Bringing innovation to patient

It is possible !!

Henry Ho

Head & Senior Consultant Urologist, SGH

Director, Medical Technology Office, Singhealth

Adj. Associate Professor, DUKE-NUS medical school

Robotic oncology fellowship, University of Innsbruck, Austria

Endourology fellowship, Hamburg, Germany

Biodesign scholarship, Stanford University, USA

Declarations

Biobot Surgicals (Singapore) Pte Ltd

– Medical Advisory Board & Shares

(Chris Cheng, John Yuen, Henry Ho)

Singhealth intellectual property patent

Clinician-innovator

Doctors, Nurses, Allied health, Administrator, BME engineers

- Clinically -related domain work 70 - 80%
  Source of need / inspiration / Idea

- Top clinical (Domain) opinion
  Predict future trends

- Can solve the problem in one's lifetime

DIVISION OF INNOVATION & TRANSFORMATION

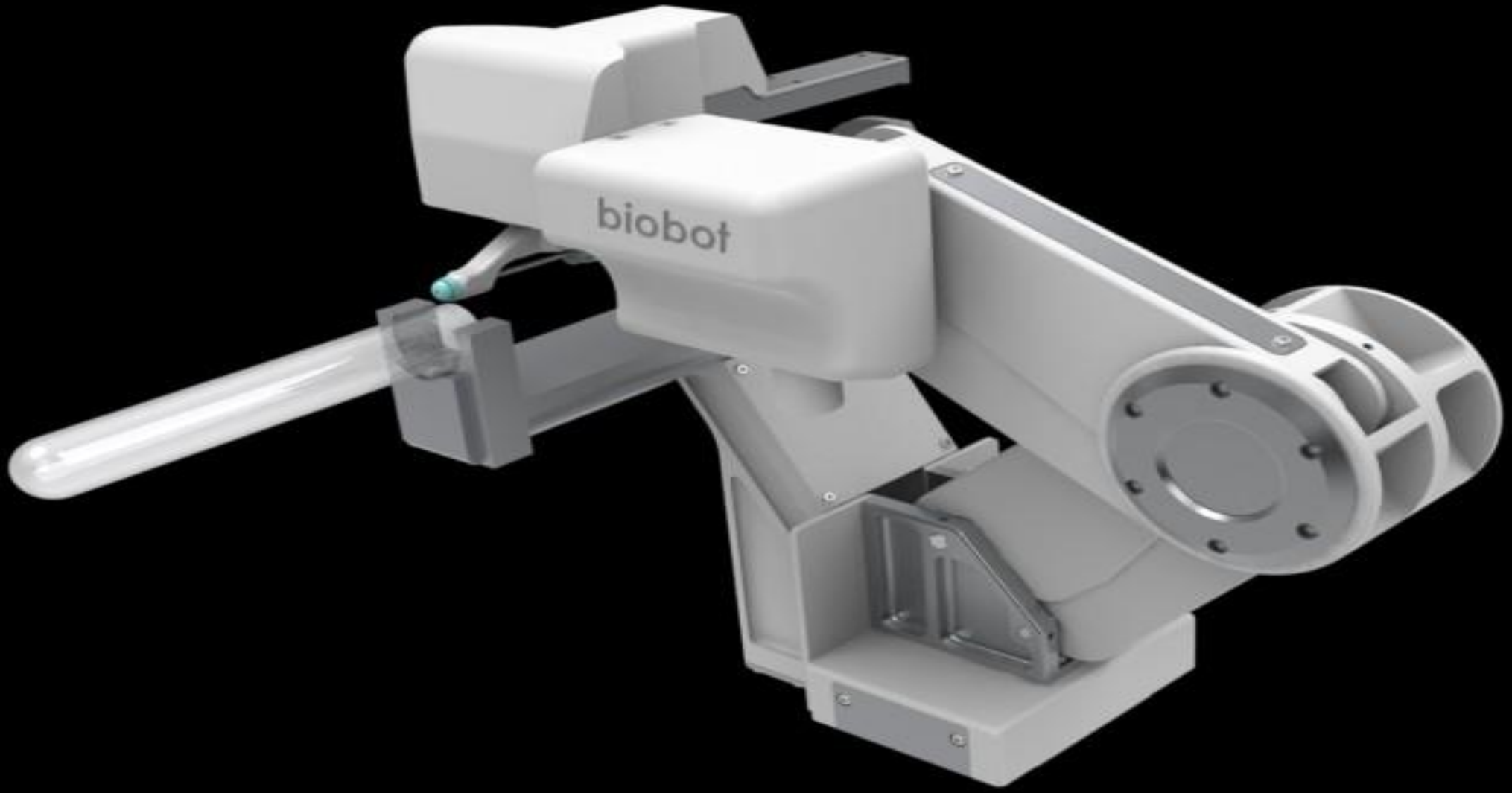
SingHealth

Overview

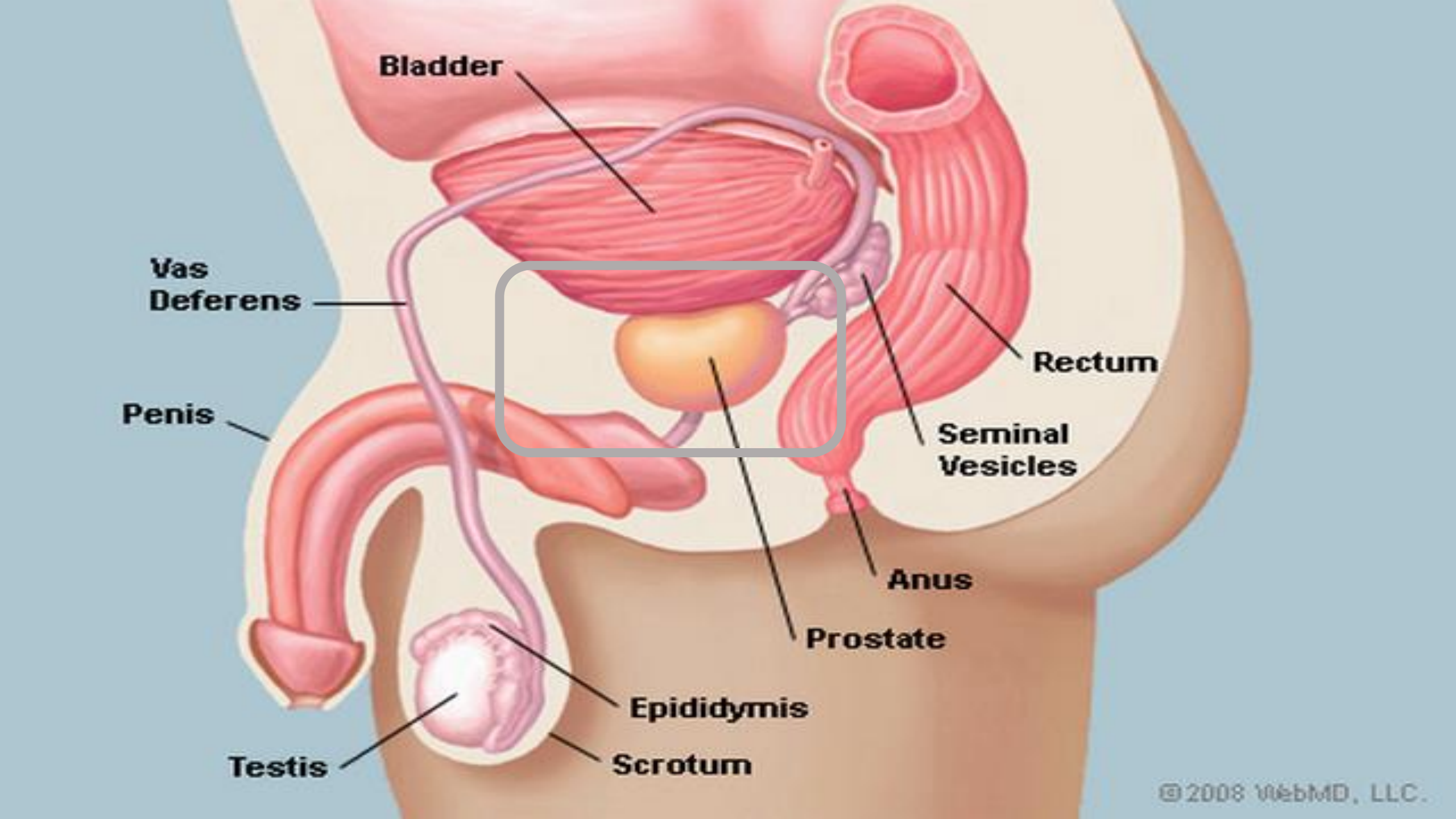
1. Clinician-innovator journey

2. SingHealth Innovation Enablers

Mona Lisa™



Biobot Surgicals Pte Ltd



TOP 10 CANCERS

diagnosed in Singapore[1]

FEMALES

(Total 26,570)

