Building an Orthopedic Innovation Engine
Introduction

- The external healthcare environment is changing rapidly and providers are under increasing pressure to innovate with increasing speed and efficiency.

- Hospitals are looking for effective ways to harness the untapped creative potential of physicians and employees; however, many organizations lack the infrastructure, processes, and resources needed to innovate in a consistent, reliable way.

- As an academic medical center and a world leader in orthopedics, Hospital for Special Surgery has a strong track record of results-oriented innovation.

- Today we will focus on sharing HSS’ experience in building an Innovation Program and some of the lessons learned along the way.

- Whether you are tweaking an existing innovation program or just getting started, we hope this webinar will provide you with some useful information that you can apply immediately to your unique context.
Rapidly Changing Healthcare Landscape

*Success is becoming more challenging for providers despite increasing demand*

**Growing Demand**
- An *aging population* and *increased lifespan* is *increasing demand* for healthcare services; over the next 10 years, the 65+ population is anticipated to grow by 36%
- In addition to demographic and epidemiological changes, patient *desire for improved quality* of life is increasing demand

**Challenging Financial Environment**
- *Cost pressures and lower reimbursement* as a result of health care reform are driving the need for enhanced efficiency and effectiveness; shift to “value-based” reimbursement
- Labor and supply costs continue to rise, creating additional pressure as reimbursement rates have not kept pace

**Increased Complexity**
- The *shift toward bundled payments* coupled with an increase in the complexity of patients (e.g., multiple comorbidities) poses additional hurdles
- *Increased consolidation* in the provider marketplace will lead to greater competition

Hospitals Need to Innovate

Hospitals understand the need to innovate but struggle with strategy and execution:

- How do we harness the creative power of our physicians and staff to drive innovation?

- How do we develop and test new solutions (e.g. process innovations, new care models, new products and services)?

- How do we bend the cost curve while improving quality?

- How do we create new sources of revenue and drive sustainable growth?

- How do we better engage physicians and align incentives?

- What should we be measuring?

- Where and how do we start?
The Innovation Challenge

Hospitals are faced with the challenge of managing today’s operations while creating the businesses of tomorrow….

**Operations Engine**
- Day-to-day operations
- Execute flawlessly
- Manage against well-defined KPIs

**Shared Resources**
- Resource allocation
- Competencies & Skills
- Culture (habits & norms)

**Improvement Engine**
- PI Programs
- Drive incremental improvements

**Innovation Engine**
- Create business of tomorrow
- Manage uncertainty
- Hypothesis, test, learn

Sources: BMGI Consulting; Hospital for Special Surgery
Hospital for Special Surgery

- Largest, most internationally renowned, academic medical center for the treatment of musculoskeletal conditions
- Key specialties include Orthopedics, Rheumatology, Rehabilitation and a number of related disciplines (e.g. Radiology, Anesthesia, Pain Management, Physiatry, etc.)
- Research spans bench-to-bedside-to population; 5 core programs:
  - Arthritis and Tissue Degeneration
  - Autoimmunity and Inflammation
  - Biomechanics
  - Musculoskeletal Integrity
  - Tissue Engineering
- Invested in creating robust infrastructure to drive innovation and continuous improvement

HSS by the Numbers

- $843M Operating Budget
- $37M Research Budget
- 205 Beds
- 35 ORs
- 11 MRI
- 29,600 Surgeries
- 338,000 Outpatient visits
- 104 orthopedic surgeons across 9 service lines
- 119 Residents and Fellows
- 3,822 FTEs
Innovation at HSS

HSS has pioneered advances in Orthopedics for decades…

… and has commercialized multiple technologies with many industry partners
## External Validation

### Recognition

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<tbody>
<tr>
<td><strong>in Orthopedics by U.S. News</strong></td>
<td><strong>In Rheumatology by U.S. News</strong></td>
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### Patient Satisfaction

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<th>99th %ile for</th>
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<td><strong>Likelihood to Recommend for 24 consecutive quarters among Magnet hospitals</strong></td>
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| 2013 Guardian of Excellence Award recipient for outstanding inpatient satisfaction |

