

## **Mobile Technology Consortium (MTC): An Industry-University Alliance**

Submitted by

**Jaime Borrás,**  
**Founder and CEO, Wireless Silicon Group Inc., Miramar, FL,**  
**Founder and Chair, Mobile Technology Consortium, Boca Raton, FL,**  
**Borko Furht,**  
**Professor and Chair, CEECS, Engineering, FAU, Boca Raton, FL,**  
**Ravi Shankar,**  
**Professor, CEECS, Engineering, FAU, Boca Raton, FL**

### **Abstract:**

The Mobile Technology Consortium (MTC) has been in existence in S. Florida for the past four years. It has facilitated technological alliances among companies, R&D collaborations with the university (aided by an NSF grant), and small business start-ups among student groups. This paper documents the evolution of the consortium and objectively evaluates the successes and failures with the intent to help other such industry-university alliances.

### **Background:**

MTC is a non-profit entity that was formed in 2008 in South Florida with the intent to foster alliances between industry and university participants. The stated vision was to bridge the university wisdom with the local entrepreneurial spirit for the growth of mobile technology and user experience. The mission was to bring together systems companies, small businesses, universities, and government agencies to evolve next generation mobile technology platforms, applications, and automation. This vision and mission statements of collaboration and innovation translated to the following goals: (1) to identify common needs/topics/projects for the consortium, (2) to collect needs of the local entrepreneurs and businesses, (3) to provide a quarterly session for status updates, (4) to review “hot technology topics” to enable emerging businesses and (5) to find students best matched to local businesses.

True to this spirit, the first MTC gathering was held in November 2008 at Florida Atlantic University, Boca Raton, FL, as a half-day conference. It contained six university presentations on radical increase in engineering design productivity, as applied to mobile platforms. This was based on public information derived from a six year long \$1M+ funded project from Motorola. The conference also featured presentations on early entrepreneurial activities from three companies. This also laid the foundation for seeking NSF funds for an industry-university center at FAU.

In 2009, Florida Atlantic University received a five-year grant from the National Science Foundation (NSF) to create the site of the Center for Advanced Knowledge Enablement (CAKE) as an Industry/University Cooperative Research Center (I/UCRC) that will provide a framework for interaction between university faculty and industry in the critically important areas of information technology, communication, and computing. There are only 15 NSF-supported centers in these areas in the United States. Our Center operates as a site of the Florida International University (FIU) center whose director is Dr. Naphtali Rishe.

The latest MTC conference was held in April 2012; it shows the progress we have made since those early days: the first presentation was on the highly successful I/UCRC Center mentioned above. The FAU center now has 18 participating companies that provide a total of \$1.4M in membership fees. We presently have 17 active research projects in the Center with 15 faculty members and 20+ graduate and undergraduate students involved. This first presentation was followed by a set of presentations which represent current industry-university alliances, on topics of health care, health monitoring, mobile Apps, semantic web, mobile virtualization, and security threats to smart phones. The MTC conference ended with an industry-university panel session on ways to improve collaborations further. We sketch below the progress and methods used.

### **Methods:**

We provide here details on formation, organization and conduct of MTC as well as the NSF center, so the reader can gain insight into the processes. We also provide a short paragraph on the infrastructure developed for initiation of small businesses. This last item is covered more comprehensively in another paper at this conference <sup>1</sup>.

**The Mobile Technology Consortium (MTC):** This was a consequence of discussions held between the first and third authors, soon after the first author retired in 2008 from his position as a Motorola Senior Fellow and CTO at iDEN Mobile Devices. MTC was founded to leverage and combine the extensive mobile technology talent in South Florida with the wisdom of the universities for the benefit of students, the entrepreneur community, and businesses. A kick-off tiger team was formed with a group of mobile technology business leaders and technologies; local business entrepreneurs, students and key university representatives from different colleges. This tiger team reviewed and discussed mobile trends in order to set the direction of the Consortium; we met on weekly bases for several months prior to our first public gathering; identifying the time shifting trend to mobile use; and underscoring the importance of the mobile platform with the emergence of the Smartphone impacting mobile commerce with virtual goods, mobile health for disease prevention, social networking with personal preferences, and the explosion of applications (Apps) with monetization in a low barrier to entry environment. Hence the Consortium's direction was set around mobile operating systems (OS), programming and Apps development, with special focus on Android; Apps Security based on "Patterns"; multimedia techniques to lower mobile power consumption; Web 2.0/3.0 – Semantic web for intelligent information retrieval and design automation for modeling and simulation to speed-up App development time.

