University of Washington
Center for Health Organization Transformation (CHOT)
Planning Meeting Agenda

Friday, February 19, 2016

Location: University of Washington
Husky Union Building (HUB) Room 334

7:30 – 8:00 am  Registration and Breakfast

8:00 – 8:30 am  Welcome and Introductions
Dr. Christina Mastrangelo, Industrial & Systems Engineering, CHOT-UW Co-Director
Dr. Cynthia LeRouge, Health Services Administration, CHOT-UW Co-Director
Dr. Douglas Conrad, CHOT-UW Lead Investigator
Dr. Linda Ng Boyle, Chair, Department of Industrial & Systems Engineering
Dr. Jeff Harris, Chair, Department of Health Services
Dr. Michael Bragg, Dean, College of Engineering

8:30 – 8:35 am  Review of Agenda
Dr. Cynthia LeRouge, CHOT-UW Co-Director

8:35 – 8:55 am  Attendee Introductions

8:55 – 9:25 am  NSF I/UCRC Presentation
Dr. Debasis Majumdar, Program Director, National Science Foundation

9:25 – 10:15 am  Values, Vision, and Capabilities Proposition of the Center
Dr. Bita Kash, Texas A&M, CHOT Director
Mr. James Gigliotti, Highmark, CHOT Industry Advisory Board Chair
Dr. Christina Mastrangelo, CHOT-UW Co-Director

10:15 – 10:25 am  Break

10:25 – 10:40 am  Overview of Project Presentation Process and LIFE Forms
Dr. David Meyer, NSF Evaluator

10:40 – 11:45 am  Project Proposal Presentations
5 presentations: 5-min each, followed by 7-min discussions and LIFE Form completion
Coincides with CHOT IAB Spring Meeting activities
11:45 – 12:30 pm  **Wicked Problems and Wild Opportunities Session (Hearing from Industry)**
_Coincides with CHOT IAB Fall Meeting activities_
Dr. Cynthia LeRouge, CHOT-UW Co-Director

12:30 – 1:30 pm  **Lunch**
_Continued discussion of Wicked Problems and Wild Opportunities_

1:30 – 2:05 pm  **Center Response to Wicked Problems and Wild Opportunities Session and LIFE Forms**
Dr. Christina Mastrangelo, CHOT-UW Co-Director
Dr. Cynthia LeRouge, CHOT-UW Co-Director

2:05 – 2:40 pm  **NSF Industry Workshop (NSF-Moderated Panel Session)**

2:40 – 2:50 pm  **Break**

2:50 – 3:35 pm  **NSF Closed Session with Industry**

3:35 – 4:00 pm  **Feedback, Next Steps, Action Items & Closing Remarks**
Dr. Debasis Majumdar, Program Director, National Science Foundation
Dr. Christina Mastrangelo, CHOT-UW Co-Director
Dr. Cynthia LeRouge, CHOT-UW Co-Director

4:00 pm  **Adjourn**
(Optional campus tour)
Planning Meeting for the I/UCRC Site Addition of University of Washington to Center for Health Organization Transformation (CHOT)

February 19, 2016
I/UCRC Program, IIP Division, Engineering Directorate

Planning Meeting Purpose, Outcomes

- Align the proposed Site and its research portfolio with the Center and its IAB
- Provide information necessary for prospective members to assess the value of the Site membership commitment

CHOT

Texas A&M University – Lead Site (Phase II)
(Director Bita Kash)
Georgia Institute of Technology – Site (Phase II)
(Director Eva Lee)
Northeastern University – Site (Phase I)
(Director: James Benneyan)
Penn State University - Site (Phase I)
(Director: Harriet Nembhard)

One Center, One Industry Advisory Board

Center Evaluator – David Meyer

NSF Presentation Outline

- I/UCRC Program
  - NSF Organization
  - I/UCRC Mission & Vision
  - Why an I/UCRC? - Program Outcomes
  - I/UCRC Operational Model
  - Maximizing Center value
- Planning Process, Next Steps
IUCRC in the Innovation Spectrum

The Industry/University Cooperative Research Centers (IUCRC) Program

**Mission:**
- To contribute to the nation’s research infrastructure base by developing long-term partnerships among industry, academia, and government
- To leverage NSF funds with industry to support graduate students performing industrially relevant research

**Vision:**
- To expand the innovation capacity of our nation’s competitive workforce through partnerships between industries and universities

Cooperatively Defined and Shared, Sector Precompetitive Research

40 years of fostering and growing long-term partnerships among industry and academy based on shared value
**Center Focus Areas**

1. Advanced Electronics, Photonics Fabrication and Processing: 4
2. Advanced Manufacturing: 9
3. Biotechnology, Health & Safety: 8
4. Advanced Materials: 10
5. Civil Infrastructure Systems: 2
6. Energy & Environment: 11
7. Health & Safety: 3
8. System Design & Simulation: 5

52 ENG Funded Centers
23 CISE Funded Centers

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**I/UCRC Fast Facts – FY15 Snapshot**

52 ENG Funded Centers 23 CISE Funded Centers

- **Program Funding**:
  - $21M in Program Funding (ENG, CISE)
  - 6:1 Leveraging of NSF funds
- **Students**:
  - Over 2000 students engaged, nearly 30% hired by members
- **Sustainability**:
  - Over 40 Graduated I/UCRCs remain in operation true to model

6 International Sites:
Belgium, Japan, Finland, Germany, India, Russia

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**I/UCRCs Fast Facts (FY14)**

**Members:**
18 on Average per Center

**Average Number of Memberships**

**Centers Nationally:**
- 77 Centers with 216 PIs
- Over 1100 Members:
  - 50% Large Business, 20% SB, 10% Federal Members, ~10% (State + Others)

**Total Funding:**
6:1 Leveraging of Program funds
47:1 Leveraging of each membership

Average Number of faculty and researcher involved per center: 18

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**Additional Funding Opportunities for I/UCRCs**

Supplements
- I/UCRC Clusters for Grand Challenges
- I/UCRC Innovation Fellows (IIF)
- Research Experience for Undergraduates (REU)
- Research Experience for Teachers (RET)
- Veterans Research Supplement (VRS)
- SBIR / STTR Phase II (memberships)
- Fundamental Research Program (FRP)
- Federal Government Interagency Exchange of Funds (IAA)
- Military Interdepartmental Purchase Requests (MIPR)

Archived

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2/22/16
Significant Program Updates

- A brand new solicitation that just posted on October 15 that revolutionizes the I/UCRC Program
- The FRP Program has been archived. Given the fundamental nature of the research projects and the industry participation, proposals should be submitted by using the GOALI mechanism to the NSF Program supporting fundamental research that is more closely related to the one proposed (not to the I/UCRC Program). Please make sure to inform us to which Program you intend to submit.
- The IMD Program has been archived in preparation of the posting of the new solicitation.
- The IIF Program has been archived. A lot of opportunities for students are found through the Office of International Science and Engineering (OISE)

I/UCRC Program New Solicitation NSF 16-504 - Highlights

- Base funding per year per site has increased and depends on in-cash only (no in-kind cash equivalent) membership fees collected from the 148 members.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Industry [in cash only] $5 and # members/site</th>
<th>NSF 16-504</th>
<th>NSF 13-594</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>$150k and 3 members</td>
<td>$150k/site</td>
<td>$65k/site</td>
</tr>
<tr>
<td>Phase II</td>
<td>$200k and 4 members</td>
<td>$100k/site</td>
<td>$95k/site</td>
</tr>
<tr>
<td>Phase III</td>
<td>$250k and 5 members</td>
<td>$50k/site</td>
<td>$115k/site</td>
</tr>
</tbody>
</table>

- Bonus: Increase your base funding in Phase II and III
  - Who is eligible?
    - Phase I and Phase II Sites exceeding minimum membership requirements
  - How much?
    - Equivalent to half the total in-cash membership fees exceeding required minimum during the current Phase, not to exceed $250k.

A Phase I Example [per site and over the five years]:
- NSF base funds in Phase I: $750,000
- Minimum Membership Fees: $750,000 in cash (no in-kind cash equivalent)
- Actual total in-cash membership fees collected: $1,200,000
- Exceeds minimum by $450,000
- Bonus: Site is eligible for ½ of $450k in Phase II

- NSF Phase II funds: $500k base + $225k Bonus = $725,000
### I/UCRC Program New Solicitation NSF 16-504 - Highlights

- Base funding per year per site has been increased and depends on in-cash only (no in-kind cash equivalent) membership fees collected from the IAB members.

