by keywords in the title and abstract, and by user-defined tags. Each patent result page (Figure 2) contains links to the patent on Google and the USPTO site, a summary prepared by CATI, and links to submit requests or documents related to the patent.



Figure 2: InovaED patent page

The system enables faculty and students to request and receive authorization to pursue projects using specific IP (Figure 3). Requests are routed to CATI staff for review, and are not visible to faculty or students at other institutions. It also enables them to contribute and search student project documents such as marketing studies, financial models, and design documents that could be utilized by other students and student teams, or by entrepreneurs under appropriate licenses (Figure 4). Project documents are also reviewed by CATI staff, and access can be restricted by institution.

The system is built on the Drupal content management system, so that it will be easy to modify and enhance functionality as needed. For example, as the community of users grows it might be useful to incorporate social networking features so that participants can comment on or discuss patents, documents, learning materials, and other resources in the system.



Home > Create content

Search this site:

- Search Patent Database
- Search Document Database
- Upload New Document
- Organizations
- Users
- My account
- Contact
- Frequently Asked Questions
- Create content
  - Document
  - Request
- Log out

### Create Request

Summary: \*

Request Range

Request Range From date: \*

Format: 02/06/2009

Request Range To date:


Format: 02/06/2009

Requested Patent: \*

Vocabularies

Purpose for using the Patent Technology:

Figure 3: InovaED request page



Home

Search this site:

- Search Patent Database
- Search Document Database
- Upload New Document
- Organizations
- Users
- My account
- Contact
- Frequently Asked Questions
- Create content
  - Document
  - Request
- Log out

### Create Document

Title: \*

Vocabularies

Document Type: \*

- Business Plan
- Design Document
- Design Drawings, Models, or Artwork
- Financial Model or Analysis
- Ideation Report
- Marketing Study
- Patent Application
- Software

Tags:

Comma separated list of words or phrases

File attachments

Summary:

Figure 4: InovaED document page

## Conclusions

InovaED represents a successful collaboration between academic, industry, and not-for-profit economic development organizations to utilize late-stage industrial IP so as to improve undergraduate entrepreneurship education and to provide a resource to develop new products, services, and companies to revitalize the regional economy. It has generated effective projects for over twenty senior business plan students, supported in-class exercises for our underclass students that have resulted in market analyses for new products, and helped to launch several new companies, with new ventures pending. This work has been extremely important as part of attempts to revitalize the regional economy. InovaED also enables academic institutions which do not have research or engineering programs, or an IP portfolio, to provide students with experience in product development, design, and commercialization. At the same time, larger institutions can take advantage of some of the resources and pedagogical tools to utilize existing late-stage industrial IP in their own entrepreneurship programs. Thus, the approaches presented here are applicable in a wide range of environments, and the CATI portfolio is an excellent place to begin a search for IP that can be incorporated in coursework and student projects.

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