### Quality

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<th>Significantly lower infection rate than NYS average for hip replacement for 5 consecutive years</th>
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<th>Lowest all-cause 30-day readmission rate in NYS for primary revision hip and knee surgery and cervical and lumbar surgeries</th>
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<th>Received Top Performer (2011) On Joint Commission Key Quality Measures. Highest earn back for Value Based Purchasing</th>
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### Culture

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<th>Only Hospital in NYS to earn 3 Magnet nursing designations</th>
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<th>2013 Gallup Great Workplace Award recipient</th>
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### Elite Athletes

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<th>Professional athletes from around the world choose HSS for their care; team physicians for over 15 professional and collegiate sports teams</th>
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Why Innovation in Healthcare Is So Hard

Industry Complexity
- Highly regulated environment - long and complex regulatory process
- Success dependent on aligning myriad of industry stakeholders – technology providers, payors, employers, hospitals, physicians, patients
- Cost pressures and competitive threats have hospitals focused on addressing today’s problems and operating today’s business
- Not enough time or attention dedicated to creating tomorrow’s business

Focus on Today’s Operations
- Cost pressures and competitive threats have hospitals focused on addressing today’s problems and operating today’s business
- Lack of funding for early stage technologies / solutions as industry becomes more risk averse (“pre-commercialization development gap”)
- Potentially long development cycles that require ongoing funding

Process & Competencies
- No systematic process for identifying and evaluating promising opportunities or developing, testing and commercializing novel solutions
- Innovation management requires different set of skills and capabilities

Funding
- Lack of funding for early stage technologies / solutions as industry becomes more risk averse ("pre-commercialization development gap")
- Potentially long development cycles that require ongoing funding

Incentives
- Lack incentives for physicians or employees to participate in innovation
Elements of a Successful Innovation Engine

1. Strategy, Leadership & Governance

2. Processes & Tools

3. Resources & Funding

4. Physician / Employee Engagement

5. Partner Development
Strategy: Goals & Objectives

It is important to clearly define your innovation program’s goals and objectives:

**HSS Innovation Center: Goals & Objectives**

- **Patient Care**
  - Continue to push advancements in orthopedics and related disciplines to improve mobility and enhance the quality of life for all

- **Brand & Reputation**
  - Preserve and further enhance our position as the global leader in innovation for orthopedics and related disciplines

- **Physician Alignment**
  - Provide physicians the support they need to bring their innovative ideas to market, while preserving value

- **Growth & Diversification**
  - Develop new sources of revenue and build new lines of business to support continued growth and diversification
  - Commercialize science, technology, data, and knowledge assets to create additional sources of value for the institution
Strategy: Scope

Develop a clear definition of innovation and a clearly defined scope:

To support the creation of new, viable offerings in musculoskeletal care that improve clinical outcomes, enhance the patient experience, and/or lower the cost to deliver care in a meaningful way.

Life Sciences
Leverage biomedical sciences to develop novel products and platforms that deliver more effective, less invasive, and/or less costly care.

Care Delivery
Develop new digital health and care delivery solutions that enable more effective, more patient-friendly, and/or less-expensive care.
Leadership & Governance

Develop a governance structure involving senior leadership that can provide guidance and support:

**HSS Innovation Center Governance Structure**

- **Innovation Committee of the Board**
- **Innovation Senior Executive Team**
  - CEO
  - CFO
  - Surgeon-in-Chief (CMO)
  - Chief Innovation Officer (CINO)
  - Chief Scientific Officer

**Innovation Portfolio**

- **Life Sciences**
  - Life Sciences Technologies
    - In Development
    - Marketed
- **Care Delivery**
  - Care Delivery Projects
    - Exploratory
    - Active
Process & Tools: Bottom-Up Innovation

- Engage innovators
- Generate ideas based on unmet need and technology opportunities

Idea Generation

- Assess opportunity based on standard set of criteria
  - IP, commercial potential, market opportunity, technology risk, ability to execute, strategic fit, etc.
- Share assessment findings with inventor and discuss next steps
- Prioritize ideas with greatest potential

