

## **T-Summit 2016 Speaker Abstracts:**

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**09:30am      10:20am      National Science Foundation Panel**

### **Auditorium**

*Susan Singer, Director, Division of Undergraduate Education, NSF*  
*Dean Evasius, Director, Division of Graduate Education, NSF*  
*Celeste Carter, Program Director, Division of Undergraduate Education, NSF*  
*Richard Tankersley, Program Director, Division of Graduate Education, NSF*

NSF's Community College Innovation Challenge and the Advanced Technological Education (ATE) program, students are challenged to experience learning in real world settings. For over two decades, the ATE program has prepared the middle skills workforce, reaching middle school to 4-year degree students by insisting upon robust academic and industry partners from the start. The NSF-funded National Center for Convergence Technology (CTC) builds upon its partnership with businesses and educational institutions in North Texas to reach at least sixty community colleges nationwide by working through five partner colleges that mentor community colleges in their geographic region to implement high-demand convergence degree and certificate programs in the emerging technologies associated with the networking IT infrastructure, including mentoring feeder high school and four-year university programs in a 2+2+2 pathway. Quarterly meetings with industry partners assure alignment between the academic and industry settings so students develop the full set of skill needed for success in both the classroom and internships. The Marine Advanced Technology Education (MATE) Center's numerous approaches to T-shape development include an international underwater robotics competition to increase global learning and build academic and employer partnerships. The SpaceTech Center provides the only FAA-recognized, performance-based certification for aerospace technicians, partnering with multiple government agencies including NASA and the military. Comparable partnerships are emerging at the bachelor's degree level.

Graduate education is undergoing modernization to prepare students for the broad range of employment opportunities ahead. The new NSF Research Traineeship program encourages bold, new and potentially transformative models and includes an "Innovations in Graduate Education Track". The goal is to enrich and extend the knowledge base about effectively implementing graduate education. Partnerships with other federal agencies, through the Graduate Research Internship Program (GRIP), provide opportunities for NSF Graduate Fellows to participate in mission related research across the federal government. Beyond the content exposure, these experiences advance professional development of graduate students across multiple dimensions. Recognizing the global nature of science and engineering and the need for a broad range of cultural competencies, the Graduate Research Opportunities Worldwide (GROW) program brings NSF Graduate Fellows to a partner country for 3 to 12 months. Panelists will discuss the lessons learned across higher education in innovative T-shape learning environments.

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**10:20am**    **10:40am**    **Innovation All Around Us: 10 Stories, Pixar Short Style**

**Auditorium**

*Brad Lukanic, CannonDesign*

How can one create the fertile ground which spurs cross-disciplinary thinking and engagement? How is the business of learning and discovery changing, and what is the surrounding impact focusing on research, collaboration and discovery? What are the aspects that facilitate silo-breaking behavior that result in cultural change? This session focuses on sharing academia and industry examples that are foundations of facilitating a behavior change, then exploring the spatial opportunities that foster boundary-crossing behaviors through a series of interactive exercises.

Because innovation is not a static endeavor, this session seeks to align the evolution in business practices to the evolution in the spaces that foster collaborative thinking. Academia and industry are evolving, with new challenges emerging. Innovation is never static and many times not by the stalwarts of the industry. Take the recent news discussions of a self-driving car being developed outside of the automotive industry, streaming music that has revamped the music industry, or even how Amazon is exploring drone technology. If you are not researching you are not innovating. This session sets to share insights and best practices while exploring future prototypes.

The two-part session first explores academic and industry case studies, closely followed by a collective workshop (see 10:55AM “Creative Learning Spaces”)

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**10:55am**    **12:30pm**    **Creative Learning Spaces**

**Room 120**

*Brad Lukanic and Mark Whiteley, CannonDesign*

Please see the collective workshop session mentioned in the CannonDesign abstract listed at 10:20 AM above.

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**10:55am      11:40am      Transformational Approaches to Creating the T-Shaped Individual**

**Room 125**

*Emily Miller, AAU*  
*Tobin Smith, AAU*

In 2011, the Association of American Universities (AAU) launched an initiative in collaboration with member institutions to improve undergraduate teaching and learning in science, technology, engineering and mathematics (STEM) fields. The overall objective of AAU's Undergraduate STEM Education Initiative is to influence the culture of STEM departments at AAU institutions so that faculty members are encouraged and supported to use teaching practices proven by research to be more effective in engaging students in STEM education and in helping students learn.

In this session, we will highlight how some universities are implementing major undergraduate STEM education reforms and are changing curricula in ways that align with the T-shaped concepts. We will specifically explain how these new and improved STEM teaching methods in and of themselves serve to promote the development of T-shaped graduates.

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**10:55am      12:30pm      The Transformative Power of Service Innovation for Digital Transformation and Platforms to Engage Students on Real-World Business & Societal Challenges**

**Members Room**

*The Transformative Power of Service Innovation for Digital Transformation –*

*Gerhard Gudergan, ISSIP and RWTH Aachen*

*Platforms to Engage Students on Real-World Business and Societal Challenges –*

*Jim Spohrer, IBM*

*Panelists:*

*Andrew Allen, University of Illinois*

*Thomas Kehler, CrowdSmart*

### **The Transformative Power of Service Innovation for Digital Transformation**

Digital transformation has become the most significant managerial challenge in organization development. It impacts the organization's entire environment. Externally, it affects the organization's strategic position in the industry; internally, it influences the nature of the work and processes between individuals. The strategic position significantly depends on the ability to develop the right competence for now and in fit to future requirements in particular, the latter being considered the most important

challenge for all kind of organizations. Both, the capability to develop new service based offerings which make use of the digital technologies and opportunities and to transform the entire organization towards a digital and service orientated organization is crucial in this context.

It is the pure speed of technology driven transformation which confronts leadership with manifold challenges when developing the right skills and competences and unfortunately, existing structures and assumptions are not valid anymore. For example, entirely different perspectives clash against each other when data analytics is located in the center of each thinking in an organization where people have been educated for their whole live to trust on systematic work and conceptual development. Should the “beta coefficient” become dominant over existing theories, methods and knowledge? And when yes, to what extend and how far should one go to get advantage by data based decisions and loosing conventional thinking at the same time? How can conceptual thinking profit from correlated data and vice versa? Taking this example makes it clear that an integrated perspective is needed. Unfortunately, it is simple a fact that most organization are not able to bring the different perspectives together: IT people are not able to communicate to mechanical engineers and business people do not understand IT people. However, taking the nature of our grant challenges in business and society and considering the degree of innovation needed to work on these challenges, we exactly need this significantly better understanding between disciplines and about the nature of a real problem as well. There are not only manufacturing companies such as Siemens or GE who need to develop these competences. Software and technology companies have to work on the same theme. Companies need guidelines to exactly develop this competence: Integrating over different perspectives and application domains. Developing T- shaped professionals by education and training is the key to solve this challenge. However, we state that beside the personal skills in organizations, the organizations’ methods and tools and routines for people to work with have to be adopted to the “T”-related requirements as well: Methods and tools should support to bring professionals from technology disciplines together with those from other disciplines and integrate domain knowledge at the same time.

The aim of this workshop is to discuss how leadership can overcome the barriers between disciplines and different work backgrounds in existing organization in order to innovate for the future. We will have speakers who will discuss the specific organizational challenges when accelerating the change in their competence base when transforming towards a digital company and reflect on the limitations. We propose a methodologic framework which we call service innovation blocks and which has been developed by ISSIP, the International Society of Service Innovation Professionals. We demonstrate how the methodology might help to overcome existing barriers and support companies to cope with the digital transformation more successful.

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**10:55am      12:30pm      Designing Assessments and Credentials for the T-Shape Graduate**

**Room 118**

*Laurence Roth, Education Design Lab*

The demand for T-shape professionals in the 21st Century workplace requires individuals with “horizontal” skills ranging from collaboration to empathy to problem solving. Institutions of higher education are grappling with how to teach, assess and credential those skills. In many cases those skills are learned informally, but schools provide no opportunity for students to further develop them, nor to signal their successful acquisition.

For the last two years the Education Design Lab has worked collaboratively with teams from seven universities and dozens of employers, to answer the following design challenge:

“How might we capture learning beyond the traditional transcript in ways that are meaningful to employers?”

