



FLORIDA HOSPITAL
NICHOLSON CENTER

Simulation & Surgical Training: Fundamentals of Robotic Surgery

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Grants Leadership



PI' s: Vipul Patel, MD & Roger Smith, PhD
Florida Hospital Nicholson Center

Source: US Department of Defense

PI: Richard Satava, MD
Minimally Invasive Robotics Assoc

Source: Intuitive Surgical Inc.

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Congressional/DoD Research Project

Robotic Curriculum



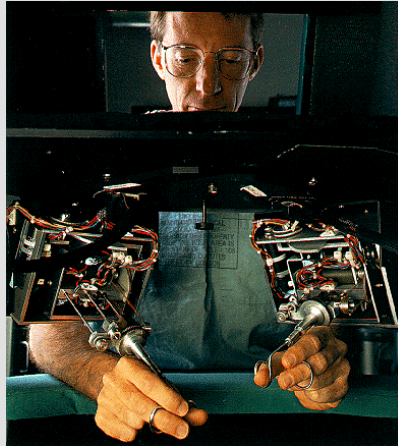
Curriculum Development:

- Define Robotic Surgery outcomes
- Develop Robotic Surgery curriculum
- Develop specific training tasks

Curriculum Validation:

- Validate training tasks
- Identify testing measures
- Set passing criteria

Telesurgery



Communication Latency:

- Map surgical movements to latency
- Redesign for latency tolerance
- Introduce instruments for safety
- Target city-pairs by latency

Automatic Surgery:

- Record movements in simulator
- Execute movements with robot
- Measure accuracy of outcome

Simulation



Surgical Rehearsal:

- Patient-specific rehearsal simulator
- Simulated patient physiology
- Measure impact on surgical perform

Military-use Validation:

- Identify military constraints
- Validate simulator for military-use
- Define deployable package

Intuitive Surgical's Training Pathway

Surgeon and OR Team Pathway

Phase	Content	Trainer
I: Introduction to <i>da Vinci</i> Surgery	Product Training	Intuitive Surgical
II: Preparation and System Training		
III: Post System Training	Clinical Training	Independent Surgeons & Societies/Academic Institutions
IV: Advanced Training		
Beyond the Pathway	Continuing Clinical Education	Independent Surgeons & Societies/Academic Institutions

- Phases I-II focus on product training, while phases III-IV focus on clinical training
- Beyond the pathway, skills are honed with continuing clinical education

FRS Mission Statement

Create and develop a validated multi-specialty, technical skills competency based curriculum for surgeons to safely and efficiently perform basic robotic-assisted surgery.

