Project Renaissance/The Digital Green House/The Technology Collaborative

In late 1997, the head of Carnegie Mellon University's (CMU's) Computer Science Department was visiting alumni on the West Coast when he learned of a Cadence Design Automation, Inc., initiative to start a U.S.-based Design Foundry. Integrated circuits were growing exponentially in complexity while designer productivity increase was less than 10 percent per year. At the same time, an NSF workshop documented that computer-aided design (CAD) software was also growing in complexity to the point that it required a two-year Associate's Degree to be proficient in Cadence software.

The product cycle, from inception to obsolescence, was dramatically decreasing. To reduce time-to-market and costs, companies were already outsourcing lower portions of the product creation cycle such as printed circuit board manufacturing. Companies had also disbanded their internal CAD tool development groups and purchased commercial tools. In addition, it was more efficient to reuse designs, such as microprocessor cores, than to start every design from a clean sheet of paper. However it could take 6 to 12 months to negotiate the intellectual property (IP) rights to reuse a design—matching, in some cases, the projected product life.

Cadence projected that the next step was for companies to outsource design, reducing the requirement to keep a group of engineers proficient on the ever-changing commercial CAD tools. Cadence proposed a Design Foundry that would take application-specific requirements, reuse design cores from their IP library, and create the detailed designs using the Cadence tool set. Cadence set up an initial Design Foundry in Scotland and was looking for a US site.

Based on Prof. Dan Siewiorek's experience with leading the Engineering Design Research Center (EDRC), an Engineering Research Center (ERC) at CMU, in its final phase of 11 years of NSF funding and through transitioning to self-sufficiency in 1997, the Computer Science Department chair asked Siewiorek in early 1998 to organize a visit from Cadence. Some background research indicated that the universities in the Southwest region of Pennsylvania (CMU, Penn State University, and the University of Pittsburgh) graduated over 1,300 computer engineers per year. A planning group was created out of leading computer engineers from the three universities. The group created a focus of System-on-a-Chip design including curriculum and new courses, supported by the universities' presidents and chancellor, as well as state officials (who were engaged through the ERC transitioning process). Then-Governor Tom Ridge joined the initial meeting with Cadence via teleconference.

Cadence selected this Pennsylvania group to further develop the plan, which they called Project Renaissance. Together with a member of the Cadence team, Dan Siewiorek co-authored the initial business plan. In addition, through the industrial contacts of the planning group, interest was lined up from several more companies.

Plans went forward and the region decided to broaden this initiative on their own and set up the Digital Green House, which combined industrial contributions with state funding to support the development of courses in System-on-a-Chip design as well as research grants to university researchers to create IP that would be available to industrial participants and to other companies to transition the IP to products.

The Digital Green House model proved so successful that the state of Pennsylvania later created a Biological Green House. Other states became interested in copying this model for high-tech economic growth. The Digital Green House then merged with an initiative in Robotics and was renamed The Technology Collaborative, which celebrated its 10th anniversary in late 2009 (http://www.techcollaborative.org/). Consequently, not only did the EDRC transform itself to sustainability but, relying in part on expertise and leadership developed in the ERC, it also enabled the entire Southwest region of Pennsylvania to add to its economic sustainability.

The Digital Green House combined with Robotics to produce The Technology Collaborative