Launching a New Era of Discovery

DENNIS S. CHARNEY, M.D.
Dean

September 27, 2012
Sinai Innovations – A Cultural Transformation

- A culture where ANYTHING is possible
- Students and Faculty who BELIEVE they can change the future of bio-medical science and clinical medicine
- Medical and Gradual School Education that are student-centered, scientifically informed and CREATIVE
- Clinical Programs that are patient-centered, of the HIGHEST quality and novel in delivery
- Research that is both incremental and TRANSFORMATIVE

*Discoveries that improve Disease Prevention, Diagnosis and Therapy*
The Culture of Innovation - Case Study: Bay Area

• Innovation at the heart of Bay Area’s economy

• Region widely considered to be the world’s leading center for innovative activity, particularly in technology

• Bay area remains at the head of its peers in terms of patents granted (15% of all patents in US)

• When it comes to innovation, spending doesn’t correlate with success

Culture is key to innovation success, and its impact on performance is measurable
The Culture of Innovation - Bay Area: Key Findings

• Companies achieving high alignment on both innovation strategy and culture, enjoy superior financial performance

• Bay Area companies have the highest proportion of their innovation agendas developed and communicated top-down

• Most Bay Area companies view continuous refreshment of their product development talent base as a critical advantage

• The ability to innovate stems from a culture that values openness to new ideas and a networked environment in which ideas and people can flow back and forth interacting fluidly

*While any one element in isolation can produce positive results, it is their combination and interaction that is critical to truly competitive innovation*
The Culture of Innovation- Bay Area: Summary

How is the Bay Area different?

The best innovators are those that can combine the right strategies with the right set of capabilities and the right cultural support to provide their customers with the strongly advantaged, differentiated products and services they want.

“One of my focuses today is to have a more integrated and holistic strategy and to make sure we don’t lose the elements that are great about the culture of innovation, but to add the elements of a culture of accountability for long-term business results. That is our greatest challenge.”

Stephen Hoover
PARC Chief Executive
Sinai Innovations – Leadership Commitment

• Investments in Innovation in Education, Clinical Care and Research

• Transparent Evaluation of Performance

• Incentive Based Compensation Models

• Financial Discipline
Aligning a Culture and Mission of Innovation

Goal
Create a dynamic and responsive infrastructure across MSSM that supports the discovery, development and implementation of innovative biomedical technologies.

- Foster a culture of innovation
- Recruit world-class, innovation-focused faculty
- Provide state-of-the-art core facilities
- Provide education and training relevant to innovation
- Provide direct financial support for innovation
- Support internal and external collaborations
## Major Recruitments/Appointments

### Strategic recruitments in targeted areas to facilitate innovation:

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<th>R</th>
<th>CE</th>
<th>P</th>
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<td>13</td>
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<td>61</td>
<td>24</td>
<td>122</td>
<td>25</td>
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</table>

**Tracks:**
- A=Academic
- R=Research
- CE=Clinical Educator
- P=Practice

The faculty came from premier institutions like: Harvard, Yale, Stanford, Berkeley, MSK, Rockefeller, Salk Institute, Brookhaven National Lab, U-Pittsburgh, etc.

Mount Sinai is attracting the best talent from US and European institutions while losing very few faculty.

Additionally, we have recruited staff at all levels to add resources in critical areas.
Quality

Best Doctors in NY

• 129 FPA Doctors in 48 specialties
  Total 188 in 48 specialties (includes voluntaries, affiliates and non-FPA)

US News & World Report Rankings

• Medical School 2012          #18
• Hospital 2012 “Honor Roll”   #14
  (out of 5,000 hospitals analyzed)
• One of 12 integrated Medical School/Hospital Academic Medical Centers which are both ranked in top 20

NIH Funding Rank

• Top 20 in Total NIH funding
• This will rise dramatically with CSM-related recruitments

AAMC Rank

• U.S. Medical Schools (AAMC) 2011  #3 Research Dollars/Principal Investigator
  (unchanged from 2009)
• #1 Research Density
  (unchanged since 2010)
Tripartite Missions of MSSM

