Agenda Item 2

Featured Start-Up – Maryland Development Center, LLC
**TOPIC**: Featured Start-Up – Maryland Development Center, LLC (information item)

**COMMITTEE**: Economic Development and Technology Commercialization

**DATE OF COMMITTEE MEETING**: September 10, 2015

**SUMMARY**: The Maryland Development Center (MDC), a new company founded to complement the University of Maryland tech transfer offices has been selected as the featured start-up for the September 10th meeting. MDC provides shared engineering, management, and business development resources, building companies around inventors. The goal is to translate University IP into valuable companies located in Maryland, creating jobs and value in the State. MDC has started with a focus on medical devices based on IP from surgeons at the University of Maryland, Baltimore, working with engineers at the University of Maryland, College Park. MDC plans to extend the operation to College Park in the near future and is now raising funds and building the business. Four companies have been founded thus far.

**ALTERNATIVE(S)**: This item is for information purposes.

**FISCAL IMPACT**: This item is for information purposes.

**CHANCELLOR’S RECOMMENDATION**: This item is for information purposes.

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**COMMITTEE RECOMMENDATION**: 

**BOARD ACTION**: 

**SUBMITTED BY**: Joseph F. Vivona (301) 445-2783
Committee on Economic Development and Technology Commercialization

Featured Start-up – Maryland Development Center, LLC

September 10, 2015
Maryland Development Center

Engineering Medical Systems
Gil Blankenship, CEO and Rahul Singhvi, Chairman
USM is **Eighth** in the Nation in Total University Research Funding

(AUTM data 2013 Total research funding)

<table>
<thead>
<tr>
<th>Institution</th>
<th>Research Expenditures</th>
<th>Startups</th>
<th>Patents Issued</th>
<th>License Income Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 University of California System</td>
<td>$5,695,388,516</td>
<td>66</td>
<td>355</td>
<td>$104,807,562</td>
</tr>
<tr>
<td>2 University of Texas System</td>
<td>$2,557,232,356</td>
<td>18</td>
<td>176</td>
<td>$55,139,493</td>
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<tr>
<td>3 Massachusetts Inst. Of Technology (MIT)</td>
<td>$1,605,975,000</td>
<td>14</td>
<td>290</td>
<td>$69,730,000</td>
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<tr>
<td>4 Johns Hopkins University</td>
<td>$1,605,387,000</td>
<td>8</td>
<td>78</td>
<td>$17,640,549</td>
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<tr>
<td>5 University of Michigan</td>
<td>$1,328,721,165</td>
<td>9</td>
<td>128</td>
<td>$14,464,565</td>
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<tr>
<td>6 UW–Madison/WARF</td>
<td>$1,123,501,000</td>
<td>7</td>
<td>157</td>
<td>$94,170,000</td>
</tr>
<tr>
<td>7 Johns Hopkins University Applied Physics Laboratory</td>
<td>$1,105,171,786</td>
<td>4</td>
<td>16</td>
<td>$712,398</td>
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<tr>
<td>8 University System of Maryland</td>
<td><strong>$1,026,953,345</strong></td>
<td>14</td>
<td>68</td>
<td><strong>$1,603,022</strong></td>
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<tr>
<td>9 University of Illinois, Chicago, Urbana</td>
<td>$1,111,335,000</td>
<td>11</td>
<td>99</td>
<td>$24,178,517</td>
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<tr>
<td>10 University of Washington/ Wash. Res. Fdn.</td>
<td>$1,012,471,661</td>
<td>17</td>
<td>94</td>
<td>$99,491,173</td>
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<tr>
<td>Average</td>
<td>$1,817,213,683</td>
<td>16.8</td>
<td>146.1</td>
<td>$48,193,728</td>
</tr>
<tr>
<td>Median</td>
<td><strong>$1,226,111,083</strong></td>
<td>12.5</td>
<td>113.5</td>
<td><strong>$39,659,005</strong></td>
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<tr>
<td>Maximum</td>
<td>$5,695,388,516</td>
<td>66.0</td>
<td>355.0</td>
<td>$104,807,562</td>
</tr>
</tbody>
</table>

Maryland is 2\textsuperscript{nd} in the country in total federal R&D funding at $16 billion  
California 1\textsuperscript{st} with $17 billion, Massachusetts 4\textsuperscript{th} with $6 billion

Maryland is 1\textsuperscript{st} in the country in R&D plant facilities
A Great Opportunity: $1 billion Medical Research Funding in Baltimore