Through the “21st Century Skills Badging Challenge”, this collaboration of educators and business leaders identified nine foundational T-shape skills which employers agreed are the most critical for career success, including resiliency, initiative, collaboration, and critical thinking. On this panel, key university participants will discuss the challenges and breakthroughs they encountered in pursuing this work. The panelists will touch on the last two years’ effort, the foundational skills that emerged, and the current work to create a suite of T-shape assessments and credentials that can become trusted currency in the hiring process.

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10:55am

11:40am

**The "Goalposts" of Engineering Education & Educating the T-Shaped Engineer  
Auditorium**

*Peter Rogers, Ohio State University*

Global changes create competitive pressures for U.S. industry, generating the need for an ever-increasing level of broadly-educated engineering students entering the workplace. This notion has been communicated through the NAE ("The Engineer of 2020") and more recently by ASEE's "Transforming Undergraduate Engineering Education (TUEE)" workshop where industry and academic participants "seek a T-shaped engineering graduate who brings broad knowledge across domains and the ability to collaborate within a diverse workforce as well as deep expertise within a single domain." These and other industry feedback encourage us to rethink the way we deliver engineering education. Recent engineering graduates continually find themselves learning on-the-job business acumen, struggling with open-ended problem solving, working for perhaps the first time on multidisciplinary teams, and learning how to communicate within and outside the organization. Many companies respond to these challenges by investing in multi-year training programs for new hires to augment engineering education with a broader set of skills.

To better prepare students for these rapidly changing industry needs, the Department of Engineering Education (EED) at The Ohio State University offers a number of courses that focus on experiential, project-based, multidisciplinary learning. These include Fundamentals of Engineering courses in freshman year and senior capstone courses. Recently, the university developed and now offers a multidisciplinary undergraduate honors program—combining engineering and business students in an integrated four-year curriculum. All IBE students are required to take both freshman and senior courses. In order to fully understand how effective our curriculum and courses meet industry-expected learning outcomes, the EED has initiated an NSF-funded project to identify and prioritize expected learning outcomes aligned with achieving T-Shaped engineers and to create, implement, and disseminate effective assessment tools. The focus of the initial grant, whose results should apply to many experiential-type courses, concentrates on professional skills typically developed and practiced in senior capstone courses—particularly those capstone courses closely emulating industry practice.

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11:45am

12:05pm

**Aligning Labor Market Needs with Postsecondary Educational Pathways:  
Developing T-Shaped Graduates and Increasing Degree Attainment  
Room 125**

*Alex Gardner, Michigan State University*

The traditional model of the university is being challenged by demands for greater accountability among students, policymakers, government, funding sources, and businesses to enroll more students and produce successful graduates with employable T-shaped skills. The production and transfer of knowledge is a critical output of higher education and is closely tied to the interests of these stakeholders as postsecondary institutions operate as market actors, attempting to adapt to the educational needs of their

environment. Linking educational programs with workforce readiness outcomes on a student by student basis may not only increase degree attainment, but would enable students to make better decisions about the costs and benefits of a particular degree. Formalizing the relationship between college studies and future careers by leveraging principles of goal setting theory and factors conducive to a supportive student learning environment may have a positive impact on degree completion. This theoretical paper examines America's need for T-shaped college educated workers and argues why more structured educational pathways at four year institutions connecting student learning to labor market needs will increase the likelihood of degree completion and labor market satisfaction.

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**11:45am**      **12:05pm**      **STEM 2.0: Career Skills for a 21st Century STEM Worker**  
**Auditorium**  
*Al Bunshaft, Dassault Systemes*

The STEM Innovation Task Force (SITF) is comprised of 36 industry, government, education, and non-profit leaders. Members include companies such as Cisco, Cognizant, Deloitte, Dow, Dassault Systemes, KPMG, PepsiCo, PTC, Sodexo, Tata Consultancy Services, Walmart as well as leading educators and governmental organizations. The SITF has a grand vision of "Accelerating sustainable STEM careers and wealth through innovation science and excellence in tomorrow's new economy." The task force will accomplish their agenda of developing STEM human capital through a number of high powered working groups that focus on certain priority areas of STEM innovation, including the STEM Career Accelerator Day, STEM 2.0, collaboration with the Million Women Mentors program, the STEM Higher Ed Council, and others.

This session will focus on an overview of all SITF programs with specific focus on STEM 2.0. STEM 2.0 defines capability platforms that lie in the gap employers see that exists today between what we require and what the current educational ecosystem is producing. This session, presented by one of the SITF co-chairs, will explain the current thrust of the task force, the linkage to the T-Shaped model, and will highlight the current focus on experiential learning.

One key conclusion of this paper is the need for more focus on so-called Experiential Learning. This is often best accomplished through industry-education partnerships and I would highlight this in the presentation. The paper can be found here:

[http://www.stemconnector.org/sites/default/files/employability\\_skills\\_paper\\_WEB.pdf](http://www.stemconnector.org/sites/default/files/employability_skills_paper_WEB.pdf) . An overview of the STEM 2.0 model can be found here:

[http://stemconnector.org/sites/default/files/STEM2pt0Publication\(2ndEdition\).pdf](http://stemconnector.org/sites/default/files/STEM2pt0Publication(2ndEdition).pdf) .

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**12:10pm**    **12:30pm**    **Establishing a Smart Services Campus**  
**Auditorium**  
*Jos Lemmink, Maastricht*

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**05:20pm**    **07:00pm**    **Poster Session**  
**Great Hall**  
**High School Programs & T-Shapes:**  
**Grouping High School Teachers Across Disciplines to Grow the T-Profile**  
**Competencies –**  
*Judy Walton (Forest Hills Public Schools)*  
**T-Shaped Learners: A Unique Case with Dual-Enrolled High School Students –**  
*Lucia Elden and Ryan Dziedzic (Mid-Michigan Community College)*

**High-School Programs & T-Shapes Poster #1:**

***Grouping High School Teachers Across Disciplines to Grow the T-Profile Competencies***

We are experimenting with the grouping of some high school teachers across disciplines to grow the T-profile competencies of both teachers and students. However, without creating a system that encourages and expects teachers and students to expand their competencies, collaboration and growth will stagnant. Our goal is to cultivate adaptive expertise through processes that lead to innovation (Sawyer, 2006), and we have adapted the concept and process of design thinking to do so.

We have chosen design thinking to encourage T-shaped competencies based on research. We believe that not only can it “improve the performance of multidisciplinary teams (which apply discipline knowledge) and interdisciplinary teams (which apply and create new knowledge), but it also sets the



stage for true transdisciplinary thinking for the first time” (Donofrio, Spohrer, & Zadeh, 2009, p. 5).

Through the learning and use of design thinking, teachers and students are expanding their horizontal skills on the T as well as cultivating depth in a system on the vertical.

Schools should be the leading example of successful learning organizations; after all, learning is their bedrock. Cultivating T-shaped teachers and students through design thinking works because the system is cross-disciplinary, human-centric, constructive, and face-to-face learning (Mootee, 2013). It allows a school to co-create knowledge and build skills at the same time (Barile, Franco, Nota, & Saviano, 2012). Two examples of our current work include our STEM Academy, and our Edible Garden.

### **High-School Programs & T-Shapes Poster #2:**

#### ***T-Shaped Learners: A Unique Case with Dual-Enrolled High School Students –***

The T-shaped metaphor is transforming institutional communication and practice. Every semester the faculty at Mid-Michigan Community College have had the opportunity to discuss pedagogical issues based on new research at “brown bag” sessions. During fall semester 2015, the biweekly session was called “Time for T,” where the college’s proficiencies in the Degree Qualification Profile (DQP) were discussed and related to the T-shaped learner model.

Currently, 25% of our students are dual-enrolled. Uniquely, a cohort of these students from a local high school are concurrently matriculated in an introductory biology and a first year English composition class. This situation has presented itself as singular collaborative opportunity between natural science and liberal arts faculty allowing them to compare course outcomes as it relates to the “boundary crossing competencies” identified by the T-model.

