

The Convergence Innovation Competition: Helping Students Create Innovative Products and Experiences via Technical and Business Mentorship

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Abstract. The Convergence Innovation Competition is an annual event designed to encourage innovation and entrepreneurship among students from multiple disciplines and experience levels. The competition provides a unique model for engaging industrial partners to work with students through category definition, mentoring and judging. In this paper we describe the evolution of the program over the last eight years, lessons learned and new opportunities for engaging students in a meaningful learning experience.

Keywords: Mobile computing · Student engagement · Entrepreneurship · Innovation · Hackathons · Competitions · Experiential learning

1 Introduction

The Convergence Innovation Competition (CIC) (cic.gatech.edu) is an annual event produced by the GT-RNOC and the Institute for People and Technology (IPaT). This unique competition is open to all Georgia Tech students and is run throughout the Fall and Spring semesters. Each year the categories in the CIC are defined by our industry partners who provide mentorship, judging, and category specific resources which are often available exclusively to CIC competitors. While the competition is not tied to any specific course, competitors are able to take advantage of class partnerships where lecture and lab content, guest lectures, and projects are aligned with competition categories. The student competitors are supported by the GT-RNOC research assistants who provide technical support and shepherd teams through the competition process.

Our primary goal for the CIC is to develop a sustainable model for promoting student innovation and creativity with a strong foundation in both technical sophistication and commercial viability. The program is operated by Georgia Tech faculty and staff, but the funding and other resources for the program come primarily from the industry partners who sponsor the activities and work closely with the teams each year. The students are expected to present both a working, end-to-end prototype of their idea and a business case. The CIC is not a hackfest and it is not a business plan competition,

but it includes elements of both. The most competitive entries include a strong, validated user experience and a plan for how to attract and sustain users. The prototype implementation leverages converged services, media, networks, services, and platforms. The students who participate in the CIC go on to commercialization, other competitions, as well as internship and job opportunities strengthened by their competition experience.

This paper describes the history, key learnings and experiences of the CIC team.

2 Competitions and Hackathons

Competition are a popular tool for tapping into the talents of large numbers of people to tackle challenging problems [1]. From grand challenges like the XPrize to simple logo designs, competitions are everywhere. In the technology arena, the Hackathon has become an especially popular form of competition.

Hackathons are often touted as opportunities for rapid design and development. However in our research we have found that, by and large, the design and development is, at best, of marginal quality and value. The designs are usually reactionary rather than considered and the code is usually incomplete and often shoddy. And yet, it seems nearly every weekend there is another hackathon, more and more of them addressing another social issue. What then is the appeal of the hackathon and what are they, or what might they be, good for; especially in the domain of social issues or what we call issue-oriented hackathons?

What hackathons seem to offer is an event for building belonging [2]. First and foremost the hackathon is a social event, a place and time at which people gather. This alone has value, particularly within contemporary computing cultures. Work and play mix together at hackathons in ways that are both enjoyable and problematic: pleasurable in the play of mingling and tinkering, but questionable as a mode of speculative labor [3]. More than just belonging to a social event, the hackathon provides the opportunity for participants to perceive that they are belonging and contributing to a social cause. In that sense, we might imagine that hackathons are an opportunity to model new forms of civic engagement [2]. And yet we also need to realize that the ways in which people are participating in social causes is so structured and limited that it may just as likely present social conditions in the most naïve and reductive of ways [3].

Perhaps the best way to approach hackathons is as prototypes for what a new modes of participation might be [4]. Rather than expecting working technology from these events, or even expecting these events to build more robust and engaged communities, these events becomes testbeds for how we might want to or be able to structure new forms of technological citizenship. In this process it is important that we attend to both what works, and even more so, what does not work, what excludes, thwarts, or limits participation, what reproduces the status quo, rather than questioning it.

In designing the CIC, we have intentionally looked beyond the hackathon for a more substantive student engagement. The CIC is a longer term activity, it includes intentional support and mentorship for students, and it gives the students time to iterate

on their work. From an administrative perspective, the CIC is a sustained, persistent activity for the organizing team as well as the many faculty members who are engaged across the campus.