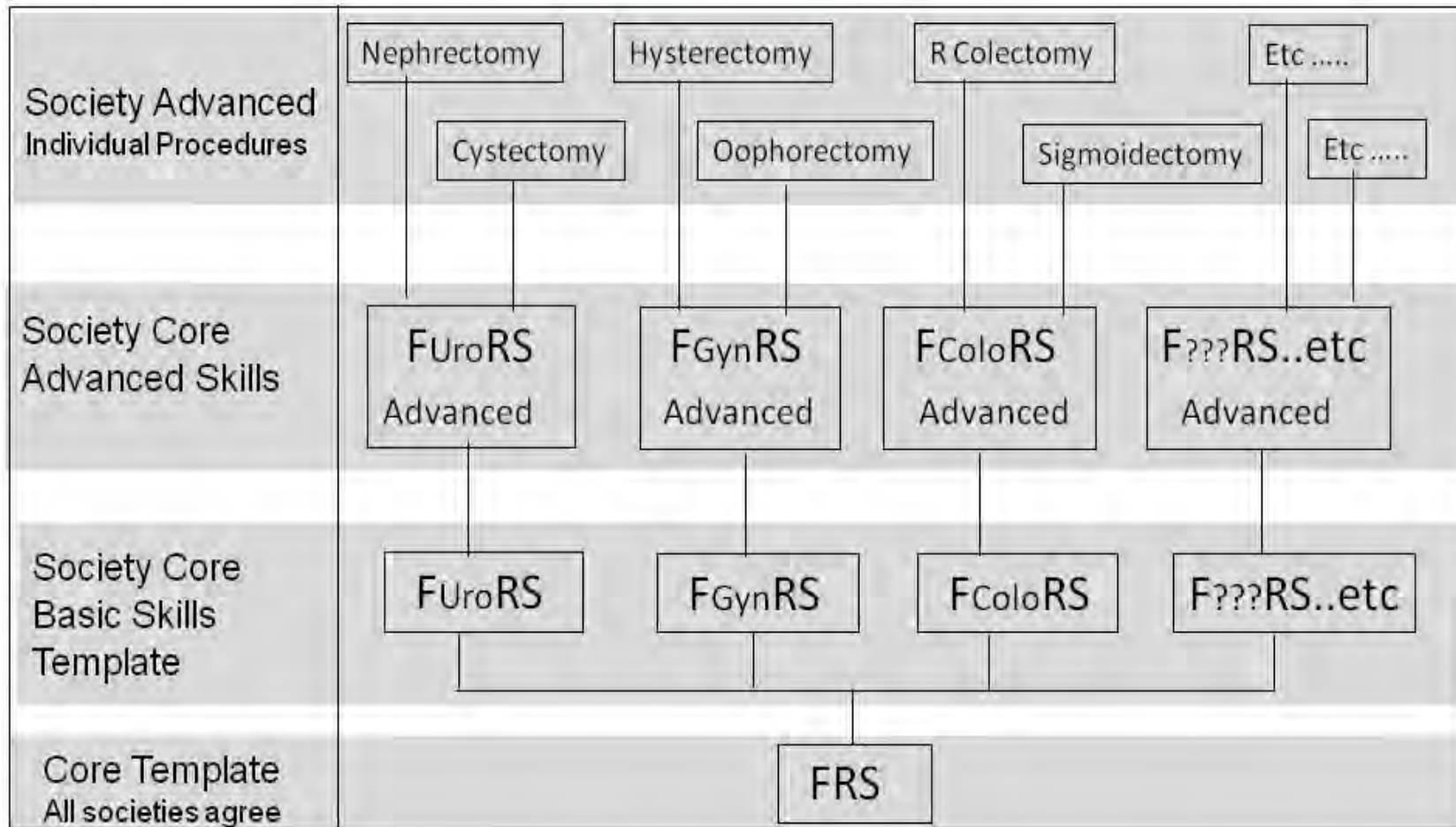
Note: The intent is to create a curriculum that is device-independent. This is admittedly difficult given the single approved surgical robot at this time. Therefore, significant attention is being paid to material that is device-flexible in anticipation of future robots.

Participating Organizations

- **American Association Gynecologic Laparoscopy (AAGL)+**
 - American College of Surgeons (ACS)
 - American Congress of OB-Gyn (ACOG)
 - **American Urologic Association (AUA) +**
 - American Academy of Orthopedic Surgeons (AAOA)
 - American Assn of Thoracic Surgeons (AATS)
 - American Assn of Colo-Rectal Surgeons (ASCRS)
 - American Assn of Gynecologic Laparoscopists (AAGL)
 - **Florida Hospital Nicholson Center***
 - **U.S. Department of Defense (DoD)***
 - U.S. Department of Veterans Health Affairs (VHA)
 - **Minimally Invasive Robotic Association (MIRA)***
 - Society for Robotic Surgery (SRS)
 - **Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) +**
 - American Board of Surgery (ABS)
 - Accreditation Council of Graduate Medical Education (ACGME)
 - Association of Surgical Educators (ASE)
 - Residency Review Committee (RRC) – Surgery
 - Royal College of Surgeons-Ireland (RCSI)
 - Royal College of Surgeons-London (RCSL)
- * Funding Sources**
+ Executive Committee