1.	Breast	29%
2.	Colorectal	14%
3.	Lung	8%
4.	Corpus uteri	6%
5.	Ovarian	6%
6.	Skin	4%
7.	Stomach	4%
8.	Cervical	4%
9.	Lymphoma	4%
10.	Thyroid	3%

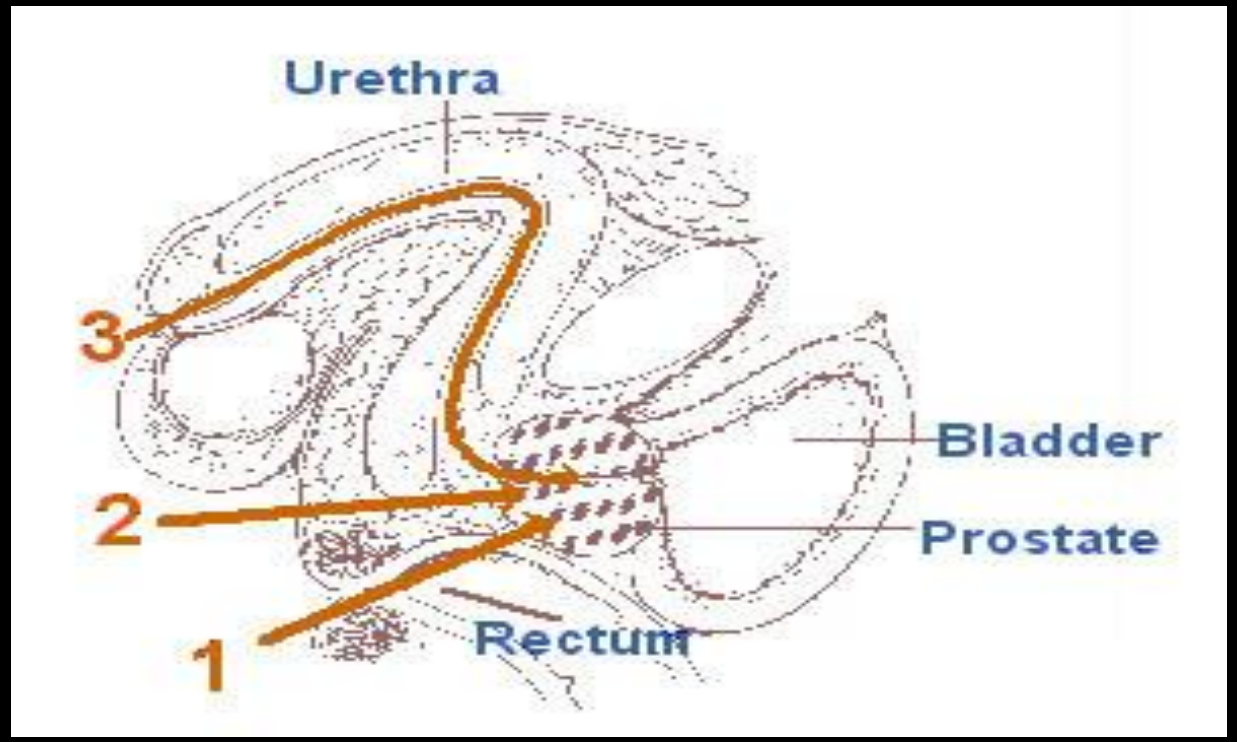
MALES

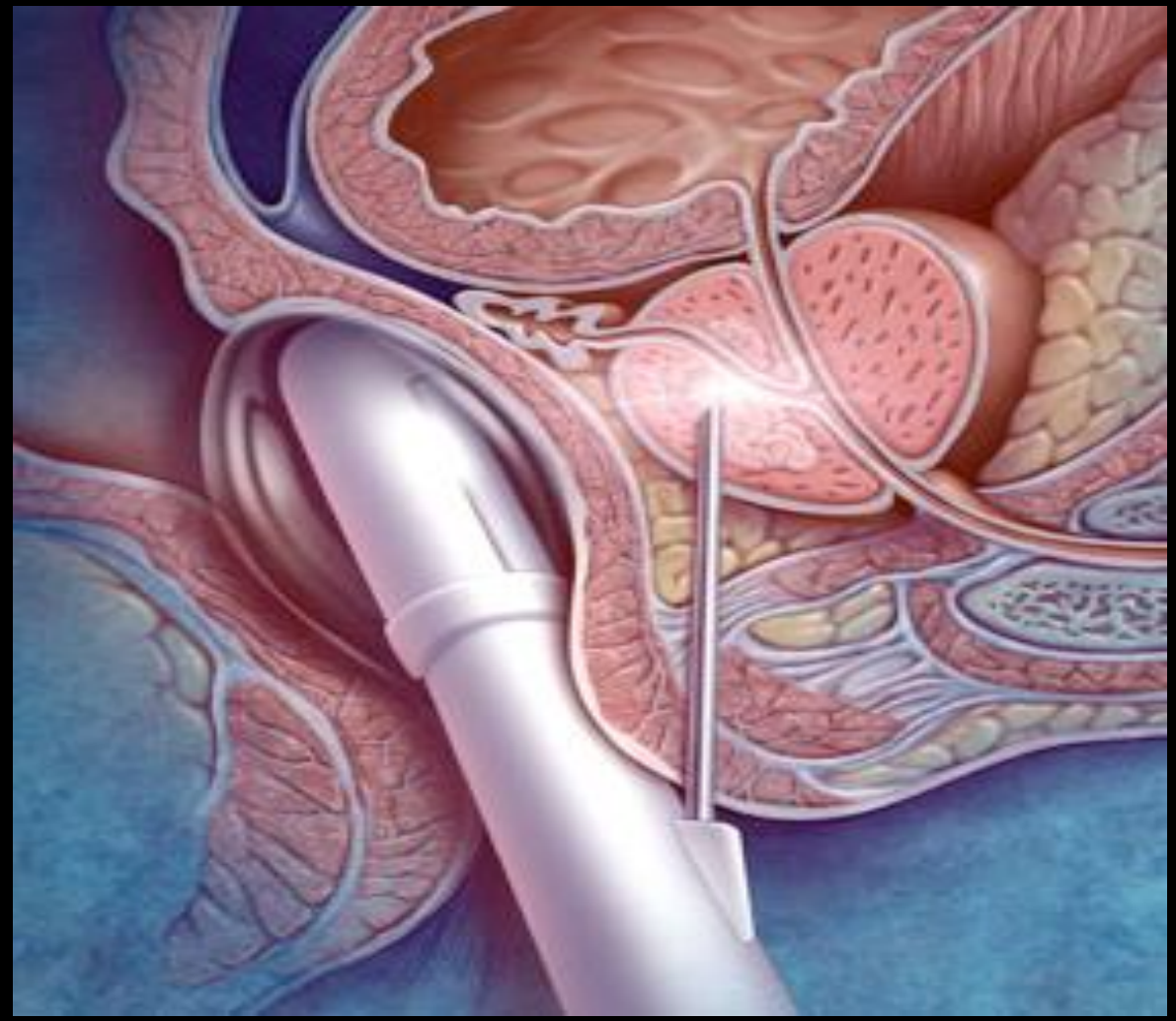
(Total 25,087)

1.	Colorectal	18%
2.	Lung	16%
3.	Prostate	11%
4.	Liver	8%
5.	Stomach	6%
6.	Skin	6%
7.	Lymphoma	5%
8.	Nasopharyngeal	5%
9.	Kidney	3%
10.	Urinary bladder	3%

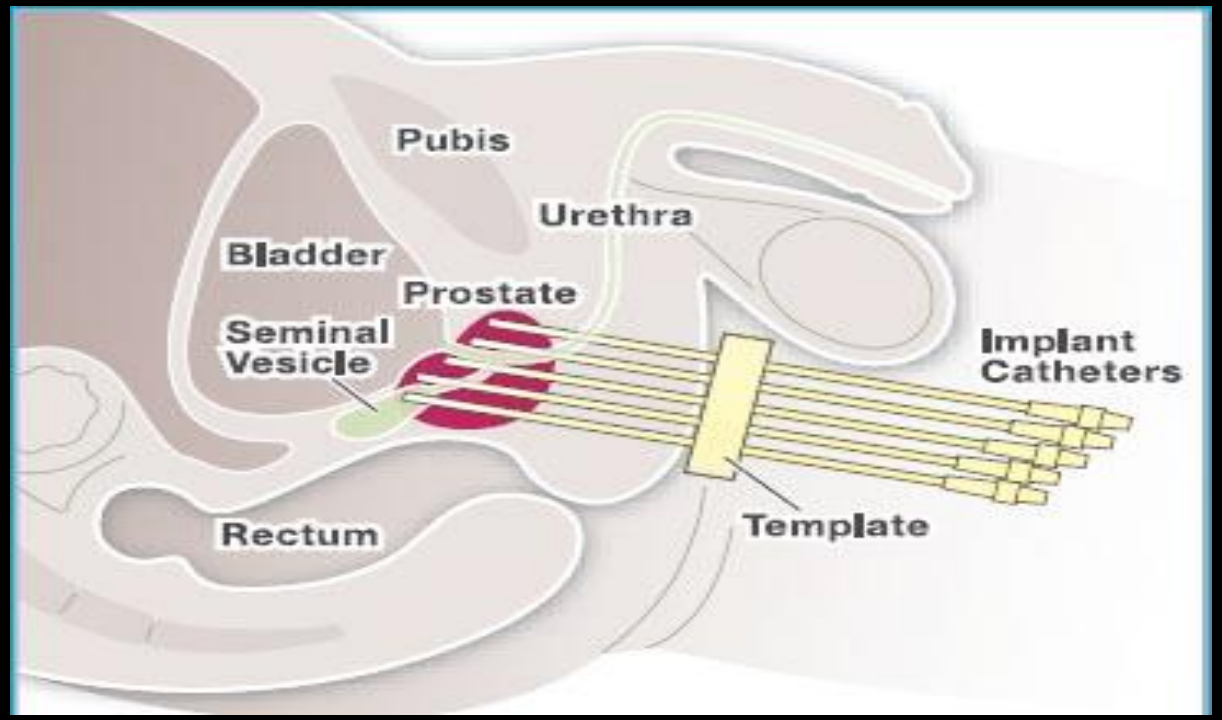
[1] *Singapore Cancer Registry, Interim Annual Registry Report: Trends in Cancer Incidence in Singapore, 2006 - 2010*