<table>
<thead>
<tr>
<th>I/UCRC</th>
<th>Industry (in cash only) $3 and # members/site</th>
<th>NSF 16-504</th>
<th>NSF 16-504 with Bonus (upper limit)</th>
<th>NSF 13-594</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>$150k and 3 members</td>
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<td>$200k and 4 members</td>
<td>$100k/site</td>
<td>$150k/site</td>
<td>$45k/site</td>
</tr>
<tr>
<td>Phase III</td>
<td>$250k and 5 members</td>
<td>$50k/site</td>
<td>$100k/site</td>
<td>$15k/site</td>
</tr>
</tbody>
</table>

- NSF funds are subjected to full F&A and amounts are inclusive of F&A.
- NSF funds are to be used to support I/UCRC costs of operation, including but not limited to the hiring of an Innovation Managing Director.
- If NSF funds are used towards research, they must be used to support IAB voted research projects.
- Under 16-504 evaluators are paid directly by the NSF!

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### Dear Colleague Letter: I/UCRC Clusters for Grand Challenges

Dear Colleague,

**Cross-center cluster**

Form a strategic team to tackle a cross-disciplinary cross-sector portfolio of research projects that hold the potential to catalyze technology breakthroughs and advance national priorities, particularly in advanced manufacturing.

The active participation of industry in the design and implementation of cluster research efforts is expected.

**Budget and Duration (1.5M for two years):** $750k per year for each cluster with up to $150k per year per I/UCRC

Eligibility: I/UCRCs meeting minimum membership requirements for three years in a row (and with one in kind only).

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### I/UCRC Evaluation & Assessment

35 + year commitment to integrating evaluation with program planning, implementation and operation. Local Evaluation – Global Assessment

**Center Inputs and Outputs Assessments**

**Targeted Assessments and Related Work Products**

- I/UCRC Graduation Status
- Breakthrough Consequences
- Gray's Work in Progress
- Gap

**Publications in Open Literature**

- > 80 publications in journals, national & international conferences (Research, Policy, AMR), Journals of Medical, Sociology, Policy, Science, Public Policy, New Directions in Evaluation
Center for Child Injury Prevention Studies (CChIPS): a Phase III IUCRC

To advance the safety of children, adolescents and young adults through research

**RESEARCH**
- Injury risk in child brain trained occupants
- Aware of Injured Assessment for Child
- Development of pre-cria Insect Antimicrobial Nut Device (ATD)
- Factors Associated with Diving in Teens with Autism Spectrum Disorders
- Over 100 projects since 2005

**ACTION**
- Child Advisory Board
- Member companies in 2005
- 26 member companies in 2012

**IMPACT**
- AIR Award: Innovation Ecosystem for Online Health & Wellness
- Partnership: University City Science Center (UCSC) in PA, industry in Vermont
- UCSC Team: CChIPS & Univ of Florida Center for Advanced Computing (CAAC)

Advances in Child Injury Prevention Conference
12th Annual Conf. Hosted by CChIPS
- Qualitative research on safety for children and adolescents to stakeholders who can affect change
- Participants: 50 attendees from industry, government and academic

Results:
- Research & research product design & test, new member research

The Children's Hospital of Philadelphia® Penn Medical Center

Testimony before the Subcommittee on Health Energy and Commerce Committee entitled A Review of Efforts to Prevent and Treat Traumatic Brain Injury (TBI)
The I/UCRC model

I/UCRC Base Membership Agreement

- Parties to Agreement, University and Center
- Annual membership fee structure
- Patent rights held by university with royalty free, non-exclusive rights to center members
- Companies wishing to exercise rights to a royalty-free license pay for the costs of patent application
- If only one company seeks a license, that company may obtain an exclusive fee-bearing license
- March-in Rights
- Publication delay policy
- Industrial Advisory Board – one representative from each company per membership
- Indemnification clause(s)

• All Members sign the agreement upon Center Award
• ONE center, and ONE membership agreement form

I/UCRC Pre-competitive Research Portfolio:
- cooperatively defined & funded on shared value

I/UCRC Pre-competitive Research Portfolio:
- Ideag, people
- Shared Project Portfolio
  - Cooperatively defined, selected
  - Governed by NSF I/UCRC Agreement
  - Royalty free, non-exclusive access to P by members

Value derived from portfolio

Requires trust be built in the model, and between all partners in the center.

Open Innovation Enhancements to I/UCRC Base Membership Agreement: two options

Option 2: Open Source Software. Sample Membership Agreement (below) with copyright Clause I replaced with the following language: All software created under this Agreement will be released as open source under the Apache License ("Center Software"). The parties agree that they will not pursue patent protection for such software: 

Explicitly added in 2014

Option 3: Public Domain Operation. Sample Agreement (below) with Clauses G, H, I, and J removed and Clause F replaced with the following clause:

Activity of the center funded all or in part by center membership fees will be in the public domain upon completion and publication review by members.

Innovation through Partnership
The I/UCRC model: A win-win solution for all stakeholders

For Academia
- Vehicle to attract and retain students to STEM fields
- Form a talented and broadly skilled workforce
- Stimulate creativity and invigorate the research labs
- Diversify the source of funding
- Trusted relationship with industry
- Provide possible access to otherwise inaccessible data and to additional funds through applied research projects
- Byproduct of the shared value
- Ready partners for translation

Educate, Collaborate and Integrate to Innovate!

For the Government
- Leverage with industry NSF investment in research and education
- Protect fundamental research
- Enhance our capacity to innovate, ensuring America’s future economic growth and international competitiveness
- Accelerate solutions to the 21st Century Grand Challenges, securing America’s global competitiveness

For Industry
- Access to identified sector pre-competitive research
- Research shaped by members and academic, shared value
- High value research projects
- Bring a more strategic and multidisciplinary environment to academia
- Invest in preparing the future workforce
- Much higher return for the same investment (membership fee)
- Sector networking, learning from industry peers, customers
- Access to intellectual property
- Lower the risks, accelerate competitive R&D
Planning Process, Proposal Submission

- The Planning Meeting uses I/UCRC processes to hone Center/Site focus, enable member commitments & vet research projects for an NSF proposal.

Prospective IAB Members

Planning Mtg
Input
Proposals
Adapted proposal set
Post-Mtg
Initial Veted Project Set
Secure membership commitments
Site: Min. $200K in-cash membership from at least four members

Proposal to NSF to join Center
Final Veted Project Set
Top 5 projects based on committed members

Proposed UW Site addition to CHOT

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National Science Foundation I/UCRC Contacts
Program email: iucrc@nsf.gov

ENG/BIO/GEO:
- Raffaella Montelli, ENG Lead I/UCRC Program Director; rmontelli@nsf.gov
- Debasis Majumdar, ENG/I/UCRC Program Director; dmajumdar@nsf.gov

CISE/Forensic/Brain:
- Dmitri Perkins, CISE I/UCRC Program Director; dperkins@nsf.gov
- Thyaga Nandagopal, CISE I/UCRC Program Director; tnandago@nsf.gov

Alex Schwarzkopf, Consultant

GEO Topic Specific Program Directors:
- Kandace Brinkley; kbrinkley@nsf.gov and Barbara Ransom; branson@nsf.gov

To schedule your next IAB meeting please review travel master calendar for available dates and contact us at iucrctravel@nsf.gov to secure them

MIPR/IAA Mary Kojanik; mkajanjik@nsf.gov

and: http://www.iucrc.org/iip.iucrc
Center for Health Organization Transformation

UW – Planning Meeting

February 19, 2016

Bita Kash, Director
James Gigliotti, IAB Chair

Outline

• NSF I/UCRC model
• Current CHOT University Sites
• Upcoming CHOT University Sites
• Current IAB members
• Research Areas
• Annual Research Cycle
• 2015-2016 Research Projects
• Bi-Annual IAB Spring Meeting
  • Houston, TX
  • April 07 & 08, 2016

