Nurturing the Next Generation of Computer Science Professionals

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The Computer Science Professionals (CSP) Hatchery will create a revolutionary learning environment by modeling the best practices of a software company work experience, layering nurturing aspects that promote ethical questioning, value diversity, and a focus on professional skills such as increased collaboration, communication, and teamwork.

The CS Professionals Hatchery
Software Company Environment
"Incubate Agents of Change"

Partner for Success!

Foundational Values
Navigating Computer Systems
Intro to Version Control
Agile Development
Intro to Database System Usage
A Brief Intro to HCI
Current Topics in Computer Science
Secure Programming
Software Testing

Students
Advising
Faculty/Staff
Industry

Next Steps
- Additional HU courses planned 2019-2020
- Continue faculty HU instructional rotation
- Continue "threading" HU content in courses
- Evaluate "CS content" in CS courses
- "Capstone Integration" feasibility evaluation
- Examine students' social/emotional levels
- Research, Validation, and Publication
- Final assessment of program impact

Progress
- Approved 11 HU courses: 5 required, 6 elective
  - 5 delivered in 2017-2018; 3 in 2018-2019
  - 57 sections, 1344 students (173-199)
  - "Entrepreneurial Emphasis" approved for Fall 2019
  - 4 faculty have taught a HU (4 grant members)
  - 4 industry partners have taught a HU
  - Faculty & industry partners - 2nd round interviews
  - Student baseline and social networks analysis
  - 5 papers co-authored with other Universities
- Produces to date: 15 conference presentations/papers, 1 book, and 3 websites?

Challenges
- Ingrained biases and comfort zones
- Building industry, student, faculty, and advising buy-in and participation
- Logistics: scheduling, integration and threading, advising, and communication
- New course development
- Modifying existing courses to reinforce Hatchery and CSP concepts — "threading"
- Maintaining survey response rate and willingness to provide feedback on beliefs and experiences
- Using survey and interview data to identify and address ongoing challenges

Hatchery* Change Process

*Hatchery Units (HUs) are one credit courses focused on skills relevant to computer science professionals and designed to rapidly adapt to the changing needs of industry. HUs are also a vehicle to disseminate social justice and equity through the curriculum.

Knowledge, Skills, & Abilities

Through several meetings with industry representatives, we iteratively developed the KSA categories and desired outcomes shown below:

KSA Category | Desired Outcomes
--- | ---
Business | Understanding how a company makes money and executes strategy
Collaboration & Teams | Working with people and groups to achieve a goal
Entrepreneurship | Organizations, manages, and assumes risks of a business or enterprise
Professional | A person engaged and qualified in the computing profession
Research & Development | Seeks innovation and improvement of products and processes
Technical | Practical knowledge and skills associated with the computing field

Hatchery Curriculum Map

*Problem Concept Development
*Project Proposal
*Project Follow-up
*Capstone Integration
*Cohort Development
*Cohort Integration

Endorsements

HP
Cradlepoint
WhiteCloud
MWW Animal Health
Smitten
AppNexus
Paylocity
Impaq
Impact Group
VisitPay
Metageek

"...That's just the way the world is. (Fundi-researcher groups) can't handle that, I can't help them..."
## Computer Science Professionals Hatchery "Measures of Success"