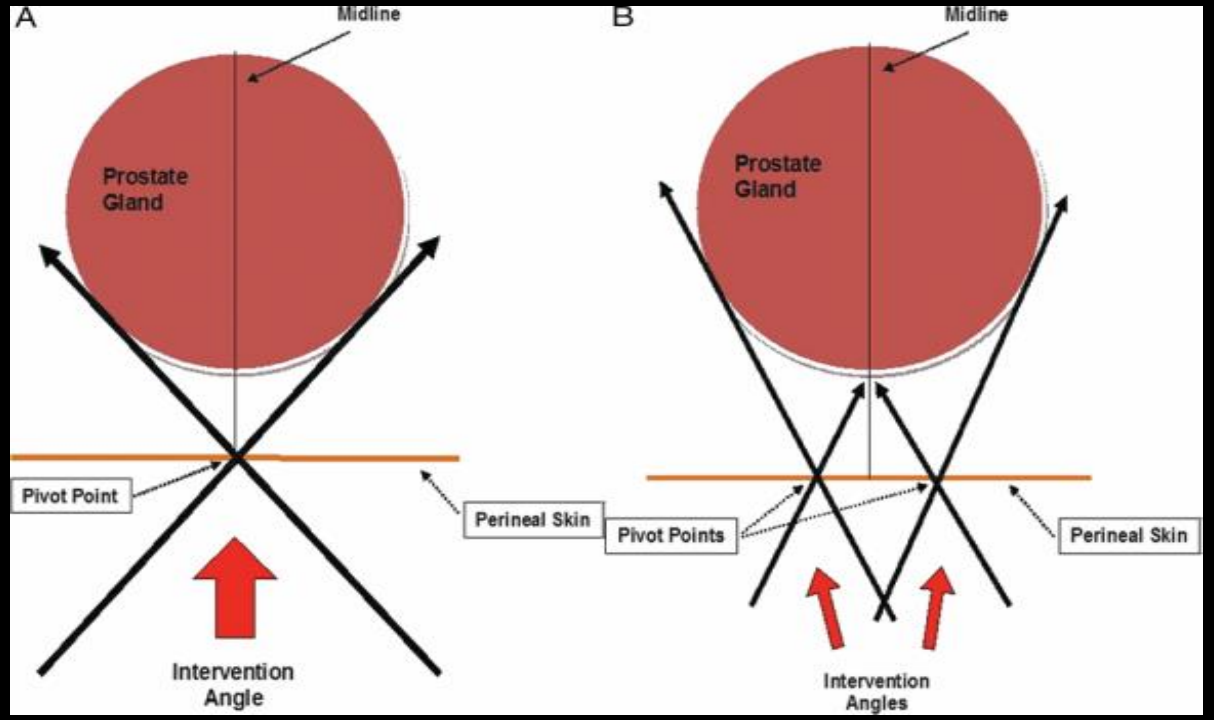
Clinical Needs





Clinical Needs

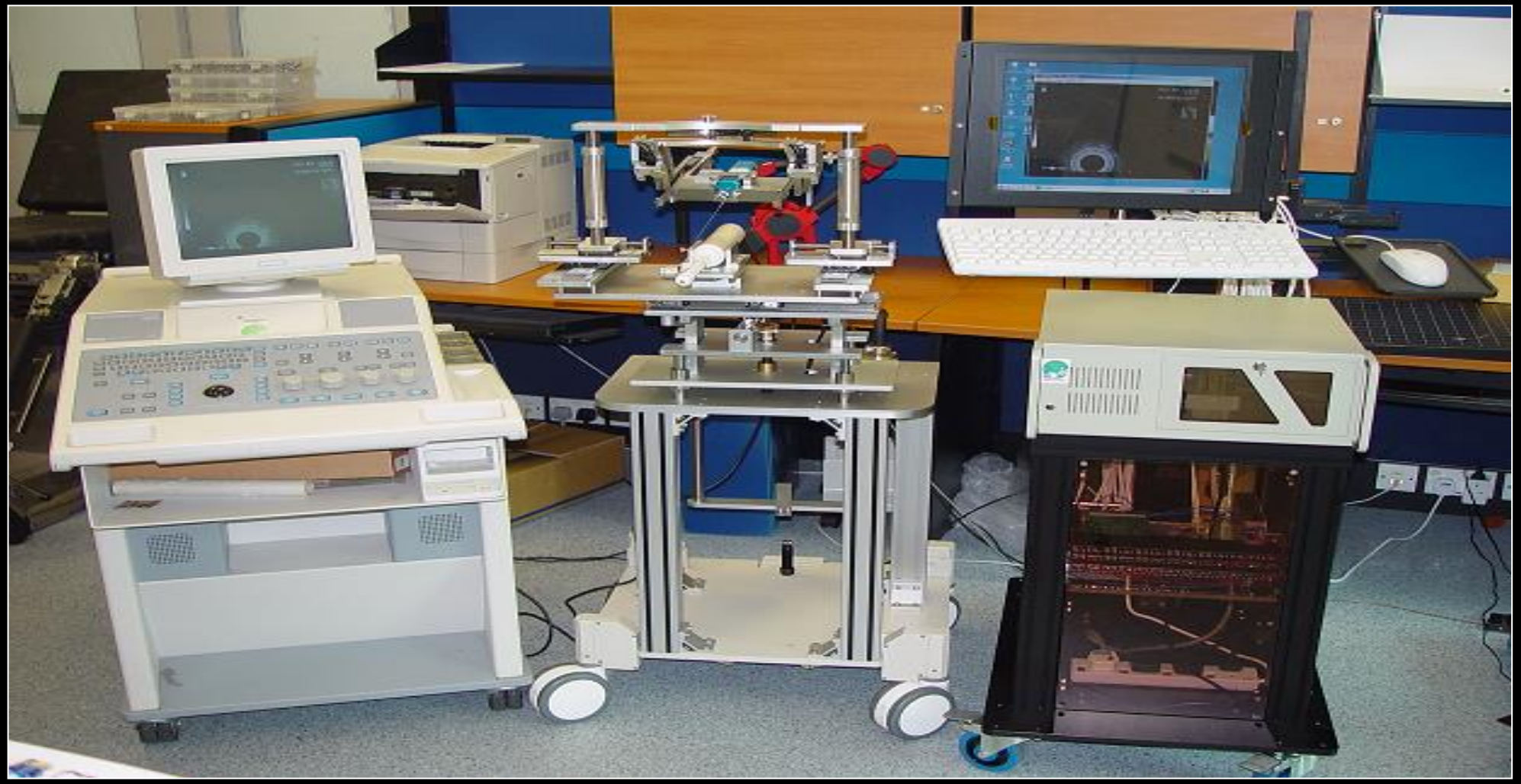




Mohan P et al. A 3D computer simulation to study the efficacy of transperineal versus transrectal biopsy of the prostate. JCARS 2007

