Symposium on Innovation in Healthcare Technology and Delivery

March 10, 2014, 1-6pm, Stevens Babbio Center, Hoboken NJ

1:00-1:30 Opening Remarks

- *Nariman Farvardin, PhD*, Professor and University President, Stevens Institute of Technology
- *George Korfiatis, PhD*, McLean Chair Professor, Provost and University Vice President, Stevens Institute of Technology
- *Mo Dehghani, PhD*, Industry Professor and Vice Provost of Research, Stevens Institute of Technology
- *Peter Tolias, PhD*, Professor and Director of the Center for Healthcare Innovation, Stevens Institute of Technology
Stevens Healthcare Symposium
March 10, 2014
Mo. Dehghani, VPR
Vision: Stevens will become a premier student-centric technological research university within the next decade.

Mission: To inspire, nurture and educate leaders in tomorrow’s technology-centric environment while contributing to the solution of the most challenging problems of our time.

Foundation Pillars
- Healthcare and Medicine
- Sustainable Energy
- Financial Systems
- Defense and Security
- STEM Education

Strategic Priorities
- Student-Centricity
- Excellence
- Impact Through Collaboration
- Technology Core
- Reputation/Prestige

Success Factors
- Growth, Selectivity, Diversity
- Student-Centricity
- Financial Stability
- Org. Excellence
- Research and Scholarship
- Reputation and Prestige

Goals
- Academic Excellence
- Dynamically Responsive to Critical Challenges
- Honor, integrity, and Accountability
- Transparency
- Government and Industry Collaboration
- Global Orientation
- Social Responsibility
Undergraduate Studies and Experience
- Undergraduate enrollment ~ 4000
- Undergraduates admittance 33%
- 6-year graduation rate 87%
- 100% Participated in Curriculum++
- 92% post-graduate outcomes

Graduate Studies and Experience
- Admitted reduced to 35%, student body increase by 30%
- Corporate graduate partnerships double in domestic and international arenas
- Specific initiatives to improve graduate teaching and student learning
- All grad students will engage with Stevens community

Research and Scholarships
- Load release for research active faculty
- New Innovation and Design Laboratory
- Annual research per T/TT STEM faculty $550K, non-STEM $100K
- Graduating Ph.D. / T/TT faculty ratio > 0.6
- National research centers double to 6
- 3% T/TT faculty in sabbatical positions

Culture and Governance
- Greater faculty diversity
- 5% of faculty recognized as Inst. Professors, Inst. Associate Professors, or equivalent
- Stevens organizational structure study
- Faculty leadership development program
- Review of interdisciplinary educational programs and research

Internal Bridges
- Graduate and under-graduate programs strategic and fiscal assessments
- Business and Operational Process Enhancement Initiative
- IT Enterprise to enable research and education missions
- Baseline to weather short-term adverse financial conditions will improve to 1.0.
- University Center

External Bridges
- $30 million campaign by 2014
- $70 million campaign by 2017
- Alumni giving rate increase
- 10-year growth in the endowment value to > $60 million
- Campus visitor experiences enhancement
- Partnerships with key Hoboken stakeholders
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Moderator: Peter Tolias, PhD
Professor and Director

ptolias@stevens.edu
McLean 515
201-216-8253
www.stevens.edu/chi
# US health care spending in context

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>GDP (nominal) in 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>USA</td>
<td>$15.65 trillion</td>
</tr>
<tr>
<td>#2</td>
<td>China</td>
<td>$8.25 trillion</td>
</tr>
<tr>
<td>#3</td>
<td>Japan</td>
<td>$5.98 trillion</td>
</tr>
<tr>
<td>#4</td>
<td>Germany</td>
<td>$3.37 trillion</td>
</tr>
<tr>
<td>#5</td>
<td>France</td>
<td>$2.58 trillion</td>
</tr>
<tr>
<td>#6</td>
<td>UK</td>
<td>$2.43 trillion</td>
</tr>
<tr>
<td>#7</td>
<td>Brazil</td>
<td>$2.42 trillion</td>
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In 2012, the US spent over **$2.87 trillion** on health care.
Breakdown of US costs by type

$2.87 trillion total

Source: National Health Expenditures, 2010
Ramifications of the Affordable Care Act

• Shift from volume based cost reimbursement to outcomes
• Emergence of accountable care organizations (ACOs)
• Managing the chronically ill at home with sensors and telemedicine
• Preventative medicine
• Advancing personalized medicine
What is Personalized Medicine?

- A medical model that customizes healthcare, with all decisions and practices tailored to the individual patient.

