Agenda Item 2

Featured Start-Up – Maryland Development Center, LLC

BOARD OF REGENTS

SUMMARY OF ITEM FOR ACTION
INFORMATION OR DISCUSSION

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.

COMMITTEE RECOMMENDATION: DATE:

BOARD ACTION: DATE:

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

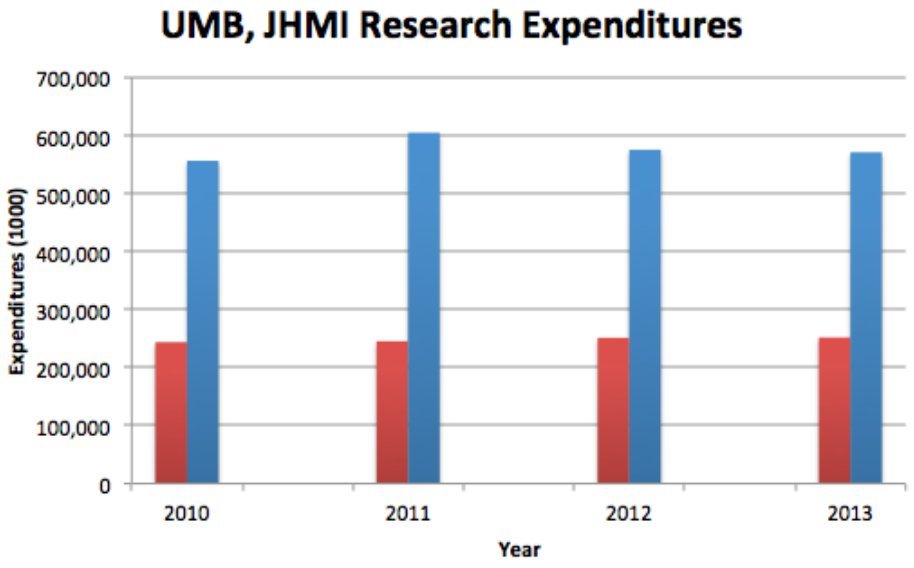
(AUTM data 2013 Total research funding)