NMRC 0537 / 2001

Clinical Needs



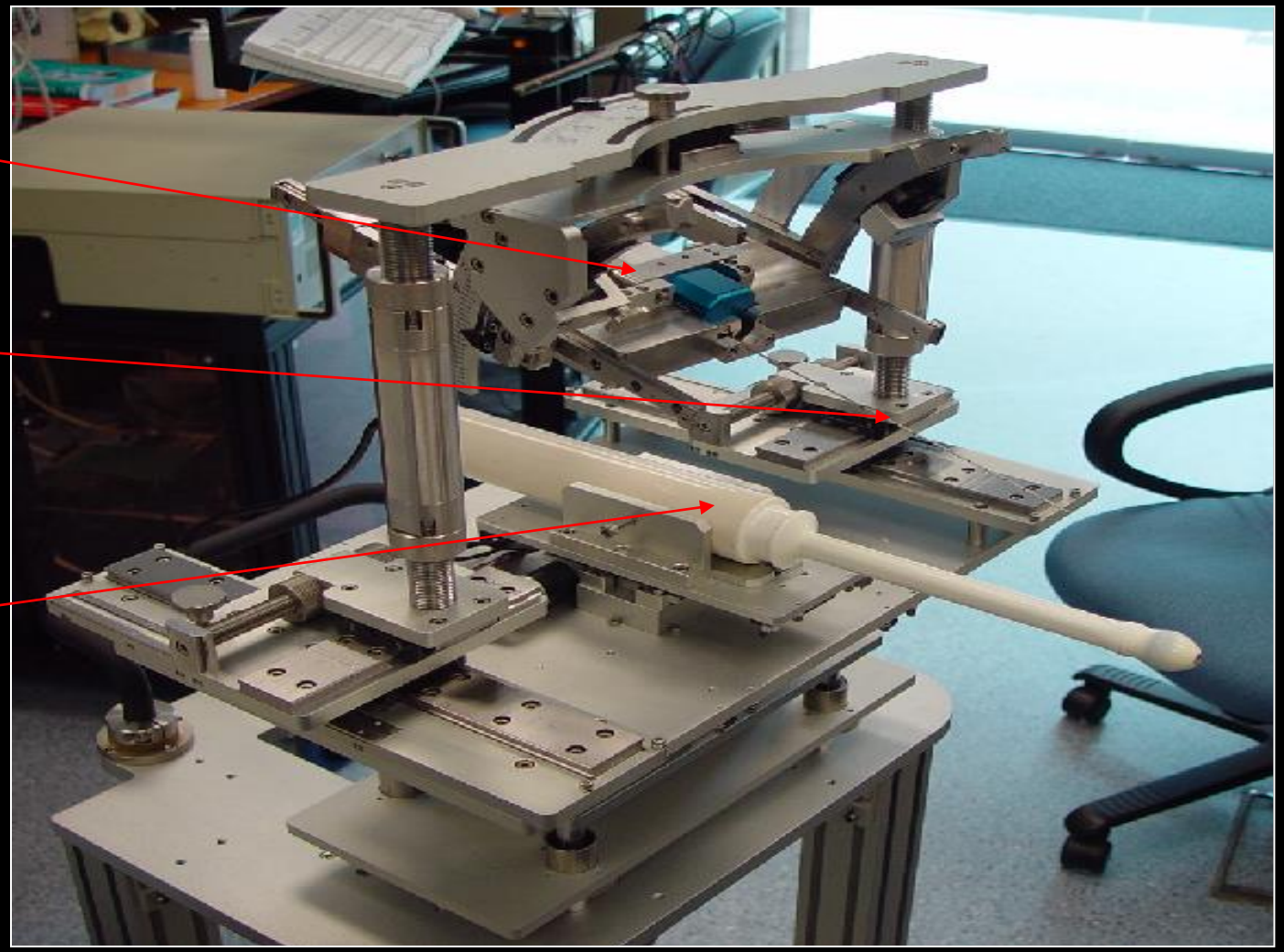
NMRC 0537 / 2001

Clinical Needs

Biopsy Gun

Biopsy Needle

Transrectal Ultrasound Probe



NMRC 0537 / 2001

NMRC 0859 / 2004

Clinical Needs

Animal Trials

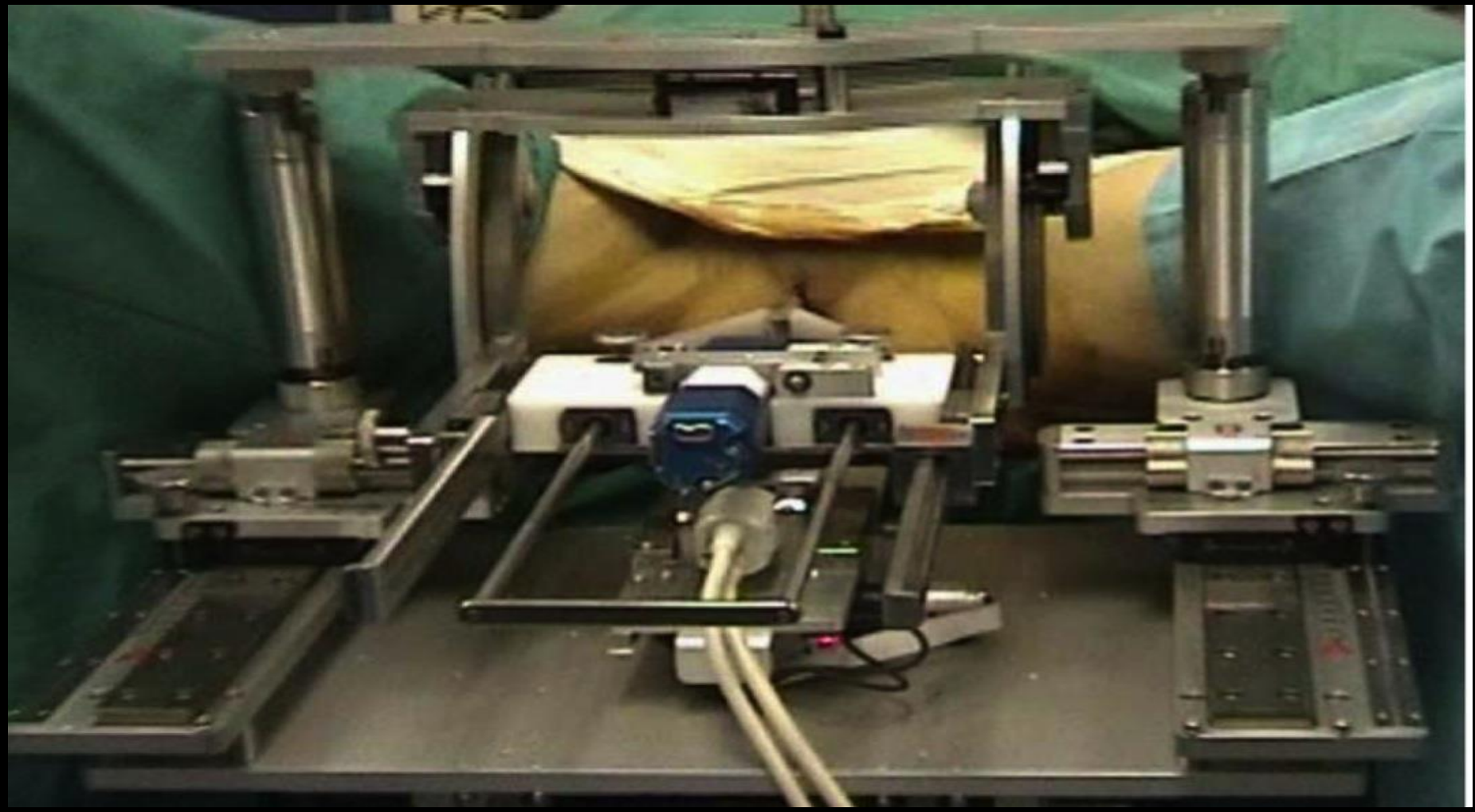
NMRC 0537 / 2001

NMRC 0859 / 2004

Clinical Needs

Animal Trials

Cadavers Trials



NMRC 0537 / 2001

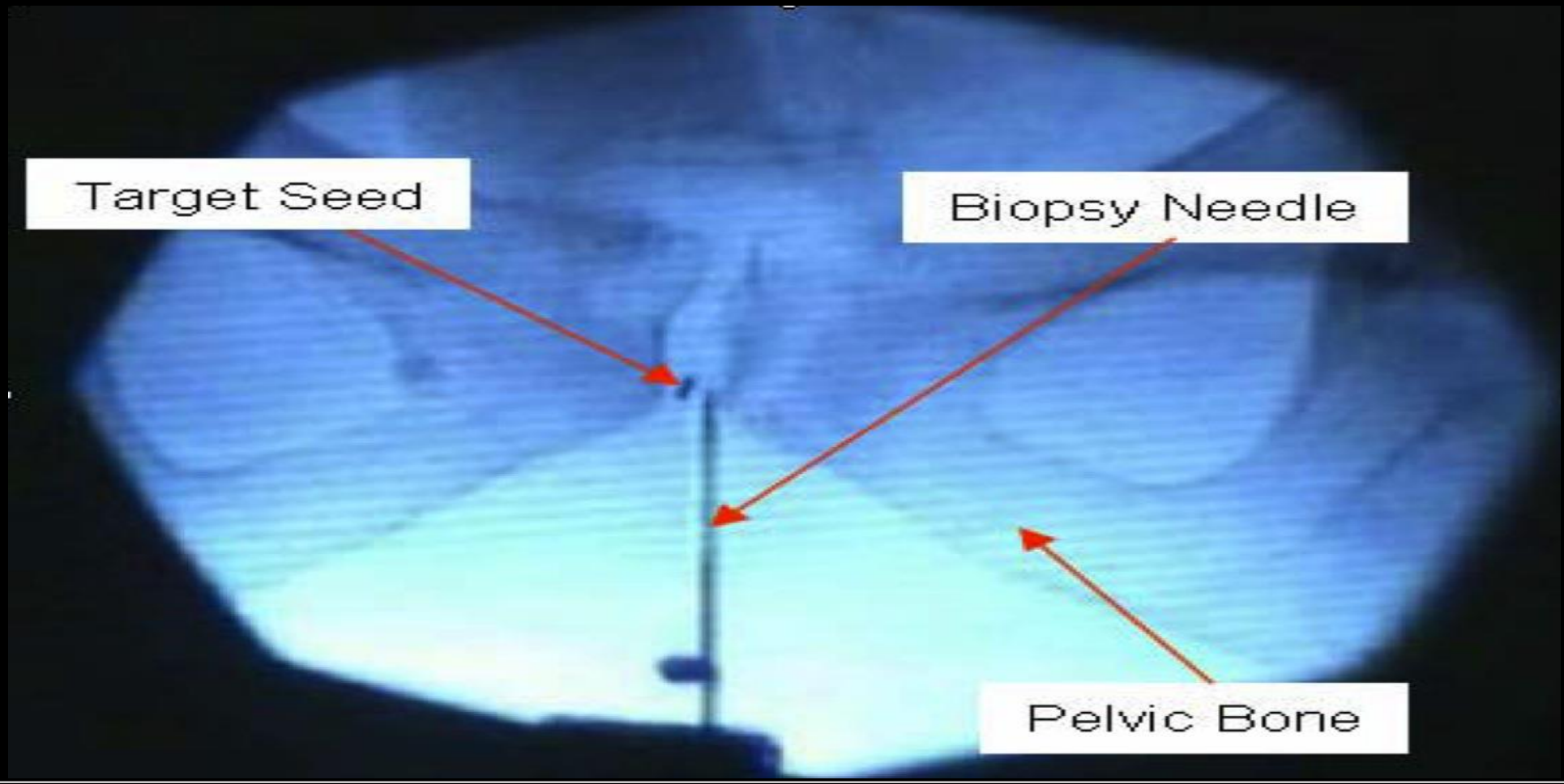
NMRC 0859 / 2004

FUNDS run out

Clinical Needs

Animal Trials

Cadavers Trials



TEC success 2006

NMRC 0537 / 2001

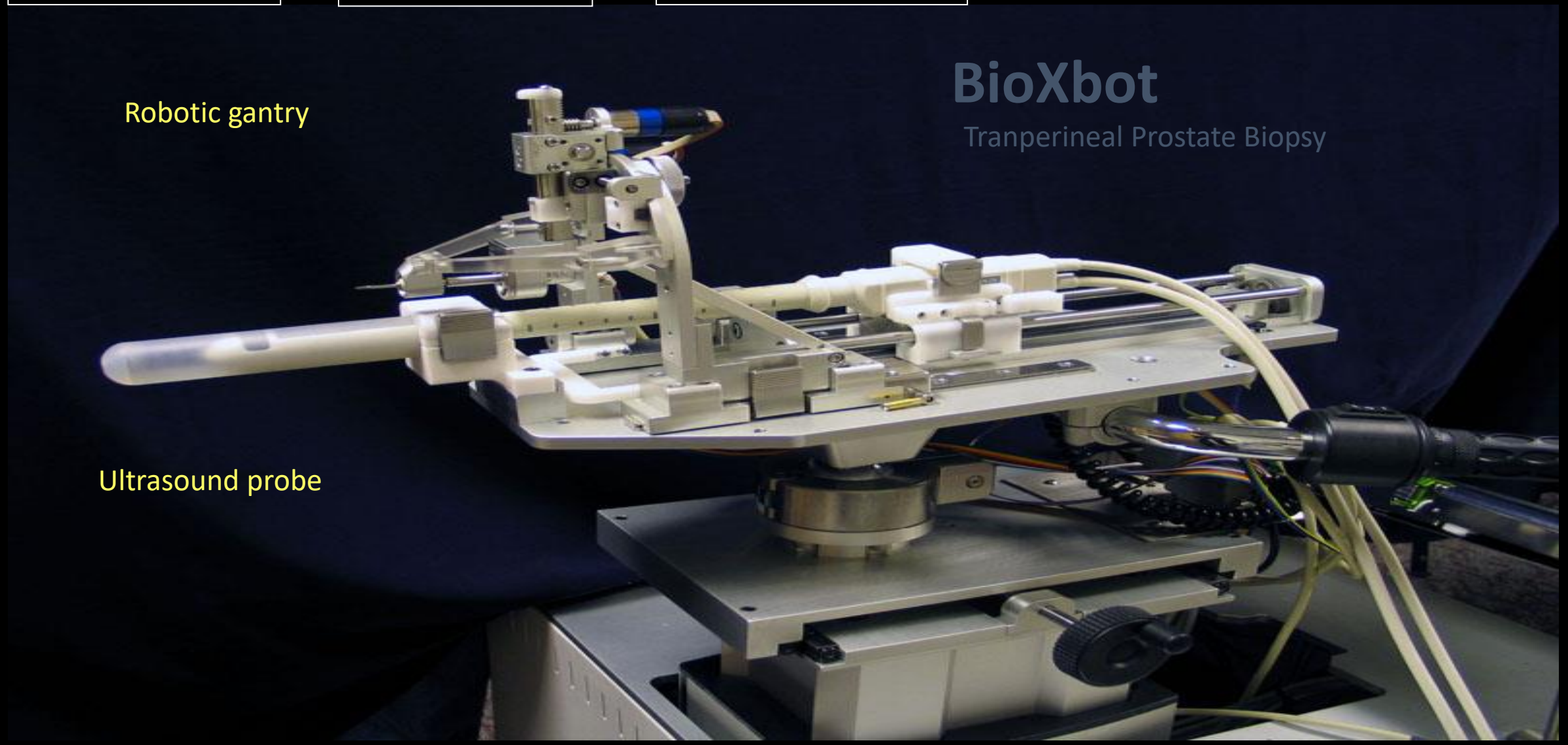
NMRC 0859 / 2004

TEC 2006

Clinical Needs

Animal Trials

Cadavers Trials



NMRC 0537 / 2001

NMRC 0859 / 2004

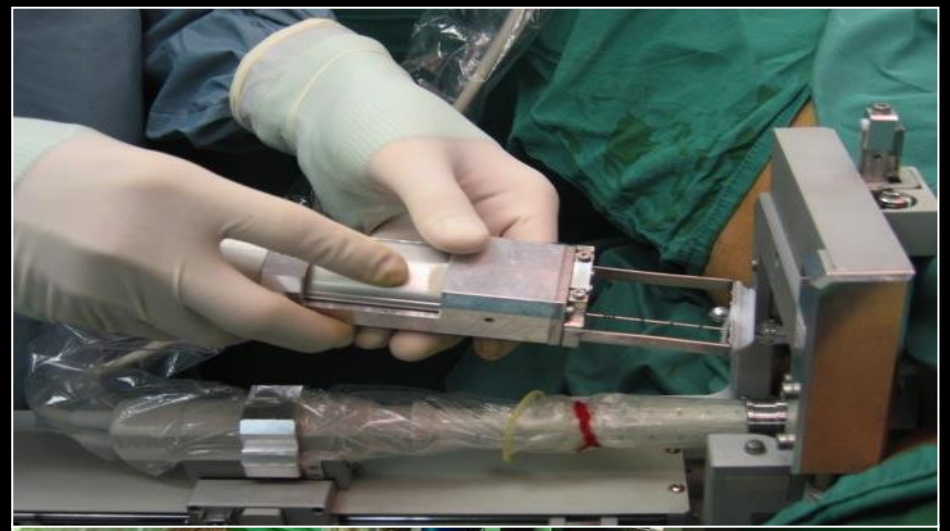
TEC 2006

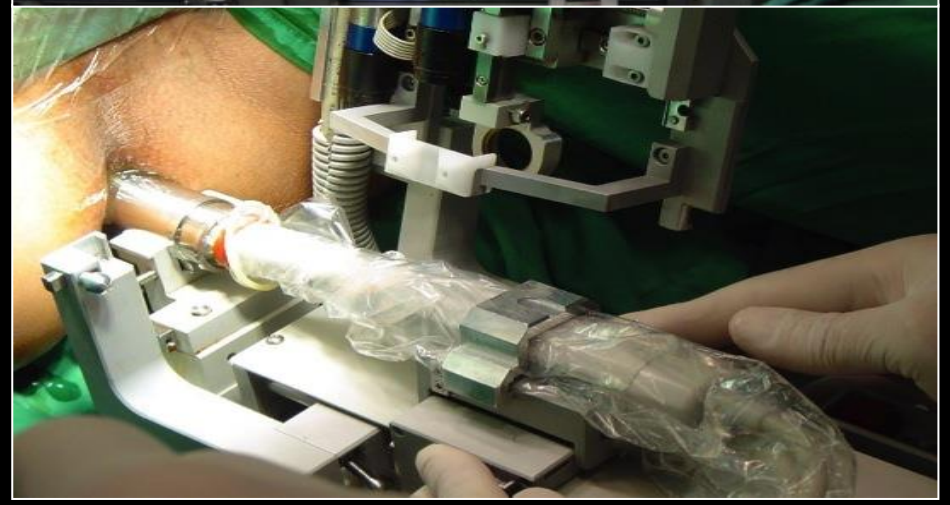
SingHealth IRB 163/2006

Clinical Needs

Animal Trials

Cadavers Trials





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SingHealth IRB 163/2006

Clinical Needs

Animal Trials

Cadavers Trials

2009 SingHealth / NTU IP License

Biobot Surgicals pte Ltd
SPRING

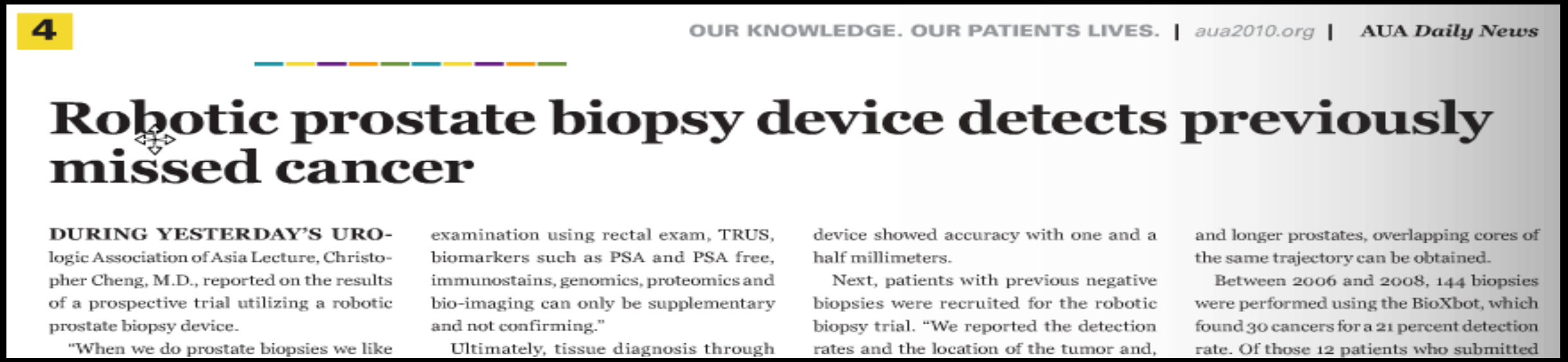
2009 SingHealth / NTU IP
License

biobot

Biobot Surgicals pte Ltd
SPRING

2009 SingHealth / NTU IP License

2010 AUA Mona Lisa™ academic launch



4 OUR KNOWLEDGE. OUR PATIENTS LIVES. | aua2010.org | AUA Daily News

Robotic prostate biopsy device detects previously missed cancer

DURING YESTERDAY'S URO-logic Association of Asia Lecture, Christopher Cheng, M.D., reported on the results of a prospective trial utilizing a robotic prostate biopsy device.

