Case Study | Written By: Audrey Woods

Arrow Electronics

Not everything in industry is competitive. Often the success of one company translates into the success of another, especially with providers of goods and services. The larger customer businesses become, the more support they need from their suppliers. These synergetic relationships—much like the relationship between researchers and business leaders—can lead not only to mutual improvements but also drive innovation and prosperity for society at large.

Through CSAIL Alliances, Arrow Electronics and its subsidiary SiliconExpert have created win-win relationships that enable technology solutions that can help make a difference in peoples' lives.

ARROW ELECTRONICS & SILICONEXPERT

Founded in 1935, Arrow began as a retail store in Manhattan selling radios. Due to the high concentration of electronics distributors in the area, the street where what was then Arrow Radio began was dubbed "Radio Row." In 1968, seeing a market opportunity to build off their initial success, Arrow shifted directions to focus on general electronics distribution, leading to a period of rapid expansion in the 1970s.

When a disastrous hotel fire killed 13 members of Arrow's senior management in 1980, the company overcame the tragedy to continue their growth trajectory. They went on to acquire over 40 strategic subsidiaries to expand their global presence and strategically grow the business. One such acquisition was SiliconExpert in March 2012, a database that includes 20,000 electronic manufacturers as well as a resource for electronic industry intelligence.

Arrow is now a Fortune 104 company that serves over 210,000 customers and brings in more than $37 billion in revenue, according to Chief Strategy and Technology Officer Shantnu Sharma. When asked to describe Arrow, Sharma says, "**we help guide the power of innovation**." In the pursuit of this goal, Sharma explains how it's important for him to observe the ecosystem of electronics companies and technology ideas as it evolves.

One way Arrow is keeping their finger on the pulse of the computer industry is by engaging with the MIT Computer Science and Artificial Intelligence Laboratory (CSAIL).

CONNECTING WITH ALLIANCES

Arrow's New England branch General Manager Howard Porter said Arrow's relationship with MIT and CSAIL started almost a decade ago when they created a unit to seek out college graduates and new companies that weren't yet being supported by Arrow. This led them to now-Senior Director of MIT Horizon and Executive Director of the MIT Center for Collective Intelligence Kathleen Kennedy, who was at that time leading The Engine, a venture fund and accelerator program for MIT tech startups. Immediately, Arrow saw the benefit of this connection. "We set out to help [these startups] grow faster and more efficiently with the hope that their success would be mutually beneficial," said Porter.

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CONNECTING WITH ALLIANCES *(continued)*

This hope proved correct, as Arrow had "very good luck" with MIT spinoffs such as iRobot, Akamai, and Boston Dynamics. One of Arrow's most successful engagements has been with CSAIL spinout Cambridge Mobile Telematics, which began in 2014 and led to a thriving relationship that continues to this day. Porter quickly realized that a lot of these exciting companies were coming out of the Computer Science and Artificial Intelligence Lab, which had an industry gateway of their own. Soon after, Porter brought the proposal to join CSAIL to Arrow's then-chief digital officer and "he loved it."

Thus, their relationship with CSAIL Alliances began.

RESEARCH COLLABORATION: MLA & DOCUMENT PROCESSING

With such a strong investment in leading innovation, it made sense for Arrow to join the board of the MachineLearningApplications@CSAIL research initiative. CSAIL research initiatives are created to bring together a small cohort of companies around a timely research topic to facilitate closer faculty interactions and further the state of the art in a given technical space. By being part of this initiative, Arrow—along with Ernst & Young, Cisco, Capital One, Ahold Delhaize Company, SAP, and BT—has the opportunity to pose industry problems to CSAIL researchers and select which proposals get funded. Right from the beginning, Arrow expressed interest in the economics of machine learning, wanting new methods to efficiently leverage available data and implement time-saving technology solutions.

Through their involvement with CSAIL Alliances, Arrow connected with CSAIL Research Scientist Amar Gupta, whose work regarding automated document reading was particularly exciting to the company. Previously, Dr. Gupta helped develop the electronic system of processing checks that has since become a modern staple. His continuing work on accelerating and expanding computerized document reading caught the attention of Arrow, who was interested in a more efficient way to process the massive influxes of non-standardized documents they receive on a daily basis. Dr. Gupta says, "they were very supportive and volunteered to give us the data that we could use for processing and testing some of the routines we were doing. So that's how the relationship originally emerged."

That initial interaction has grown into two separate sponsored research contracts with Arrow. With Arrow's SiliconExpert subsidiary, Dr. Gupta is developing ways to process the vast quantity of unstructured information the company must summarize in order to share the technical details for which their platform is known. According to Vice President of Global Supply Chain, Architecture, and Digitalization Ross Valentine, "we receive and process thousands of technical data sheets, which come from electronic manufacturers. Every one of those data sheets could be a different format, so the challenge we set out was how to ingest and make sense of all these different formats through an optical character recognition AI process." Working with Dr. Gupta, the researchers "were able to create a process to read and comprehend those documents and turn them into a usable form that could be ingested by the SiliconExpert platform."

This successful prototype gave them the confidence to extend the research into a multi-year engagement, with the aim to scale the initial proof-of-concept into a system that can handle tens of thousands of documents.

In a similar vein, Arrow has engaged Dr. Gupta to help "read" and automate the processing of invoices. "There's a lot of paperwork [at Arrow] in terms of bills, shipping records, and custom forms which have to be filled out," said Dr. Gupta. To address this challenge, he and fellow researchers are studying how much of that can be sped up with automation.

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Dr. Gupta describes this research as "a very constructive relationship," adding, "what I like about Arrow and [their subsidiary company] SiliconExpert is that they're very supportive of the work." According to him, the company is courteous, professional, and problem-solving as they mutually strive toward solutions.

Valentine says, "what I see with both of these projects is they really will generate operational efficiency and take a lot of manual process and error out of the business."

On the research side, Dr. Gupta cited how working with Arrow is a win-win. "This is a company which has really seen the writing on the wall" in terms of Arrow's decision to pursue time-saving automation techniques. "**This is one of those relationships which I think should be used as a model between an organization and MIT in terms of how the two sides have collaborated together in a very productive manner**."

Arrow continues to be an active member of the MLA@CSAIL board. Furthermore, their employees take full advantage of other Alliances resources by using the website to understand the kind of work happening in the CSAIL community, take part in the researcher First Friday Lunch Series, and stay informed about upcoming events.

GOING FORWARD

Overall, Sharma is pleased to be a part of CSAIL Alliances, citing the symbiotic nature of the relationship. "We learn a lot about what's happening and what's cutting edge in the industry and academia," he says.

Looking ahead, Arrow is hoping to engage even more deeply with CSAIL and CSAIL Alliances to both pursue further research opportunities and broaden their footprint on campus. They want to get more involved in AI, green tech, and connecting with new startups. Porter's personal goal is "to help solidify the relationship with CSAIL" so that more researchers and students are aware of the resources Arrow has to offer. "We're a company that prides ourselves on open architecture. The faster we solve your technical problems, the sooner you get to market," which is in Arrow's best interest as a distributor of electronic components.

Porter is also excited to grow the network of businesses in the greater Boston area, saying it's "huge" to keep companies in Massachusetts and create an in-person environment of innovation. Being involved with CSAIL helps Arrow play a role in the development of this ecosystem.

Despite the extensive work they've already accomplished, "we're not even close to being tapped on what we could really do together," according to Porter. For Sharma, it's a fulfilling experience to have a "front-row seat" to the emerging, cutting-edge technologies coming out of CSAIL, encouraging other companies to take advantage of the opportunities provided by CSAIL Alliances.