1. Education

2. Research

3. Clinical
## Education: Quality – Matriculating Class of 2012

**MD Students**

- Number of Complete Applications: 5,149
- Number of Interviews (excl EA/MSTP): 738
- Size of Class: 140
- MD/PhD: 11
- Humanities and Medicine: 28
- NY State Residents: 30%
- Women: 45%
- URM: 19%
- Average MCAT: 35.7
- Average GPA: 3.75
- Number of Undergraduate Schools: 64
  
  (Penn=14, Columbia=11, Harvard=8, Yale=8, Brown=8, Cornell=5, Hopkins=5)

This is the BEST class in Sinai’s history
Education: Quality – Matriculating Class of 2012

**MD/PhD Students**
- Number of Complete Applications: 285
- Size of class: 11
- NYS State Residents: 27.3%
- Women: 9%
- URM: 27.3%
- Average MCAT: 36
- Median GPA: 3.77
- Number of Undergraduate Schools: 10


# of MD/PhD applicants increased 7.5% (from 2011)
PhD Students

- Number of Complete Applications: 515
- Size of Class: 37
- NY State Residents: 24%
- Women: 57%
- URM: 19%
- Average GRE: 1,380
- Median GPA: 3.56
- Number of Undergraduate Schools: 36


This is the BEST class in Sinai’s history
Medical Education Notable Accomplishments

• Obtained LCME re-accreditation
  • Longest possible cycle
  • Commendations received for the strength and innovativeness of the program, productivity of the students and praise for institutional commitment and support

• Launched SciMed, innovative program recruiting students studying engineering, mathematics, computer science, and physics into a new early assurance program

• Recruited its third class of outstanding MD/MSCR students to PORTAL

• Unveiled the addition of VScan to our physical diagnosis course in Art and Science of Medicine

• Recruited Paul Lawrence to head Educational Technology

• Raised $2.6M for scholarships in the most successful fundraising drive to-date
Medical Education Initiatives

• Strategic Plan
  – Curriculum Design Team (CDT) redesigning the curriculum, to be launched August 2013.
  – Annenberg 12th Floor Lecture Hall will be renovated in 2013
  – Plans for a simulation education center to cover school and hospital training needs are being developed
  – New Director of Alumni Office to be recruited
Graduate School Notable Accomplishments

• Launched the first course in **Center for Technology, Innovation, and Entrepreneurship (C-TIE)**

• Established new advanced courses bringing basic science discoveries into the clinic.
  • Specific tools to pursue innovation with an emphasis on entrepreneurship.

• Developed **First-Ever** course on Whole Genome Sequencing
  • Students have the option to sequence, analyze and interpret their own complete genome
  • New era of "**Precision Medicine**", where care is chosen with precise knowledge of the molecular mechanism behind a patient’s condition

• Continued to strengthen and expand our patient and population-based Masters and PhD programs

• Enhanced educational and networking opportunities for careers beyond academia
Graduate School Initiatives

• Establish a new track within Genetics and Genomic Sciences that attracts a new cadre of PhD students with extensive computational skills.

• Establish a new track within Systems Biology of Disease and Therapeutics dedicated to bioengineering and therapeutics

• Expand our MD/PhD program to include post-MD graduate training during residency and fellowship

• Continue to expand training programs and courses for our PhD students that promote innovation and translation.
Mission:
Pursue research and education at the intersection of basic science discovery and applied science implementation in order to **advance** the invention and development of new biomedical technologies.

- C-TIE’s first graduate course being launched on September 27th is the Q.E.D. Project.

- The course provides a hands-on, team-based, technology development experience for students. Over the course of an academic year, student-led teams will learn to define a specific problem, invent a technology-based solution to the problem, and build a prototype solution for it. These solutions will be evaluated based on innovation, practicality, ease of use and adoption, economic impact, and commercial potential.