"When we do prostate biopsies we like examination using rectal exam, TRUS, biomarkers such as PSA and PSA free, immunostains, genomics, proteomics and bio-imaging can only be supplementary and not confirming."

Ultimately, tissue diagnosis through device showed accuracy with one and a half millimeters.

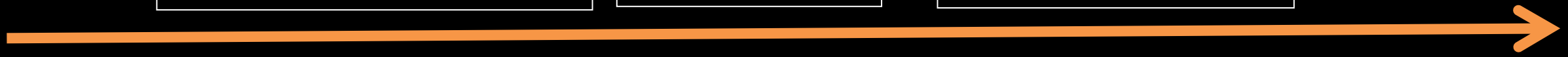
Next, patients with previous negative biopsies were recruited for the robotic biopsy trial. "We reported the detection rates and the location of the tumor and, and longer prostates, overlapping cores of the same trajectory can be obtained.

Between 2006 and 2008, 144 biopsies were performed using the BioXbot, which found 30 cancers for a 21 percent detection rate. Of those 12 patients who submitted

Biobot Surgicals pte Ltd
SPRING

2011
FDA approval

2012
CE mark approval



2009 SingHealth / NTU IP License

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Biobot Surgicals pte Ltd
SPRING

2011
FDA approval

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2009 SingHealth / NTU IP License

2010 AUA Mona Lisa™ academic launch

2013 AUA Mona Lisa™ commercial launch

EARLY
DETECTION

7 NEWS

Mona Lisa™ in 2021

Singapore

- SGH
- SKH
- CGH
- NUH
- Mt E

International

- Australia
- Germany
- Italy
- United states

2021:
Biobot X Medbot (China)

Medbot (China) IPO in HK mainboard listing

SingHealth RESEARCH | Medical Technology Office

VISION

To build healthcare-inspired medical devices

MISSION

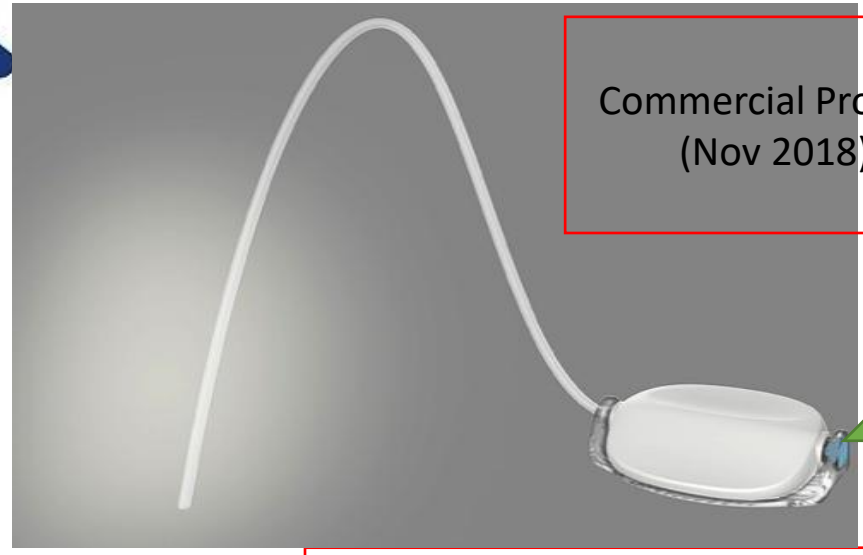
To nurture clinician innovators