Jamey & Bita

NSF I/UCR Model and CHOT’s Value Proposition

Current CHOT University Sites
**Update on University Sites**

Currently in Planning Grant Year

**University of Washington**

Applied for Phase II Funding

**Northeastern**

**PennState**

**Florida Atlantic University**

**University of Alabama at Birmingham**

Applying for Phase II Funding July 2016

**University of Louisville**

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**Areas of Research**

- Develop
- Validate
- Implement

- Health Systems
- Health Service Providers
- Government
- Vendors/Tech
- Associations
- Pharma Retail

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**Current CHOT Industry Members**

**Health Systems**
- Children's Healthcare of Atlanta
- Morehouse School of Medicine
- Grady Health System
- Partners Health
- Highmark
- Penn State Hershey Medical Center
- Main Line Health
- Maine Medical Center (new member)
- Texas Children's Hospital

**Health Service Providers**
- Northside Anesthesiology Consultants, LLC
- UBRICA

**Governments**
- Pennsylvania Office of Rural Health
- Coastal Bend Education Center (new member)
- Central Texas Veterans Health Care System (new member)
- Veterans Health Administration - VA-CASE (new member)
- MITRE (new member)

**Retail/Vendor**
- Restore Medical Solution
- AT&T (new member)
- Siemens Healthcare

**Associations**
- American Society of Anesthesiologists

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**Annual Research Cycle**

**Fall CHOT IAB Meeting**

- Research project presentation
- IAB members share research ideas and questions

**Following the Fall meeting**

- Research proposals developed with IAB input CHOT sites facilitate collaborative research project

**Spring CHOT IAB Meeting**

- Present Research Proposals
- IAB provides feedback & ranks research proposals

**Following the Spring Meeting**

- CHOT sites conduct research projects
### 2015-2016 CHOT Projects

<table>
<thead>
<tr>
<th>Title</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying and Utilizing Inexpensive Technologies to Manage Patient Populations</td>
<td>University of Alabama at Birmingham</td>
</tr>
<tr>
<td>Robust and Adaptive Optimal Healthcare Staff Scheduling</td>
<td>Northeastern University</td>
</tr>
<tr>
<td>Challenges in Telemedicine: A Systematic Review and Engagement with Rural Communities</td>
<td>Georgia Institute of Technology</td>
</tr>
<tr>
<td>Understanding Group Practice Trends, Physician Burnout, and Engagement</td>
<td>Texas A&amp;M University</td>
</tr>
<tr>
<td>Modeling ACOs as Macro Integrated Systems of Care</td>
<td>Northeastern University</td>
</tr>
<tr>
<td>Patient Flow in Children's Hospitals: Research-Informed Strategies to Influence Discharge Time and Capacity</td>
<td>Texas A&amp;M University</td>
</tr>
<tr>
<td>Translating UBRICA's Vision for Kenya to Evidence-based Strategy and Funding</td>
<td>Texas A&amp;M University</td>
</tr>
<tr>
<td>Hospital Acquired Conditions: Systematic and Adaptive Approach</td>
<td>Georgia Institute of Technology</td>
</tr>
<tr>
<td>Technology Trends and Smart Interventions to Mitigate Patient Risk at Critical Transitions for Total Joint Arthroplasty (TJA)</td>
<td>PSU/TAMU</td>
</tr>
<tr>
<td>Improving Health Promotion: Leveraging Statistical Learning and Electronic Medical Records for Healthcare Market Segmentation</td>
<td>Pennsylvania State University</td>
</tr>
<tr>
<td>Understanding the “White Space” of Where Patients Go After They Leave the Hospital</td>
<td>University of Alabama at Birmingham</td>
</tr>
<tr>
<td>The Clinical Staff Perception of Use of and Satisfaction with Telemedicine and Clinical Documentation in the Home Health Setting</td>
<td>University of Alabama at Birmingham</td>
</tr>
</tbody>
</table>

### 2015-2016 CHOT Projects & Budgets

<table>
<thead>
<tr>
<th>Title</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare System Optimization: Advancing Delivery Timeliness, Quality, and Effectiveness</td>
<td>Georgia Institute of Technology</td>
</tr>
<tr>
<td>Personalized Medicine</td>
<td>Georgia Institute of Technology</td>
</tr>
<tr>
<td>Social Network Analysis: Examining Interactions Among Providers at the Network Level</td>
<td>UAB/Florida Atlantic University</td>
</tr>
<tr>
<td>Improvements to Root Cause Analysis of Patient Safety Events</td>
<td>Northeastern University</td>
</tr>
<tr>
<td>Examining How Lean Six Sigma Processes Reduce Hospital-Acquired Conditions</td>
<td>Pennsylvania State University</td>
</tr>
<tr>
<td>The Role of Disparities in 30-Day Hospital Readmission Rates</td>
<td>Texas A&amp;M University</td>
</tr>
<tr>
<td>Analysis and Reduction of Practice Variation</td>
<td>NEU/SIT</td>
</tr>
<tr>
<td>Assessment of a Telehealth Device in Promoting Heart Failure Patient Engagement and Self-Care in Rural Areas</td>
<td>Pennsylvania State University</td>
</tr>
<tr>
<td>Investigating the Impacts of a Patient's Social Network in Achieving Gamification Solutions in Personalized Wellness Management</td>
<td>Pennsylvania State University</td>
</tr>
<tr>
<td>Reducing Readmission After Hip Surgery Using Statistical Process Control and Smart Home Care</td>
<td>Pennsylvania State University</td>
</tr>
</tbody>
</table>

### CHOT Peer-Reviewed Publications

- **2015**
  - Conference Poster/Presentation, 47
  - Publications, 26
CHOT Student & Faculty Engagement

CHOT IAB Spring Meeting
April 07 & 08
Texas Children’s Hospital Pavilion for Women
Houston, TX

April 07
11:00am – 7:00pm
April 08
8:00am - 3:00pm

Contact Information

CHOT Director: Bita A. Kash, PhD, MBA, FACHE
bakash@tamhsc.edu

CHOT Managing Director: Lesley E. Tomaszewski, PhD
lesleyt@tamu.edu

IAB Chair: James Gigliotti
james.gigliotti@highmark.com
CHOT-UW
Values, Vision & Capabilities

Christina Mastrangelo
Cynthia LeRouge
February 19, 2016
Seattle, WA

CHOT UW Academic Units

• College of Engineering
  – Industrial & Systems Engineering
• School of Public Health
  – Health Services
• Other Collaborators
  – Engineering in Medicine
  – Primary Care Innovation Lab
  – START Center, Global Health

CHOT UW Vision

• To become a premier research center in the Integration of Technology in Healthcare Delivery.

‘Industry’ Representation

• Technology: Airstrip, Amazon, BurstIQ, Carena, HealthSaaS LifeMed ID, Philips, Sound Generations
• Health Systems: Group Health, Marshfield Clinic, Overlake, Seattle Childrens, SSM Health, UW Medicine
• Health Service Provider Organizations: Ascent Living, Billings Clinic, Confluence Health, Express Scripts, Pullman Family Medicine, NW Kidney Center, Sound Family Medicine
• Government: Health Benefit Exchange, Public Health Seattle & King County
• Associations: Area Agency on Aging, Home Care Assoc. of WA, Lutheran Community Services, International Health Terminology Standards Development Organisation
• Supply Chain: Cardinal Health
• 3rd Party Payer: Molina
Based on current research projects and initial conversations with potential industry collaborators.

- Actual projects will be based on ideas generated in collaboration with CHOT UW industry members.
- Project proposals may be found in your packets.
NSF Industry/University Cooperative Research Centers (I/UCRC)
David Meyer, Ph.D.
NSF I/UCRC Center Evaluator

Center Evaluation & LIFE Form Review

- Introduction to I/UCRC Evaluation: What helps us effectively collaborate across institutions and interest areas?