Our presentation will look at the broad competencies from multiple perspectives:

- 1.) An explanation of how the “T” is facilitating a bridge among our technical and liberal arts courses;
- 2.) Our ‘Time for T’ faculty discussion across the curriculum;
- 3.) The specific collaboration between the biology and humanities faculty; and
- 4.) Data on student perceptions and understandings of the broad competencies of the T-model in these two courses.

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05:20pm

07:00pm

Poster Session

Great Hall

**Advising & Counseling for T-Shapes:**

**Hands-Free: Integrating Career Development into Curricula Through and Online**

**Asynchronous Career Course –**

*Kelly Bishop (University of Maryland)*

**Transforming to T-Shaped Advising: An Essential Step to Create T-Shaped**

**College Graduates –**

*Jonglim Yoo and Robin Rennie (Michigan State University)*

**Advising & Counseling T-Shapes Poster #1:**

**Hands-Free: Integrating Career Development into Curricula Through and Online**

**Asynchronous Career Course –**

Despite the national call for “career ready” graduates, many career centers are challenged by a limited ability to engage students in a robust career development process. The service delivery model depends on students initiating and devoting time to the process. Career development appears as a supplement rather than a core part of degree requirements, and the piece-meal way services are accessed relegates career centers to a transactional rather than developmental relationship.

Career courses provide a structured introduction to career development that is more coherent, relevant, and valued. Unfortunately, they typically have small enrollments and require significant staff resources, so relatively few students benefit. Is it possible to build a career course that could enroll hundreds of students? In PSYC 123: The Psychology of Getting Hired, 500 students each semester pace themselves through six online modules. All course content is drawn from freely available online resources and existing campus tools. Students take auto-scoring quizzes and receive points for completing activities (e.g., a mock interview), deliverables (resume, LinkedIn profile), personal reflections, and online discussions. Instructor time is significantly less than in a traditional career course. Pre- and post-course assessments demonstrate remarkable gains in knowledge of employer expectations, higher confidence in career skills, and ability to continue the career development process.

## Advising & Counseling T-Shapes Poster #2:

### **Transforming to T-Shaped Advising: An Essential Step to Create T-Shaped College Graduates**

Academic advising can play a critical role developing T-shaped college graduates. Traditional college advising is “I” shaped concentrating efforts on completion of degree requirements and mastery of a discipline. The Dow STEM Success Scholars Program at Michigan State University has instituted a new T-shaped advising model, offering students multiple ways to expand their skills sets beyond just academic knowledge. Key elements are:

- Outreach to and follow up with students
- Aggressive student tracking and monitoring
- Comprehensive understanding and interconnection of students' academic, professional, emotional, financial and social needs
- Peer mentoring/tutoring
- Cooperation and communication with campus wide services opportunities
- Partnerships with resources off campus to further develop students complete T-skill set
- Early intervention

Our presentation will showcase the difference between T-Shape Advising and traditional advising, sharing our successes and lessons learned to help others to adapt to the T-shaped advising model.

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05:20pm

07:00pm

Poster Session

Great Hall

**Interdisciplinary Pathways to T-Shape:**

***Experiential Learning: Stimulating Creativity, Entrepreneurism, and Leadership Skills***

*– Rebecca Macdonald (Cornell)*

***Using General Education Minors to Prepare T-Shaped Graduates –***

*Stephen Biscotte and Tim Baird (Virginia Tech)*

**Interdisciplinary Pathways to T-Shapes Poster #1:**

**Experiential Learning: Stimulating Creativity, Entrepreneurism, and Leadership Skills**

Cornell Engineering has been a world-wide leader in the development of experiential learning for over 30 years. As we continue to aspire to make discoveries and educate leaders who will change the world, greater attention has been given to the engineering student project teams. Ultimately, this led to the development of a program level position with coordination throughout the College of Engineering. The primary focus of the program is to provide opportunities for students across all engineering and related disciplines to participate in hands-on interdisciplinary design, development, and construction of novel methods and/or projects. Students use their technical knowledge, creativity, entrepreneurship, and leadership skills to engage in national and international competitions and service projects. Currently twenty-three teams are registered with over 1000 student participants representing every undergraduate engineering degree as well as from all colleges at Cornell. A qualitative and quantitative study was undertaken to better understand the breadth and impact of the current program. Along with size, the following categories will also be addressed: gender, class rank, ethnicity, project type, budgets, travel, course credit, etc. This will establish a baseline for the program that can be measured against for future growth, needs or interests, and decision making.

## **Interdisciplinary Pathways to T-Shapes Poster #2:**

### **Using General Education Minors to Prepare T-Shaped Graduates**

Virginia Tech has spent several years developing Pathways to General Education. Pathways is an integrated curriculum that provides engaging opportunities at the intersections of breadth and depth in undergraduate learning. Pathways enable students to meet their general education requirements through the completion of one of three hands-on minds-on approaches. One such example is an interdisciplinary Pathways minor in areas such as Sustainability, Civic Agriculture and Food Systems, Innovation, and Latino American Studies. Pathways minors provide repeated opportunities to practice different 'ways of thinking' in diverse contexts, starting with a common introductory experience to prime-the-pump and culminating in a capstone experience. Groups of students from diverse majors will work together using their deep knowledge from the major and boundary-crossing competencies from general education to address real-world problems. Presenters will share perspectives and strategies for collaborating to build a curriculum that marries the deep and narrow expertise derived from the major with the cross-cutting competencies that define the T-shaped graduate. The poster will discuss the value of a new academic model for student learning, the opportunities for faculty and administrative collaboration, and the challenges to implementation using Pathways GenEd Minors as examples.

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05:20pm

07:00pm

Poster Session

Great Hall

**Stimulating T-Shape Conversations:**

**One, Two, "T" -- How to Get Faculty, Staff and Students "Talking T" –**

*Marybeth Heeder (Michigan State University)*

**Building Capability for Critical Jobs in Enterprises Today: A Methodology for**

**Industry to Work with Universities to Increase the Pipeline of Skilled Graduates –**

*Dianne Fodell (IBM)*

**Stimulating T-Shape Conversations Poster #1:**

**One, Two, "T" -- How to Get Faculty, Staff and Students "Talking T"**

At Michigan State University, faculty expertise and administrative insight have fueled moves to make curricular changes to align with T-shaped concepts. Our institutional undergraduate learning goals, in fact, align with a T-shaped approach. In this presentation, we will ...

One: ... share how we effectively introduced our new domestic and international students to the "T" during academic orientation.

Two: ...explain how, in a pilot section of our First Year Writing course, we continued this conversation. We will cover how students engage in a learner centered, innovative practical writing course and reflect on their path to purpose (Damon) as they write a sequel to their favorite children's book, work in small groups to create a video, deconstruct a cultural artifact, and explore a possible career interest. While inquiring, discussing, experiencing and reflecting on their mindset (Dweck), "failing forward," and their purpose, the students (and faculty and staff) discover what it means to be.....T"!

## Stimulating T-Shape Conversations Poster #2:

### **Building Capability for Critical Jobs in Enterprises Today: A Methodology for Industry to Work with Universities to Increase the Pipeline of Skilled Graduates**

IBM Global Academic programs have helped close the skills gap for its skills needs and those of its clients and partners. IBM follows a well-defined process for assessing the skills needed for the future and for working with exemplar universities who are best known for developing those skills programs. IBM then produces faculty and student resources in addition to making software, systems and courseware available for use in the classroom. IBM reaches out to universities around the world and helps faculty enhance their existing programs or build new academic programs that produce graduates with experience in IBM technologies and real world experience so that skilled graduates are available to fill critical job roles.

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**10:00am      10:20am      T-Shaped Students and the Future Workforce**

**Auditorium**

*Nancy Sturm and Dr. Joe Bocchiario, Sextant Group*

The marketplace – particularly the labor market – identifies and rewards the 21st Century Skills needed in today's and tomorrow's work environment as identified by the World Economic Forum. Higher Education campuses across the country seek ways to refocus instruction and student engagement to align with those 21st Century Skills. Meanwhile, technology has become a mandatory companion to almost everything we do. How can technology help create teaching and learning environments that foster these expected skillsets? We propose a workshop that will engage the audience in the following context: Present an analysis of research that defines the 16 skills needed in the 21st Century as identified by the World Economic Forum.

Engage the participants in a team-based activity where they will employ key 21st Century Skills to solve a problem.