3 CIC History

The CIC began as the IMS Research Competition in 2007 (cic.gatech.edu/2007). The initial idea was to run a student competition to find out what students could do with the emerging mobile technology known as the IP Multimedia Subsystem or IMS. The expression “searching for the killer IMS application” was often used to describe the endeavor. The first competition was co-sponsored by Cingular Wireless and Siemens, which later became ATT and Nokia-Siemens Networks. The competition idea was largely driven by the technology and the significant training and support required for students to develop applications in this new space. The sponsors made a significant investment in bringing a full IMS infrastructure to campus and making it available for students to do their development.

The competition was established in a world before the iPhone and Android and before anybody had heard of an AppStore. The state of the art development options were J2ME (Java for Mobile) and Symbian. It was very time consuming and technically challenging for students to build an application and install it on a real phone. It was nearly impossible for them to even consider commercially launching their application because the main pathway for doing so was a multi-year on-boarding process with a wireless carrier.

Because of the daunting learning curve for both the technology and the wireless business, we focused our efforts on removing barriers and reducing the challenges for students. We created a new course in Mobile Application development that was designed to teach enough of both the technology and the wireless carrier business that students could understand the constraints on developing and launching a mobile application. We also created a companion laboratory course that provided significant hands-on access and support with approximately one teaching assistant for every twenty students. Despite this effort and expense, there were still many students who were never able to get their application running on a physical device.

The first competition had four categories, defined based on the target audience for the applications. The categories were: Family, Young Adult/Teen, Business User, Campus Community. In this first year, there were twenty teams who submitted project proposals of which fifteen ultimately submitted a project. Those 15 teams included 41 students, with most teams being 2 or 3 students. The students were drawn primarily from technology majors (CS, ECE) with a few business majors.

The second year operated much the same way with mostly similar results (cic.gatech.edu/2008). The technology continued to be a steep learning curve and the participation level was about the same. One key change was in the category definitions. The user-focused categories of the first year proved to be too narrow and did not resonate with the students. The second year there were two categories simply defined as Innovation and Contextual Use. (Today we would say those are judging criteria used across the categories rather than category titles.)

By the end of the second year, the mobile applications world was dramatically changing. The introduction of the iPhone, followed by Android, and the Mobile AppStores drastically reduced both the technical and the business hurdles for creating and launching a mobile application. It became clear that the focus on IMS technology for application development was no longer necessary. It was a time of regrouping for the GT team and for our industry sponsors. For the third year, the competition was renamed the Convergence Innovation Competition, as it is still known today. The idea of convergence was motivated by the convergence of technologies (e.g. wired and wireless networks), platforms (e.g. mobile phones, tablets, TVs, cars) and users (e.g. business and personal).

In the ensuing years, the competition has grown into a twice annual event with more than 300 participants each year. While most entries include some form of a mobile application, it is no longer a requirement. The participants represent a broader student mix of majors and backgrounds. The technology hurdles are significantly lower and every project includes running prototypes, often already made available in the AppStore. The highlight of the competition is a live demo event where students present their projects to each other and to the panel of judges from across campus and from our industry partners. The industry partners are more diverse as well including technology, transportation, health care and others. For 2014 and 2015, student teams from Georgia Tech's Lorraine campus in Metz, France have also participated with a live demonstration and judging event connected via videoconference.

The competition categories have changed with the technology trends and the priorities of the different industry partners. For three years, we worked closely with a major set top box manufacturer on interactive TV technologies and had several teams developing TV-related applications. Now that "smart TVs" are commonplace in the market, that area has become less interesting for innovation. Recent years have seen "the sharing economy" appear as a popular theme with many people applying the Airbnb model to a steady stream of new application ideas.

Today, the CIC is a successful experiential learning opportunity for students to engage in real world problem solving while learning application development skills. The students are challenged to consider multiple points of view as they discover problems to be solved and possible solutions. They learn the process of ideation and are required to talk to potential users/customers to understand problems before proposing solutions or writing any code.