Evaluation

- For high priority ideas, work with inventor to step-up value
  - Create development roadmap; prototype, validate, and de-risk
  - Identify and marshal necessary resources
  - Build business plan, negotiate agreements, and raise funding

Acceleration

- License technology or create start-up
- Scale-up
- Share revenue generated with inventor
- Ongoing monitoring and oversight

Commercialization
Process & Tools: Top-Down Innovation

- Identify and prioritize problems worth solving
- Review KPIs
- Observations and interviews
- Select 2-3 priority opportunities for further investigation

- Understand current state
  - Waste walk
  - Painstorm
  - Root cause analysis
- Prioritize problems worth solving

- Solution development
  - Brainstorm
  - Brainswarm
- Pilots and rapid prototyping to test and refine solutions
  - Hypothesis, test, learn loops

- Buy-in and alignment
  - Business Case
  - Stakeholder alignment
- Roll-out plan
- Train staff
- Implement and scale

Source: Furr, Nathan and Jeff Dyer. *The Innovator’s Method: Bringing the Lean Start-up into Your Organization*. HBR Press. September 2014
Resources

Build a team of dedicated and distributed resources to support innovation:

HSS Innovation Center

Life Sciences Innovation

- Technology Development
  - MD Engagement
  - Market Research
  - IP Protection
  - Licensing
  - Negotiations
  - Audits
  - Project Mgmt

- Biomechanics & Imaging
  - Research
  - Design
  - Testing
  - Prototyping
  - Computational Modeling
  - Imaging Protocols

- Research
  - Bench Research
  - Animal Studies
  - Clinical Trials

Care Delivery Innovation

- Biostatistics
  - Registries
  - Data Mining
  - Predictive Analytics
  - Validation

- Operational Excellence
  - Process Innovation
  - Care Delivery Optimization
  - Data Analytics
  - Advisory Services
  - Project Mgmt

- Information Technology
  - Support Digital Health Initiatives
  - IT Partner Integration
  - Pilot Support

Finance

- Financial Analysis
- Business Planning
- Accounting

Legal

- Contract Development
- Negotiation
- Regulatory Compliance

Strategy & Business Development

- Business Strategy
- Partnership Vetting
- Physician Engagement
- Project Management

Clinical & Business Operations

- Best Practices
- Knowledge Transfer

Education

- Knowledge Transfer
- Curriculum Development

Resources & Funding
Funding

Allocate funds to support innovation activities in a sustainable way:

**HSS Innovation Fund**

- **Purpose**
  - Support the advancement of early stage technologies and innovations in orthopedics (and its related disciplines)
  - Bridge the pre-commercial development gap and accelerate projects to the point of external commercial investment

- **Eligibility & Uses**
  - Supports innovation led by HSS Clinicians, HSS Scientists or HSS Employees
  - Fund critical path activities including manufacturing prototypes, conducting animal trials, clinical trials, and pilots, or developing software

- **Selection Process**
  - Oversight provided by Senior Hospital leadership including CEO, Surgeon-in-Chief, the Chief Scientific Officer, and Innovation Senior Management team
  - Well-established criteria used to evaluate most competitive & impactful proposals
  - Guidance and input from external subject matter experts as needed

- **Funding**
  - HSS has seeded $1 million to the Innovation Fund
  - Looking to grow Fund with the help of philanthropists who have a passion for healthcare innovation and early stage technologies
Physician & Staff Engagement

*Develop strategies to engage physicians / staff and align incentives*

- **Awareness**
  - Create awareness about the program and its purpose
    - Communicate and celebrate success stories

- **Outreach**
  - Meet with key physicians that drive innovation
    - One-on-one meetings to understand their pain points
    - Engage key physicians in innovation strategy development

- **Incentives**
  - Create the proper system of incentives to encourage participation
    - IP policy
    - Revenue share and equity share policy

- **Relationship Building**
  - Responsiveness – quick turn around when assessing new ideas
  - Build trusted relationship – objective, fact-based guidance and advice
  - Follow through on promises – demonstrate reliability
Partner Development
Cultivate partnerships to help with commercialization:

**Life Science / Medical Device Commercialization Partners**

- **Exactech**
  - (Total Knee)

