We have all worked in teams before and many times the experience has left us hoping to never have to work in another one again. Through his research, Professor David Socha has been discovering ways to make teams more productive and less chaotic.

Benjamin Franklin once said, “In this world nothing can be said to be certain, except death and taxes.” We can add another certainty to this list: teamwork. Whether we like it or not, at some point in our lives, we will have to work with others in a team setting.

Socha realizes this and through his research, he has been finding ways to ensure that the time spent in teams is both productive and rewarding for its individuals and the group as a whole.

One area of Socha’s research is in multi-person flow. Flow is a concept that was first introduced by psychologist Mihaly Csikszentmihalyi (pronounced Mee-hy Cheek-sent-ma-ha-ee) in the 1980s as a state the human mind enters that makes them highly productive at their task.

“When you are in flow, the challenge of the activity and your skill level are so well matched that your work completely absorbs your attention,” explains Socha. “It’s the type of thing where you all of a sudden look up and go ‘Oh my goodness, where did time go?’”

While Dr. Csikszentmihalyi studied this concept in individuals, Socha is trying to understand how state of flow can be detected in teams.

Socha hypothesizes, “for a team, being in a state of flow means that all individuals are in a state of flow and they all have a shared vision of what they’re going for. If you add those two things together, then the team will rock; they’ll do amazing things.”

To accomplish the task of detecting when a team is in a state of flow, Socha teamed up with Michelle McCarthy, of McCarthy Technologies, Inc., and Adam Feuer, currently of Expedia, Inc., to study the ‘BootCamp Immersive Training’ created by McCarthy Technologies, Inc.. The BootCamp is a team-centered experiential training designed for people to learn and develop their Core Protocols—a set of practices developed over the course of 200+ BootCamps to help teams be more productive.

The BootCamp is a great opportunity to learn how to detect the state of flow because one of the Core Protocols that is taught at the camps is how to enter and stay in a state of flow as a group. To help measure and understand
Dear Alumni and Friends of Computing & Software Systems,

This is the time of year that plans started in the fall begin to come to fruition. More and more students are completing their studies and graduating, new educational opportunities are created, student and faculty research projects produce results, more advanced equipment is being put to ever more demanding use, and our faculty and staff community grows with additional members. I don’t think it’s a coincidence that all of this coincides with the beginning of spring and the reappearance of the sun in Pacific Northwest skies.

This issue of Bits & Bytes showcases a sampling of this activity. We have seen our first graduate students earning the Master of Science degree. This is an amazing accomplishment: these students are real pioneers who arrived in our program on day one and flourished through a period of tremendous change. We’ve had our new Graduate Certificate in Software Design and Development approved. This certificate fills a vital need in our community and our nation, providing an avenue for people interested in switching careers to join the computing profession. (We’re also deep in the process of developing new degrees and revising old ones; news I expect to share with you in a future issue of Bits & Bytes.) Our graduate and undergraduate students now have a remodeled, and renamed, Advanced Projects Lab, with high-end hardware and meeting facilities. Among the things they’ve been doing there is building new ways to interact with computers. These students also have a new faculty member with whom they can find project opportunities: Sue Kraemer.

So, please take a moment, flip through these pages, and excuse us if we brag a bit.

Cordially,

Dr. Michael Stiber
Professor and Director

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**Letter from the Director**

**Graduate Certificate Receives Approval**
We are happy to announce that our formerly-designated Masters Preparation Sequence now is an officially transcripted Graduate Certificate, effective Fall 2011.

**UW1-302 Renovated**
The remodeling project for UW1-302 wrapped up earlier this quarter. The new Advanced Projects Lab (APL) will be home to undergraduate and graduate students actively working on research projects with Computing & Software Systems faculty. The renovated lab provides groups with more specialized equipment and collaborative resources, such as a conference table, soft seating, mobile whiteboards, and tables with whiteboard surfaces.

**Computing & Software Systems Welcomes New Acting Assistant Professor, Sue Kraemer**
Sue received a BA in Chemistry and Biology from Saint Mary’s University of Minnesota and a Ph.D. in Radiation Biology and Molecular Cellular Biology from Colorado State University. She also has an MBA with an emphasis on Executive Leadership from Seattle University. She has spent over fifteen years leading research in life science disciplines. She was a senior scientist at Seattle Biomed and assistant professor at Johns Hopkins University. Combining her research experience and MBA training, Sue has provided leadership development for scientists at the Fred Hutchinson Cancer Research Center. Sue also serves as a Board Member and Grants Committee co-chair at the Sustainable Path Foundation. Her research experience combined with her leadership development work has led to her interest in investigating the question “How can we work better together to foster creativity and innovation in our scientific and technical organizations?”

**First UW Bothell Cyber Defense Team Places Sixth in Regional Competition**
The Computing & Software Systems Program is proud of our very first CSS student team for placing sixth in their first Collegiate Cyber Defense Competition (CCDC) event, which took place March 24 to 25 at Highline Community College.