- A simple way to maximize your I/UCRC Membership Investment

- ...and the Meaning of LIFE

LIFE.
LEVEL OF INTEREST AND FEEDBACK EVALUATION FORMS

It helps to understand the opportunity:
if it works, it’s huge

Industry Sector Impacts, NSF I/UCRC Investments since center inception

CPaSS: Center for Particulates & Surfactants (1998)
BSAC: Berkeley Sensors and Actuators Center (1986)

<table>
<thead>
<tr>
<th>I/UCRC Investments &amp; Impacts</th>
<th>TOTAL</th>
<th>IMS</th>
<th>BSAC</th>
<th>CPaSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated impacts (present value)</td>
<td>$1297.3M</td>
<td>$846,738,946</td>
<td>$410,727,849</td>
<td>$9,638,633</td>
</tr>
<tr>
<td>Total investments (present value)</td>
<td>$19.6M</td>
<td>$1,133,857</td>
<td>$13,250,712</td>
<td>$3,203,057</td>
</tr>
<tr>
<td>Benefit:Cost Ratio</td>
<td>64.7:1</td>
<td>270.2:1</td>
<td>31.2:1</td>
<td>3.0:1</td>
</tr>
<tr>
<td>Net Present Value</td>
<td>$1247.5M</td>
<td>$843,605,090</td>
<td>$397,477,137</td>
<td>$6,435,577</td>
</tr>
</tbody>
</table>

- Realized impacts with a net present value of $1.25B.
- Each dollar invested by NSF-I/UCRC generated an estimated 64.7 dollars in impacts.

I/UCRC Evaluation Team (D. Gray, et al.)

It helps to understand the network effect:
“Most of the smart people in the world don’t work for your company”

- Bill Joy, Former Chief Scientist, Sun Microsystems
I/UCRCs are two types of social networks:

Bonding Networks
Relatively closed networks of friends and close collaborators that are homogenous

Opportunity Networks (or Bridging Networks)
Relatively open networks that bridge different communities, interests, abilities, perspectives:
New ideas from a diverse group

I/UCRC as a Complex System: Reinforcements and Disincentives

But bringing people together does not mean they can work effectively across contexts and interest areas.

It helps to use evaluation feedback

- Tracks key center outcomes and improvement recommendations over time
- Provides comparisons with 50+ other currently active I/UCRCs
- Informs the conversation between Industry, University & NSF

Build Trust and Communication:
Foster and grow long-term trusted relationships between Industry and academe based on shared value.
Bridging the Valley of Death:
A simple way to maximize your I/UCRC Membership Investment

IAB Behaviors as an External Boundary Spanner:
• Have discussions with Center faculty to develop new proposals that are consistent with the firm’s goals
• Propose research ideas and topics for Center investigators to pursue
• Contact center investigators outside of Center meetings
• Make recommendations to modify research projects already in progress

OUTCOMES
• R&D Benefits
• Commercialization
• Students Hired
• Follow on Research within Organization
• Research Relevance
• Networking


LIFE is...
• Used to support both project selection and on-going project feedback
• A way to support IAB research discussions and help generate ideas to support research projects
• NOT a voting process

Go to iucrc.com
Click on the meeting you want to access: February 19th, 2016
“Center for Health Organization Transformation”
Password: chot2016uw

How to use Level of Interest Feedback and Evaluation (LIFE) Forms

How to use Level of Interest Feedback and Evaluation (LIFE) Forms

Go to iucrc.com
Click on the meeting you want to access: February 19th, 2016
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Password: chot2016uw

After each presentation you will have a few minutes to give feedback on the project
Select “Evaluate Project”
If “interested with change,” please note requested changes.

Include your name and Organization (Names are not shared in summarized results)

Press submit when finished.

Your Comments Fuel Discussion

What makes this project “hot” or “transformational?”

Real-time project revisions are encouraged if needed

Helpful comments include:

• Suggestions for precompetitive work
• Potential applications & industry benefits
• Project improvement suggestions
• Industrial relevance
• Similar work done elsewhere
• Offers of help (mentoring)

Questions?

NSF Industry/University Cooperative Research Centers (I/UCRC)
David Meyer, Ph.D.
NSF I/UCRC Center Evaluator

Center Evaluation & LIFE Form Review

– Introduction to I/UCRC Evaluation: What helps us effectively collaborate across institutions and interest areas?
– A simple way to maximize your I/UCRC Membership Investment
– …and the Meaning of LIFE
Industrial Advisory Board (IAB) Guidelines for Effectively Participating in the National Science Foundation’s Level of Interest and Feedback Evaluation (LIFE) Process

Introduction: The LIFE feedback process is not a project selection methodology but is meant to inform whatever project selection approach your center uses. There are a number of purposes served by asking industry representatives to complete LIFE feedback on project proposals: 1) Q&A time is usually limited and having member organizations provide written feedback allows everyone the chance to have input; 2) Written feedback gives PIs a chance to consider industry concerns and provide a thoughtful reply; 3) Feedback and replies can be debriefed as a group and help surface areas of agreement and disagreement and reach a consensus on the need for and feasibility of project changes. 4) Reviewing the interest rating distribution allows members to understand whether a few or many members are interested in a project and use this information during the project selection process.

Steps for Completing Feedback and Responses:
1. Website: www.iucrc.com
2. Select Center Meeting: February 19 2016, Center for Health Organization Transformation
3. Enter password = chot2016uw
4. After each research project presentation:
   a. Click [Evaluate Project] and select a level of interest rating based on your firm’s needs and interests.
   b. Provide questions, suggestions or comments you have about the project. The most valuable feedback are “actionable” comments like suggestions and questions that help the PI improve the project.
   c. Enter your Name and your Organization.
   d. Select [SUBMIT] after each project presentation.
   e. Repeat for each project.
5. During IAB discussion of projects:
   a. You can review the feedback and responses to each project by selecting [Summary] next to each project.
   b. If you would like to review responses to all projects presented at the meeting, you may use the [Review Meeting] link at the top of the project list page (PDF and Word versions are also available).

Reviewing LIFE Feedback: IAB Facilitators
When we review LIFE feedback, it can be helpful if an IAB member volunteers to lead the discussion of an individual project. If you choose to fulfill this responsibility, please review all the comments and responses for a given project and develop a high-level summary of what you consider the key issues or questions that need to be addressed or understood. In particular, highlight any issues or concerns that you consider particularly important for the group to discuss or for the PI to clarify. Generally, your oral summary should last about 2-3 minutes. We will allow an additional 5-10 minutes as needed for further discussion among the industry, with PI response.

Project Selection
If the projects reviewed via the LIFE system are new proposals, a project selection process (typically IAB consensus discussion or member voting) will follow the LIFE discussion. Regardless of how Centers go about selecting projects, the clarification that happens during the LIFE process helps improve project quality and increases IAB support for the projects that are selected.
### I/UCRC Executive Summary - Project Proposal

**February 2016**

<table>
<thead>
<tr>
<th><strong>Project Title:</strong></th>
<th>Quality Assurance in Community-Based Lung Cancer Screening Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Leader:</strong></td>
<td>Christina Mastrangelo</td>
</tr>
<tr>
<td><strong>Budget:</strong></td>
<td>$50,000</td>
</tr>
<tr>
<td><strong>Type:</strong></td>
<td>New</td>
</tr>
<tr>
<td><strong>Research Cluster:</strong></td>
<td>Macro/Policy</td>
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<tr>
<td><strong>RFP:</strong></td>
<td>Operations</td>
</tr>
</tbody>
</table>

**Project Description:** Lung cancer remains a leading cause of cancer death in the U.S. Lung cancer screening with low-dose chest CT imaging has the potential to reduce mortality from lung cancer among individuals at high-risk due to a long-term history of smoking; however, screening with chest CT imaging carries potential risk because it can identify spurious findings that lead to unnecessary use of invasive diagnostic procedures, and complications and deaths from those procedures. This project will work with community lung cancer screening programs to develop practical and efficient approaches for monitoring the quality and performance of lung cancer screening to ensure the potential benefits of screening are maximized and harms are minimized. In this study, the attributes of a high quality lung cancer screening center are the ability to identify and screen only high risk patients, reduction of false positive rates which leads to lower invasive procedures performed on non-cancer patients and a smoking cessation program. Economic feasibility for implementation of these high quality measures in participating community lung cancer screening programs will be characterized. Overarching goal: understand the process of implementing an effective quality improvement process in lung cancer screening programs, and the cost programs face to measure quality.

**Experimental plan:** This project is designed to be a partnership between the research team and community lung cancer screening programs. At least one stakeholder from organizations with lung cancer screening will be included in the investigation of quality measures and characterization of a general system modeling process. The characteristics (both qualitative and quantitative) will be used to build a dynamic simulation model of a screening system. The experiments conducted on the simulation model will be able to determine the measures to be taken in order to improve quality via their impact on outcomes. Their economic costs will be also be assessed in order to determine their impact.

