

■ Sub Samaddar, Feature Editor, J. Mack Robinson College of Business, Georgia State University



Michael McNeese

is an associate professor at the School of Information Sciences and Technology, Pennsylvania State University, University Park. He holds a PhD in cognitive science from Vanderbilt University. His research interests

are in the areas of Cognitive Systems Engineering.

mdm25@psu.edu



Sandeep Purao

is an associate professor at the School of Information Sciences and Technology, Pennsylvania State University, University Park. He holds a PhD in management science from the University of Wisconsin-Milwaukee.

His research interests are in the areas of Organizational Computing.

sandeep-purao@psu.edu



James Thomas

is dean of the School of Information Sciences and Technology, Pennsylvania State University, University Park. He holds a PhD in strategic management from the University of Texas at Austin. His research inter-

ests are in the areas of Knowledge Management and Sense Making in organizations.

j2t@psu.edu



John Yen

is University Professor of Information Sciences and Technology and professor-in-charge at the School of Information Sciences and Technology, Pennsylvania State University, University Park. He holds a PhD in

computer science from the University of California, Berkeley. His research interests are in the areas of Intelligent Agents.

juy1@psu.edu

By using the metaphorical context of the new and multiperspective challenge that the starship Enterprise encountered in its early years, McNeese, Purao, Thomas and Yen describe multidisciplinary initiatives at Penn State. Their school believes that a multidisciplinary approach is critical for dealing with the complex problems of information technology in work and life. Other universities also have various multidisciplinary initiatives regarding IT, and we will have more articles describing some of those initiatives in coming months.

Where No One Has Gone Before ...

by Michael McNeese, Sandeep Purao, James Thomas, and John Yen, Pennsylvania State University, University Park

Once upon a time, when the starship Enterprise was first put into service, it embarked on one of its most dangerous voyages. Some distance outside the familiar territory of the solar system, where every planet was by then marked, studied, and categorized (Earth was still the only class M planet), the ship encountered the primordial soup of objects, small and large, floating in space. Just as the ship was maneuvering through this final layer of the Milky Way, towards the uncharted deep recesses of space and untold galaxies, a new challenge loomed on the large monitor screen on the bridge.

The leader of starship Enterprise, James T. Tirk, summoned three of his advisors to investigate this large creature that had appeared on the monitor screen. It made a buzzing sound that appeared to come closer every minute. Jimmy Young spoke first. "It appears to have some intelligence. We need to find out whether it is alive. Perhaps it has been given some intelligence by its creator."

Mickey Mesner piped in, "It is reacting to its environment. Look how it is changing its appearance. We should try to coax it into our living lab."

Sammy Pilot was the last to weigh in. "Well, we really do not know if this is an individual entity or a collective intelligence," he said. "Perhaps this is not a single creature. We should try to understand how it is structured, and how it is functioning."

James Tirk pondered the advice. His advisors had, indeed, given him several alternatives. It was his turn now to make

sense of the different things he had heard. Unlike his job on earth, which included a membership in the Chamber of Commerce, James Tirk relished his new responsibilities at the helm of the starship. He particularly enjoyed the differences that each of his advisors brought to the task. In the end, he realized, it was not that one of these had to be right but rather, it was the combination of perspectives that prevailed. This was also different from the days on earth, where competing viewpoints in the chamber had to be resolved by selecting one of the many available alternatives sometimes by an appeal to authority. The Enterprise posed different challenges.

The buzzing sound was now louder. It seemed to emanate from the bowels of the creature. The image also filled the screen. The creature had moved closer. Or perhaps it had grown larger. James wondered if the Enterprise had a strange attraction to the creature. Perhaps it was continuing on a collision path. Clearly, this was like no other challenge James Tirk had faced while navigating the familiar solar system. Unless a way could be found to prevent it from colliding with the Enterprise, there would be no Enterprise left to explore the uncharted territories outside the familiar bounds of the solar system.