SingHealth DukeNUS ACADEMIC MEDICAL CENTRE
Joint Office of Research

Vivo-Surgical Pte Ltd

Unmet Need : a way to provide consistent, focusable light on the operating area for procedures in deep cavities.

KLARO™



Commercial Product (Nov 2018)

50% of surgeons surveyed (12/25) said OT lighting is insufficient

12 surgeons said **more** lighting is needed for **open**, **narrow** and **deep cavities**

3 surgical specialties (Head & Neck, Colorectal & Gynecology) expressed **strong interest** in using a **better** deep cavity lighting device

Specifications

Need Specification	Quantification
Color Temperature	5500K
Brightness	Above 300 Lux
Battery powered	3-4hrs
Sterility	Sterile/Sterilisable
Weight	< 10g
Price	$60-80/item
Reusability	Disposable
Safety	Compliant to regulatory standards EN62471:2008, IEC 60086-4

Design Freeze and Licensing (Jan 2017)

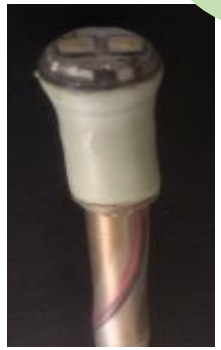
Concept Generation, Prototyping, Testing (Sept 2014-Dec 2016)

2014
SMART
Ignition Grant Winner

2016
NHIC National Health Innovation Centre
I2D Grant Winner

Version 1

Version 2



Version 3


vivoSurgical
Broad Applicability
Gynaecology
Head and Neck
Orthopaedic
Peritoneal
Urology
KLARO™ OFF
KLARO™ ON
vivoSurgical
KLARO™
IN VIVO SURGICAL LIGHTING
Achieve uniform flood-lighting from within surgical cavities
Made in Singapore.
Engineered in Germany.
Designed for Safety & Quality.
In Partnership With
Panasonic
NHIC National Health Innovation Centre
SMART
SingHealth
National Cancer Centre Singapore
Singapore General Hospital
SHENZHEN HAWK
OBS BAISHENG MEDICAL