**Related work elsewhere?** Quality of lung cancer screening is analogous to problems that were experienced when breast cancer screening began to be implemented 40 years ago. To address poor quality care experienced by women, Congress mandated a quality processes through the 1992 Mammography Quality Standards Act. Uncertainty about the real-world implementation of lung cancer screening outside of the NLST controlled trial setting have led to calls for policy development. Prioritizing quality assurance activities in lung cancer screening programs is important for several reasons including identifying areas where gaps in care are most likely and most modifiable. As lung cancer screening programs are being developed, prioritization of resources is critical, and this work is limited.

**How this project is different:** This project develops a stakeholder-informed conceptual model of lung cancer screening quality guided by an advisory board of leaders from five lung cancer screening programs who are responsible for oversight of, payment of, and delivery of lung cancer screening services. The feasibility and clinical utility of proposed quality assurance and outcomes audit measures are based on the extracted audit data from the programs.

**Project benefits to industry:** This project is primarily focused on raising the quality of lung cancer screening in community-based screening programs to be at par with or higher with controlled screening programs. This project will provide a methodology to assess screening programs: especially economically-viable required resources at an operational level that reduce the variability in metrics and outcomes.

**Major milestones achieved/expected:** The timeline of this project is planned to year-long, in which 6 months are spent in data collection, theoretical modeling, and model validation using data from partner centers. Data collection and modeling steps include building a consensus model of screening activities. In the validation step, applying the model to different community based screening programs, identifying areas of improvement and assessing their cost.

**Expected Deliverables:** We will produce a white paper outlining the findings of this report and 3 manuscripts for submission to a peer-reviewed journal.
**Project Title:** The Boeing/UW Medicine Accountable Care Network (ACN) Project: Enhancing Health Care Quality and Outcomes While Containing Costs

**Project Leader:** Douglas Conrad  **Budget:** $80,000  **Type:** New

**Research Cluster:** Macro/Policy  **RFP:** Payment Models

**Project Description:** The specific aims of this research are to address the principal challenges facing the Boeing Company and the University of Washington (UW) Medicine Health System in their joint development of an accountable care network (the "Boeing/UW ACN"):

1. Significantly lowering the rate of growth in total health care costs per member month (pmpm) for participants in the ACN and providing a model example for potentially broader application.
2. Significantly improving the quality of health care and health outcomes for Boeing/UW ACN participants, and potentially producing spillover cost-savings benefits for Boeing employees not participating in the Boeing/UW ACN.
3. Improving the understanding of patient, market, and provider factors that influence the achievement of specific aims 1 and 2 above.

**Experimental plan:** The investigators will assemble a dataset of member-level claims utilization, payment, patient experience information, demographic descriptors, benefits characteristics, and market area characteristics for Boeing/UW ACN participants ("designated members") and a comparison group of "attributed" Boeing employees not participating in the Boeing/UW ACN but receiving the plurality of their care from providers within the network assembled by UW Medicine for the ACN. This data will be collected from a 3-year period prior to the program inception (baseline) and two years after. Multivariate regression will be used to estimate the program’s impact over time, as well as the effect of other factors. This quasi-experimental research design allows one to calculate the changes in performance between the participant (intervention) group and the comparison group using “difference-in-difference.” That design eliminates confounding effects of constant factors that might affect program results but are not observable by the researcher. Using at least three years of pre-program data has the advantage of allowing the researcher to at least adjust for unobserved confounders that did change over time. The investigators also will conduct key informant interviews of Boeing/UW ACN program designers and managers and a sample of network providers regarding barriers, facilitators, and lessons learned related to implementation of the ACN.

**Related work elsewhere?** There is an emerging body of research by economists, sociologists, clinicians, and management practitioners regarding implementation and impacts of integrated care delivery (e.g., Song, Chernew, Safran, et al on alternative quality contracts); using IT to coordinate care across independent organizations; and the effects of value-based payment models on clinical efficiency and population health.

**How this project is different:** This mixed methods, quasi-experimental research is a powerful methodology for estimating the causal impacts of one of these types of innovative models (namely, the ACN), rather than settling for a study of correlation between program and quality, cost, and outcomes. Moreover, the combination of rigorous causal modeling with qualitative research on underlying perceptions and experiences of key players will significantly enhance understanding of not only what happened as a result of the ACN, but how and why it happened.

**Project benefits to industry:** Providers and their provider organizations, Boeing health management, and the Boeing third-party administrators will gain new, scientifically-valid, and reliable knowledge and understanding of the impacts of this new integrated care delivery and payment form on cost, quality, health outcomes, and patient experience, while also learning why and how these impacts were achieved.

**Major milestones achieved/expected:** The project is expected to be completed within two years. In months 1-6 of the study, quantitative and qualitative data will be collected and prepared for analysis. In months 7-18, the investigators will perform data analyses. Months 19-24 will be for final report-writing.

**Expected Deliverables:** The investigators will provide statistical and narrative reports of the ACN’s impact on utilization and payments (cost), quality, health outcomes, and patient experience at six-month intervals and at the end of the study. Key informant interview results will be reported at six-month intervals and at the study’s end.
**Project Title:** Organizational Factors Affecting the Successful Integration of Physician Groups with Health Systems

**Project Leader:** Ann Nguyen  
**Budget:** $50,000  
**Type:** New

**Research Cluster:** Macro/Policy  
**RFP:** Operations

**Project Description:** In recent years, integration of physician groups with health systems ("physician-system integration") has become a key strategy for health systems to improve their organization and in turn, improve their outcomes. Physician groups, however, can be aligned with health systems through a variety of structures. At the present time, health systems that are moving toward becoming accountable care organizations (ACOs) are contemplating what physician integration model would work best. The success of varying types of physician integration models has been ambiguous in part because there are many ways to define success. In this proposed study, we aim to examine success through the lens of the Triple Aim – population health, patient experience, and cost. Our primary research research is: What types and characteristics of physician integration structures influence the success of the health system?

**Experimental plan:** We will use a mixed methods approach to examine the relationship between physician integrating structures with health system success. As a part of this relationship, we will investigate the role of care coordination as a mediator. For the quantitative component, we will run multiple regression models and apply the Baron and Kenny procedure for mediation analysis. Our data will include the American Hospital Directory and the American Hospital Association (AHA)'s Annual Survey, IT Survey, and Survey on Care Systems and Payment for hospitals across the U.S., FY2009-FY2014. The outcome variable is success of the health system. The predictor of interest is the physician integrating structure. The control variables are organizational and market characteristics. For the qualitative component, we will compare the quantitative findings to theory and interview data that we collected in our prior work.

**Related work elsewhere?** Researchers in this field have examined components of physician-system integration, focusing on specific integrating structures, specific outcomes, and specific markets. There is a mix of evidence on the value of integration. Some empirical studies have shown positive results. Stronger physician-system integration has been associated with lower staffing per admission, improved physician satisfaction, and improved financial status. On the clinical level, integration has been linked to increases in quality of care indicators, such as more appropriate emergency department use. Other studies, however, reported hospital financial losses, higher hospital prices and spending, higher procedure rates, higher patient expenditures, and no changes in clinical outcomes.

**How this project is different:** This proposed project aims to synthesize the existing body of research to create and validate a conceptual model that explains the relationship between physician groups and health system success. Novel to this project is the inclusion of care coordination as a mediator in this relationship. This project is the final part of a larger dissertation. The dissertation uses a three-pronged approach – a systematic review, qualitative methods, and mixed methods – to conduct research that is translatable into practice for health care leaders. In addition, to our knowledge, we are among the first to use the AHA's new care coordination data from the Survey on Care Systems and Payment. Lastly, we apply classic organizational theories to create a solid foundation for our research.

**Project benefits to industry:** Our results will inform successful creation and sustainability of integrated delivery systems that are driven by the shift toward forming ACOs. Our work will support organizational strategies for aligning physician groups and health systems to optimize population health, improve the patient experience, and reduce cost per capita.

**Major milestones achieved/expected:** The project is expected to be completed in one year. In the 1st quarter of the study year, data will be prepared for analysis. In the 2nd and 3rd quarters, data analyses will be performed. In the final quarter, we will write up the results.