James Tirk had already tried to hail the creature. He tried again. "We come in peace. We are the starship Enterprise from planet Earth." To no avail. The buzzing continued. It was now like a buzzsaw. The noise could not be ignored. On the bridge, the crew had to shout just to be heard. James

knew that he could not wait any longer to take action. But what should it be? He realized that Jimmy Young's perspective would be a useful one if they placed the creature inside a living lab as Mickey Mesner had suggested. If the creature were a collective, instead of a single organism, as Sammy Pilot suggested, the internal functioning of the collective would have to be analyzed to understand its intent. He realized that perhaps all three perspectives were essential to understand how the creature reacted with the environment, consuming, and generating information. As he came to terms with the three perspectives, the creature was almost upon the Enterprise.

Breaking the Final Barrier

It has been five short years since the School of Information Sciences and Technology (IST) at Penn State University was founded. Since its inception, it has taken on itself the challenge of engaging with problems related to Information Technology using a multidisciplinary approach. During this time, the school has recruited about 25 faculty from several disciplines including computer science, management information systems, library science, geography, psychology, and business. The school is built on the recognition that many problems related to the use of information technology in society today require a multidisciplinary approach that may not be accepted by the familiar bounds set by traditional disciplines. As a result, the school seeks to build teams of faculty from different disciplines to engage with problems faced by industry, communities, and government in the design, use, and application of information technologies.

The vision of the school is that a multidisciplinary approach is critical for dealing with the complex problems of information technology in work and life. In a sharp departure from the previous two decades, today's scholars realize that information technologies are tightly linked to the context of use and to the user(s) interacting with the technologies. The scope of contexts can vary widely from individual, group, organization, community, nations, and global. Having a deeper impact on these contexts (e.g., better human decisions, more adaptive processes) has become the driving force of innovation in the information age. Hence, innovations in technology

should be guided by studies about the context, and new insights about the context itself can naturally emerge from deployment of new technologies. Thus, innovations in information technology and scientific studies about its context feed into each other to form a dynamic cycle that can bring IT to a new frontier—the frontier that even Enterprise has not yet visited.

The three core areas of research that IST scholars agree on consist of people, technology, and information/knowledge. Faculty members and teams often focus their research on the interrelationships between two or among all three of these areas. Projects undertaken by faculty, therefore, range from solving the technical problems of homeland security to developing tools to better store, retrieve, and use information; from investigating how technology affects the workplace to determining how IT can foster community networks that address health care, education, and public policy; and from developing design tools for critical workflows in organizations to understanding linkages between computing architectures and institutional styles.

The problem-based aspect is evident in research endeavors, which often require teams of faculty with diverse interests and capabilities. Research efforts undertaken by faculty at the school, therefore, include the following:

- intrusion and error detection in databases to ensure seamless carryover and continuation of database functionality and processing of transactions in spite of impairments,
- intelligent search engines that build on lessons learned from observing individual needs to improve information retrieval and processing, and
- studies of gender imbalance in the IT workforce and devising societal interventions to recruit and retain women in professional fields.

The mode of research suggested and practiced by IST has attracted funding from several sources: state, federal, and private such as the National Science Foundation,

the U.S. Marine Corps, Army Research Lab, and Office of Naval Research and private industry including Lockheed Martin and Ford Motor Company. Grant awards to IST faculty members have more than quadrupled since the school's inception four years ago. Since 1999, IST researchers have brought in more than \$11.5 million for projects in which faculty members have participated. This represents a rise from \$1.8 million of funding during the first year of inception. During 2003, IST researchers will bring in about \$4 million more for projects targeting human-computer interaction, computer-aided decision making, and digital libraries, to name a few. In fiscal year 2003, industry research contracts with IST faculty members have almost tripled

Grant awards to IST faculty members have more than quadrupled since the school's inception four years ago.

to more than \$730,000. The United States Marine Corps is also giving more research dollars to the school for projects focusing on protection of critical facilities

and use of information technology to improve logistics and supply chains.