<table>
<thead>
<tr>
<th>Rank</th>
<th>Institution</th>
<th>Expenditures (1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>U. CA, San Francisco</td>
<td>632,512</td>
</tr>
<tr>
<td>2</td>
<td>U. CA, Los Angeles</td>
<td>662,694</td>
</tr>
<tr>
<td>3</td>
<td>U. CA, San Diego</td>
<td>686,622</td>
</tr>
<tr>
<td>4</td>
<td>Johns Hopkins U.²</td>
<td>556,555</td>
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<tr>
<td>5</td>
<td>Duke U.</td>
<td>586,147</td>
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<tr>
<td>6</td>
<td>OH State U.</td>
<td>260,059</td>
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<tr>
<td>7</td>
<td>U. Cincinnati</td>
<td>244,330</td>
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<tr>
<td>8</td>
<td>Yeshiva U.</td>
<td>313,816</td>
</tr>
<tr>
<td>9</td>
<td>Case Western Reserve U.</td>
<td>243,794</td>
</tr>
<tr>
<td>10</td>
<td>Baylor C. of Medicine</td>
<td>209,987</td>
</tr>
<tr>
<td>11</td>
<td>U. MD, Baltimore</td>
<td>243,867</td>
</tr>
<tr>
<td>12</td>
<td>Vanderbilt U.</td>
<td>213,529</td>
</tr>
</tbody>
</table>

U MB, JHMI Research Expenditures

Year

2010 | 2011 | 2012 | 2013
---|---|---|---
632,512 | 662,694 | 686,622 | 640,574
495,149 | 562,440 | 581,953 | 571,257
556,555 | 604,889 | 575,575 | 571,174
586,147 | 594,380 | 602,521 | 559,210
260,059 | 306,566 | 261,648 | 288,361
244,330 | 267,182 | 271,131 | 279,564
313,816 | 280,343 | 287,691 | 270,587
243,794 | 268,279 | 268,228 | 260,356
209,987 | 215,448 | 225,290 | 259,468
243,867 | 245,498 | 251,374 | 252,023
213,529 | 244,872 | 248,196 | 249,327

MDC LLC Proprietary (NSF data)
MDC Objectives

- **LEVERAGE** the extraordinary research talent base at UMB and UMCP and UMBC (and JHU, and NIH, etc.)

- **COMPLEMENT** the Tech Transfer Offices as a company “generator”

- **FOCUS**: Devices - much less costly than therapeutics and diagnostics to develop and much faster to market

- **PRINCIPLES**:
  1. Device design, development, manufacturing creates value through company formation and employment;
  2. Build around the inventors – no to the “one person, one company” model
  3. Shared engineering, management, finance, ..., until the companies can “graduate”
Initial Technical Areas

- **Pulmonology** (A. Iacono, J. Wolf)
  - EO2 - Emergency oxygenation catheter

- **Otorhinolaryngology - Head & Neck Surgery** (J. Wolf)
  - SONOSA – Detection and location of OSA

- **Vascular Surgery** (R. Sarkar)
  - Emergency femoral arterial cannulation
  - Smart tourniquet
  - Magnetic tracking device

- **General Surgery** (J. Pearl)
  - Thermal Endoscope
  - Video analytics for surgery

- **Sleep health** (G. Blankenship, M. Upender)
  - Sleep health monitoring and coaching (wearables)

- **Connected Care** (G. Blankenship, R. Singhvi, A. Iacono)
  - Remote patient monitoring direct to clinician
  - Patient concierge systems
  - Vaccine compliance
Pipeline (many, many opportunities)

1. **Surgical Vision, LLC**: Thermal endoscope, surgical video analytics (Pearl)
2. **Awarables, Inc.**: Wearable sensors for sleep health (Blankenship)
3. **Relixia, LLC**: Vaccination compliance (Singhvi, Blankenship)
4. **Tesserae, LLC**: SONOSA detection of sleep apnea device (Wolf)
5. **EO2**: Emergency oxygenation device (Iacono, Wolf)
6. **Vascular Technologies**: Arterial cannulation tool (Sarkar)
7. Total body fluid balance system (Iacono)
8. Safe pharmaceutical dispenser (Walker, Blankenship)
9. Remote ICU patient monitoring (Iacono)
10. **ClearMind**: Blood testing for schizophrenics (Kelley, Ben-Yoav)
11. **GlycoT Therapeutics, LLC**: Reagents and antibody modification (Wang UMCP)
12. Aortic soft clamp (Salenger)
13. Coaptive Ultrasound (Tropello)
14. Connected Care Systems – facility-clinician-patient engagement service (Blankenship)
15. Fall-E – patient safety system (Srinivasan, Blankenship)
MDC Company Structure

