

## Innovative, New Enterprise Architecture Degree Programs Are Under Development

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The higher education field is assisting in the maturation of the enterprise architecture (EA) discipline with the introduction of new degree programs and other initiatives in EA. Leaders responsible for EA must be aware of developments such as this, and consider plans to take advantage of them during the next two years.

### Key Findings

- There is clearly a shortage of qualified enterprise architects and others with a similar perspective in the labor market, evidenced by numerous clients reporting great difficulty in recruiting to fill open enterprise architect positions, even in an economy with high unemployment. Programs such as those cited here can be used to develop EA talent.
- Pennsylvania State University (located in University Park, Pennsylvania) is pursuing an ambitious plan, the first of its kind in North America (to our knowledge) to introduce new undergraduate and graduate degree programs in EA. The EA Professional Master's Degree will be offered globally, online.
- More than 70 companies, government agencies and professional associations from several countries have been initially involved in an advisory committee. They have provided input to the shaping of the Penn State EA program, demonstrating significant interest in this initiative from the corporate and government sectors.

### Recommendations

- CIOs, lead architects and other leaders should monitor the development of higher education initiatives in EA, and consider the opportunity to use the Penn State EA program to address staffing needs for recruiting or existing staff development.
- IT or business professionals interested in career development should investigate options such as the EA program at Penn State to develop knowledge/skills, while enhancing their resume as they seek new positions in EA and beyond.
- Employers recognizing the importance of the "soft" (people) skills in effective enterprise architects should, beyond encouraging EA knowledge/skills development through an EA master's degree program, develop interpersonal skills via specialized in-person courses and on-the-job work with a skilled mentor.

## ANALYSIS

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Penn State University has begun an EA initiative<sup>1</sup> that includes the introduction of new degree programs in EA, targeted to launch with the fall semester, 2011, along with a certificate program (non-degree-bearing) and an EA research center. Gartner research indicates that this will be the first EA degree program in North America and the first globally available online professional master's EA degree program. We believe this to be another sign along the journey of a gradually maturing discipline that is being increasingly pursued by organizations around the world to improve their strategic planning, including, but not limited to, strategic technology planning. This is a very good and healthy sign for the advancement of the EA profession.

Despite a weak global economy and job market, Gartner client inquiries continue to reveal that companies are struggling to find qualified enterprise architects to hire. Although the Penn State initiative will take time before it starts producing EA graduates, there is some hope that — by 2013 for graduate students, or 2015 for undergraduate students — the supply-and-demand gap for enterprise architects will begin to close. Other universities are discussing the possibility of developing their own EA degree programs, and it is likely that some will follow through on delivering them during the next several years, as they too recognize the opportunity that exists to meet a market need.

### **Penn State's EA Initiative**

Since 2003, Meta Group (acquired by Gartner in 2005) and Gartner (since 2005) have partnered with Penn State's Executive Management Program on the creation and delivery of a five-day program called the Emerging Enterprise Technology Strategist. Among other topics, this program included material on the use of the EA discipline as part of the business and IT strategic planning process. Dr. Brian H. Cameron, Professor of Practice and the Director of the Enterprise Architecture Initiative in the College of Information Sciences and Technology (IST) at Penn State, recognized the need and opportunity for Penn State to do more in higher education with EA. With the support of Dr. Henry C. "Hank" Foley, then Dean of the College of IST and currently Vice President for Research and Dean of the Graduate School, and Dr. David L. Hall, current Dean of the College of IST, Dr. Cameron started an EA initiative at Penn State that now includes multiple dimensions.

To begin the EA initiative at Penn State, Dr. Cameron formed an EA advisory group that quickly grew in its early stage in 2009 to more than 70 organizations, both public and private sector, dominantly based in North America, but with notable participation from Canada, the U.K., Germany, India, Argentina, the Netherlands, Singapore and China. The university's EA courses will expose students to many of the major EA frameworks, methods and approaches, while not endorsing any one of them. The EA initiative has four primary initial parts: (1) bachelor's degree with EA focus, (2) EA master's degree, (3) EA certificate program and (4) EA research center (see Note 1 for details).