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

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

Maryland is 1st in the country in R&D plant facilities

A Great Opportunity: $1 billion Medical Research Funding in Baltimore



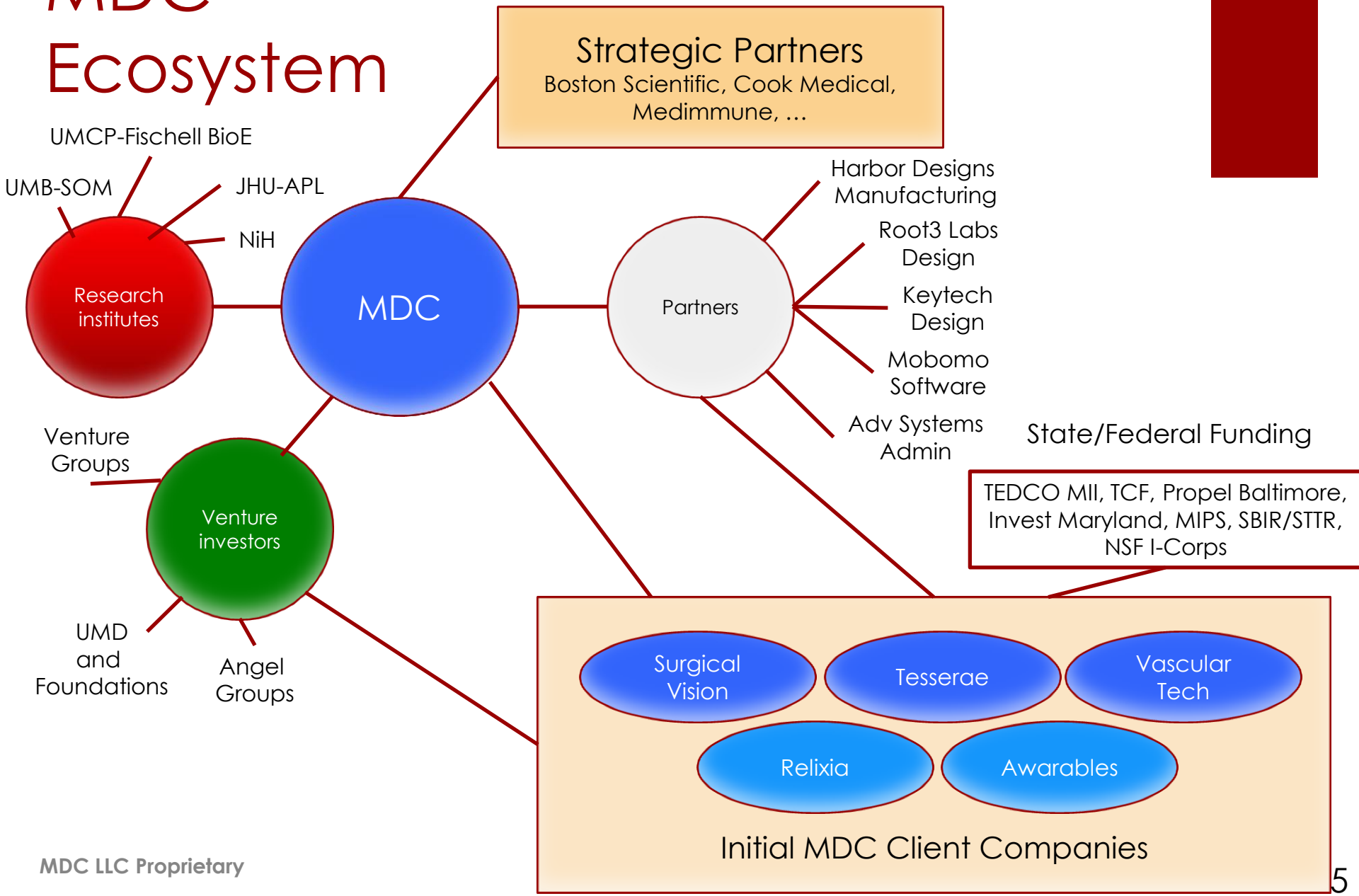
Rank	Institution				
	All institutions				
1	U. CA, San Francisco				
2	U. CA, Los Angeles	632,512	662,694	686,622	640,574
3	U. CA, San Diego	495,149	562,440	581,953	571,257
4	Johns Hopkins U.[3]	556,555	604,889	575,575 i	571,174
5	Duke U.	586,147	594,380	602,521	559,210
23	OH State U.	260,059	306,566	261,648	288,361
24	U. Cincinnati	244,330	267,182	271,131	279,564
25	Yeshiva U.	313,816	280,343	287,691	270,587
26	Case Western Reserve U.	243,794	268,279	268,228	260,356
27	Baylor C. of Medicine	209,987	215,448	225,290	259,468
28	U. MD, Baltimore	243,867	245,498	251,374	252,023
29	Vanderbilt U.	213,529	244,872	248,196	249,327

(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"