Harbor Designs
Root3 Labs
Mobomo Software
Adv Systems USA

Performance Partners

MDC

Investment Partners

Founders
Abell Foundation
UM Foundation
UMB OTT
Venture Groups

Relixia 15%

Awarables 15%

Surgical Vision 15%

Tesseract 25%

Vascular Technologies

SONOSA Apnea

Arterial Cannulation

Safe Medications

Safe Pharma Dispenser

Other Projects

Vaccine Compliance

Sleep Analytics

Thermal Endoscope

Emergency Oxygenation

Smart touriquet

Safe Mind
Blood Testing

Ultrasound Gastrostomy

Aortic soft clamp

Ultrasound Gastrostomy

Vascular Technologies

SONOSA Apnea

Arterial Cannulation

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Ultrasound Gastrostomy
MDC Company: Surgical Vision Systems LLC

- **Need:** Imaging during laparoscopic surgery
  - Current technology: Fluoroscopy
    - Slow, radiation hazard, limited reimbursement
  - Alternate: Thermal imaging
    - Alternate view of the operating field
    - “One hand” procedure

- **Market:**
  - 40,000 laparoscopic cameras and over 100,000 laparoscopes sold each year in the US
  - Annual Market: $1.2billion worldwide
  - Stryker has 70% of the market – possible exit path, acquisition by Stryker

- **Opportunity:** We were able build and test a prototype in 9 months with a $100,000 TEDCO MII Phase 1 grant

- **Startup funding:** State + investors $750,000
Leak

Gall stones – thermal

Gall stones – fluoroscope

Project start: June 2014
Animal trial March 2015
Trial cost: $2,500
Confirmed product viability

[Faster, cheaper, better]
MDC Company: Tesserae Medical LLC

- **Need:** New test for Obstructive Sleep Apnea

- **Market:**
  - 18 million Americans with OSA
  - Rivals diabetes in scope

- **Opportunity:**
  - Sleep lab testing ($4billion) is expensive and outmoded
  - Home testing will become the new standard
  - Current home sleep test equipment cumbersome, expensive

- **Current cost of OSA in US = between $60 and 165 billion due to overlap with other chronic illnesses.**
Intersection with other chronic disorders

Total cost of OSA treatment = between $60 and 165 billion due to overlap with other chronic illnesses.

Ultrasound image processing to detect, locate the obstruction.

- Airway open
- Airway collapsed
SONographic Diagnostics for Obstructive Sleep Apnea (OSA)

SONOSA has 1/10th the footprint of conventional sleep systems
MDC Fund Raising

- Startup funding
  - $250,000 partners
  - $100,000 University of Maryland

- Raising $7.5 million for initial development – Use of funds:
  - $2.5 million for MDC staff and operations, years 1 and 2
  - $550,000 for Awarables SleepFit for pilot testing and market entry
  - $650,000 investment in Surgical Vision Systems for product design, license, and market entry
  - $450,000 for design, development, testing of EO2 Apneic Oxygenation Catheter, substantial later investment if successful
  - $500,000 for Tesseractae Medical, LLC for device design, development, and testing, substantial later development if successful
  - $250,000 for Vascular Technologies, LLC for Femoral Artery Cannulation device design, development, testing
  - Reserve fund for licenses, patents, investments and expansion

- Will raise an additional fund over the next 2 years – goal $20 to $50 million
Initial Milestones for MDC

1. **Establish baseline capability** to develop multiple (5) prototypes (12 months)
   - Design, Engineering, Testing, Market assessment
     - Surgical vision thermal endoscope;
     - Sleep technology, wearables, OSA, and treatment;
     - EO2;
     - Arterial cannulation;

2. **Market entry** (18 months) with 2 companies, 2 others in development
   - Sleep analytics
   - Thermal endoscope

3. **Staff**: 10-15, engineers, technicians, business development, management

4. **Office and facilities** – Baltimore, near the UM Medical Center
A Model: TRX Systems, Inc.

TRX Customers & Partners

Motorola Solutions

• Deliver 3D indoor location, sensor fusion, mapping, and ranging solutions

• Market focus is defense, federal, and public safety personnel

The University “enabled” this company

Many national awards