The CSS team competed with 10 other regional college/university teams to protect their network from contestant attacks by Red Hat hackers—a team of professional hackers from government and private companies.

Our CSS team is actively recruiting for next year’s competition. If you are interested, contact the CSS office for more information at (425) 352-5279.
REKINNECTING WITH MATH

JACK AND JEB HAVE TAKEN THE KINECT REVOLUTION INTO THE CLASSROOM WITH KINECTMATH

TELL US A LITTLE ABOUT THE KINECTMATH PROJECT

KinectMath is a practical software tool that takes advantage of Microsoft’s Kinect sensor. It gives the user the ability to easily control abstract math concepts physically and in real time. KinectMath allows students to manipulate graphs and functions easily by using their body. It’s low cost, interactive based learning has the potential to increase student engagement, comprehension, and interest in mathematics through both physical and mental involvement.

During KinectMath’s initial deployment teacher feedback has been overwhelmingly positive, with reports of excitement and engagement from both students and teachers. However, we are cautiously optimistic, understanding that the initial novelty of learning from a gaming device may eventually wear off when students must demonstrate the concepts they have learned. With this in mind we have continued to add and modify the software as best we can, in order to let Kinect-Math reach its full potential.

WHAT GOT YOU INTERESTED IN THIS PROJECT AND WHY DID YOU CHOOSE TO USE THE KINECT?

Jeb: I became involved with this project when I approached Professor Kelvin Sung about working with the Microsoft Kinect. I had been interested in working on a
Garvice Eakins  
High 5 Software  
SME Barcode  
Garvice developed software for the Symbol MT2000 handheld mobile terminals in his internship with High 5 Software. His software included features such as enabling the user to receive purchase order items, create customer orders, and take payment to name just a few.

Albert Gardner  
Vertafore, Inc.  
Software Development for Insurance Agency Data Conversion Engine  
Albert's internship at Vertafore had him replace the existing Insurance Agency Data Conversion Engine with a new more efficient and user-friendly version.

Alicia Flinchum  
Promethean, Inc.  
Data Validation/Code Refactoring for ActivProgress Application  
Alicia created a data validation system for the ActivProgress application at Promethean. She helped implement automated measures to validate whether data entered by students and staff match predetermined ranges and formats.

Nathan Campbell  
IBM  
UEFI Performance Profiling  
Nathan built a specialized UEFI Debugger for his internship with IBM. The tool made it possible to focus code optimization efforts on firmware modules that were accessed numerous times during the booting of servers.
COOPERATIVE EDUCATION HIGHLIGHTS

WINTER 2012

JORDAN LOCKE AND KYLE ZARETZKE

PNWER Asset Visualizer

Jordan and Kyle developed an asset visualization application for the Pacific Northwest Economic Region (PNWER) organization. The application retrieves information stored on the cloud (Microsoft Azure) and displays it on a map. It works on a desktop computer and Windows Phone.

Peter and Rafael worked together to create DealHut--a mobile application that gathers local and national business information, such as location, hours of operation, and promotional events that businesses offers, and displays that information to users’ smartphone based on their preferences and GPS location.

TREVOR ROMERO

Decisive Data

UC Nomination Tool

Using ASP.NET and C#, Trevor created a web tool for one of Decisive Data’s clients that helps them keep track of sales and sales opportunities of Microsoft Lync.

NICOLE TIEDMAN

Sage Bionetworks

Nicole supported the platform team at Sage Bionetworks by writing standardized unit testing for newly created functionality on the website, database, and storage aspects of subprojects at each stage within their SCRUM SDLC.

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Winter 2012 Cooperative Education student presenters
this phenomenon, Socha and his collaborators used the Experience Sampling Method (ESM) which was developed by Dr. Csikszentmihalyi to assess an individual’s mental condition during a task. These assessments were carried out by having the individual stop their task at random times during their day and fill out questionnaires about their mental state.

Yet, using the ESM for the BootCamp session in January, led to an insight. “It became clear quite quickly when we started using the ESM that there’s a big gap. When you’re using the technique you get interrupted and that’s really irritating,” explains Socha. That breaks their concentration, which pushes them out of flow.

Socha decided to look for alternate ways to detect flow. “Is there some way to use some tool to detect when a team is in a state of flow?” asks Socha.

This coming spring quarter, Socha and his colleagues will use Human Computer Interaction (HCI) practices to investigate this question. They plan to observe teams to see what insights they can gather about how to automatically detect a state of flow in teams.

Ultimately, it may also be possible to detect when teams are not in flow, and perhaps even provide prompts to help bring them back into multi-person flow.

Conversely, who makes up your team could prove to be just as important in creating great teams as being able to enter and sustain a state of flow. This is why, in another area of research, Socha is trying to answer the question of whether a more diverse group translates to a better group.

“There are lots of people who already claim that,” says Socha. “Michelle McCarthy, for instance, finds out that if she has a BootCamp and there are at least 16 people then the Boot Camp is successful.” Similarly, some work with design teams at Stanford showed that intentionally creating teams with greater diversity in personality types led to a substantial increase in team performance.