Singhealth DUKE-NUS Innovation Centre

Multi-functional

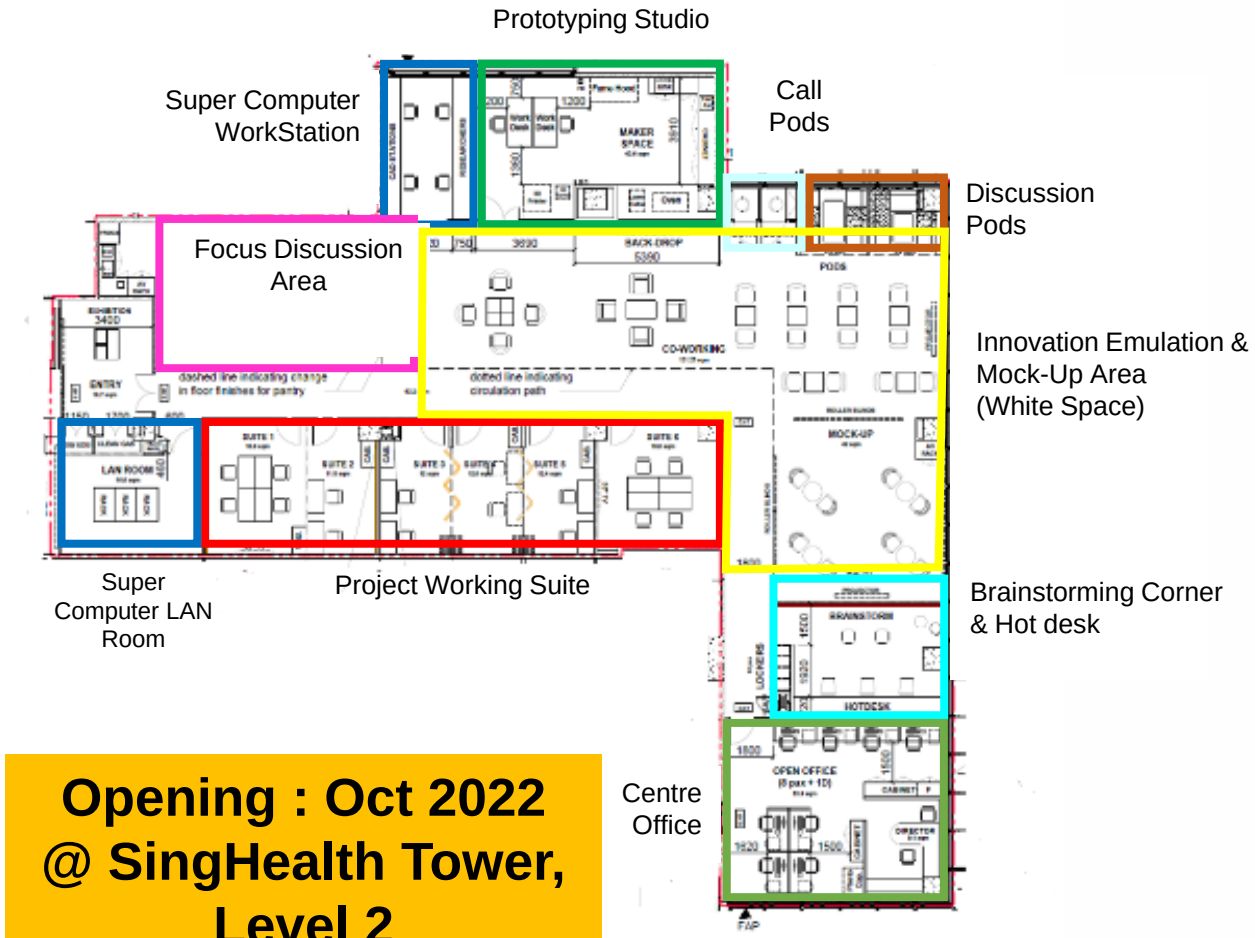
Rapid Prototyping Lab, Super Computers,
Digital Playpen, Project Execution;

Flexible

White Space (Living Lab),
Project mock-up/ Collaboration Engagement

For ALL

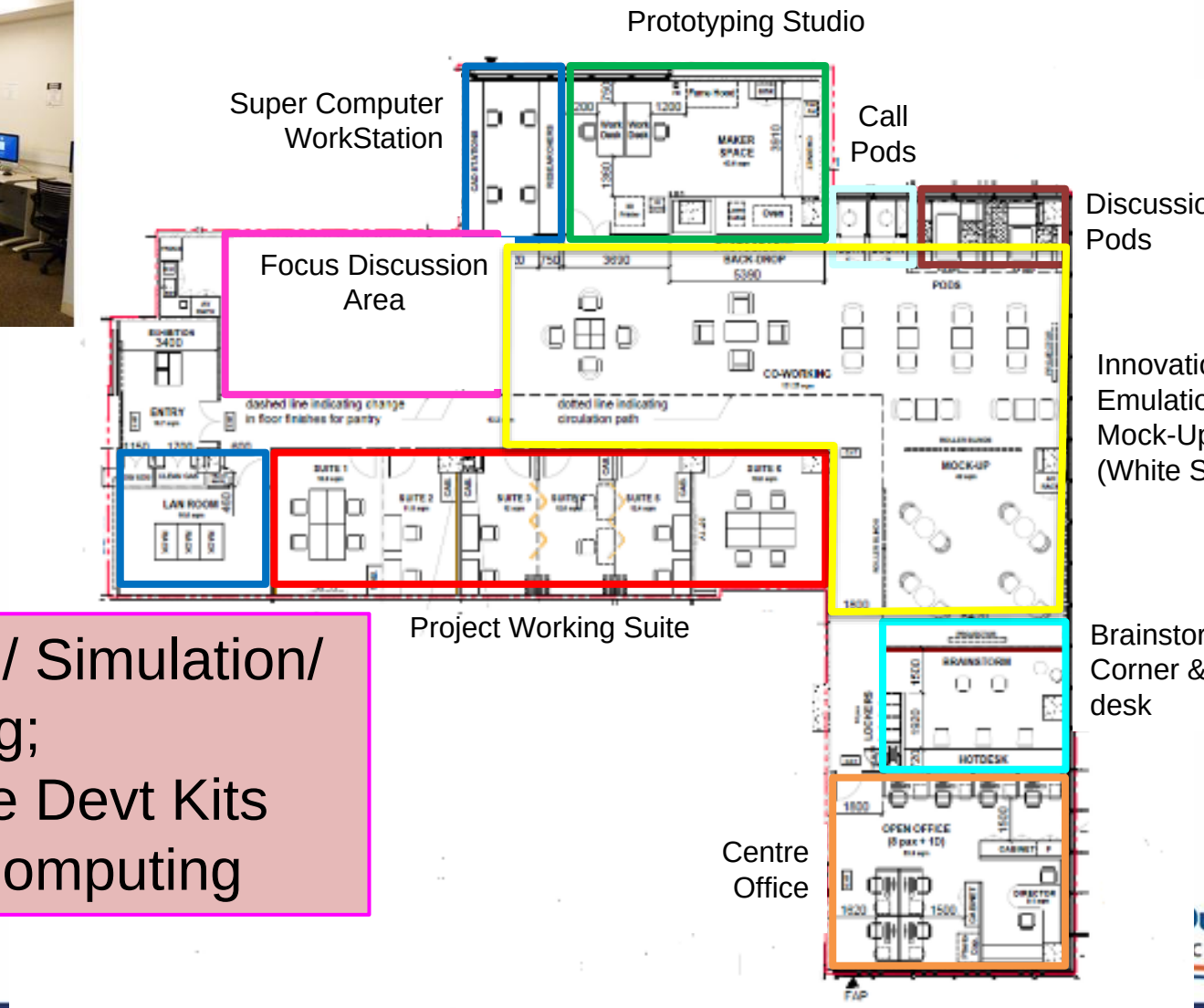
External Partners
New to Seasoned Innovators
(Doctors, Nurses, Allied Health, Administrators)



Opening : Oct 2022 @ SingHealth Tower, Level 2

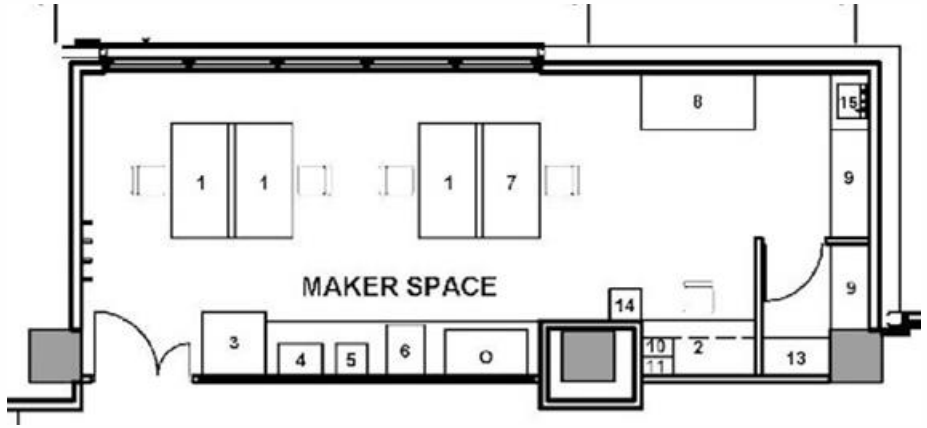
SingHealth DukeNUS ACADEMIC MEDICAL CENTRE