Each group will present and discuss the skills used in the activity. The theme will be "how can technology and space encourage physical and social environments that foster a pedagogical approach to teaching these skills?"

Share/Discuss the technology trends that will influence the development of these 21st Century Skills. How can they be optimally aligned throughout the stages of teaching and learning?

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**10:00am      10:20am      Toward a T-Shaped Management Curriculum at the University of California  
Room 120**

*Paul Maglio and Erik Rolland, University of California - Merced*

Management encompasses the science and art of how organizations accomplish goals using available resources efficiently, effectively, and sustainably. Now is the time to create innovative management programs in innovation, science, and technology, with a focus on sustainable processes and practices at all levels. Global service-based business models have transformed the way the world works, enabled by new information and communications technologies, specialization of businesses and professions, global regulations, and increased use of external services. National priorities aim toward economic improvement, driven by scientific understanding and systematic innovation. As a new interdisciplinary research university, UC Merced is uniquely positioned to create new and novel management programs, and to lead in research and practice in areas of management relevant to the Central Valley, California, the US, and beyond.

Modern businesses require employees with diverse, deep interdisciplinary skill-sets, including business analytics, decision analysis, logistics, resource management, and services. UC Merced has substantial depth in these areas, including experience delivering innovative and interdisciplinary entrepreneurship and management programs. By weaving diverse specialties together, we are creating research-based management programs that will educate the business leaders of tomorrow, focusing on value-creation, innovation, and sustainability. We achieve this by building on our strengths and focusing on real-world problems relevant to the university, region, and state. Specifically, we are planning a one-year Master of Management in Innovation, Sustainability, and Technology, a cross-functional program that addresses the need for developing managers and leaders with deep knowledge in their areas of expertise, combined with a sound foundation of management skills.

In this presentation, we will describe our setting, our plans, and our progress toward developing a T-shaped management curriculum at UC Merced.

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**10:00am      10:20am      Assessing T Competencies Using a Gaming Technique Based on Organizational Fit  
Lecture Room**

*Phillip Gardner, Michigan State University*

A challenge in developing T professionals is the lack of an assessment strategy that can be used across multiple stages in the transition from college into the workplace: development during college, recruiting and development during career. Knack, a gaming assessment based on the principles of organizational fit and neuroscience theories, is being introduced as an option in monitoring T growth. Knacks are groups of individual skills and competencies that include character & leadership (7 competencies), decision-making (8), mindset (8), social & emotional intelligence (6). Groups of competencies form Power Knacks which



include business transformation & digital economy, thinking and creating, people orientation & team collaboration, execution & results orientation, and leadership & vision. This presentation reviews some current attempts to understand the assessment in a university setting. Knack will also provide some preliminary information on the use of the assessment in corporate recruiting and development.

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**10:00am**      **10:20am**      **Embedding T-Shaped Learning in Vocational Education and Training**  
**Members Room**  
*Cathy Ellis, Highbury College (UK)*

Highbury College is a leading vocational college in the UK annually training over 10,000 students in a wide range of professional and technical disciplines. Programmes are available from pre-entry through to university level to provide coherent and clear progression pathways to further study, into and through work, and through changing career opportunities. Highbury has recognised that in the increasingly competitive employment market more and more young people are becoming entrepreneurial and enterprising and starting their own businesses and has embraced innovation and entrepreneurship as two of its defining attributes.

The College has embraced the concept of the T-Shaped curriculum to equip its students with the work readiness and transferable skills employers value and enterprise requires. Working with its Employer Advisory Boards (employer representatives from local, national and international companies) it has developed a pedagogical framework to foster multi-disciplinary learning and the development of T-shaped skills. This session will outline the following steps taken to date by Highbury College to establish an integrated T-Shaped curriculum:

1. The development of new learning models focused on commercial and entrepreneurial learning opportunities.
2. The introduction of Design Thinking as a core skill for staff and students.
3. An organisational structure which facilitates multi-disciplinary learning

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**10:00am**    **10:20am**    **Insights and Challenges Advancing the T-Shaped Agenda**

**Room 125**

*Michael Kolb, MSU Denver  
Jane Mall, Denver University*

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**10:25am**    **10:45am**    **Education Time Warp in an Age of Exponential Technologies:  
A Four-Dimensional Education to Meet the Challenges of the 21st Century -**

**Auditorium**

*Charles Fadel, Center for Curriculum Redesign*

Technologies such as Artificial Intelligence, Robotics, Big Data, Biotech, Nanotechnology etc. are redefining what it means to be human. The world of the 21st century bears little resemblance to that of the 19th century, so Education curricula must be deeply redesigned for versatility and adaptability, implying all of the four dimensions of Knowledge, Skills, Character and Meta-Learning, and the interplay between them. Key themes discussed include:

- Several technologies are progressing exponentially fast, and the world of the 21st century is vastly different from that of the 19th and 20th century. Yet education standards have not been deeply redesigned to deal with that context and its consequences on humankind.
- To meet humanity's challenges, a 21st century education must comprise the four dimensions of: Knowledge (both traditional and modern, interdisciplinary), Skills, Character, and Meta-Learning.
- STEM disciplines matter increasingly, but Humanities/Arts remain absolutely essential – each borrowing from the other, for a deeply versatile T-shaped education. Versatility is key to resilience.

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**10:25am**    **10:45am**    **Bridging the Skills Gap with T-Shaped Graduates**

**Room 120**

*Dianne Fodell, IBM*

Never before has there been a wider IT skills gap between college graduates and what global enterprises need. Big data, analytics, cyber security, digital commerce, parallel and mobile computing, cloud computing and now cognitive computing are all critical skills needed for large and small enterprises, including IBM and its clients and partners. In addition, most jobs require workers to have a triple combination of knowledge of Business, Technology, and People/Culture as well as great writing, listening,

and critical thinking skills. This presentation will address some of the programs IBM is implementing to increase the university pipeline for T-shaped, critical IT skills and short term credentials that prepare university students to close this employability gap.

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**10:25am      10:45am      The Mycroft Cognitive Assistant: Enhancing and Supporting T-Shaped Skills and Research Collaborations**

**Room 125**

*Paul Courtney, Open Health Systems Laboratory*

*Kara Hall, National Cancer Institute, NIH*

In the near future, we anticipate a scientific enterprise where cognitive assistants regularly serve as an integral part of a research team throughout the entire research process. A research process can be broken into four-phases (Hall et al., 2012), with each phase requiring key T-shaped skills and offering opportunities for successful collaborative exchanges to advance science and society. Mycroft, a new initiative, aims to produce a suite of tools designed to enhance the effectiveness and efficiency of research collaboration. The IBM Watson-powered Mycroft aspires to provide tools to enhance the skills and augment the capacity of T-shaped professionals, from assessing and address gaps in T-shaped skills to providing advice to enhance interactions (e.g., collaborating with non-T-shaped colleagues) as well as aiding in the synthesis of knowledge across disciplines to support new insights among T-shaped collaborators.

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**10:25am      10:45am      Expanding Possibilities: Considering the Development of Career Peer Advisors and T-Shaped Professionals**

**Lecture Room**

*Marcus Sanderlin; Dr. Joanne E. Marciano; Enezhiah Walters, Michigan State University*

As Career Services personnel are called upon to provide innovative services to better prepare students

for competitive job markets, we highlight opportunities to support student Career Peer Advisers in their development as T-shaped professionals. During this presentation, we share findings from a qualitative mini-study addressing the research question: How does serving as a Career Peer influence Career Peers' experiences as students attending our university? We center our inquiry in a theoretical framework that brings together college student development theories highlighting the interaction between students' involvement in campus organizations and their persistence to graduation (Astin, 1999) and considerations of the T-Shaped Professional that emphasize a focus on holistic student development in relation to the competencies needed for career readiness.

This session draws upon the expertise of a Career Services Coordinator, an educational researcher, and an undergraduate Career Peer Adviser who collaborated in a qualitative research project examining how serving as Career Peers influences Career Peers' experiences as students. Attendees will consider strategies for utilizing the Career Peer Advisor model as a tool for creating T-Shaped Professionals.