4 Student Teams

The students who participate in the CIC come from a mix of majors and backgrounds. While the core participation has come from our home department of Computer Science, we have worked to promote as much diversity in the teams and general lab participation as possible. We feel that this is a critical part of the learning experience and key to making the teams and their projects successful. Figure 1 shows one of the tools we have used to explain the skills mix that is required for a successful team. To promote this diversity we have explicitly called out these skills and challenged the students to

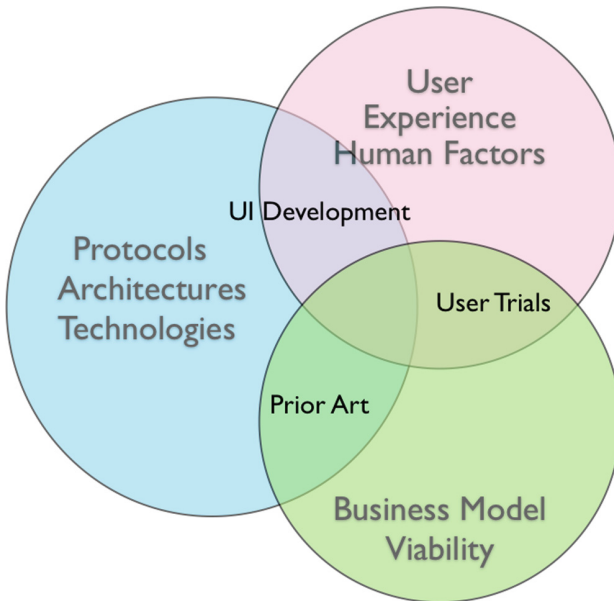


Fig. 1. Building a Team

find the expertise they need to round out their team. Historically, going all the way back to the first year, the most successful teams have followed this advice.

The CIC program is open to all current Georgia Tech students from all majors, both graduate and undergraduate. Historically, the highest participation has been from MS students from CS or related (HCI, ECE) majors. From discussions with students and alumni, we have learned that the practical nature of the projects with emphasis on industry connections has particular appeal to MS students who often have recent work experience and all of whom are actively looking for a job in the next year. We have put significant effort into attracting more undergraduate students to the program and for the last two years have seen almost equal numbers of graduate and undergraduate students involved.

One positive aspect of the student participation in the CIC has been the significant representation of female students participating in and succeeding in the program. As a Computer Science program at an engineering focused school, our programs have traditionally had extremely low (< 10 %) female enrollments. And while both the Institute and department numbers have improved in recent years, they are still disappointing. The CIC on the other hand has been very successful in engaging female students with more than 40 % representation in recent years and with multiple winning teams that were more than half female. From our experience, this is also significantly better representation than most of the hackathons with which we have been involved.

We have worked to build this team diversity over the years through several efforts. We reached out to faculty in specific areas that have been under-represented (e.g. design, business) and helped them to identify ways to integrate their regular class

projects and deliverables with the CIC. In several cases those faculty have reported a noticeable improvement in the quality of their class projects after including the CIC demonstrations and judging events as part of their own semester timeline. We also hold regular tutorial sessions and open house events for the campus community on various technologies and skillsets (e.g. connected car, Google glass) and advertise the CIC as part of those events.

Over the years we have observed that the size of the team can be as important as the makeup. While we occasionally see a winning team with two members and once or twice a winning team had five or more members, the optimal team size is three or four people. Generally, a one or two person project does not have enough time to create all of the deliverables in the timeframe of one semester. With more than four members there is an increasing likelihood of friction among team members that often causes more harm than good. Whenever we've seen a successful team with more than four members, the post-mortem interviews tend to reveal that most of the work was done by a core group of three students.

While most students do not go on to commercialize their CIC entries, most do report on the benefits they have gained from the experience and how they used the CIC to help them land a job. The CIC provides students with the specific case experience of addressing a real problem, creating a real solution and having a tangible result that they can demonstrate to a would-be employer.