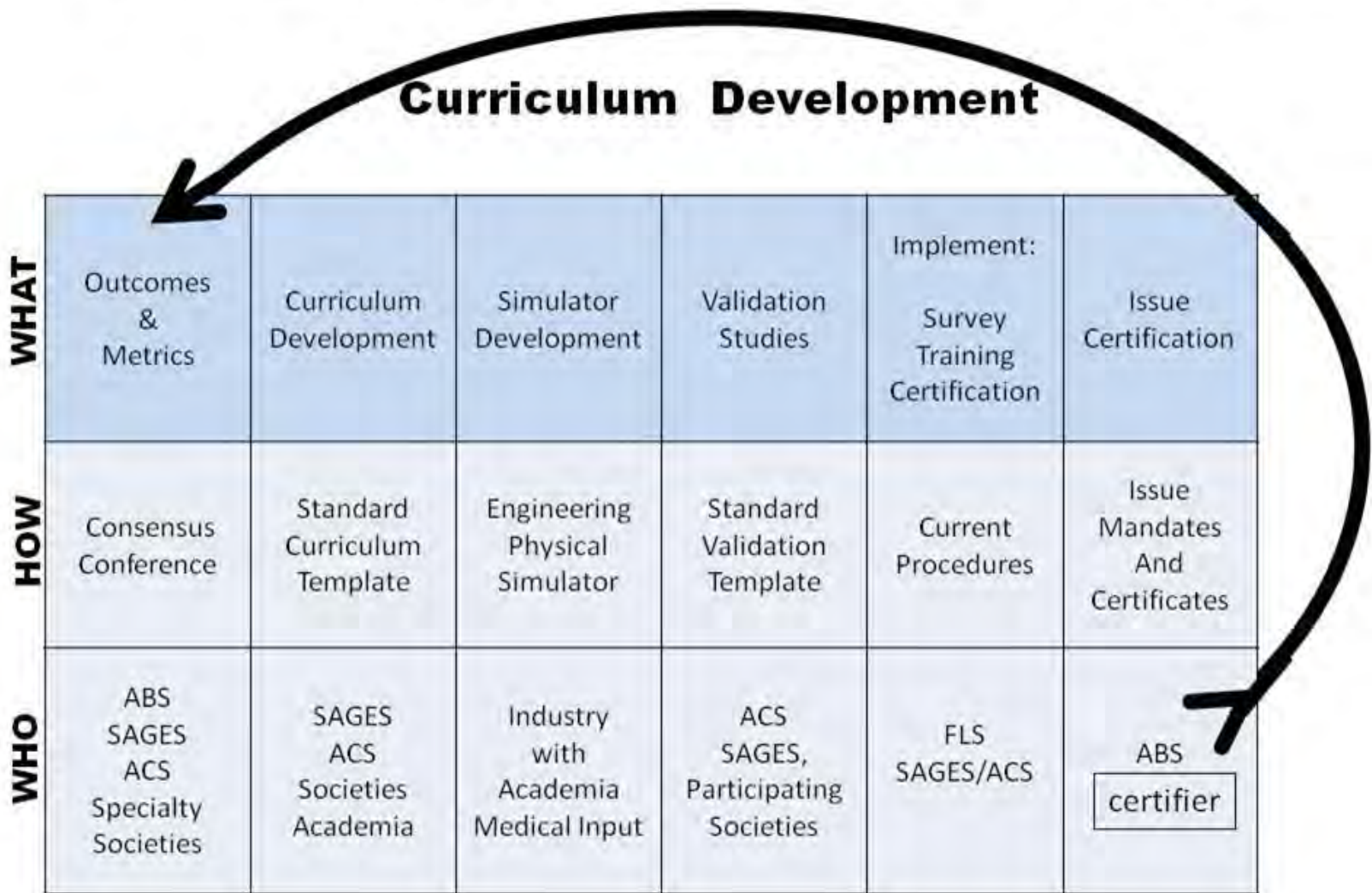
Development of Curriculum from common template

"Sweet* Tree"



* Adapted from Rob Sweet, MD, Professor of Urology, University Minnesota, 2010

The Metrics Drives the Process



Creator: Rick Satava, MD, Univ of Washington

Consensus Conference Process

1. Outcomes Measures (Dec 12-13, 2011)
2. Curriculum Outline (April 29-30, 2012)
- 2.5 Curriculum Development (Aug 17-18, 2012)
3. Validation Criteria (December, 2012)
4. Validation Studies
5. Transition to Objective Testing Organization (est. July 2013)

- Expert Discussion and Contributions
- Modified Delphi Voting Mechanism

#1 Outcomes Measures

Pre-Operative	Intra-Operative	Post-Operative
System Settings	Energy Sources	Transition to Bedside Asst
Ergonomic Positioning	Camera Control	Undocking
Docking	Clutching	
Robotic Trocars	Instrument Exchange	
OR Set-up	Foreign Body Management	
Situation Awareness	Multi-arm Control	
Closed Loop Comms	Eye-hand Instrument Coord	
Respond to System Errors	Wrist Articulation	
	Atraumatic Tissue Handling	
	Dissection – Fine & Blunt	
	Cutting	
	Needle Driving	
	Suture Handling	
	Knot Tying	
	Safety of Operative Field	