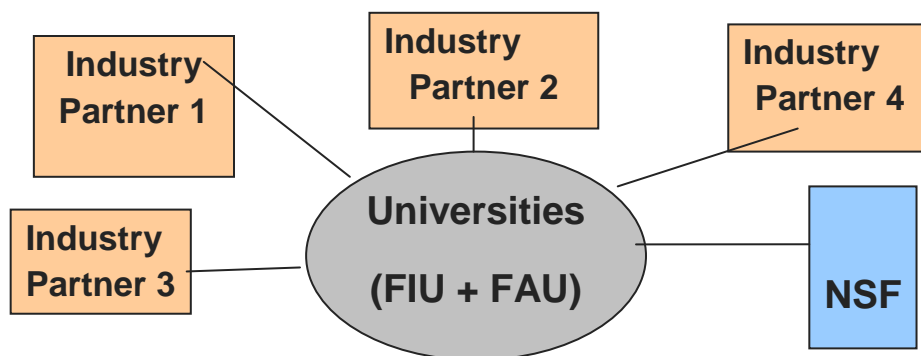
**The NSF I-UCRC Center:** Our Center was formed under the leadership of the second author. Its' mission is to accomplish the following goals:

- *To continuously evolve an understanding of the technology needs of the industry sector through direct contact with industry professionals and related corporations.*
- *To identify applied research themes that meet needs of private and public sectors.*
- *To conduct industry-relevant research.*

Our Center's research agenda includes the creation of new technologies for various web-based applications, next generation hardware and software development techniques and tools, mobile and wireless systems and technologies, video compression and communication technologies and systems, networking and communication systems, data mining and machine learning technologies, and various interdisciplinary initiatives and applications including medical systems and healthcare informatics. Our research is applicable to many fields, including national defense and homeland security, healthcare, biomedical science, environmental science, entertainment, finance, and technology services. Issues of interest to multiple industries are also explored through partnerships and collaborative research.

**Organization of the NSF Center:** Membership in our center is open to private businesses, government agencies, and others with research needs in the areas of information technology, communications, and computing. The Center provides its partners with numerous benefits, including early access to research innovations and opportunities to interact and work with university faculty, students, and industry peers.

The Center's Industry Advisory Board (IAB), made up of representatives of all the members and chaired by the first author, has the responsibility of determining the research areas and related projects in which membership fees will be invested. The IAB meets twice a year to discuss proposed projects and set research priorities for the Center. The IAB makes recommendations on research projects to be carried out by the Center and the allocation of resources to these projects.



*Model of the I/UCRC*

NSF seed funding ranges from \$300,000 to \$750,000 over five years, with sustaining support coming from CAKE members. Yearly membership fees range from \$5,000 for small companies (affiliate members) to \$50,000- \$150,000 for medium and large companies (full members).

Companies paying higher membership fees have priority in selecting the Center's research projects. At this time the FAU Center has 16 companies with total memberships of about \$1.4 million. We expect to continue to grow with the goal to have 25 members by 2014 with total memberships of \$2.5 million.

The NSF program requires independent evaluators. Serving the Center in this capacity is Dr. Vida Scarpello, a recognized expert in the field of industrial relations who has been a consultant to major US corporations as well as city and state governments.

**The Small Business Incubator:** Several factors coalesced to lead us in this direction. A six year study on radically increasing engineering design productivity funded by Motorola had shown the feasibility of developing products in a short period of time. The third author, PI for this project, adapted this methodology to academic courses. We identified three stages of component development (with graduate students), prototyping (with undergraduate students), and creating marketable Apps (with high school students) as one semester courses with a unified goal of developing Apps for a given App domain. By synergistically sequencing these courses, during the fall, spring, and summer semesters, we have achieved this overall goal on an annual basis. We expanded to include undergraduate students in arts, anthropology, and business so the prototypes developed were not only functional (the role of engineering students), but aesthetic (thanks to arts students), marketable (contribution from business students), and socially sensitive (with help from anthropology students). We were also driven by the ABET accreditation criteria 3 to integrate team projects and real-world experience in the engineering undergraduate curriculum. The MTC members were strongly involved in advising, judging, and facilitating subsequent business formation. See the results section for our results so far.

## Results:

**The Mobile Technology Consortium (MTC):** MTC has held semi-annual conferences starting in Fall 2008. The following table shows the dates and themes for these sessions. We will post these presentations at a common site and provide reference to that at the latest conference scheduled for September 2012.

Date	Theme	Number of Presentations
Nov. 21, 2008	Mobile Technology Consortium and Mobile Trends	11
Mar. 03, 2009	The First 100 Days - Consortium Status Report	10
Sept. 11, 2009	Mobile Health and the Cloud	12
Mar. 26, 2010	Mobile Applications Status and Trends	10
Sept. 17, 2010	Mobile Computing and Applications	12
Feb. 18, 2011	Mobile Payment and Mobilizing the Smart Grid	10
Mar. 20, 2012	Mobile Future and Applications	12
Sept. 21, 2012	Mobile Update and Start-Ups	TBD

The MTC was featured in an article <sup>2</sup> published by Miami Today e-Edition entitled “Mobile device industry group spreads web in South Florida”. The article quoted Mr. Steve Luis, Director for Technology at the School of Computing and Information Sciences at FIU as saying that “the Consortium gives academics a forum to present their work along with a way to get an idea of what industry is doing and what its needs are.”