MDC Ecosystem



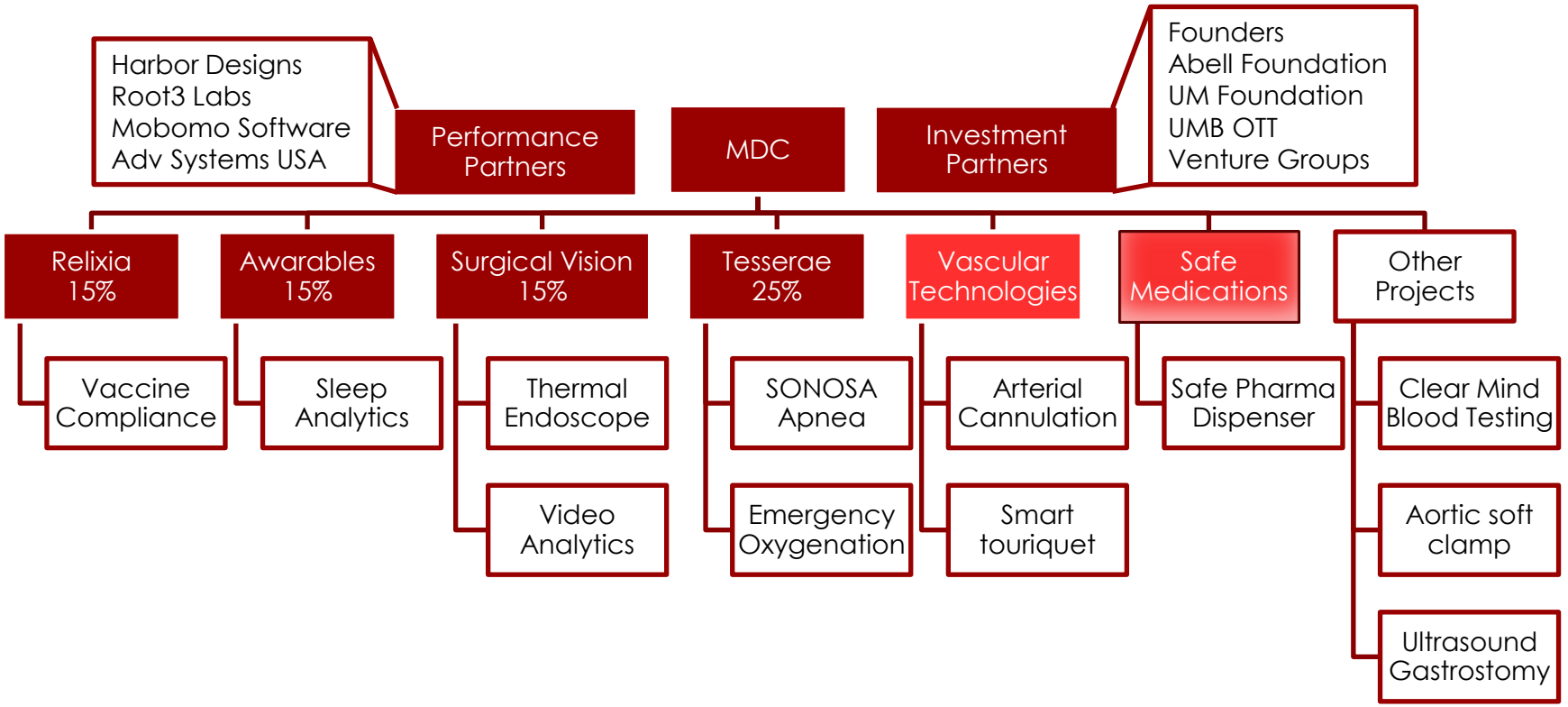
Initial Technical Areas

- **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

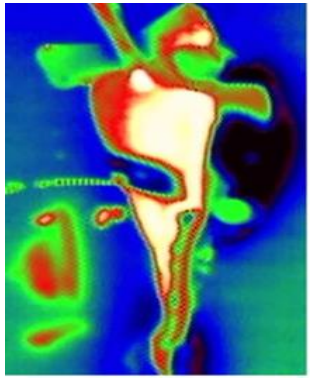
Pipeline (many, many opportunities)

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, Blankenshiip)
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)

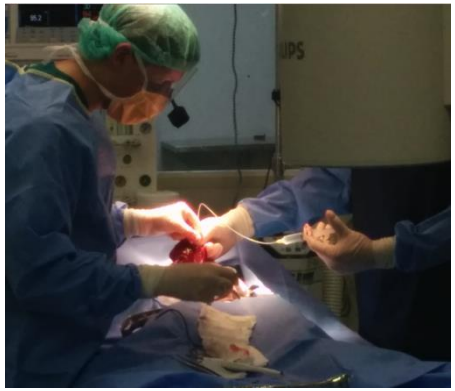
MDC Company Structure



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



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

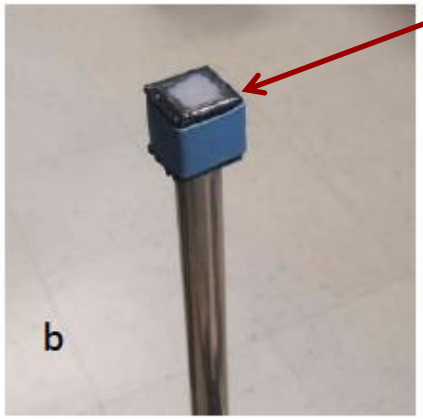
[Faster, cheaper, better]