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**10:25am**      **10:45am**      **A Scientist, an Engineer, an Artist, and a Designer Walked Into a Bar: An SEAD of a Story**

**Members Room**

*Liesl Baum; Tom Martin; Ico Bukvic; and Kari Zacharius, Virginia Tech*

In 2011, Virginia Tech introduced the Institute for Creativity, Arts, and Technology, uniquely partnered with the Center for the Arts, to forge new pathways toward the nexus of science, engineering, arts, and design. This eclectic collection of faculty and students are positioned to span multiple colleges to collaboratively explore pedagogical implications, unique research approaches, and novel ways to engage the community at large through trans-disciplinary experiences. This panel is representative of those faculty and students and will serve to provide insight into methods of collaboration, failures and successes, and discuss how the university and community at-large have responded to these efforts in regards to influence on coursework, degree programs, faculty collaboration and experiential learning for students.

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**10:50am**    **11:10am**    **Educating Well-Rounded T-Shaped Data Scientists**

**Auditorium**

*Shlomo Argamon, Illinois Institute of Technology*

Data science is currently one of the most sought-after fields for professional recruiting and yet one of the hardest to define. Data science educational programs are extraordinarily diverse, and no clear paradigm has yet emerged to describe the precise knowledge, skills, and aptitudes that we should be teaching. I will survey the data science education landscape, which can be divided into four primary types: Business Intelligence, Deep Technical, Broad Technical, and Well-Rounded. Each has a vision of the data scientist they seek to produce, and each has its place. Our focus is on the “Well-Rounded” programs, whose goal is to produce T-shaped data scientists. They combine deep theoretical and practical training in core data science with a combination of classroom and practicum study geared to developing the collaborative, communicative, and critical competencies needed to succeed in an inherently multidisciplinary field. This presentation will describe the components of a well-rounded data science curriculum as well as how to deal with various challenges in its implementation.

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**10:50am**    **11:10am**    **Adapting the Pink Time Assignment to Promote Self-Regulated Learning Across**

**Course Types**

**Room 120**

*Timothy Baird, Virginia Tech*

To explore new opportunities to promote self-regulated learning (SRL) across a variety of contexts, this study applies a novel assignment called Pink Time in seven different courses at two universities. The assignment asks students to “skip class, do anything you want, and give yourself a grade.” In each case, instructors adapted Pink Time to fit the needs of their course. Altogether, 165 students completed 270 self-directed projects and self-assessments targeting 5 metrics of SLR. Early findings show that: (1) students are more likely to perceive success in certain measures of SRL than in others; (2) variance in perceptions is low; (3) subsequent iterations of the assignment support higher perceived measures of SRL. Together these findings illustrate the value and flexibility of the Pink Time assignment as well as persistent challenges in supporting students’ SRL.

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**10:50am**    **11:10am**    **Shattering Myths and Removing Barriers to Enable Interdisciplinary,  
Transformative Learning**

**Room 125**

*Jana Markowitz, The Collective Mind*

Whether in silo'd corporations or in the ivy-covered halls of higher education, where inter-departmental and inter-college competition for resources is never-ending, there are always ample barriers to implementing interdisciplinary learning. These barriers limit the development of potential t-shaped individuals both in school and in the workplace.

From the perspective of an organization development / leadership development consultant who is often brought in to "solve" people-problems, this presentation will review and debunk a few of the most-common myths and barriers (i.e., there is no time, there is no money, we already do that, we tried that and it didn't work, 'they' will not work with me) while also offering alternative, collaborative approaches to broadening

I-shaped people into T-shaped ones.

Ideally participants will connect with others they meet in the presentation and continue the conversation and idea exchange between the 2016 and subsequent

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**10:50am**    **11:10am**    **Building T-Shaped Professionals for the Digital Age**

**Lecture Room**

*Thomas Stone, Thomas Stone BP*

Digital technologies are transforming business processes, creating competitive advantage, and driving other top and bottom line improvements at numerous public and private enterprises. Yet, as business leaders thrill at the promise of digital transformation, astute CIOs are quickly realizing that these benefits could be short-lived at best without a fresh breed of "T-Shaped" IT professionals, skilled in the ability to integrate today's digital technologies within and across the technical and business architectures of the firm to create value for customers. Such is the case for both profit and non-profit ventures. In higher education, the impact of this change is most notable, as institutions across the sector continue to aggressively seek ways to innovate services to enhance the learning experience, while driving new operating models to manage and reduce costs.

Harvard University's recent IT Academy is a marvelous example of how higher education is looking internally and developing T-Shaped professionals to advance its digital transformation. This presentation shares insight into Harvard's journey to build a comprehensive professional development IT Academy, the success it's enjoyed with this initiative, and the 8 steps to getting started on a similar path to building T shaped professionals in any organization that wants to develop its talent to take advantage of the amazing opportunities in the digital age.

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10:50am

11:10am

**Building the Next Generation Workforce: How Augmenting Traditional Academics  
with Dedicated Skill-Building Programs Delivers T-Shaped Results**

**Members Room**

*Rya Conrad-Bradshaw, Fullbridge*  
*Krysta Sadowski, Fullbridge*

Students will average an astounding 27 jobs over the course of their lifetimes. Add to that the fact that another 30% will be part time, freelance or contract employees — and you can begin to see just how seismic a shift is underway. The gap between college and career has never been wider and higher education institutions are feeling the pressure to better prepare their students.

This emerging skills gap indicates a shift in the type of professional needed to successfully lead organizations in the 21st-century economy. In light of this shift, the question before higher education is how to ensure that college curriculum aligns with the needs of employers while also providing students with opportunities to expand their intellectual horizons in a specific discipline. Put another way, the question before higher education is how to transform students into well-rounded T-shaped professionals.

Since 2011, Fullbridge has been partnering with higher education to create programmatic solutions to address this need. Programs are run co-curricularly or as part of degree programs. Embracing proven learning methodologies in hybrid learning, programs simulate the workplace, where those T-shaped skills are most valuable. By creating an integrative, experiential program where T-skills are built, practiced, assessed, and improved, programs have significant and transformative student impact.

The outcomes of our programs demonstrate that participants enter as students and leave as T-shaped professionals well versed in key professional competencies, along with a vocabulary to present their skills. We also hear from employers how much more effective students developed in this way are: 100 percent of employers surveyed reported that Fullbridge graduates were more effective than other hires. This explains why 90 percent of Fullbridge graduates are employed in career-related full-time employment compared to the national average of 52 percent.

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**11:15am      11:35am      Crafting a Minor to Produce T-Shaped Graduates**

**Auditorium**

*Debbie Hughes, Business-Higher Education Forum  
Roger H. French, F. Alex Nason Professor, Faculty Director, Applied Data Science,  
School of Engineering, Case Western Reserve University*

The undergraduate Minor offers students pursuing their baccalaureate degree an opportunity to develop a secondary focus as part of their normal course of study. The process to develop and award Minors is already embedded within the structure of many post-secondary institutions. Minors can be used by academic institutions to offer curriculum and learning in emerging fields, such as cybersecurity and data science.

New Minors, particularly those which are created to address gaps in existing degree areas and directly meet industry's needs should be crafted as an intentional program of study, rather than a group of independent courses. These new Minors should require experiential learning opportunities through an applied project, such as undergraduate research, internships, or a capstone project. Additionally, the required courses for the Minor should be purposefully structured to embed 21st century workplace skills, such as critical thinking and communication. Graduates with this type of Minor will be better prepared to enter the workforce and make an immediate contribution. Case Western Reserve University has developed this type of new Minor in Applied Data Science, which can serve as a national model.

The Applied Data Science Minor at Case Western Reserve University (CWRU) is available to all undergraduate students from any school across the campus. The program requires the students to advance through five levels: 1) Data Science Programming 2) Inferential Statistics 3) Exploratory Applied Data Science 4) Data Science Research 5) Statistical Learning; Modeling and Prediction. The ADS curriculum serves nicely as a generalized approach to many types of data science problems in today's society, where the challenge is to transform data to information. By having this tool in their arsenal, CWRU students will be able to capably differentiate themselves from other graduates in their domain and field. Furthermore, the ADS Minor capabilities will open up doors across organizations that would otherwise be left undiscovered. The first students will graduate with the ADS Minor in 2016.