In September 2010, the EA advisory group conducted its second meeting in as many years to work on providing guidance and direction to the university as it continues in the planning process. The program continues to build momentum and global interest.

### **Other EA Degree Programs**

Several universities have individual courses that directly or indirectly deal with EA topics. However, few have gone further to create a full degree program in EA. Our research revealed the following existing EA degree programs:

- *Delft University of Technology* — Delft is the oldest and largest university of technology in the Netherlands, located in the city of Delft. It offers a Master of Science (M.Sc.) in Computer Science — Information Architecture.<sup>2</sup> It is a Computer Science Master's degree with a specialization in information/enterprise architecture, but sometimes abbreviated as M.Sc. Information Architecture. The program focuses on the problems of using information and communication technology (ICT) in organizations to improve their business. The curriculum is a collaboration of electrical engineering, mathematics and computer science (EEMCS) and technology, policy and management (TPM). The program started in 2004 and produced its first two graduates in 2006.
- *Griffith University* — Griffith offers three graduate-level programs in EA<sup>3</sup> at its Nathan campus (in the Brisbane, Queensland, Australia area), hosted by the School of Information and Communication Technology. The first program is the base and is a prerequisite for the other two: Master of EA. Upon successful completion, students with a grade point average of more than 4.5 may pursue the Master of EA with Advanced Studies. Alternatively, students with a grade point average of more than 5.0 may pursue the Master of EA with honors.
- *Royal Melbourne Institute of Technology (RMIT) University* — RMIT is one of Australia's oldest and largest universities. It offers a master's of technology (EA) graduate diploma.<sup>4</sup> The program began in 2005 and produced its first round of graduates in 2008. It is designed for IT professionals desiring to become enterprise architects. It integrates business and technical IT knowledge. A minimum of five years of "appropriate" experience is required and validated by an interview to determine eligibility for the program. There is no dissertation requirement.

Other universities are discussing the possibility of creating EA degree programs, and a few, such as the National University of Singapore<sup>5</sup> (NUS), which currently has an EA certificate program, are planning EA master's degree programs for the future. NUS also conducts EA research, primarily focused on its application in government.

## Certification Programs in EA

We have observed a rising number of EA certification programs across the globe in recent years as organizations seek to monetize the recognition of EA as a profession. These programs have differing methods, approaches and standards, and thus, none of them can credibly claim to be an authoritative certifier for enterprise architects (see "Findings: EA Certification Proliferation Raises Red Flag to Employers and Employees Alike" and "Hype Cycle for Enterprise Architecture, 2010"). Very few of the EA certification programs offer university Continuing Education Unit (CEU) credits. The FEAC Institute has partnered with California State University at East Bay (Hayward) to offer CEUs for its Federal Enterprise Architecture Framework (FEAF) and Department of Defense Architecture Framework (DoDAF) certification programs.<sup>6</sup>

In Australia, Griffith University will begin a new postgraduate program in 2011, offering a graduate certificate in EA.<sup>7</sup> An undergraduate degree is *not* a prerequisite for interested students with sufficient, relevant experience. This certificate can optionally be a step toward a master's degree (see above).

In North America, these certification programs (with or without CEUs) have been the only formal mark of "distinction" available to those seeking to enhance their CV/resume with EA credentials. Now, it looks like there will be an alternative. We still believe, and hiring managers we speak with during client inquiry confirm, that the best resume enhancements are documentation of business accomplishments.

## Analysis and Conclusions

We have spoken with many client organizations<sup>8</sup> about the developments in EA education, particularly in North America, and draw the following conclusions and observations:

- We applaud Penn State for taking the uncommon — but leading-edge and innovative — approach of engaging the corporate world at the very beginning of a new academic program to actively seek their guidance and input in shaping the EA program itself. The idea is to ensure that students produced by both the undergraduate and master levels will have the knowledge and competencies that will make them desirable new employees. The strong engagement of the corporate world in this endeavor is a firm affirmation that these companies agree with this approach. Indeed, informal discussions with several of the Penn State EA advisory group members confirm this finding. These corporate representatives indicate that these EA graduates would be of value to them in a number of roles, not just EA positions. Penn State is planning to produce graduates suited for several roles, including but not limited to EA, in which a more well-rounded enterprise perspective is of business benefit.
- In the midst of a globally weak economy, the Penn State program has managed to attract the interest of an extraordinary, large and impressive number of companies and government organizations. These partner organizations have engaged via the Penn State EA advisory group, and have committed staff time and significant financial support toward the creation of the new EA program. This level of participation would be impressive in a strong economy, but for this to occur during the past 18 months in a down economy is a strong indicator of corporate interest in this program and demand for its graduates.
- We have heard from many that question the merit of an undergraduate degree in EA. The argument is that EA is a senior-level discipline that demands experience. They question whether EA bachelor-level graduates would be ready to perform as an enterprise architect. We believe that the EA bachelor's program is just as valid and useful as a bachelor-level business degree. In both cases, the graduate would be a junior/entry-level contributor, probably under the guidance of a senior EA mentor, taking on much of the detail work assignments in support of the larger program. Bachelor EA graduates certainly would not be ready to assume the role of lead architect, but that's not the objective. The bachelor's program would develop entry-level candidates. This program would also feed more young people into the EA field. Most EA teams lack the youth aspect of diversity in their teams, and thus, they lack the important perspective of "digital natives" as they do their work.
- Far too many enterprise architects and the programs they run are dominantly IT-centric. This is a quite dated approach to EA. Schools need to teach best practice, not historical practice. EA is a profession perfectly suited to an interdisciplinary studies approach. There should be a blend of curriculum content from the business school, engineering school and IT school, at a minimum. In our opinion, most of the EA degree programs cited above are overly technology-centric, focusing more on systems architecture than on EA. Penn State would do well to avoid this bias as it builds its new program. Indeed, it is working to build its EA degree programs as interdisciplinary/interschool degrees.
- In virtually all cases where clients tell us about open enterprise architect positions, they also report difficulty in recruiting to fill these positions, even in an economy with high unemployment. The new Penn State program offers some hope of gradually increasing the pool of better-qualified junior (bachelor's) and more-senior (online master's) candidates beginning in 2013. We recognize that true, interdisciplinary degree programs

are difficult to create in any institution, due to the political forces at work, but we are optimistic that these issues can be addressed to create the sort of program that the market really needs.

- From a U.S. perspective, there has certainly been a recent trend toward offshoring many job functions, especially in IT. EA positions, however, which are most commonly found within the IT organization, are almost never moved offshore. Furthermore, they are positions that earn good wages. Penn State graduates from these programs will be equipped to assume other roles as well, such as project/program leadership, portfolio management and business process analyst. Equipping students for good-paying jobs is a positive step in the right economic direction.
- Just as the EA discipline has progressed over the past dozen years from being a purely technical discipline to a much more holistic discipline that now goes beyond the borders of IT, we expect that best practices in EA will continue to evolve. It is critical that universities with EA programs stay in touch with real-world best practices and continuously evolve their curriculums accordingly.
- Being an *online* program, the Penn State EA master's degree raises some potential concern. People skills (soft skills) are an important competency in the most effective enterprise architects. Developing such skills is difficult in an online environment. The Penn State program planners should do everything possible to mitigate this challenge as they plan their online program. Candidates and employers must take this into account as well.
- Nearly all current EA seminars, courses and certification programs are exclusively focused on a single EA framework, method or process. We believe that any major academic program about EA should survey most of the major alternate EA approaches, along with their pros and cons. It is our understanding that Penn State plans to do this.

## Bottom Line

Penn State's EA initiative is a significant, positive step in higher education toward the advancement of the real EA profession that goes beyond the narrow, technical architecture focus of most other EA training.

## RECOMMENDED READING

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"Findings: EA Certification Proliferation Raises Red Flag to Employers and Employees Alike"

"Hype Cycle for Enterprise Architecture, 2010"

## Evidence

<sup>1</sup> Penn State University's Enterprise Architecture Initiative (see <http://ea.ist.psu.edu>). Additional details are provided by Dr. Brian Cameron from the School of Information Sciences and Technology.