- **Zimmer**
  - (Trabecular Metal Stem Anatomic Hip)

- **Mathys**
  - (Unicondylar Knee)

- **LINK**
  - (Ceramic on Ceramic Total Knee Replacement)

- **DJO Global**
  - (Total Knee)

- **MAKO Surgical Corp.**
  - (Robotics)

- **Ortho Development**
  - (Spine System)

- **Synthes**
  - (Artificial Disc)

- **Extremity Medical**
  - (Total Wrist)

- **Transgenomic**
  - (Diagnostic)

- **Wright**
  - (Total Knee)

- **Greatbatch**
  - (Surgical Instrumentation)

- **StelKast**
  - (Total Knee)

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**Care Delivery Partners**

- **OrthoSecure**
- **Intralign Health Solutions**
- **VIIMED**
Recent Case Studies

Drug Delivery Implant

Context
- Implantable drug delivery system developed by Robert Hotchkiss, MD in collaboration with Mark Figgie, MD and HSS Engineers

HSS Partnership
- Conducted market analysis and developed partnerships
- Issued patents and provided early-stage funding
- Designed and fabricated prototype device
- Conducted large animal feasibility study with pSivida

Results to Date
- Positive preliminary results from animal study
- Preparing for first in-human IND study in 2014

Hydrogel

Context
- Platform of hydrogel technologies developed by Russell Warren, MD and Suzanne Maher, PhD

HSS Partnership
- Conducted background and market analysis; filed patents
- Designed, engineered, and prototyped new products
- Funded animal studies for two product opportunities
- Introduced inventor to strategic partners

Results to Date
- Attracted external funding based on early achievements
- Hydro-Gen, LLC was founded to secure additional funding to further develop the platform

Carbon Nanorod Annulus Patch

Context
- New material platform for spinal products developed by Frank Cammisa, MD, Joshua Schroeder, MD, and Celeste Abjornson, PhD

HSS Partnership
- Conducted background and market analysis
- Filed patents
- Designed, engineered, and prototyped new technology
- Established relationship with partner for joint proposal

Results to Date
- Secured external development funding
- Planning for next step in commercialization

OrthoSecure

Context
- Rules-based internet software that identifies and verifies compatible implant parts developed by Steven Haas, MD and HSS researchers

HSS Partnership
- Tested in the HSS “Living Laboratory” with 6 surgeons
- Linked to enterprise software for patient records and inventory mgmt.
- Provided access to potential investors and strategic partners

Results to Date
- Implemented OrthoSecure for knee and hip replacements at HSS
- SanDance Technology, LLC was founded to commercialize OrthoSecure
Summary

1. Strategy, Leadership & Governance
2. Processes & Tools
3. Resources & Funding
4. Physician / Employee Engagement
5. Partner Development
Conclusion

- An Innovation Program can help accelerate and enhance the success of innovation initiatives.
- Investing in developing a robust set of innovation capabilities can provide hospitals with the agility necessary to adapt quickly in a changing healthcare environment.
- Change takes time – providers must be patient, unrelenting and take a long term view for developing a culture of innovation.
- Start small, start today, and move quickly.
Streamlining Orthopedic Episodes of Care

Wellbe’s Smart Patient Navigation

Wellbe helps service line leaders to manage growing programs by leveraging digital patient navigation to increase the capacity of existing resources. The cloud-based platform combines vital tools for patient engagement and care coordination across the continuum to manage the performance of value-based reimbursement programs. This patient-centric approach using actionable feedback results in reduced risks, optimal costs and a better patient experience.

Wellbe’s solution includes:

**Guided Patient Journeys for Better Engagement and Experiences**

Easy-to-follow Guided CarePaths™ are designed around your facility’s existing content and aligned to your current program’s clinical pathways to help your patients on their journeys to better health.

**Coordinated Care with Connected Teams**

Each member of the care team can leverage CarePath Automation™ to help them complete their “to-do’s” while ensuring collaboration on patient progress.

**Real-time Insight from Patient Generated Data**

On-demand reports give administrators the quick data they need to report to the C-Suite on program performance.