**Products**

<table>
<thead>
<tr>
<th>Conference</th>
<th>Year</th>
<th>Location</th>
<th>Type</th>
<th>Product Title</th>
<th>Authors</th>
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</thead>
<tbody>
<tr>
<td>ASEE - American Society for Engineering Education</td>
<td>2017</td>
<td>Columbus, Ohio</td>
<td>Paper</td>
<td>Talking about a Revolution: Overview of NSF RED Projects</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
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<tr>
<td>USEFRED (RED) - Revolutionary Engineering Departments</td>
<td>2017</td>
<td>Lexington, Kentucky</td>
<td>Panel</td>
<td>Nurturing the Next Generation of Computer Science Professionals</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
</tr>
<tr>
<td>ASEE - Frontiers in Education (FIE)</td>
<td>2018</td>
<td>Baltimore, Maryland</td>
<td>Panel Discussion</td>
<td>Revolutionizing the Culture of Computer Science</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
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<tr>
<td>ASEE - American Educational Research Association (AERA)</td>
<td>2018</td>
<td>New York, NY</td>
<td>Conference Presentation</td>
<td>Identifying gender differences in undergraduate Computer Science students. Women aren't as different</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
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<td>New York, NY</td>
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<td>The Computer Science Professionals' Hatchery</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
</tr>
<tr>
<td>CaCEC - Collaborative Network for Engineering and Computing Diversity</td>
<td>2016</td>
<td>Crystal City, VA</td>
<td>Paper</td>
<td>The Computer Science Professionals' Hatchery at Boise State University. Incorporating Inclusion, Diversity and Social Justice into the Computer Science Curriculum</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
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<td>CNSF - Coalition for National Science Funding</td>
<td>2016</td>
<td>Washington, DC</td>
<td>Panel Session</td>
<td>Nurturing the Next Generation of Computer Science Professionals</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
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<td>Salt Lake City, Utah</td>
<td>Paper</td>
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<td>USEFRED (RED) - Revolutionary Engineering Departments</td>
<td>2016</td>
<td>Asheville, VA</td>
<td>Presentation</td>
<td>Portable concept Hatchery</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
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<td>USEFRED (RED) - Revolutionary Engineering Departments</td>
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<td>Incorporating Focused Professional Skills, and Inclusion, Diversity, and Social Justice into the Computer Science Curriculum</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
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<td>HICCS - Hawaii International Conference on Systems Sciences</td>
<td>2015</td>
<td>Macau, China</td>
<td>Paper</td>
<td>The Computer Science Professionals' Hatchery</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
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<td>RESPECT - Research on Equity &amp; Student Participation in Engineering, Computing, &amp; Technology</td>
<td>2015</td>
<td>Minneapolis, MN</td>
<td>Paper</td>
<td>Teaching Professional Morality and Ethics in Undergraduate CS Students. Experiences in CS-HU 130. &quot;Super Connectors&quot;</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
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<tr>
<td>PSA - Pacific Sociological Association</td>
<td>2015</td>
<td>Salt Lake City, Utah</td>
<td>Paper</td>
<td>Abstract</td>
<td>The Computer Science Professionals' Hatchery</td>
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<tr>
<td>ASEE - American Society for Engineering Education</td>
<td>2015</td>
<td>Tampa, FL</td>
<td>Abstract</td>
<td>Peer Network Built Around Commonalties Experiences on Undergraduate CS Students. The Curiosity of Integrated BS in Undergraduate Computer Science Education</td>
<td>Dr. Noah Salzman (Co-PI) - Educational Specialist, Dr. Tim Andersen - Research Director</td>
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## Assessing Community in an Undergraduate Computer Science Program Using Social Network Analysis

### Measures of Success

**Highlights:**

- Identify institutional practices and social dynamics that produce 'super-connectors'.
- Hypothesize that connected students are more likely to persist when they encounter setbacks or adversity.
- Students in higher grade levels have more densely populated networks.
- Significant connectedness variation, ranging from 1 to 28 connections.
- Analyses of variations in connectedness can expose factors that could help explain lower completion rates.
- Teaching assistants and tutors are typically well connected and important for building connections across grade levels.

### Conclusions:

- No meaningful differences in the connectedness of male versus female students, white versus non-white students, or traditional versus non-traditional students.
- Significant differences in the connectedness of several subgroups:
  - Students’ connectedness increases through the four years.
  - Students in their fifth year or more of studies tended to be less connected than traditional seniors.
  - Students who identified themselves or their peers as gamers tended to have significantly more connections than their non-gamers classmates.
- Quantitatively demonstrates the importance of teaching and learning assistants in creating community in the CS department.
- These individuals have an outsized impact in building connections in the undergraduate CS community and further support the value of peer tutors.
- Lack of connections for students can help to diagnose the overall feeling of ‘non-belongingness’ in CS.

### Differences in Degree by Genres

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<td>Female</td>
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### Differences in Degree by Year

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<td>3rd</td>
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<td>4th</td>
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### Differences in Degree by Race

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### Differences in Degree by Non-Connect

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