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**11:15am      11:35am      Supporting the Development of T-Shaped Students from Underrepresented Groups  
through Metacognitive Practices**

**Room 120**

*Elizabeth Hane and Scott Franklin, Rochester Institute of Technology*

Participants will explore metacognitive activities, including novel group and individual assignments, used with deaf/hard-of-hearing and 1st-generation STEM majors in RIT's project IMPRESS (Integrating Metacognitive Practices and Research to Ensure Student Success).



Session facilitators will describe IMPRESS, which involves a pre-matriculation summer workshop, a general education course on metacognitive practice, and a learning assistant experience. Drawing upon research that shows marked differences between experts and novices in a variety of metacognitive abilities (e.g. self-assessment, sense-making and epistemology), IMPRESS tests the impact that focused reflective activities has on student mindset and academic performance.

The program emphasizes development traditional “T-Shaped” skills, such as working in teams with individuals of diverse backgrounds, critical thinking, and evaluation of evidence. Additionally, students learn about how personal identity intersects with professional identity, and learn strategies for coping with problems like stereotype threat. Facilitators will provide program details and materials to enable participants to adapt and replicate aspects of the program in their own setting.

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**11:15am      11:35am      Building a T-Shaped Engineer Through Partnership with Industry  
Room 125**

*Carmellia Davis-King, Michigan State University*

Cultivating T-shaped engineering students called for Michigan State University College of Engineering to change how students were being educated during their first year on campus. In partnership with Consumers Energy, Robert Bosch and General Electric, the College of Engineering’s CoRe Experience has developed co-curricular programming that focused on developing, supporting and embracing t-shape competencies as a component for student development.

Partnering with industry during the engineering students first year on campus has proven to have a positive effect on the competitiveness of CoRe Corporate Partners student co-op and internship candidates. To ensure that students understand T-Shaped competencies corporate sponsors provide additional opportunities such as mentoring, evening presentations, team based competitions and professional conferences focused on training and development. For industry to have the opportunity to participate in developing student experiences with the mission of creating T Shape individuals provides an opportunity for students to learn early in their academic career the keys to being successful in and outside of the classroom. The data used in a 2013 survey of all students in the College of Engineering, demonstrates our efforts to support the T-Shaped engineer and the students perspective on the effectiveness of those efforts as well.

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**11:15am      11:35am      Integrated Science and Technology - Broad Science and Tech Holistic Problem Solving  
Lecture Room**

*Jeffrey Tang, James Madison University*

The challenge for higher education to produce more T-shaped graduates is understandably couched in terms of crossing the T: adding the breadth to the norm of disciplinary depth. In the highly interdisciplinary program of Integrated Science and Technology (ISAT) at James Madison University, a central focus of the program is providing all of our students with a broad STEM foundation. In addition to this wide range of technical instruction, students also learn about the social context of technology and science, thus preparing them to be flexible problem-solvers capable of tackling a variety of problems. Defining depth has been more challenging, as our curriculum is organized around critical problem areas rather than traditional disciplines. As we rethink our curriculum to focus more explicitly on systems-oriented, holistic problem-solving, the ISAT program is asking tough, fundamental questions about what can count as depth in such interdisciplinary contexts.

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**11:15am      11:35am      Experiential Learning and Creating T-Shapes  
Members Room**

*Kenneth Wong, Virginia Tech*

In order to meet the world's most pressing challenges, university education must evolve to produce more "T-shaped" professionals. High quality experiential learning is essential to this goal, because experiential learning provides a natural means for students to learn collaboration across disciplines in the context of complex and meaningful problems. Therefore, it is vital that we be able to provide experiential learning at much greater scales than ever before.

Unfortunately, most approaches and systems for education at scale are ill-suited for this purpose, because they were designed around the model of classroom teaching that focuses on the transfer or distribution of facts and content. These systems inherently reflect a unidirectional, one-to-many topology that is the exact opposite of what experiential learning strives to be. Moreover, such systems emphasize conformity to and mastery of a pre-determined curriculum, rather than exposure to a diverse range of ideas and lived experiences.

Our efforts in this area have identified and organized some of the major challenges to experiential learning at scale; we are now investigating new pedagogies and systems that will effectively address those issues.

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**11:40am**    **12:00pm**    **IT Worker of the Future**

**Auditorium**

*Greg Donahoe, Deloitte*

Scarcity of technical talent is a significant concern across many industries, with some organizations facing talent gaps along multiple fronts. The legacy-skilled workforce is retiring, and organizations are scrambling for needed skills in the latest emerging disruptive technologies. To tackle these challenges, companies will likely need to cultivate a new species—the IT worker of the future—with habits, incentives and skills that are inherently different from those in play today.

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**11:40am**    **12:00pm**    **Balancing T-Shaped Individuals and Security Culture**

**Room 125**

*William Toth, Oak Ridge National Laboratory*

A common strategy employed in government facility and industry for reducing risk to high value assets is to enforce “compartmentalization.” This is a concept that simply describes the limiting of access of individuals to only those areas required by their jobs, or to information where they have a “need to know.” This strategy is in direct conflict with the characteristics of “T” shaped individuals who find value in collaboration, interdisciplinary connections, and a holistic systems view. The strategy is also in conflict with the industry’s own concept of “security awareness” that requires employees of high value asset facilities to be mindful of weak clues that may indicate security violations. This proposed presentation will offer an evaluation of compartmentalization strategies prescribed in international security standards, and illustrate points of conflict with “T” shaped individual orientation and propose ways to reconcile the conflicts to achieve a more balanced security culture.

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**11:40am      12:00pm      Developing T-Shaped Professionals: An Institutional Commitment to Student Success  
and Post-Graduate Outcomes**

**Members Room**

*Lisa Hinkley, Lake Forest College*

Developing students into T-shaped professionals is a challenge that must be confronted using a collaborative approach. Institutions can most effectively develop T-shaped professionals and make progress on retention by mobilizing the campus community to see these issues as interrelated. Lake Forest College is creating a community-wide effort that engages faculty, staff, students, alumni, and friends of the College in developing and executing short- and longer-term programs that help students to succeed in College and to build the necessary breadth and depth skills central to the T-shaped professional. This presentation will begin with an introduction to the overlapping goals of student success in college and post-grad success; then, be followed with examples of best practices and a facilitated discussion about strategies for identifying opportunities at any institution. The discussion will be relevant to participants in any role in academia and to partners who work with academic institutions.

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**11:40am      12:00pm      Peer-to-Peer Learning: Student Perspectives on Innovative Learning and**

**Problem Solving**

**Lecture Room**

*Lori Blanc, Virginia Tech*  
*Stephanie Lewis, Virginia Tech*  
*Elizabeth Lilly, Virginia Tech*  
*Christina Nelson, Virginia Tech*  
*Emily Schlake, Virginia Tech*  
*Francisco Ramos Mora, Virginia Tech*  
*Megan Underwood, Virginia Tech*

The residential model for undergraduate education is critical to the development of the T-shaped student, with depth in the discipline but strength across the range of skills required to address the complex challenges of the 21st century. We will present a collaborative student/academic affairs program that integrates six high impact practices, combines curricular and co-curricular activities, and creates a culture of learning that fosters the development of T-shaped students. Virginia Tech's Curie and Da Vinci (a.k.a. "CurVinci") Living Learning Communities (LLCs) consist of life, physical and quantitative science undergraduates. CurVinci is a First Year Experience program that includes semester-long "Peer to Peer Projects" -- envisioned, spearheaded, managed, and implemented by students -- on which the student community collaborates in different 'professional' roles. This project complements students' academic courses by focusing on the process of problem-solving and skills associated with the practice of science, through a "learn by doing" experience. In this presentation, students and faculty representing all levels of project organization will discuss (a) their experiences in relation the project's learning outcomes, and (b) the potential for LLCs to stimulate the very lifelong learning attitudes and skills that are prized in the classroom and professional contexts.

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**12:05pm      12:25pm      Developing the Connective Tissue of the T**

**Room 125**

*Gordon Rowland and Jason Hamilton, Ithaca College*

The Ithaca College faculty has created an integrated core curriculum that requires students to select among five themes and to take four courses that represent different perspectives of their theme. This is intended to help students empathize with multiple viewpoints, for example, to come to know how perspectives differ in terms of epistemology, methods, and assumptions.