5 Connection to Industry

The CIC is made possible only through the generous support of our industry partners who sponsor the competition each year through financial, material, and human capital. The program was started as a unique vehicle for connecting industry with academia around a new technology. We have worked to evolve the program into a valuable model that brings value to our partners as well as Georgia Tech and our students.

The original value proposition focused on finding “the killer app” in the ideas brought forth by the students. That proved to be unrealistic for a number of reasons. First, the result of the competition is rarely a product that is ready to launch. In the cases where the participants have gone on to commercial success it has almost always taken several years, a few pivots, and maybe even a complete restart before getting there. Secondly, the sponsoring companies are rarely in a position to act on the ideas themselves and have, at least in a few cases, left the students hanging while the corporate machine tried to figure out how to move forward. In the meantime, the students graduate, get a job, and move on. In short, it does not work if the sponsor's primary objective is to identify Intellectual Property (IP) that they will acquire from the students to commercialize.

Today, we work with each industry partner to identify the most important benefits for them and then work to make those a reality. For many, there is a new technology or capability that the company has or is considering and wants to encourage people to use. For others, they are simply interested in taking the pulse of what types of trends are interesting to students. In many cases, the CIC is an important part of the recruiting program for future employees.

For the students, the benefits of the industry participation are one of the primary advantages of the CIC versus other projects or competitions. The industry input through class presentations, advising sessions, open houses and judging events provide valuable perspective to help the students understand the business space and the constraints of domain they are working in. The students learn to answer important questions like: Who is your customer? Who is using it? Who pays for it? What are the legal/licensing challenges? Who is the competition? What happens if you are successful?

The funding provided by the sponsors for the CIC supports the events and prizes but the bulk of the funding pays for the people involved whose job it is to help the students succeed. The GT-RNOC employs from ten to twenty student employees who work to keep the lab open for students, run tutorials, create sample code for new devices, and generally support the wide range of tools and technologies that are constantly appearing. With the breadth of skills required it does not work to have a few people who try to become experts on everything. Instead, there are specialists in iOS, Android, wearables, connected car interfaces, Arduino, etc. And, since presentation and business understanding are also important, we have staff with graphic design and communications skills to help students refine their presentations as well. Just as every student team needs a broad set of skills to succeed, the lab staff needs a broad set of skills to support them.

We describe the CIC ecosystem in terms of three key components: Partners, Resources and Innovation. (See Fig. 2) Our partners come industry and from across

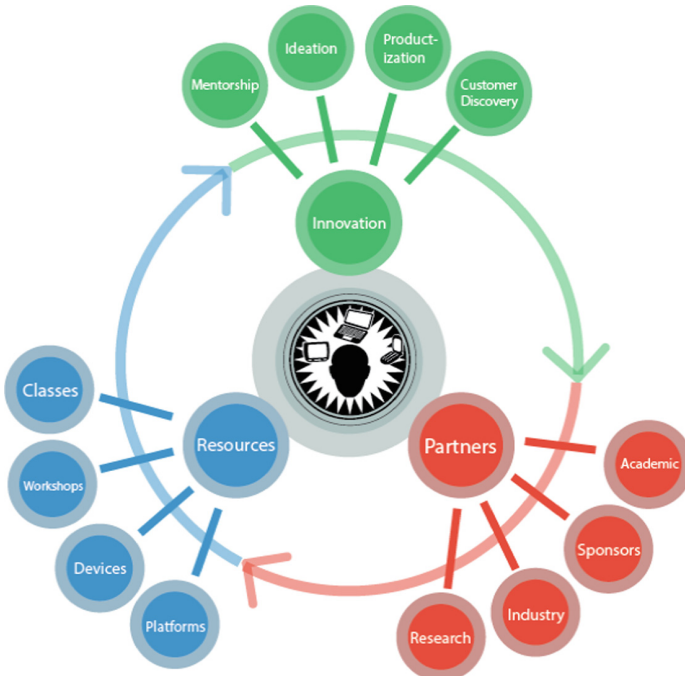


Fig. 2. CIC Ecosystem

campus in research and academic units. Many of our partners provide direct financial support in the form of sponsorship but they also provide access, insight and guidance to the students. The resources provided for the students to support their work are extensive and include lab space, classes, workshops, devices and platforms [5]. And finally, the students are supported throughout the innovation process by mentors who guide them from ideation through customer discovery and productization.