The MTC served as an example of industry and University collaboration with entrepreneurship enablement to the President of the Dominican Republic’s Enterprise Florida Initiative. A special invitation from the President allowed the MTC to share lessons learned with Dominican Republic business and entrepreneur leaders. As a result, MTC established a closer relationship with the Orange R&D Skill Center in Dominican Republic <sup>3</sup>.

The MTC was invited by the Florida Advanced Technological Education Center (FLATE) to participate in a dynamic industry panel discussion focused on exploring the current and future state of Florida’s high-tech industry <sup>4</sup>.

**The NSF I-UCRC Center:** The NSF I/UCRC, formed in 2009, has proven to be a win-win situation both for our university and our industry and government partners. We are thrilled with the opportunity to conduct industrially relevant research, receive additional funding for it, and moreover, benefit from the recognition and prestige of being an NSF research center.

Our Center is successfully building a bridge linking academia, industry, and government in a coordinated research initiative, which this region desperately needed. The Center, representing the combined efforts of FAU and FIU researchers, now has the critical mass to serve the information technology (IT) industry and to help South Florida IT mature into the top tier.

The Center presently has 16 industry members with the total memberships of \$1.4 million. We have 18 active industry projects with 15 faculty and more than 20 graduate and undergraduate students involved in these projects. One of our completed projects – a joint effort with FIU and the University of Maryland and sponsored by NSF, titled "Distributed Cloud Computing Study: 3D Visualization Services for Climate Data on Demand," – has been selected by NSF to be included in their recently published Compendium on "Industry-Nominated Technology Breakthroughs of NSF Industry/University Cooperative Research Centers".

The current industry projects include mobile and wireless technologies, systems, and applications, applied image processing systems, data mining and machine learning techniques and tools, innovative networking and communication systems, and technologies and tools for smart campus management.

Several completed projects and relating results, products, and systems are now commercialized and being applied by local companies including Pronto Progress, Relli Technologies, Adventure Technologies, and Avocent. The Table below lists our industry members at present.

**Industry Members:** Since the FAU Center was established in August 2009, 16 companies joined the Center with total memberships of about \$800,000 in cash and 1.45M in equipment and software.

Company	Total Membership	Representative in IAB
Adventure Technologies	\$15,000	Mike Weir, CEO
Avocent	\$58,000	Steve Geffin, Vice President www.avocent.com
Aware Technologies	\$120,000 (in-kind)	Peter Millett, Chairman and CEO www.awaretechnology.com
CGC.com	\$50,000	John Hruska, CEO www.wigime.com
Hillers Electrical Engineering	\$18,600	Paul Hillers, CEO www.hillersee.com
ILS Technologies	\$75,000 (in-kind)	Fred Yentz, CEO www.ilstechnology.com
Jansyl Technologies	\$5,000	Sylvia Tantillo, CEO
LastBestChance, LLC	\$300,000	Mike Levine, CEO
LexisNexis	\$82,000 \$300,000 (in-kind)	Armando Escalante, CTO www.lexisnexis.com
MobileHelp	\$48,000	Scott Adams, Chairman Robert Flippo, CEO www.mobilehelpnow.com
Pronto Progress	\$35,000	Timothy Proksh, CEO www.prontoprogess.com
Relli Technologies	\$50,000	Reuven Gilton, CEO www.relli.com
Smart VCR, LLC	\$50,000	Mike Levine, CEO
Soren Technologies	\$5,000	Faiz Fattech, CEO www.sorentech.com
Tecore Networks	\$100,000	Jay Salkini, CEO www.tecore.com
Tecore Wireless Systems	\$965,000 (in-kind)	Jay Salkini, CEO

**The Small Business Incubator:** This is not an official entity at present. A total of 5 small businesses were formed from the courses developed. One of them won a second prize in the small business competition held at our university in 2011. Another one has had two Android Apps receive top recognition in recent conferences hosted by Google and AT&T. A third one, recently formed, has already attracted VC funding. Two others applied for SBIR funding and did not succeed. One of these has since then developed collaboration with our university for developing university-wide Apps. There is more work to be done to achieve consistent success in this arena.