**Expected Deliverables:** We will produce a white paper outlining the findings of this report and a manuscript for submission to a peer-reviewed journal.
### Project Description

Large hospital configurations are multi-layered, intertwined, complex systems of systems. And though all function within the same organizational system and share many patient care and performance goals, each system also has its own resources, processes, objectives and metrics to manage. The many systems each have policies and processes that guide acquisition, allocation and assignment of resources in response to internal and external changes (patients, referring physicians, regulatory, staff, and community). Each of the systems attempts to optimize their efforts, but uncoordinated, localized efforts never provide optimal system performance. In this project we propose to use discrete event simulation (DES) testbeds to examine the consequences of real-time optimal resource allocation and assignment policies, when each of the policies would be implemented as external (to the DES model) optimization procedures/tools computing processes.

**Experimental plan:** Identify three additional hospital partners for data, test and evaluation. With three additional hospital partners we believe we can develop a broad range of alternative policy evaluation points as well as policy alternatives for each evaluation point. Develop a sufficient DOE to assure good coverage of evaluation points and policies with greatest impact for partners. Partner with research colleagues that have developed, or are developing, policy optimization models designed to address real-time decisions. The term real-time is relative and intended to mean that the optimization models would be employed frequently (many times per hour or shift) and more focused on operations issues than longer term strategic planning questions. The initial investigations will likely examine hospital performance when considering independent and coordinated policies for patient bed/unit assignments and care team assignments to patients and units. **Extend the current testbed to incorporate standardized external optimization program APIs.** Standardized APIs (application program interfaces) will minimize the time and effort required to select/establish parameter sets to test new allocation algorithms. These APIs will increase the accessibility of the testbed to more researchers and provide a common basis for comparison of results. **Distribute work products.**

**Related work elsewhere?** There are numerous examples of standalone optimization modeling approaches for most effective allocation of resources, and significant efforts in simulation optimization which focus on methods of reducing the time required to simulate large, complex systems, but we have identified no other groups using a hospital simulation test bed to examine the consequences of policies.

**How this project is/was different:** This project will employ high fidelity DE simulation models of hospitals to function as configurable testbeds. These models would reflect many of the critical interdependent systems of the hospital and provide a consistent framework within which to compare the performance of the system under alternative policy regimes, both coordinated and uncoordinated.

**Project benefits to industry:** The objective is to provide a broader basis for understanding best practices when computational decision support resources are available/used to make coordinated and uncoordinated decisions. The pace of change in technologies, increasing demand for care and evolving health policies requires a framework within which changes to the current system can be examined and evaluated thoroughly and consistently to understand the consequences of alternative courses of actions. This project will demonstrate a methodology for evaluating new decision support tools and methodologies that focus on local allocation decisions but should be understood in the context of the overall hospital system.

**Major milestones achieved/expected:** We have worked with Virginia Commonwealth University to demonstrate several examples of policy evaluation using discrete event simulation. Subsequent milestones will include identification of additional hospital partners; completion of project DOE; test and evaluation of DES to analytical model APIs (see prior discussion); demonstration of integrated modeling results; expanded evaluation of coordinated and uncoordinated local choice policy decisions.

**Expected Deliverables:** Publications during the development of the modeling components as well as results of policy comparison investigations. Distribution (web site) of hospital testbed models, external operations policy models and configurations used to evaluate policy performance.
Project Title: Exploring Challenges to the Reach of Virtual Care Clinics Across Patient Subpopulations

Project Leader: Ryan Sterling   Budget: $40,000 (≥ if additional CHOT sites are engaged)   Type: New

Research Cluster: Enabling HIT and Care   RFP: Population Health

Project Description: Telemedicine has great potential to extend the reach of quality care to patient populations not historically well-served by the traditional health system and better contain costs. One form of telemedicine is the virtual care clinic (VCC), which provides patient-initiated primary and urgent care services using real-time, interactive technologies (e.g., video, phone). However, little is currently known about the true reach of VCCs across patient subpopulations. As initial studies indicate lower rates of telemedicine adoption and acceptance among racial/ethnic minorities compared to non-Hispanic Whites, these subpopulations are at particular risk for disparities in VCC adoption and use. Furthermore, given that VCCs can be used by any member of a household, adoption and satisfaction may differ depending on the initiator-patient relationship. If VCCs, and by extension, telemedicine, are to achieve their full potential to impact population health and contain costs, we must better understand adoption, use, and satisfaction across racial/ethnic subpopulations. In response to this gap in knowledge, the proposed study addresses the following research questions: What subpopulations are aware of VCCs? What subpopulations demonstrate an intention to use VCCs, if available? What are challenges and barriers to VCC use among subpopulations? Study aims include: (1) Develop a comparative conceptual model of potential challenges and barriers to use of telemedicine among racial/ethnic minority populations as compared to non-Hispanic Whites; and (2) Test and adapt the model as needed specific to the VCC context.

Experimental plan: To meet Aim 1, we will conduct an environmental scan of practice-based and peer-reviewed literature related to disparities and telemedicine to inform our conceptual model. To meet Aim 2, we will test the conceptual model (guided by Aim 1) to determine whether challenges and barriers hold in the VCC context, noting exceptions related to type of medical condition and whether care is for self-use vs. caregiver-use (in care of other). We will conduct short, structured qualitative interviews with a convenient sample of 50-60 individuals within the service area of participating CHOT partner(s). The participant sample will include: users and non-users of VCCs (among those eligible for the service); and individuals currently ineligible. We will oversample racial/ethnic minority populations to better ensure a representative sample.

Related work elsewhere? Prior research demonstrates that patients have high rates of satisfaction with various telemedicine services and, once used, are more likely to prefer that mode of care delivery in the future. However, little is known about actual patient uptake among those eligible for such services, particularly in cases where the virtual visit is initiated by the patient, as with VCCs. Limited but emerging research has implications for how to best tailor strategies targeting racial/ethnic subpopulations for the introduction, marketing, and implementation of telemedicine.

How this project is different: Literature related to challenges and barriers to patient use of VCCs is non-existent, and there is a dearth of research in the larger telehealth literature related to disparities in use by racial/ethnic status. In addition, the proposed research is novel because it will also address challenges and barriers related to type of medical condition and whether care is for self-use vs. caregiver-use.

Project benefits to industry: As adoption of VCCs and other telemedicine interventions expand, huge opportunity exists to extend the reach of delivery systems and engage with historically underserved patient populations that are at high risk for poor health and unnecessary service utilization. To care for these patients, health organizations need to find new, effective delivery models that are lower cost, as traditional reimbursement mechanisms become increasingly restrictive, and value-based and population health management becomes ever more a priority. Results from this study can be extended beyond VCCs to inform the successful design and implementation of other innovative telehealth delivery models that promote high value services while reducing the use of low value services received in traditional in-person care settings.

Major milestones achieved/expected: The project is expected to be completed in 18 months. In the 1st quarter of project year 1, the literature review and conceptual model will be completed. In the 2nd-4th quarters of year 1, the interview instrument will be developed, piloted, and administered. In the 1st-2nd quarters of project year 2, we will analyze data and write up results.
MEMBERSHIP AGREEMENT

This Agreement is made this ______ day of ______ by and between The University of Washington, having a place of business at 4333 Brooklyn Ave NE, Box 359472, Seattle, WA 98195-9472 (hereinafter called "UW") and ___________________ (hereinafter called "COMPANY"), located at ____________________________.

WHEREAS, The Texas A&M Health Science Center, School of Public Health ("TAMHSC-SPH"), GEORGIA INSTITUTE OF TECHNOLOGY, NORTHEASTERN UNIVERSITY, and THE PENNSYLVANIA STATE UNIVERSITY (each hereinafter called a "Center University" or, collectively, the "Center Universities") have established an Industry/University Cooperative Research CENTER for HEALTH ORGANIZATION TRANSFORMATION (hereinafter called "CENTER") and the parties to this Agreement intend to join together in a cooperative effort to support the CENTER to maintain a mechanism whereby the university environment can be used to perform research on the execution of transformational interventions and strategies that combine evidence-based management and clinical innovations and ongoing organizational learning and cultural change.

THEREFORE, the parties hereby agree to the following terms and conditions:

A. CENTER will be operated by certain faculty, staff and students employed by UW. For the first five years, the CENTER will be supported jointly by industrial firms, Federal laboratories and the National Science Foundation (NSF). It is possible that the UW may receive support from NSF for an additional five years.