<sup>2</sup> Delft University of Technology (see [www.tudelft.nl/live/pagina.jsp?id=bd80d529-ee89-49a8-ac4d-eb929206b600&lang=nl](http://www.tudelft.nl/live/pagina.jsp?id=bd80d529-ee89-49a8-ac4d-eb929206b600&lang=nl)). Note that this Web page and much of this website is only available in Dutch.

<sup>3</sup> Griffith University, Nathan Campus has three master-level degree programs in EA (see [www17.griffith.edu.au/cis/p\\_cat/admission.asp?ProgCode=5495&Type=overview](http://www17.griffith.edu.au/cis/p_cat/admission.asp?ProgCode=5495&Type=overview)).

<sup>4</sup> RMIT University has a Master of Technology (EA) graduate diploma (see [www.rmit.edu.au/programs/mc152](http://www.rmit.edu.au/programs/mc152)). Additional details are provided by Keith Frampton, who was involved with the creation of the program.

<sup>5</sup> National University of Singapore, Institute of Systems Science has an EA certificate program (see [www.iss.nus.edu.sg/iss/index.jsp](http://www.iss.nus.edu.sg/iss/index.jsp)).

<sup>6</sup> California State University at East Bay (Hayward) has partnered with the FEAC Institute (see [www.ce.csueastbay.edu/certificate/enterprise\\_architecture/index.shtml](http://www.ce.csueastbay.edu/certificate/enterprise_architecture/index.shtml)).

<sup>7</sup> Griffith University offers a graduate certificate in EA (see [www3.griffith.edu.au/03/ertiki/tiki-read\\_article.php?articleId=26982](http://www3.griffith.edu.au/03/ertiki/tiki-read_article.php?articleId=26982)).

<sup>8</sup> During the past 18 months, this author has discussed the developments in EA education with more than 100 clients via client inquiries and conferences.

## Note 1

### Penn State University — EA Initiative Details

*Bachelor's Degree With EA Focus:* A new, undergraduate major with a focus in EA is in the planning stages, with an intent to launch the program beginning in the fall semester of 2011. This program will be at the University Park main campus and anchored in the College of IST. However, it will include courses from other areas, such as the Smeal College of Business. The program is being based on recommended competencies generated by the undergraduate program working group within the larger EA advisory group.

*EA Master's Degree:* A new, online professional master's degree with a focus in EA is also in the planning stages, with a launch planned for the fall semester of 2011. The goal is to develop it as an interschool, interdisciplinary degree (crossing the science and arts schools). This program will be organized primarily for online delivery, making it accessible to English-speaking, practicing professionals anywhere in the world who seek to advance their knowledge, competencies and, ultimately, careers. There is a graduate program working group, again part of the larger EA advisory group, which has developed recommended competencies for students seeking this degree. Prerequisites for the program include a prior, post-secondary school degree (typically a bachelor's degree) and a minimum of two years of relevant work experience. Applicants will be evaluated by a committee that will also consider exceptional cases. There is no direct student linkage or dependency between the Penn State EA bachelor's and master's programs.

*EA Certificate Program:* Primarily targeted toward early-career professionals, a new EA certificate program will be delivered online. This program is oriented toward practicing professionals who seek to advance their knowledge and competencies in EA-related areas without committing to a full, degree-bearing program. There are no prerequisite requirements. The first course, Introduction to Enterprise Architecture, is under way online in a pilot phase with approximately 35 students from the U.S., Latin America and Australia. Tuition and fees are \$1,773 for this course, which earns two graduate credits. Upon completion of the introductory course, students will have the opportunity to take a new optional certification exam designed around the course from The Open Group.

*EA Research Center:* As Penn State has done with other research topics, it is forming an academic research center on EA to advance the discipline through collaborative research within academia and with corporate, government and industry association partners at the intersection of theory and organizational practice. A research working group subcommittee of the EA advisory group has already held some meetings to get this started. The first EA research survey project has been completed. This survey investigated use of EA frameworks and metrics. Gartner will be publishing research based on this survey.

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