- Using all available clinical information (data) for a patient to select the medication, dosage, or preventative measure best suited for that specific individual rather than from population studies.

- Reducing trial and error-based treatment to produce optimal medical outcomes and decrease healthcare costs.
<table>
<thead>
<tr>
<th>Drug Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-depressants (SSRIs)</td>
<td>38%</td>
</tr>
<tr>
<td>Asthma Drugs</td>
<td>40%</td>
</tr>
<tr>
<td>Diabetes Drugs</td>
<td>43%</td>
</tr>
<tr>
<td>Arthritis Drugs</td>
<td>50%</td>
</tr>
<tr>
<td>Alzheimer’s Drugs</td>
<td>70%</td>
</tr>
<tr>
<td>Cancer Drugs</td>
<td>75%</td>
</tr>
</tbody>
</table>

Goals of Personalized Medicine

• Increase efficacy and personalization of therapeutic treatments
• Detect disease at an earlier stage
• Tailor therapeutic treatments to the individual rather than the population
• Identify drug responders from non-responders
• Identify patients who may experience an adverse response to therapy
• Active monitoring of treatment response and disease progression
• Reduce cost of healthcare
Stakeholders in Healthcare Innovation

- Patients
- Health Care Providers
- Diagnostic Companies
- Biopharmaceutical Companies
- Medical Device Companies
- IT/Informatics Companies
- Academic and Government Research Labs
- Advocacy Groups
- Payors
Science and Engineering–Driven Medical Innovation

Life Science
• Drug discovery & development
• 3D tissue engineering and modeling
• Therapy assessment
• Regenerative medicine

Chemistry
• Designing better drugs
• Drug formulation

Computer Science
• Biochemical modeling, diagnosis & therapy selection
• Data mining from electronic medical records
• Telemedicine, security

Biomedical Engineering
• Implants, sensors & analytical devices
• Diagnostics & imaging
• Surgical tools

Technology Management
• Systems engineering based modeling
• Healthcare economics
• Ethics and policy

Nanotechnology
• Biomaterials
• Drug delivery
Stevens University Wide
Center of Healthcare Innovation

Supporting over 60 affiliated faculty from all three Schools and our College involved in:

1. Development of new medical technology and services addressing unmet medical needs

2. Advancement of tools to analyze, visualize and model complex data to enable the prediction of outcomes and improvement of efficiencies

3. Preparing new multidisciplinary degree programs

4. Engagement of undergraduate and graduate students in real-life problem solving research and entrepreneurial activities
Healthcare Research Scholars Program

• Year-long mentored research

• Eligible are undergraduates who have completed their freshmen, sophomore or junior year and are participating in any of the following mentored summer research programs:
  – Stevens Scholars
  – Innovation and Entrepreneurship Scholars
  – Volunteers performing summer research

• 30 awards annually
  – Stipend for Student ($2,000) in fall and spring semesters
  – Research support for the mentor (up to $4,000)
  – 6 credits (PRV310 and PRV302 or equivalent)
  – Deliverables are a Paper for publication and a Seminar defending the work due at the end of spring semester
  – Application info:  http://www.stevens.edu/chi/undergraduate-scholarships
Symposium on Innovation in Healthcare Technology and Delivery

1:30-3:15 New Models for Drug Development and Personalized Therapy
Keynote: Richard Schlegel, MD, PhD.
Professor and Chairman of the Department of Pathology, Director of the Center for Cellular Reprogramming, Lombardi Comprehensive Cancer Center, Georgetown University Medical Center
- Woo Lee, PhD, George Meade Bond Professor, Stevens Institute of Technology
- Jenny Zilberberg, PhD, Researcher, Hackensack University Medical Center
- Alvin Stern, PhD, Visiting Professor, Stevens Institute of Technology
- Carrie Perlman PhD, Assistant Professor, Stevens Institute of Technology
- Panel discussion/Q&A

3:15-3:30 Break

3:30-5:15 Healthcare Delivery in the Era of the Affordable Care Act
Keynote: William Rouse, PhD,
Alexander Crombie Humphreys Professor and Director of the Center for Complex Systems & Enterprises, Stevens Institute of Technology
- Mark Spektor, DO, President and CEO, Bayonne Medical Center, CarePoint Health
- Yingying Chen, PhD, Associate Professor, Stevens Institute of Technology
- Samantha Kleinberg, PhD, Assistant Professor, Stevens Institute of Technology
- Donald Lombardi, PhD, Industry Associate Professor, Stevens Institute of Technology
- Panel discussion/Q&A

5:15-6:00 Networking Reception (Babbio Atrium)