6 Discussion and Lessons Learned

Through our experience in developing and producing the CIC we have learned many lessons about how to work with and motivate students and how to help them be successful. The CIC has changed greatly and it will no doubt continue to do so as the technologies change and the motivations and interests of both sponsors and students evolve. This section highlights some of our most important lessons learned.

6.1 Avoid Intellectual Property (IP)

The single most valuable lesson from the first two years of the competition was in how to handle IP rights for the student competitors. As part of the first year, significant cash prizes were given to the winners in exchange for the students granting “first right to commercialize” to the sponsor. This turned out to be a major issue for the students and many chose not to participate despite the financial incentive. One team even stated that they “would not give us their best idea, just their second best.”

Beginning with the third year, the competition rules clearly establish that the students retain all rights to any IP they create as part of the CIC. And every year, several students will ask specifically about this issue to make sure this is the case before they will proceed. The reality is that these projects rarely generate true, patentable results. When they do, we work with the teams to file invention disclosures and prepare for patent applications. We also coach them on how to present their project and demonstrate it without disclosing the details of any patentable secrets. We encourage them to focus on getting something working and getting it in front of real users to get feedback as early as possible.

6.2 Big Prizes Are not Necessary

Our first competition included a total of \$100,000 in cash prize money. The overall winning team collected \$30,000. This made for great advertising and drew some large crowds to the informational events but it did not attract the right kind of student. Despite attracting large numbers of students looking for free food, this approach did not engage the most talented and dedicated people who would ultimately be successful in the competition. Since year three, we never announce the specific prizes until they are awarded at the judging event. Prizes tend to be less

than \$1000 in value, such as an iPad or Xbox. The students we are looking for are better motivated by the opportunity to show off their ideas and to launch their project.

The other major issue with large prizes is the legal baggage associated with competition law. For the first two years the competition operated under strict rules and the students were bound by a legal contract as part of their participation. This greatly reduced our agility in responding to challenges during the course of the semester (e.g. a planned technology was not available in time) and put unnecessary limits on everything from team size to which students were eligible.

6.3 Video Presentation

The student teams are required to create a two to three minute pitch video describing their application, the problem solved, key value propositions, use cases, business case, etc. We started doing this in the mobile applications class to speed up the class presentations and scale to larger class sizes. We found that the assignment brought several key benefits for the competition as well. First, it forces the students to rehearse and refine their presentation. Second, it creates an artifact for future use in showing off the student's work. The videos from all of the winning entries for the last several years are available on the CIC website (cic.gatech.edu). This is valuable both for us and for our industry partners. The students also benefit from having a portfolio artifact to share with prospective employers.

6.4 Live Demo and Judging Event

For the first several years the judging was done online from written project reports and in closed-door presentations. The awards were then given out several days later at a separate event. The CIC now culminates with a showcase where all participating finalists set up their posters and demos in a trade-show style event. The students spend the first hour practicing their pitches with each other and the lab staff. Then, they spend about two hours demonstrating for the judges who are walking around the room, scoring each entry and voting on the winners. The winners are announced at the end of the event.

This event serves several important goals. First, it allows the students to celebrate their success with their peers and show off their work to each other and the campus community. Second, it forces the students to practice both their "elevator pitch" for their idea and their demonstration to make sure that the application really works as planned. The most successful teams are ready to hand their phone to a judge and allow them to use the application themselves. And perhaps most importantly, the judging event provides the industry partners with a phenomenal opportunity to interact with the students directly, learn about emerging trends, and identify promising talent. For the last several years, the event has been attended by several representatives from the sponsoring partners including executives that have noted to us what a unique opportunity it is for them to interact with the students.

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