Socha is in the process of developing a tool that will help quantify this diversity notion. Instead of focusing on one, or a few specific measures of diversity, Socha wants to provide flexibility to study a variety of diversity measures.

This work was partially stimulated by Socha’s colleague, Skip Walter, who teaches a certificate course on User-Centered Design at the University of Washington in Seattle.

Socha explains that in a recent class that Walter taught, he forced his students into teams instead of having them pick their own.

He did this by using a set of questions that were based on Myers-Briggs Type Indicator assessment method—a questionnaire developed to help measure an individual’s perception of the world and how they make decisions.

“Another thing he looked at,” explains Socha, “is whether the person has a driver or an analytical personality. And then there was your personal background, your gender background, and your skills in this domain.”

The results were astonishing.

“The teams last quarter did the best work he’s ever seen,” describes Socha.

One problem is that balancing the diversity across a set of teams in a larger classroom is difficult. For this reason, Socha and his colleagues are looking at developing an online tool that an instructor could use in their classroom to help form more diverse teams.

Students could fill out a questionnaire similar to the one Walter administered in his class. The tool would then automatically distribute the students into teams based upon instructor-defined weights. At the end of the course, students and their instructors could return to the website and assess how they feel the teams performed.

“If we got a lot of courses to use this we could actually get hundreds or thousands of data points using a variety of different types of measures of diversity,” explains Socha. “And we could actually start answering some interesting questions about what types of diversity seem to matter.”

Socha’s research has the potential to fundamentally change the way we structure and understand team dynamics. By knowing how and when a team enters the state of flow, more productive work could take place, producing higher quality deliverables. In addition, knowing what combinations of individuals make up great teams could further augment team productivity and their effectiveness.
**EVENT**

UW Bothell Innovation and Creativity BootCamp

Professor David Socha hosted the UW Bothell Innovation and Creativity BootCamp on January 6-8. Seventeen participants and seven consultants explored how to be a great team.

**PUBLICATIONS**

**Accelerating Large-Scale Simulations of Cortical Neuronal Network Development (Tech Report)**


**Camera-Aided Human Navigation: Advances and Challenges**


**Can Graduating Students Design: Revisited**


**Group Whiteboards and Modeler/Customer Teams: Getting Closer to Industrial-Style Collaboration in a Classroom**


**In Situ Data Provenance Capture in Spreadsheets**


**Students’ Perceptions of the Differences between Formal and Informal Learning**


**‘REKINECt’ CONT.**

The project that utilized a natural interface for controlling the computer and the Kinect had recently been released so it was an easy choice. He informed me that Professor Robin Angotti had an idea about a math education program that graphed distance over time, similarly to an attachment one can purchase for a standard graphing calculator. From that idea we developed a quick prototype that rapidly began to grow in scope. We then recruited Jack Chang and we continued to add more features, modes and options. We have continued to meet regularly and add to KinectMath based on the feedback we have received from math educators.

**Jack:** I dropped out of high school because I played a lot of video games and found lectures to be boring and tedious. I soon realized that playing video games would not get me anywhere. A few months ago, I had the great opportunity of joining this project. I want to help students like me, who struggled with lectures, by turning math into a fun and enjoyable subject.

One of the reasons I decided to attend UW Bothell is because of Professor Kelvin Sung. A few years ago, my friend showed me some of Sung’s work and asked me, “See those projects? Aren’t they amazing? You should go to school and make some games!” That’s when I decided to come back to school.

Before I joined this project, I had worked on several projects with Professor Sung. I had a lot of fun working with him because he has a lot of passion for his projects. One day, he approached me and asked me if I wanted to do something with the Kinect. That’s when I joined this team.

I had worked with Jeb Pavleas, my teammate, on several projects in the past. We did a lot of pair programming and he has helped me sort out a lot of problems. I just love to work with him. That’s another reason that I joined this team.

**What challenges did you face and how did you overcome them?**

The most difficult challenge we faced was the agile development nature of this product since the features have not been defined and we are still exploring the possibilities of what KinectMath can offer to math education. This is because we are progressing the software by user requests and feedback rather than having specific requirements for the product beforehand.

**Do you plan to continue working on Kinect Math after you graduate?**

Yes, after graduation, as long as KinectMath maintains a user base, we have agreed to continue to support the software with bug fixes and small feature releases. However, Professor Sung and Professor Angotti have suggested they may be able to find another group of students to continue developing larger changes and requests in the future, which we support.
Help Support Our Mission!

Whether it’s $5 or $500, every gift helps keep the Computing & Software Systems program a unique and rewarding experience for our students and an important resource for computing education in this region.

Support from people like you enables us to grow our activities even in these tough economic times.

Become part of our mission by donating today. You can direct your giving to CSS by visiting www.uwb.edu/css and clicking on the ‘Make a Gift’ link.

Thank You for Your Generous Support!