Additional ongoing research projects at the school continue to exemplify this interdisciplinary focus. One is aimed at helping local police departments take advantage of existing and new information technologies. Studies have shown that while vital and sometimes life-saving data is available to first responders to emergencies and crime scenes, they don't always have the tools or ability to access it. Another deals with electronic marketplaces, where software agents are being designed to assist businesses in making better and more strategic, yet quick, trading decisions that can improve cost and efficiency. A third deals with connecting condition-based maintenance of ground equipment that is monitored by sensors and supported by wireless technology and its integration with the supply chain mechanisms to ensure that the parts and resources will be delivered in an anticipatory mode, even before failure occurs. This can improve safety as well as reduce downtime of equipment. Yet another is involved in developing intelligent agents to help decision-making teams in

See **Information Technology**, page 23

- *Stair and Reynolds*: Support for student learning (end of chapter questions, questions on the Web etc.) and cases.
- *Oz*: Coverage of ethical and societal issues in each chapter and the use of the same case at the start and end of chapter to promote greater learning.
- *Turban, Rainer, & Potter*: Coverage of Supply Chain Management and IT Integration, the CD-ROM, and end-of-chapter study aids such as "What's in IT for me" and the Virtual Company Assignment.

As a disclosure, the author uses *Stair and Reynolds* due to the richness of its instructor support materials and the student aids.

References

Gorgone, J. T., Davis, G. B., Valacich, J. S., Topi, H., Feinstein, D.L., & Longenecker, H. E. (2002). IS 2002: Model curriculum and guidelines for undergraduate degree programs in information systems. *Communications of the Association for Information Systems*. ■

Peter T. Ittig
 College of Management
 University of Massachusetts
 Boston, MA 02125-3393
http://www.faculty.umb.edu/peter_ittig/

DSI Online Membership Directory Is Available to All Institute Members

To access the DSI online membership directory, point your browser to:

<http://decisionsciences.org/directory/auth.asp>

Log in using your email address and membership number as password. If you do not remember your membership number, you can have the system send your password to you from the authentication page. If you have not registered an email address, contact us at dsi@gsu.edu with your membership number and email address, and we will update your profile for you. Once you are logged in, you can also update your own profile. ■

Information Technology, from page 16

homeland security scenarios handle what can be overwhelming amounts of information. The intelligent agents will anticipate the information needs of decision makers based on a mental model they share with the team and proactively assist the team by providing information related to those needs.

As the faculty teams engage in these interdisciplinary projects, increasingly cross-functional, integrative solutions that can impact all areas of business and community are being developed that draw on all three areas—people, technology, and information.

David Hall, associate dean for research, sums up the school's strategy this way. "We used to believe that the so-called 'hard sciences' were those such as physics, chemistry, and mathematics because they addressed problems related to the structure of matter, the origin of the universe, and general relativity. Now we're becoming aware that the really hard sciences are those such as IST that tackle problems involving technology and its interaction with the most complicated entities in the universe—namely, human beings."

The problem-based focus, which requires an interdisciplinary perspective, also

permeates the teaching undertaken at the school. All courses at doctoral, masters, and undergraduate levels are taught with a problem-oriented focus, where teams of students engage with complex problems to design enterprising solutions in unique contexts that they explore in depth. Examples of this include the design of interfaces in vehicles, teams of coordinating agents on a battlefield, and workflows in pharmaceutical companies for participating in drug approval processes. The examples motivate the students to learn the techniques from different disciplines necessary to devise and deploy the solutions. Through this quest they develop a strong interdisciplinary understanding and the requisite leadership to develop the new frontier of the information age.

Engaging the Inevitable . . .

"Lock on to the center of the creature. Lay a course bearing straight into the belly of the creature. We will have to do this at warp speed."

James Tirk realized that the only way to escape the clutches of the solar system was to navigate directly through the core of this creature. It was clearly an obstacle to the path Enterprise had laid out.

His advisors agreed. "We can sense how the creature reacts and compensate," said Mickey Mesner.

"Agreed," replied Sammy Pilot. "If it is a collective, it will certainly have the ability to sense and respond by adjusting its internal workings, reorganizing."

"If each of the agents it is made up of is endowed with intelligence, it should rearrange itself," Jimmy Young whispered.

James Tirk issued the order. "Engage!" ■

Acknowledgement: *Information about the ongoing research projects and funding accomplishments was provided by Margaret Hopkins, coordinator for public information.*

Subhashish (Sub) Samaddar

Department of Management
 J. Mack Robinson College of Business
 Georgia State University
 P.O. Box 4014
 Atlanta, GA 30302-4014
 Voice: 404-651-4063/Fax: 404-651-3498
s-samaddar@gsu.edu
<http://www.gsu.edu/~dscscs>