#### **Discussion:**

We believe that MTC has facilitated the following during the four years of its existence: (1) A networking environment for South Florida companies. It has brought together people from different industries to help resolve each other's problems; (2) Facilitation of the NSF I-UCRC center at FAU. This provides businesses with a way to research and resolve difficult problems and innovate, with a lower cost and personnel overhead; (3) Start-up of three student-led small businesses with focus on smart phone Apps; (4) Student presentations of their smart phone Apps

to business leaders and venture capitalists; (5) Recruitment of best students by the local industry; (6) Mentoring of students at both FAU and FIU; (7) Expansion of MTC's reach by holding conferences at two Miami area universities: Miami Dade College and FIU; and (8) Development of several state-of-the-art courses on smart phones and related technologies.

### **Conclusions:**

The MTC (Mobile Technology Consortium) has directly and indirectly facilitated improved communication and collaboration among industry engineers & business leaders, and university faculty members & students, contributing to successes in many different ways. Regular conferences have led to wide spread dissemination of the results further reinforcing the value of such joint undertakings.

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4. Borrás, J., High-Tech Hotspots – Industry and Education in the Sunshine State, Panel Session, High Impact Technology Exchange Conference, Orlando, FL, July 27, 2010.

### **Biographical Information:**

Jaime Borrás, CEO, Wireless Silicon Group, Inc. and Chair, Mobile Technology Consortium, is a pioneer and innovator in the Wireless Telecommunications Industry highly regarded for his leadership inventing and implementing new technologies in breakthrough products to drive emerging markets. Prior to WSG, Mr. Borrás served as Motorola's Senior Fellow, Corporate Vice President and Chief Technology Officer of iDEN Mobile Devices. His major accomplishments included integrated circuit designs for the first generation cellular phones; commercialization of the first Push-To-Talk multifunction iDEN phone; and development of the fourth generation Smartphones incorporating multi-radios including WiMAX, Wi-Fi, CDMA, Bluetooth and GPS technologies with special focus on multimedia, entertainment and social networking applications. He led the technological development of iDEN's multi-billion-dollars handset business at Motorola, Inc. He was awarded the status of a master innovator at Motorola, and has UCR43 United States utility patents and over 50 publications. His many honors include three "Patent of the Year" awards for his work in the iDEN Technology and wireless handset architectures, the Outstanding Technical Achievement Award and the selection as one of the Top 50 Most Important Hispanics in Business and technology. Mr. Borrás holds three degrees from FAU; dual bachelor's degrees in physics and electrical engineering, a Masters in EE and a business diploma from Kellogg Graduate School of management. He chairs the IAB at FAU and he serves in the IAB of FIU and MDC. A strong advocate of community outreach, especially to young people, Mr. Borrás has been very active in programs such as Viva Technology, which advances science, technology, engineering and mathematics (STEM) awareness among middle school and high school students.

Borko Furht is a professor and chairman of the Department of Computer & Electrical Engineering and Computer Science at Florida Atlantic University (FAU) in Boca Raton, Florida. He is also Director of the NSF-sponsored Industry/University Cooperative Research Center (I/UCRC) on Advanced Knowledge Enablement. Before joining FAU, he was a vice president of research and a senior director of development at Modcomp (Ft. Lauderdale), a computer company of Daimler Benz, Germany; a professor at University of Miami in Coral Gables, Florida; and a senior researcher in the Institute Boris Kidric-Vinca, Yugoslavia. Professor Furht received a Ph.D. degree in electrical and computer engineering from the University of Belgrade. His current research is in multimedia systems, video coding and compression, 3D video and image systems, wireless multimedia, and Internet and cloud

computing. He is presently Principal Investigator and Co-PI of several multiyear, multimillion-dollar projects, including NSF PIRE project and NSF High-Performance Computing Center. He is the author of numerous books and articles in the areas of multimedia, computer architecture, real-time computing, and operating systems. His recent handbooks include Handbook of Data Intensive Computing (2011), Handbook of Cloud Computing (2010), and Handbook of Social Network Technologies and Applications (2010). He is also editor of two encyclopedias – Encyclopedia of Wireless and Mobile Communications, CRC Press, 2007, 2013 (2<sup>nd</sup> edition), and Encyclopedia of Multimedia (Springer, 2009).

Ravi Shankar, Ph.D., MBA, PE, Fellow (AHA), is a professor in the Department of Computer and Electrical Engineering and Computer Science (CEECS). He is also the director of a college-wide center on systems integration ([www.csi.fau.edu](http://www.csi.fau.edu)). His current research is focused on semantic web and engineering design productivity. He has taught several courses recently with focus on Android smart phones, robotics, and semantic web. All these areas have had a strong STEM component and involvement of students from local high schools, undergraduate students from engineering and other disciplines, and graduate students in engineering. More information may be found at [android.fau.edu](http://android.fau.edu), [robotics.fau.edu](http://robotics.fau.edu), and [semanticweb.fau.edu](http://semanticweb.fau.edu). He has 5 US patents. The university has received \$1M in royalties from commercialization of his research. He was recently funded by Motorola Cell Phone Division by a \$1.1 M grant (over 6 years) to radically improve engineering design productivity.