We believe that, while the courses succeed in introducing multiple, distinct ways of knowing, they do not sufficiently prepare students to make connections across. In other words, they lead to multi-disciplinary, not inter- or trans-disciplinary understanding, and to dotted lines in the T.

To fill this gap, we have created a set of four mini-courses called Integration, Insight, Creativity, and Character. The skills students are gaining from these courses serve as the connective tissue between the perspectives (across the horizontal axis of T), and between the theme and the student's major (between the horizontal and vertical axes).

To date 24 faculty instructors from all five schools at the college have offered more than 60 of the mini-courses to over 1000 students.

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**12:05pm      12:50pm      Learning Environment Design Solutions for Creating T-Shaped Individuals**

**Lecture Room**

*Rob Reynolds, NextThought LLC*

In order to develop T-shaped individuals and to inculcate the T-shaped metaphor across diverse organizations and institutions, we must first create effective Learning Environment Design patterns specific to this goal. Moreover, these patterns must be based on a common design language so that they can be deployed easily universally within different types of environments with unique presentation and instructional constraints.

The session examines T-shaped education and culture formation from a Learning Environment Design perspective, and provides both a language framework and a series of design patterns for transforming educational and organizational models for producing T-shaped individuals. Participants will be introduced to the Learning Environment Modeling Language (LEML), used by the University of Central Oklahoma (UCO) and NextThought, and will work through a series of collaborative steps to co-design flexible, Learning Environment Design patterns that can be deployed across a wide variety different environment types (organizational, curricular, and physical). The session will end with the presentation of "best-practice" design patterns created by NextThought for the purpose of promoting T-shaped learning.

As mentioned above, the session will be collaborative and participants will leave with a set of design patterns to facilitate the implementation of T-shaped learning and organizational design. The primary presenter/facilitator is Dr. Rob Reynolds, Chief Learning Officer at NextThought LLC. NextThought is an online learning solutions company providing design and training across a variety of Higher Education, K-12, and Professional institutions and organizations.

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**12:05pm      12:50pm      The Innovation Center Design: Student Perspectives on Industry Collaboration**

**Members Room**

*Carrie Perrone, SmithGroupJJR*  
*Chris Purdy, SmithGroupJJR*

**The Innovation Center Design: Student Perspectives on Industry Collaboration**

Institutions are exploring a new model of learning founded on project-based, experiential learning opportunities with interdisciplinary teams. These experiences allow learners to further develop skills and

attributes critical to success in today's workforce like teamwork, critical thinking, and problem-solving. For students preparing to enter the job market, this experience is enhanced when the relationships between institutions and industry partners exist.

As architects specializing in higher education design, speakers, Chris Purdy and Carrie Perrone, are the forefront of exploring how space can enhance these unique partnerships between higher education and industry. During this presentation, attendees will hear them about different design models for industry and student collaboration ranging from innovation centers to unique learning and research environments in existing facilities. The presentation will explore the characteristics of these learning environments, provide student perspectives on successful space attributes as well as what they are looking for when interacting with industry partners.

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**12:05pm      12:50pm      Developing T-Shaped Talent at Scale: UNC Charlotte Experiences**

**Auditorium**

Moderator:

*Yi Deng, Dean, College of Computing and Informatics,  
University of North Carolina at Charlotte (UNCC)*

Panelists:

*Mary Lou Maher, Chair, Department of Software and Information Systems, UNCC  
Bojan Cukic, UNCC*

*Bob Garrell, Director, Software Quality Assurance, Oracle Communications GBU  
Lori Fellela, Senior Director, End User Computing, TIAA*

*Maryalicia Johnson, College of Computing and Informatics, UNCC*

The College of Computing and Informatics (CCI) at the University of North Carolina at Charlotte currently educates over 2,000 undergraduate and graduate students. Organizing large-scale educational efforts to meet the market demand for T-shape talent has been one of the primary goals of the College in recent years. Following the clear articulation of T competences by the members of the Dean's advisory board, the College systematically pursues changes in the academic process to meet industry demands. Within the last three years we grew the industry partnership program to include more than 50 companies (<http://cci.uncc.edu/partners/membership>). The program fosters collaborative relationships between CCI and select businesses including access to a portfolio of benefits for engaging our students and faculty. Delivering market-driven T-shaped education programs is now the cornerstone of the 2020 strategic plan. Changing academic requirements in our undergraduate curriculum aim to balance the "breadth" and "depth" competences. In July 2015, the team of CCI researchers received a 5-year NSF award, part of the Professional Formation of Engineers: Revolutionizing Engineering Departments (RED) program. We are embarking on a large-scale curriculum changes that emphasize student connections with their Peers, Profession and Purpose (the 3Ps). This award will allow us to support college faculty members to innovate their teaching methods (active learning and "flipped" classrooms) and build evidence of improved student success as the result of the T-transformation.

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**12:30pm**      **12:50pm**      **Developing the "Me" in the T-Shaped Professional for Liberal Arts Students through Integrative Learning**  
**Room 125**  
*Elizabeth Boggs and Tim Stiles, Stetson University*  
*Tricia Reilly, Gartner*

In many ways liberal arts students are an expression of the T-shaped professional, possessing both breadth of knowledge and skills gained through general learning outcomes, in addition to expertise in a specific discipline. However, liberal arts students struggle with how to connect their academic learning to careers and how to market themselves to employers—where is the disconnect? One possible answer lies at the center of the T-shaped model; self-awareness as expressed by the “Me.” In their work on the T-Shaped Model, Estry, Gardner, and Gross (2014) assert that there are three core aspects of self-awareness in the T: purpose, awareness, and confidence. Using the T-shaped Professional as a model for integrative learning, staff from Career & Professional Development will describe collaborative approaches we use to facilitate students' capacity to find their purpose, increase their awareness, and improve their confidence in order to prepare them to succeed in the 21st century workforce and our global society.

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**12:55pm**      **01:40pm**      **World Cafe Session**  
**Lecture Room**  
**Table 1: Vocations & Professions Table:**  
**One Size Does Not Fit All: How Georgia Tech is Adapting T-Shaped Education to Fit Institutional and Local Contexts -- Colin Potts and Michelle Tullier (Georgia Tech)**  
**Developing T-Shaped IT Employees and Campus Safety Officials -- Brenda van Gelder (Virginia Tech)**

**One Size Does Not Fit All: How Georgia Tech is Adapting T-Shaped Education to Fit Institutional and Local Contexts**

For many years, Georgia Tech has been developing a T-shaped approach to higher education. Our curriculum encourages students to be trans-disciplinary in their mastery of knowledge and systems. And, with the 103 year-old co-op program, 53% study-abroad rate among undergraduates, and active participation in leadership programs, undergraduate research, community engagement, and other co-curricular activities, Georgia Tech's students learn to apply their academic knowledge and develop boundary-crossing professional skills.



This paper has three objectives: (i) To describe innovative ways that Georgia Tech is integrating the horizontal bar of the T (breadth), which is managed principally by a collection of academic professional units, and the vertical spine (depth), which is maintained by the faculty; (ii) To highlight ways that Georgia Tech is playing a state-wide leadership role in customizing NACE's career readiness competencies and melding them with T-Shaped principles on its own campus and for the 30 public institutions in Georgia; and (iii) Raise questions for discussion regarding how to adopt or enhance T-Shaped initiatives at attendees' own institutions and in local contexts.

### **Developing T-Shaped IT Employees and Campus Safety Officials:**

This World Cafe topic will discuss an approach at Virginia Tech for developing T-shaped skills in our central Information Technology employees, in partnership with our campus safety officials and practitioners. By collaborating to leverage central IT infrastructure, expertise and resources to enhance the Virginia Tech Police Department and Office of Emergency Management's efforts, both groups of professionals expand their horizontal skills in relation to their deep expertise in their respective areas. As a result of this initiative, emergency managers and police are increasingly comfortable with new technologies and IT jargon; while Computer programmers are more familiar with the challenges and issues impacting security and safety officials. Student interns/employees are also included in this T-shaped development opportunity. Both groups work side by side on new methods of securing the football stadium during home football games, as well as installing and maintaining a system of security cameras throughout the campus. Most importantly, both groups have a broader understanding and experience with the others' concerns, priorities, and obstacles. This enables the groups to work more effectively in keeping our campus safe and secure.