**Director:** Geoffrey Smith, Professor-Department of Health Evidence & Policy  
(co-founder and General Partner of Ascent Biomedical Ventures)
Global Health Update

**Goals:**
- Become a top 10 leader among academic global health programs in the United States
- Improve the health of people around the world with particular emphasis on the world’s most underserved populations

**Achievements to-date:**
- Sent more than 75 Students and 60 Residents on medical missions to over 25 countries.
- Launched a new Human Rights Program, which will include a Clinical Center of Excellence for victims of torture
- Launched a new post-residency Global Health Teaching Fellowship
- Expanded Global Mental Health program and provided psychiatric/psychological assistance in Japan in response to the earthquake/tsunami disaster
- December 2012 – Host a high-profile international conference at Mount Sinai in partnership with Doctors Without Borders
Research – Highlights

• MSSM maintained Top 20 in NIH Funding
• The efficiency of space utilization has remained high:
  – AAMC Rank - #1 in $/sf & #3 in $/Faculty
• This has enabled us to make major recruitments within our existing space
• Infrastructure to support “Culture of Innovation”
  – High Performance Computing
  – Center for Therapeutic Antibody Discovery
  – Integrated Screening
  – Medicinal Chemistry
  – Center for Biostatistics & InCHOIR
  – Office of Technology & Business Development
• Notable New Initiatives with High Potential for Innovation
  – Genomics Core Facility & Genetics Testing Laboratory
  – Center for Systems Pathology & Integrated Diagnostics
  – CLIPMERGE Program
Minerva – Roman Goddess of Medicine and Science

- 70 Teraflops peak speed
- 64 million CPU hours available per year
- $2.7M hardware investment from the Dean’s Office
- Extremely power efficient/green and cost effective
- Minerva has:
  - 7,680 Advanced Micro Devices (AMD) 2.3 GHz Interlagos cores
  - 120 Dell C6145, 2 blade chassis nodes in six cabinets
  - 64 compute cores in four sockets and 256 Gigabytes (GB)s of memory per node
  - 30 Terabytes (TB) of RAM
  - Interconnected with Mellanox Quad Data Rate (QDR 40 Gbps) Fat-Tree Infiniband
  - 1.5 Petabytes (PB) of Data Direct Networks (DDN) SFA10K high-speed storage (600 disk drives in two cabinets), 10 GB/s
  - Dual 10 Gigabit Ethernet links to the Sinai campus network
Scientific Computing – Minerva
Why Scientific Computing?

• Some scientific problems would take too long to solve if they were computed sequentially

• Solution: Collect a lot of processors, memory and storage and have them work in synchrony/parallel to solve a scientific problem

• In April 2012, deployed Minerva, a new scientific computing and data infrastructure to
  – empower scientists and researchers to efficiently and effectively analyze massive data sets, and
  – tackle computationally intensive research topics in many fields, including genetics and genomics, and molecular dynamics

• Scientific Computing at Mount Sinai will
  – boost the scientific productivity and innovation of the scientists and researchers, and
  – increase the rate of scientific discovery and grant/donor income
In 2013, we will deploy a scientific visualization center to help:

- Researchers see scientific phenomena easier
- Executives see complex processes easier
- Students see surgeries
- Staff communicate with patients easier
- Doctors communicate with patients remotely

Contact: Patricia.Kovatch@mssm.edu
Center for Therapeutic Antibody Discovery

• Monoclonal antibodies as therapeutic drugs:
  • 4 of the top 10 drugs by sales are Mab
  • By 2014, 4 of the top 6 drugs will be Mab
  • Therapeutic market expanded from $40B to $48B in 2010
  • Rapid and highly successful approval rate for Mab as drugs
  • Human Mab have a high rate of technical success and are well tolerated

Contact:  thomas.moran@mssm.edu
Integrated Screening

- New high-speed automated liquid handler.
- Fully automated production of shRNA libraries.
- Automated processing of cells for high-content microscopy and qRT-PCR.

Dan.felsenfeld@mssm.edu
Medicinal Chemistry

• Synthetic and medicinal chemistry resource for research groups to add small molecule component to programs either as research tools or experimental therapeutics.

• Complements screening infrastructure built for ISC(TCBC)

• Major instrumentation, NMR, LCMS

Contact: michael.ohlmeyer@mssm.edu
Center for Biostatistics & InCHOIR

- Promotes and enhances clinical and translational research at MSSM with over 20 biostatisticians (10 faculty), programmers, and support staff

- Provides statistical support for any MSSM investigator (brief consultation and long term collaborations)

- Supports the Institutes for Translational Sciences (Conduits), the Tisch Cancer Institute, the Institute for Translational Epidemiology, the International Center for Health Outcomes and Innovation Research (InCHOIR) and other research centers