B. In addition to COMPANY, any other companies, Federal Research and Development organizations, or any Government-owned Contractor Operated laboratory may become a sponsor of the CENTER, consistent with applicable state and federal laws and statutes. Federal Research and Development organizations and Government-owned Contractor Operated laboratories may become sponsors of the CENTER on terms and conditions other than those in this agreement upon approval by UW and two-thirds of the INDUSTRIAL ADVISORY BOARD (as defined below in Paragraph E).

C. COMPANY agrees to contribute $50,000 in support of the CENTER and thereby becomes a member (as defined below in Paragraph E) for a Membership Year. COMPANY may renew its membership in CENTER on a year-to-year basis by paying $50,000 for each subsequent Membership Year. A "Membership Year" means each successive 12-month period, commencing at contract submission. At COMPANY’s election, payment of the annual membership fee shall be made to UW either a lump sum or in four equal quarterly installments of $12,500 each payable as of January 1, April 1, July 1, and October 1 of each Membership Year. Checks from COMPANY should be made payable to The University of Washington and mailed to same at 4333 Brooklyn Ave NE, Box 359472, Seattle, WA 98195-9472. Because research of the type to be done by the CENTER takes time and research results may not be obvious immediately, COMPANY intends to remain a fee paying member for at least three years. However, COMPANY may terminate this agreement, effective at the end of any Membership Year by giving 90 days written notice to UW (Dr. Christina Mastrangelo, mastr@uw.edu, Industrial & Systems Engineering, University of Washington, Box 352650, Seattle, WA 98195-2650) prior to the termination of that Membership Year (i.e., notice must be given on or before October 1 of the then-current Membership Year, and such termination will be effective as of January 1 of the Membership Year following notice of termination). Upon termination, neither party shall have any further obligations to
the other party except that COMPANY will fulfill all payment obligations that accrue prior to the effective date of such termination.

D. The CENTER will begin to develop research projects that are recommended at the first INDUSTRIAL ADVISORY BOARD (defined below in Paragraph E) meeting.

E. There will be an INDUSTRIAL ADVISORY BOARD composed of one representative (also called Health Transformation Leader) from each member. The INDUSTRIAL ADVISORY BOARD makes recommendations on (a) the research projects to be carried out by CENTER, and (b) the apportionment of resources to these research projects, and (c) agrees to operational procedures applicable to the activities of the INDUSTRIAL ADVISORY BOARD. The INDUSTRIAL ADVISORY BOARD will not have the authority to modify policies and procedures of UW with respect to activities of the CENTER.

F. UW reserves the right to publish in scientific or engineering journals the results of any research performed by CENTER. COMPANY, however, shall have the opportunity to review any paper or presentation containing results of the research program of CENTER prior to publication of the paper, and shall have the right to request a delay in publication for a period not to exceed sixty (60) days from the date of submission to COMPANY, to protect COMPANY’s Confidential Information or Intellectual Property, provided that COMPANY makes a written request and justification for such delay within forty-five (45) days from the date the proposed publication is submitted by certified mail to COMPANY.

G. All patents derived from inventions conceived or first actually reduced to practice in the course of research conducted by the CENTER (the “SUBJECT INVENTIONS”) shall belong to The University of Washington System. UW System, pursuant to chapter 18 of title 35 of the United States Code, commonly called the Bayh-Dole Act, will have ownership of all patents developed from this work, subject to "march-in" rights as set forth in this Act. COMPANIES that wish to exercise rights to a royalty-free license agree to pay for the costs of patent application, prosecution and maintenance. The University of Washington System agrees to grant a nonexclusive royalty free license to SUBJECT INVENTIONS that are conceived or first reduced to practice during those Membership Years in which such CENTER sponsor is a member pursuant to Paragraph C of this Agreement. COMPANY will have the right to sublicense its subsidiaries and affiliates. If only one CENTER sponsor seeks a license to a SUBJECT INVENTION pursuant to this Paragraph G, that company may obtain an exclusive fee-bearing license through one of its agents, and shall have the right to sublicense its subsidiaries and affiliates (subject to the non-exclusive rights of the federal government as provided in the Bayh-Dole Act).

If COMPANY wishes to obtain a non-exclusive or an exclusive fee-bearing license to a SUBJECT INVENTION as provided herein, COMPANY shall provide written notice to HSCof such intent within ninety (90) days of the disclosure of the subject invention. Such notice shall be sent to the attention of __________ at the address first given above.

H. Copyright registration shall be obtained for software developed in the course of research conducted by CENTER during those Membership Years in which COMPANY is a member pursuant to Paragraph C of this Agreement. (“SOFTWARE”). Title to copyrights in such SOFTWARE shall belong to the University of Washington System. COMPANY shall be entitled to a nonexclusive, royalty-free license to all SOFTWARE developed by CENTER. COMPANY will have the right to enhance and to re-market enhanced or un-enhanced SOFTWARE with royalties due to CENTER to be negotiated, based on the worth of the initial SOFTWARE, but not to exceed a percentage (to be negotiated with COMPANY) of a fair sale price of the enhanced software product sold or licensed by COMPANY.
If COMPANY wishes to exercise its rights under this paragraph to enhance and/or remarket enhanced or un-enhanced SOFTWARE, COMPANY shall provide written notice to UW of such intent within ninety (90) days of the disclosure of the SOFTWARE. Such notice shall be sent to the attention of _________ at the address first given above.

I. Any royalties and fees received by UW under this agreement, over and above expenses incurred, will be distributed as follows:
(1) 37.5% to inventor, or in accordance with the University of Washington System royalty-sharing schedule,
(2) 25.0% to __________________________, and
(3) 37.5% to CENTER operating account, or to _____ in the event that CENTER is no longer in operation.

J. Neither party is assuming any liability for the actions or omissions of the other party. Each party will, to the extent permitted by the Constitution and the laws of the State of Washington, indemnify and hold the other party harmless against all claims, liability, injury, damage or cost (including reasonable attorney’s fees) based upon injury or death to persons, or loss of, damage to, or loss of use of property that arises out of the performance of this agreement to the extent that such claims, liability, damage, cost or expense results from the negligence or malfeasance of a party’s officers, directors, subcontractors or employees.

K. The validity, interpretation, and enforcement of this Agreement shall be governed and determined by the laws of the State of Washington, excluding the conflict of laws rules which might require the application of the laws of another jurisdiction.

L. UW MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE OR USE, WITH RESPECT TO ANY MATTER WHATSOEVER, INCLUDING WITHOUT LIMITATION ANY INFORMATION, DATA REPORTS RESEARCH, INVENTIONS, PRODUCTS OR SOFTWARE THAT MAY BE PROVIDED BY THE CENTER UNIVERSITIES UNDER THIS AGREEMENT.
WITNESS THE DULY AUTHORIZED SIGNATURES of the persons hereinafter set out.

This agreement will become effective when it has been signed by the second of the two parties (as indicated by the date stated opposite each party’s signature to this agreement).

The University of Washington                      Company Name

____________________________                     ______________________________
Name                                             Name
Contracts and Grants                             Title
UW Sponsored Research Services

Date: _____________________                     Date: _____________________

By signing in the space provided below, the Principal Investigator indicates that he has read and understands the requirements and obligations of this program of research as provided in this Agreement; such signature, however, is not intended to, and shall not make, the Principal Investigator a party to this Agreement.

____________________________
Dr. Christina Mastrangelo, Principal Investigator
College of Engineering
University of Washington
Wi-Fi Instructions

Network Name: University of Washington
UW NetID: event0140
Password (case-sensitive): YyzW=EejV=AadK

<table>
<thead>
<tr>
<th>Steps</th>
<th>Actions</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Establish a Wi-Fi connection through your wireless router by selecting it from your device’s Wi-Fi configuration menu.</td>
</tr>
<tr>
<td>2.</td>
<td>Using your browser, enter a URL to some site external to the UW such as Google.com.</td>
</tr>
<tr>
<td>3.</td>
<td>You will be prompted to enter your UW NetID and password (see above). Doing so will register the UW NetID as the owner of the device, as identified by its hardware address (MAC number). Until this step is successfully done, anyone using the device will only be able to access on-campus sites.</td>
</tr>
<tr>
<td>5.</td>
<td>You can now use your device to access Internet sites on campus and beyond.</td>
</tr>
</tbody>
</table>
CHOT is the only NSF industry-university cooperative research center I/UCRC that is focused on innovations in healthcare delivery.