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12:55pm

01:40pm

**World Cafe Session**

**Lecture Room**

**Table 2: Building T-Shaped Competence Table:**

**Peer-to-Peer Learning: Student Perspectives on Innovative Learning and Problem**

**Solving** -- *Lori Blanc, Stephanie Lewis, Elizabeth Lilly, Christina Nelson, Emily Schlake, Francisco Ramos Mora, Megan Underwood (Virginia Tech)*

**Exercises that Build Boundary-Crossing Competencies** -- *Rya Conrad-Bradshaw and Krysta Sadowski (Fullbridge)*

**Peer-to-Peer Learning: Student Perspectives on Innovative Learning and Problem**

**Solving:**

The residential model for undergraduate education is critical to the development of the T-shaped student, with depth in the discipline but strength across the range of skills required to address the complex challenges of the 21st century. We will present a collaborative student/academic affairs program that integrates six high impact practices, combines curricular and co-curricular activities, and creates a culture of learning that fosters the development of T-shaped students. Virginia Tech's Curie and Da Vinci (a.k.a. "CurVinci") Living Learning Communities (LLCs) consist of life, physical and quantitative science undergraduates. CurVinci is a First Year Experience program that includes semester-long "Peer to Peer Projects" -- envisioned, spearheaded, managed, and implemented by students -- on which the student community collaborates in different 'professional' roles. This project complements students' academic courses by focusing on the process of problem-solving and skills associated with the practice of science, through a "learn by doing" experience. In this presentation, students and faculty representing all levels of project organization will discuss (a) their experiences in relation the project's learning outcomes, and (b) the potential for LLCs to stimulate the very lifelong learning attitudes and skills that are prized in the classroom and professional contexts.

## Exercises that Build Boundary-Crossing Competencies

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12:55pm

01:40pm

**World Cafe Session**

**Lecture Room**

**Table 3: Systems Thinking & T-Shapes Table:**

**Providing a Holistic Perspective to T-Shaped Professionals –**

*Gary Metcalf (InterConnections) & Stuart Umpleby (George Washington University)*

**The Missing Piece: Holistic Problem-Solving and the Undergraduate Education of**

**Future T-Shaped Professionals –**

*Amanda Biesecker, Robert Brent, and Michael Deaton (James Madison University)*

### Providing a Holistic Perspective to T-Shaped Professionals

The concept of the T-shaped professional addresses the need to expand the perspectives and competencies of highly-specialized individuals. The differences between the vertical and horizontal bars of the “T” have often been described as contrasts between technical approaches to education and the liberal arts, but a more comprehensive understanding is needed. This session will address long-standing bodies of knowledge which run parallel to traditional approaches to science and research, but which were forgotten in most university programs. Cybernetics helped create the foundations for information sciences, and systems science captured the importance of context as a causal factor. These domains of knowledge balance traditional, analytic approaches to research, and better explain problems of complexity. They allow professionals to shift between perspectives, greatly expanding their abilities to analyze problems, imagine alternatives, and anticipate consequences. This session will describe how these parallel approaches to learning have been used in practice, and how they can be expanded into mainstream education.

**The Missing Piece: Holistic Problem-Solving and Undergraduate Education of Future T-Shaped Professionals:**

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**12:55pm      01:40pm      World Cafe Session**

**Lecture Room**

**Table 4: Individual & Organizational Measurement & T-Shapes Table:**

**How T-Shaped ARE You? Assessing Your Present "T-Shape" and Your Pathway for**

**T-Shaped Growth in the 21st Century**

*Louis Freund (San Jose State University)*

**Measuring, Improving and Managing Your Firm's Capacity to Innovate –**

*Michelle Grainger and Paul Mugge (North Carolina State University)*

**How T-Shaped ARE You? Assessing Your Present "T-Shape" and Your Pathway for  
T-Shaped Growth in the 21st Century**

The concept of the T-Shaped professional has been gaining popularity as companies explore ways to increase their awareness of each employee's skills, expertise, and experience, and what roles, training, and assignments might optimize their contributions and further development. The idea is simply that professionals in every field of must not only be "deep" in technical expertise and knowledge base (their "T-Stem"), but also should be broad in their professional experiences across different roles, working with people in other disciplines, cultures, systems, and regions, and other areas.

This session introduces a metric for defining one's "T-Shape" that may help to advance definitions and usefulness of this concept. It covers the design of a T-Shape metric – a comprehensive view of an individual's professional career that captures the elements of his or her T-Stem and T-Top and generates a T-Score based on weightings assigned to accomplishments and experiences.

**Measuring, Improving and Managing Your Firm's Capacity to Innovate –**

Innovation can be measured, improved and managed – not to mention taught! NC State University's Center for Innovation Management Studies (CIMS) has created a framework and tool which addresses both, most commonly known as the IMMA, more formally recognized as the Innovation Management

Maturity Assessment. During this World Café Session, the leaders of CIMS will provide participants a quick overview of their Innovation Management (IM) Framework and the IMMA. This discussion is meant to provide a high-level introduction of how the tool works, why an organization should use it and examples of real data – before and after application.

The IMMA has been administered digitally over the last 8+ years to over 10,000 individuals, representing over 70 firms across varying industry sectors and in multiple languages. Leveraging the robust demographic capabilities of the tool, the results are graphically powerful and encourage a firm's leaders to look both broadly across the organization and dig deeper within it to further understand why such variances inevitably exist within the same organization. The discussions around the results are meant to enable leaders to successfully and strategically understand the results, make concentrated efforts to improve the results and then to measure again.

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**12:55pm      01:40pm      World Cafe Session**

**Lecture Room**

**Table 5: The Future of T-Shaped Conversations – Sparking and Maintaining the**

**Dialogue Table:**

**T-Shaped Expertise and Trading Zones –**

*Michael Gorman & Rider Foley (University of Virginia);*

*Shannon Nicole Conley (James Madison University)*

**Global Futures Intelligence System: Millennium Project Goals to Spark Conversations  
Between T-Shaped Professionals –**

*Jerome Glenn (The Millennium Project, Global Futures Institute)*

### **T-Shaped Expertise and Trading Zones**

Today's students are entering a world full of wicked problems like climate change and terrorism and opportunities like transforming human capabilities. They will need to catalyze trading zones that combine existing expertise. A prerequisite is the ability to acquire T-shaped expertise. At UVA, JMU and Virginia Tech, we are investigating to teach T-shaped expertise at three levels:

1. Intra-personal--developing mental models of problem situations that combine information and skills usually put in separate disciplinary bins;
2. Inter-personal--learning enough of the language and concepts of a different expertise to be able to work effectively with its practitioners.
3. Institutional--learning how to get institutions that often compete for funding and prestige to realize that they can go much farther and deeper if they work together.

At the last T-shaped summit, we presented results from a pilot study using concept maps to assess the acquisition of T-shaped expertise in two classes at UVA and one at JMU. We will present a plan for a

more comprehensive study that includes both undergraduates and graduate students in classes from three institutions and explores cross-institutional trading zones.

### **Global Futures Intelligence System: Millennium Project Goals to Spark Conversations**

#### **Between T-Shaped Professionals**

Global Futures Intelligence System (GFIS <https://themp.org>) is an on-line collective intelligence tool and network able to develop T-shaped individuals and concepts. Since the global future requires all the disciplines, it can cultivate T-shaped professionals. It is being built by futurists, business executives, government officials, NGOs executives, and other thought leaders identified by the 56 Millennium Project Nodes around the world.

In addition to governments, businesses, NGOs, and individuals, universities such as: Monterrey Institute (Mexico), Free University of Berlin, University of Toronto, American University (US), Mondragon University (Spain), and the University of Notre Dame (US) are beginning to use it for students to reinforce T-shaped concepts. Users from the EC in Brussels to Yulim Trading Corporation in Seoul see how future developments fit into global future possibilities.

The GFIS is not just new software, vast information, and global experts; it is also a system to produce synergies among these three elements for greater intelligence than their separate values. It is rather a global intelligence utility that for T-Shaped thinking and learning.