- InCHOIR provides infrastructure for multicenter RCTs (Randomized Clinical Trials)
  - Innovative clinical trial designs
  - Expertise with quality of life and economic endpoints
  - Clinical & data coordination
  - QA & monitoring
  - Regulatory (e.g. FDA) expertise
  - Electronic data capture systems

Contact: Michael.Parides@mssm.edu
New leadership and re-organization of technology transfer program. Significant increases in the number of key metrics and launch of new initiatives including:

- 15% increase in new technology disclosures and IP filings
- 20% increase in funding from industry collaborations
- 25% increase in license and commercialization transactions
- 200% increase in income to MSSM and its stakeholders ($75 million)
- Decreased legal and financial risk through settlement of multiple disputes regarding commercialization of our inventions

- Launch of
  - MAb call for targets program in conjunction with MSSM’s antibody core
  - Blue Mountain Technologies
  - Industry request for proposal pilot
  - Accelerator relationship with the Alexandria Life Science Center

Contact: Teri.Willey@mssm.edu
New Initiatives with High Potential for Innovation

Genomics Core Facility & Genetic Testing Laboratory
- A CLIA Next-generation sequencing facility, the only one in NY State
- Develop a mix of standard and cutting edge sequencing technologies (Illumina, PacBio, Ion Proton, others) to innovate more cost effective, accurate, and speedy methods for comprehensive clinical sequence analysis
- Pioneer novel research applications of these sequencing technologies.

Center for Systems Pathology & Integrated Diagnostics
An innovative approach to precise medicine based on novel pathology and genetic applications:
- individualize treatment, optimize outcomes enhance research capabilities across MSSM
- Generate intellectual property through partnering with our clinicians, basic investigators, and industry.

CLIPMERGE Program
- Clinical Implementation of Personalized Medicine through Electronic Health Records and Genomics is a translational program to evaluate the utility of integrating genomic data and personalized medicine into routine clinical care.
- Innovative CLIPMERGE Technology developed at Mount Sinai led to two patent filings on "System and Methods for Personalized Clinical Decision Support"
Major initiative to simplify and expedite protocol submissions & review:

- New web-based system replacing InfoEd will be implemented over the next 18 months
- Major processes including PPHS, GCO, FCOI & IACUC evaluated and optimization opportunities identified for implementation
- Initial web-based tools to support protocol development and grant submission are already available
  - Grant/Protocol Navigation Wizard to define process requirements
  - Grant Application Resource Center (GARC) [http://www.mssm.edu/garc](http://www.mssm.edu/garc)
- Implemented Policy Review Board to re-assess regulatory process
Faculty Practice Accomplishments 2012

- **Growth**
  - 7% growth in volume and revenue
- **Patient experience**
  - Top 30% nationally in patient satisfaction
- **Access**
  - All practices meet benchmark: < 2 weeks for 3rd new appointment
  - E scheduling & MyChart
- **Efficiency**
  - Growth of central billing office
  - Growth of off-site, centrally-managed, multispecialty sites – Columbus Avenue site opened
- **Innovation**
  - FPA part of MSMC successful CMS Shared Savings Program application for Mount Sinai Care, an Accountable Care Organization
Launching a New Era of Discovery

Faculty Practice Accomplishments – Growth

Visits, 2009-2012
(including procedures)

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<th>Year</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012*</th>
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<td>Visits</td>
<td>554K</td>
<td>616K</td>
<td>783K</td>
<td>878K*</td>
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Ambulatory Encounters
2009-2012

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<th>2010</th>
<th>2011</th>
<th>2012*</th>
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<tr>
<td>Encounters</td>
<td>271K</td>
<td>327K</td>
<td>377K</td>
<td>435K*</td>
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Faculty Practice Accomplishments – Revenue

**FPA Annual Receipts 2009-2012**

- 2009: $395M
- 2010: $416M
- 2011: $443M
- 2012: $475M

**FPA Margin 2009-2012**

- 2009: $3.8M
- 2010: $6.8M
- 2011: $11.8M
- 2012: $14.7M*

*Note: The margin for 2012 includes an adjustment factor.
Faculty Practice – Patient Satisfaction

<table>
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<th>4Q2010</th>
<th>4Q2011</th>
<th>2Q2012</th>
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<tr>
<td>National</td>
<td>10%</td>
<td>32%</td>
<td>58%</td>
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<tr>
<td>Regional</td>
<td>18%</td>
<td>60%</td>
<td>79%</td>
<td>90%</td>
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Faculty Practice – Growth FPA Central