**INDUSTRY ADVISORY BOARD (IAB)**

**INDUSTRY MEMBERSHIP = $50,000**

**Pooled Members $**

**Core Funds & Supplemental Funds = $500,000**

**Innovations in Healthcare Delivery**

- **Investigate**: Research-informed strategic decisions
- **Validate**: Innovations and prototypes
- **Implement**: Evidence-based innovation across settings

CHOT’s research model relies on the knowledge and experience of healthcare leaders to guide academic research to ensure that it is meaningful and applicable to the healthcare industry and provides immediate decision support.
Expected cost savings of **$329,365.96** for teams who shared personnel between the RRT and the code blue team when applying the cost-effectiveness model.

Total savings potential of the incapacitated introduction of Remote Monitoring System is **13.3%** – equivalent to almost **$40 billion** in annual savings.

Potential reduction of **$3,655,387** in average annual total costs by shifting 9.73% of care to video based treatment for post-traumatic stress syndrome.

2% reduction in length of stay for admitted patients and up to **2.5 fewer hours** in ED prior to admission to internal medicine.
Ranked #23 in the nation by US News & World Report for Best Undergraduate Engineering Program (America’s Best Colleges, 2015)

Ranked #25 in the nation by US News & World Report for Best Graduate School (Best Engineering Schools, 2015)

Industrial & Systems Engineering (ISE) prepares students for careers in a diverse and dynamically global environment, by providing them skills to foster a sustainable and safe future. Students learn to take a systems approach to problem solving and to recognize the larger societal impact of each engineering decision. We are a community of innovative leaders. Our students take courses from internationally renowned faculty, participate in creative, cutting-edge research, and are highly involved in the ISE community through our various student organizations (Institute of Industrial Engineers and the ISE honor society, Alpha Pi Mu).

Students at all degree levels are involved in research with local industry partners and increasingly in joint programs with the Schools of Medicine, Public Health, and the Built Environments. ISE graduates are in high demand at the local, state, national and international level. Our students are employed at Boeing, UPS, Starbucks, Microsoft, Amazon, as well as consulting, government, and academic institutions around the world.

EDUCATION

Industrial & Systems Engineering at the University of Washington offers robust programs for a Bachelor of Science in Industrial Engineering (BSIE), Master of Science in Industrial Engineering (MSIE), Master of Industrial & Systems Engineering (MISE), and Doctor of Philosophy (Ph.D.). The Industrial & Systems Engineering Department teaches and conducts interdisciplinary research in the areas of manufacturing systems, automation and robotics, operations research, simulation, quality and reliability, human factors and virtual environments, and health systems.

FACULTY

The department currently has nine (9) tenure-track faculty four (4) of whom are women, making ISE the most gender balanced department in the College of Engineering. ISE has adjunct and affiliate professors from the UW Medical Center, Health Sciences, Civil & Environmental Engineering, Environmental and Global Health, the Business School, Civil & Environmental Engineering, Mechanical Engineering, as well as national and international scholars that enhance the program’s teaching and research efforts.

RESEARCH

Industrial & Systems Engineering’s research portfolio is regularly funded by federal agencies such as the National Science Foundation, Office of Naval Research, National Institute of Health, Juvenile Diabetes Foundation, National Highway Traffic Safety Administration, Veteran’s Affairs, Department of Transportation, UW Medicine, and Seattle Children’s Hospital as well as companies such as Boeing,
Microsoft, Toyota, and Westat. Annual research portfolios are currently over $4.2 million and is conducted by individual researchers as well as the Human Factors and Statistical Modeling Lab, Integrated Brain Imaging Center, and Scale-Independent Multimodal Automated Real Time Systems (SMARTS) Lab. ISE faculty have collaborative research projects across that UW: Aeronautics & Astronautics, Civil & Environmental Engineering, Electrical Engineering, Radiology, Foster School of Business, and the School of Public Health.

### STUDENT DEMOGRAPHICS

**Student Enrollment (2015):**

- Undergraduate: 141
- Master of Science: 32
- Master of Engineering: 56
- PhD: 28

**Graduation numbers (2014-2015):**

- Undergraduate: 48
- Master of Science: 19
- Master of Engineering: 3
- PhD: 3

### OPPORTUNITIES TO BECOME INVOLVED

**Undergraduate:**

- Scholarships
- Alpha Pi Mu, IE Honor Society
- Institute of Industrial Engineers, Student Chapter

**Graduate:**

- Fellowships
- Research assistantships
- Teaching assistantships
- Course Projects

**Industry:**

- Internships
- Co-ops
- Senior Design Projects
- Research Projects

**Alumni:**

- Department advisor
- Adjunct lecturer
- Student mentor
- Industry speaker to classes and student organizations
The Department of Health Services prepares future health educators, practitioners, managers, and researchers to improve the well-being of communities in the United States and throughout the world. It trains students for influential careers in health system management, education, program design and evaluation, health promotion, public health practice and research, and policy analysis.

Alumni engage with Health Services in a variety of professions. Graduates from its programs may direct hospital services, provide health education, analyze utilization patterns of health care, or create policies for health insurance companies. They might analyze the impact of Medicaid changes on quality of care, develop an intervention to slow the spread of HIV/AIDS or promote seatbelt use, or design health communications to reach individuals at risk for colon cancer. They might collect and use data to improve programs for healthy aging, or reach clinicians, community members, and policymakers with resources that help pregnant women quit smoking.

**SAMPLE JOB TITLES INCLUDE:**

- **COPHP**
  - Community Health Program Manager
  - Health Policy and Advocacy Analyst
  - Public Health Staff and Management
- **eMPH**
  - Community Health Manager
  - County Public Health Director
  - Research Scientist
- **MHA / EMHA**
  - Director of Operations
  - Hospital Administrator
  - Strategic Project Manager
- **HIHIM / MHIHIM**
  - Health Information Specialist
  - Program Operations Specialist
  - Project Manager

- **MPH**
  - Health Promotion/Education Specialist
  - Public Health Policy Analyst/Adviser
  - Public Health Program Manager
- **MS**
  - Research Coordinator
  - Research Scientist
  - Project Director
- **PhD**
  - Director of Research
  - Professor
  - Research Scientist

**DEGREES OFFERED**

- **BS:** HEALTH INFORMATICS AND HEALTH INFORMATION MANAGEMENT
- **MHA:** IN-RESIDENCE PROGRAM; EXECUTIVE PROGRAM
- **MPH:** COMMUNITY-ORIENTED PUBLIC HEALTH PRACTICE; EXECUTIVE PROGRAM; GENERAL PROGRAM; HEALTH SYSTEMS AND POLICY; MATERNAL AND CHILD HEALTH; SOCIAL AND BEHAVIORAL SCIENCES
- **MS:** CLINICAL RESEARCH; HEALTH SERVICES
- **MHIHIM:** HEALTH INFORMATION AND HEALTH INFORMATION MANAGEMENT
- **PHD:** CONCENTRATIONS AVAILABLE IN: EVALUATIVE SCIENCES AND STATISTICS; HEALTH BEHAVIOR AND SOCIAL DETERMINANTS OF HEALTH; HEALTH ECONOMICS; HEALTH SYSTEMS RESEARCH; OCCUPATIONAL HEALTH

**HEALTH SERVICES RESEARCH TRAINING PROGRAM:** FELLOWSHIPS, RESEARCH TRAINING AND POSTDOCTORAL OPPORTUNITIES

**GRADUATE CERTIFICATE PROGRAMS:** COMPARATIVE EFFECTIVENESS RESEARCH; EMERGENCY PREPAREDNESS AND RESPONSE; HEALTH MANAGEMENT; MATERNAL AND CHILD HEALTH

**CONCURRENT DEGREE OPTIONS:** MHA/JD; MHA/MBA; MHA/MD; MHA/MPA; MPH/MHA;
MPH/MSW; MPH/JD; MPH/MSD; MPH/MD; MPH/PHD (ANTHROPOLOGY); MPH/MN; MPH/DVM; MPH/MPA; MEDEX (MPH/PA); WSU (EMPH/DVM); MD/PHD

**CERTIFICATE PROGRAMS:** HEALTH INFORMATICS AND HEALTH INFORMATION ADVOCACY; HEALTH INFORMATICS AND HEALTH INFORMATION MANAGEMENT; MEDICAL MANAGEMENT; PUBLIC HEALTH PRACTICE

**EXECUTIVE OPTIONS:** MHA; MPH