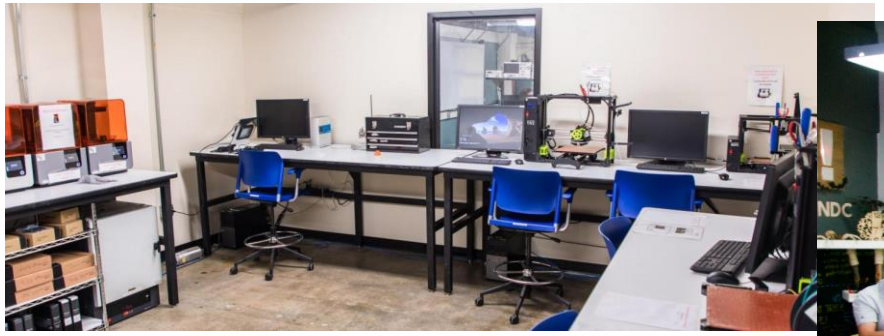
Digital Playpen / Sandbox

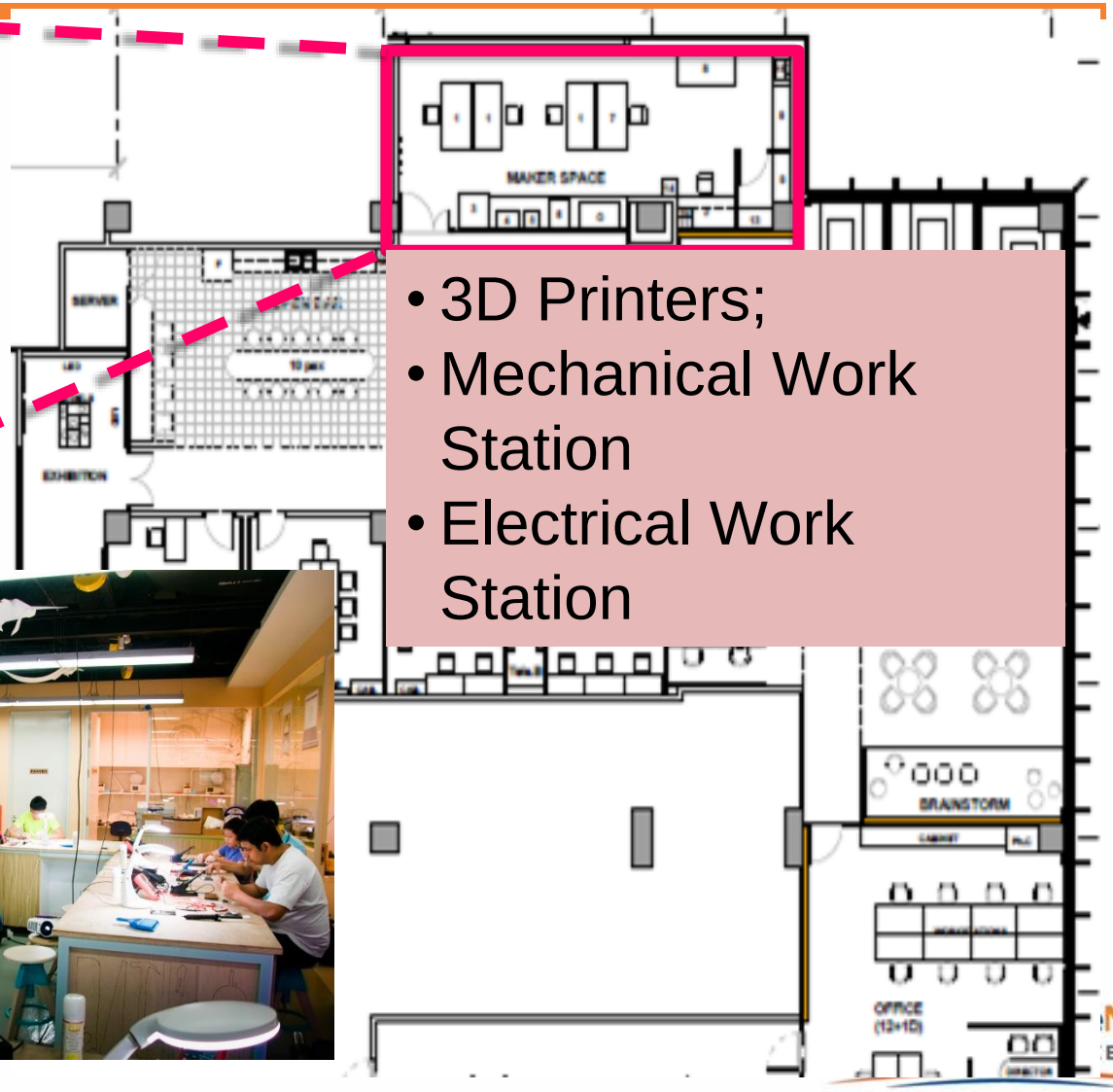


- 3D CAD/ Simulation/ Modeling;
- Software Devt Kits
- Super Computing

Rapid Prototyping Lab

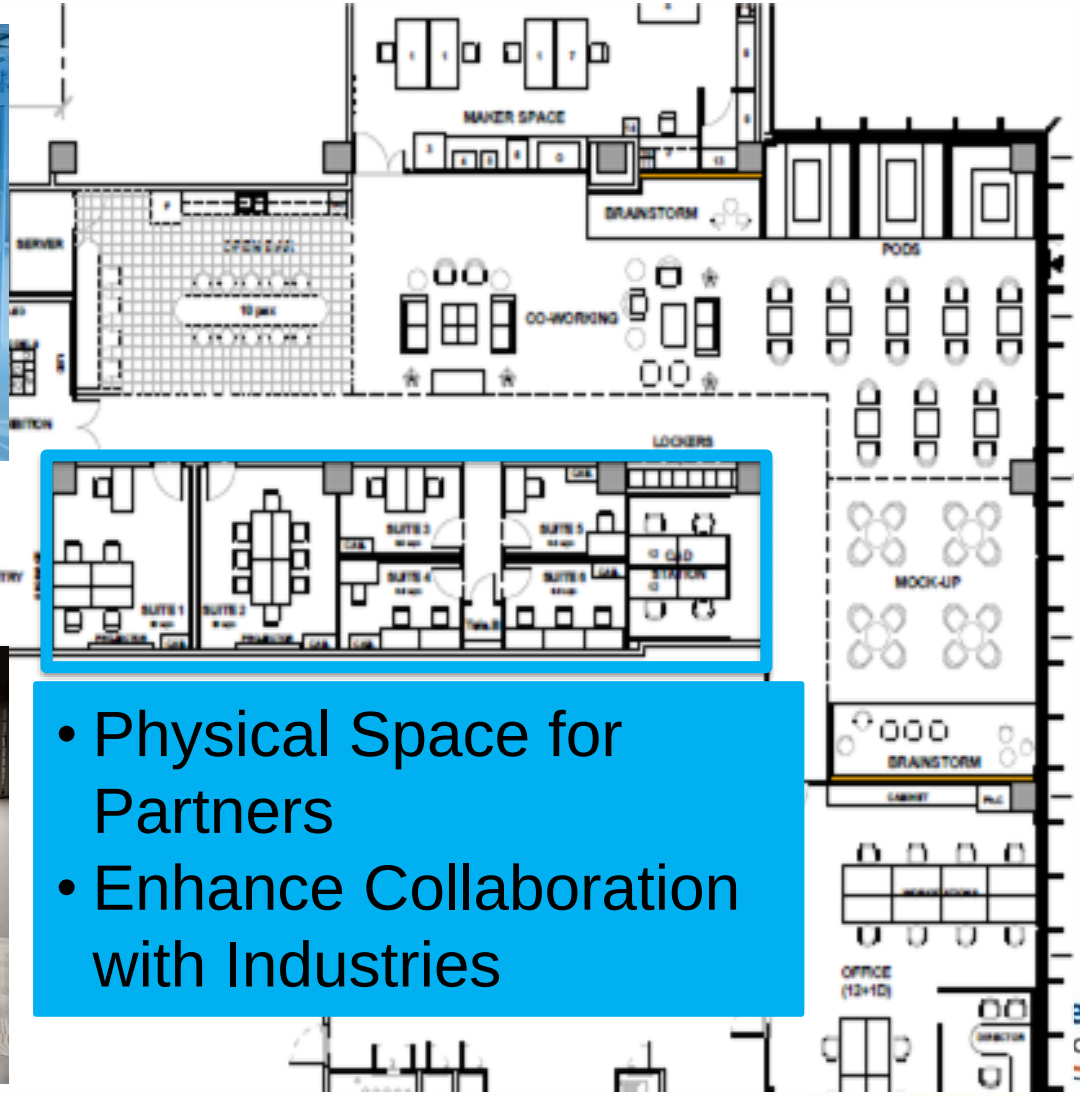






- 3D Printers;
- Mechanical Work Station
- Electrical Work Station

Working Suites



- Physical Space for Partners
- Enhance Collaboration with Industries

White Space, Living Lab

- Living Lab;
- Technology/ Process Emulation/ Mock-up/ Demonstration;
- Focal Engagement;
- Project Execution;

Collaboration at its peak !

Take home WORDS

Idea

Passion

Expertise

Funding

Time

Have FUN !!