FPA Central Billing Office 2012

- 8 departments joined
- CBO: 14 of 26 departments
- ~50% FPA business
- CBO doing network billing

CBO Annual Receipts 2009-2012

- 2009: 26.8M
- 2010: 27.5M
- 2011: 35.8M
- 2012*: 212M*

*Estimated value
Faculty Practice Goals 2013

- **Growth**
  - 7% growth in volume and revenue
- **Patient experience**
  - Improve to top 20% nationally in patient satisfaction (Press Ganey)
- **Access**
  - Improve phone access to best practice benchmarks
- **Efficiency**
  - Add 6 more departments to the CBO
  - Central call center
- **Expansion**
  - Upper East Side centrally-managed, multispecialty site with primary care focus
- **Innovation**
  - Cross-Departmental “Centers of Excellence” for clinical care
Mount Sinai’s Accountable Care Organization

- Spring 2012 - Accountable Care Organization Established (Mount Sinai Care, LLC)
  - Separate Legal Entity
  - Identified Board of Directors
  - Management Team
    - Mark Callahan, MD, CEO
    - Jeffrey Farber, MD, CMO
    - Theresa Dolan, COO

- July 2012 – Medicare Shared Savings Contract Awarded

- Positions Mount Sinai for Healthcare Reform and Population Management
  - One of very few AMC’s nationally
Newly formed Department of Family Medicine and Community Health

Neil Calman, M.D., Chair

• Creates academic affiliation with Institute for Family Health, a leader in providing high-quality, affordable primary care

• Provides excellent outpatient training opportunities for students and residents;

• Strengthens Mount Sinai’s primary care delivery capabilities

• Facilitates collaborations between Mount Sinai specialists and family medicine practitioners

• Bolsters research efforts focused on health disparities and health outcomes.

• Enhances Mount Sinai’s contributions to community through expanded primary care and family medicine services

• Positions Mount Sinai for health care reform initiatives
The School has met its overall financial goals since the Strategic Plan was approved (000’s)

Financial Operating Results:

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<td>2012</td>
<td>$</td>
<td>$ YTD is favorable</td>
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<tr>
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<tr>
<td>2009</td>
<td>$ 71</td>
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<tr>
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<td>$ (2,880)*</td>
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<td>2007</td>
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*Loss resulted from market downturn

Fund raising for the $1 billion Capital Campaign, currently exceeding $977 million, has been sufficient to support the Strategic Plan spending

Research and FPA growth major contributors to School’s financial success
Financial Challenges to Continued Success

• Heightened financial challenges for both Clinical and Research Programs continue
  - Clinical reimbursement constraints from health care reform
  - Federal Budget issues
  - NIH Funding
    - Salary cap reduced to $179,700
    - Impact of possible sequestration in 2013 could be > 10%
    - Committee reviews of funding needs of PI’s with > $1 million of Direct Cost Funding

• Research spending growth has slowed again in 2012 principally from expiration of ARRA stimulus grants.

• The CSM Building will open in the 4th Quarter of 2012

• Capital Project Funding for existing school buildings
Action Plan to Meet Financial Challenges

• Continue successful Financial Goals
  • School’s Financial Goals:
    – Positive financial operating results using only the 5% endowment spending rate investment income
    – Philanthropy supports the gap between Strategic Plan revenues and spending on growth initiatives
  • Department’s Financial Goals:
    – Departments must consistently achieve positive financial results
    – Research and Clinical performance guided by metrics
  • Institute Financial Goals
    – Recruit well funded faculty
    – Enhance core facilities to expand research base
Action Plan to Meet Financial Challenges

• Departmental Incentive Plans to Encourage Financial Performance:
  − Clinical Revenue Growth Incentive Policy
  − Clinical Operating Margin Incentive Policy

• Continued Focus on Faculty Productivity
  − Investigator Incentive Policy
  − Performance goals for each physician with regular reviews of actual results
  − Compensation models tying 100% of compensation to performance

• Compensation must be covered by Teaching, Research, and Clinical Revenue

• Mount Sinai moving to integrate institutional goals on quality, productivity, outcomes into physician compensation plans.
Action Plan to Meet Financial Challenges