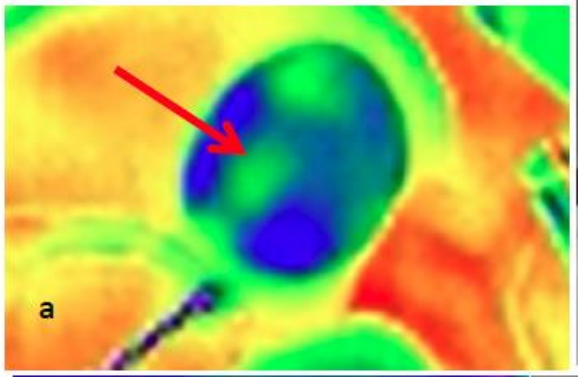
SVS Thermal Endoscope Version 0.5

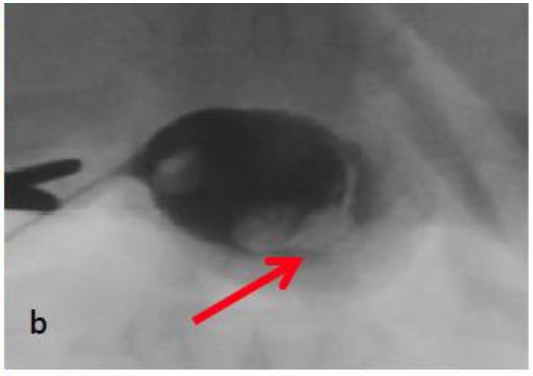
Sensor

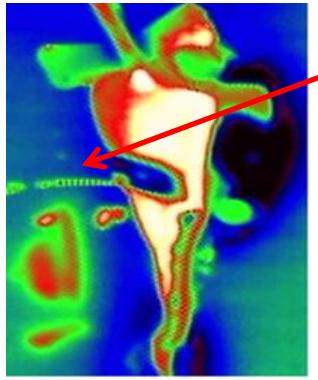
J. Pearl Testing

Stryker Endoscope









Leak

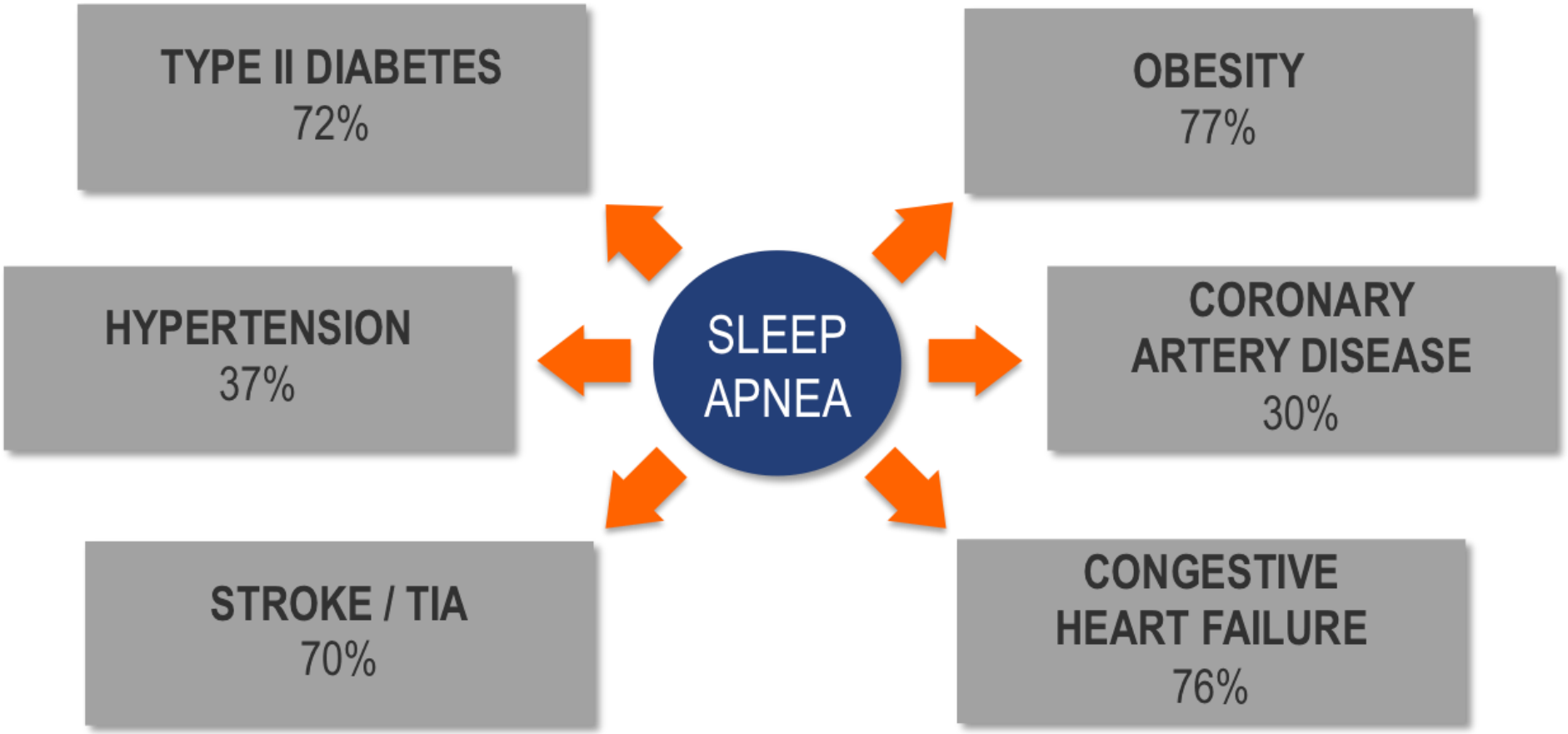
Gall stones – thermal

Gall stones – fluoroscope

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.

Dyken et al "Investigating the relationship between stroke and obstructive sleep apnea." *Stroke* 27.3 (1996): 401-407.

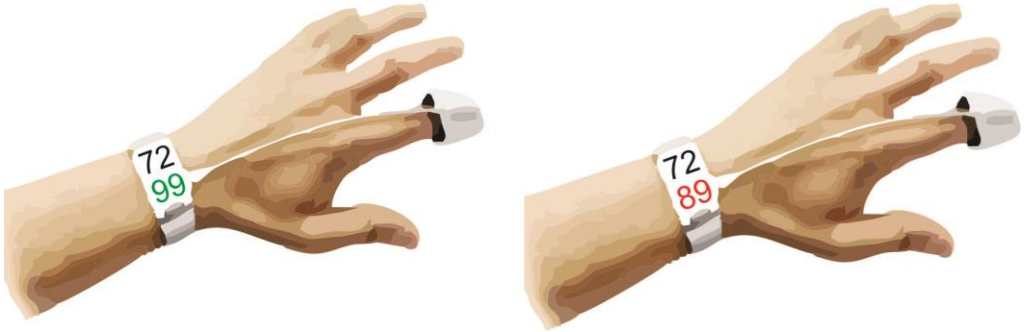
SONOSA

Ultrasound image processing to detect, locate the obstruction

Airway open

Airway collapsed

SONographic Diagnostics for Obstructive Sleep Apnea (**OSA**)



Current testing system

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 Tesserae 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

Tentative

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

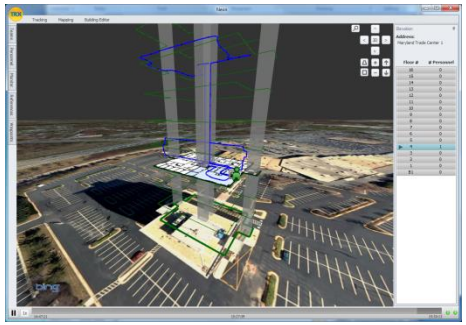
Founded by Gil Blankenship, Carole Teolis, Ben Funk, Amrit Bandy

A Model: TRX Systems, Inc.

TRX Customers & Partners

Motorola Solutions

Metropolitan Emergency Communications Center (Fire/EMS)



- Deliver *3D indoor location, sensor fusion, mapping,* and *ranging* solutions
- Market focus is defense, federal, and public safety personnel

The University "enabled" this company

Edison award

Many national awards