• More Space for Growth
  – Administrative services moved off campus
  – CSM provides additional space to support education, research and clinical operations
  – Continue to expand Faculty Practice offsite locations

• Clinical and Research Growth from:
  – New recruits,
  – Faculty productivity, and
  – Efficient, cost effective operations

• Philanthropy support according to campaign goals

• FINANCIAL DISCIPLINE IS IMPERATIVE
  – Business Plans
  – Return on Investment
  – Continuous monitoring of financial results with timely corrective actions, if necessary
Launching a New Era of Discovery

SINAIinnovations

45
CSM & Tower Moves

Move In Schedule

- Ruttenberg Cancer Treatment Center CSM & Tower 3 & 4
- Research Floors Imaging on SC-1 (Jan 2013) Starting mid Nov through Jan
- FPA Tower 5 & 6
- Radiology FPA & Radiation/Oncology & Research Imaging – SC2

Construction Schedule

- Tower Construction Completion
- Hess Center Floors SC1 – 10
- Radiology FPA – SC2
- Radiation/Oncology & Research Imaging – SC2

SINAI Innovations
200 health data scientists from the research, startup and corporate worlds showcasing innovative data-driven projects both inside and outside Sinai and dive into the breadth and depth of health data available. By providing a platform for cross-pollination of tools and ideas, we hope to expand the boundaries of knowledge and inspire the data-driven health revolution.

More information:
Michael Linderman (michael.linderman@mssm.edu)
http://livingwellthroughdata.eventbrite.com
Sinai Conferences that Stimulate Innovation

SINA/innovations
Launching A New Era Of Discovery

New York
November 12-14, 2012

Featured Speakers:
Ivan Sedljenberg
(Retired Chairman and CEO, Verizon)
David Zaslav
(CEO, Discovery Channel)
Jeffrey Hammerbacher
(Founder & Chief Scientist, Cloudera and Faculty, Mount Sinai School of Medicine)
Elazer R. Edelman
Thomas D. and Virginia W. Cabot Professor, Health Sciences and Technology, Massachusetts Institute of Technology (MIT)

Tweets about "SINA/innovations"

Register Now

Mount Sinai School of Medicine

Launching a New Era of Discovery
Sinai Conferences that Stimulate Innovation

Lives in the Balance: Delivering Medical Innovations for Neglected Patients and Populations

Register Online

December 13-14, 2012
New York City
Leadership matters........

Disciplined innovation is NOT a contradiction

Adapted from:  Jim Collins & Morten T. Hansen “Great By Choice”
Leadership of Discipline

Acknowledge unpredictability of external environment
BUT
Will not allow results to be determined by them

INSTEAD:
– Define values
– Set Goals
– Develop performance standards
– Make informed decisions
– Maintain consistency
– Change course quickly if needed
Leadership of Disciplined Creativity

Encourage creativity and innovation
BUT
Will not commit resources without validation

INSTEAD:
- Identify areas of opportunity
- Develop multiple parallel small initiatives in those areas
- Define metrics and a clear timeline for progress
- Evaluate success of each initiative objectively
- Commit resources to the most promising initiatives
- Make strategic investments in most successful ones
Leadership of Disciplined Creativity with Vigilance

Recognize unexpected adverse events occur regularly
BUT
Will not allow them to dilute the institution’s strengths

INSTEAD:
– Prepare for worst case scenarios
– Recognize threats early
– Avoid asymmetric risks
– Create shock absorbers to deal with the unexpected
– Adjust pace of decisions to speed of events
– Focus on superb execution
Great deeds in life are born from moments of Great Opportunity.

Do not let these moments pass through your hands

Be dreamers, who make others’ dreams come true!
Suggested Reading

**Great by Choice**

*New York Times Bestseller*

Uncertainty, Chaos, and Luck—Why Some Thrive Despite Them All

*Jim Collins*

Author of *Good to Great*

*4 Million Copies Sold*

*Morten T. Hansen*

**Resilience**

The Science of Mastering Life's Greatest Challenges

"This book teaches you how to become stronger, how to bend but not break, and how to make the best out of a bad situation..."

*Earvin "Magic" Johnson*

*Steven M. Southwick, M.D.*

& *Dennis S. Charney, M.D.*