Faculty Members: Outcomes Measures

- **Arnold Advincula, MD** American Assoc of Gynecologic Laparoscopists & ACOG
- Rajesh Aggarwal, MD Royal College of Surgeons - London
- Mehran Anvari, MD Minimally Invasive Robotic Association (MIRA)
- John Armstrong, MD USF Health, CAMLS (now Florida Surgeon General)
- Paul Neary, MD Royal College of Surgeons - Ireland
- Wallace Judd, PhD Authentic Testing Corp.
- Michael Koch, MD American Board of Urology
- Kevin Kunkler, MD US Army Medical Research & Materiel Command TATRC
- **Vipul Patel, MD** Global Robotics Institute - Florida Hospital Celebration Health
- COL Robert Rush, MD US Army Madigan Healthcare System
- Richard Satava, MD Minimally Invasive Robotic Association (MIRA)
- Danny Scott, MD Society of American Gastro and Endoscopic Surgeons (SAGES)
- Mika Sinanan, MD University of Washington
- **Roger Smith, PhD** Florida Hospital Nicholson Center
- Dimitrios Stefanidis MD Association for Surgical Education
- Chandru Sundaram, MD American Urological Association
- Robert Sweet, MD American Urological Association
- Edward Verrier, MD Joint Council on Thoracic Surgery Education

Skills Definition (Sample)

Task Name	Description	Errors	Outcomes	Metrics	Importance Rating					Rank Order
					1	2	3	4	Total Score	
Needle driving	Accurate and efficient manipulation of the needle.	Tearing tissue, Troughing the needle, Needle scratching, Wrong angle on entry/exit, Adjacent organ injury, (more)	Accurate and efficient placement of needle through targeted tissue, Following the curve of the needle, without associated tissue injury	Time, accuracy, tissue damage, material damage	0	0	3	6	33	3
Atraumatic handling	Haptic comprehension. Using graspers to hold tissue or surgical material	Traumatic handling, Tissue damage or hemorrhage	Manipulates tissue and surgical materials without damage	Metric-respect for tissue, Stress and strain indentation and deformation	0	0	3	6	33	4

#2 Curriculum Development

Didactic & Cognitive	Psychomotor Skills	Team Training
Lecture-based	Principle-based	Checklist-based
Intro to Robotic System	Based on Physical Models (Virtual Models are Derivative)	#1: WHO Pre-Op
Pre-Operative Activity	3D Exam Tools	#2: Robotic Specific
Intra-Operative Activity	Use Tasks that have Evidence of Validity	#3: Undocking & Debriefing
Post-Operative Activity	Multiple Outcomes Measured per Exercise	#4 Crisis Scenarios
Each Activity includes: Goals, Conditions, Metrics, Errors, Standards	Cost Effective Solution	
	High Fidelity for Testing, Lower Fidelity for Training	
	IRR Requires Ease of Administration	

Faculty Members: Curriculum Develop

Arnold Advincula

Abdulla Al Ansari

David Albala

Richard Angelo

James Borin

David Bouchier-Hayes

Timothy Brand

Geoff Coughlin

Alfred Cuschieri

Prokar Dasgupta

Ellen Deutsch

Gerard Doherty

Brian Dunkin

Susan Dunlow

Gary Dunnington

Ricardo Estape

Peter Fabri

• Vincenzo Ficarra

• Marvin Fried

• Gerald Fried

• Tony Gallagher

• Piero Giulianotti

• Larry Glazerman

• Teodar Grantcharov

• James Hebert

• Robert Holloway

• Santiago Horgan

• Lenworth Jacobs

• Arby Kahn

• Keith Kim

• Michael Koch

• Rajesh Kumar

• Gyunsung Lee

• Raymond Leveillee

• Jeff Levy

• C.Y. Liu

• Col. Ernest Lockrow

• Fred Loffer

• Guy Maddern

• Scott Magnuson

• Javier Magrina

• Michael Marohn

• David Maron

• Martin Martino

• W. Scott Melvin

• Francesco Montorsi

• Alex Mottrie

• Paul Neary

• Eduardo Parra-Davila

• Vipul Patel

• Gary Poehling

• Sonia Ramamoorthy

• Koon Ho Rha

• Richard Satava

• Steve Schwaitzberg

• Danny Scott

• Roger Smith

• Hooman Soltanian

• Dimitrios Stefanidis

• Chandru Sundaram

• RobertSweet

• Amir Szold

• Raju Thomas

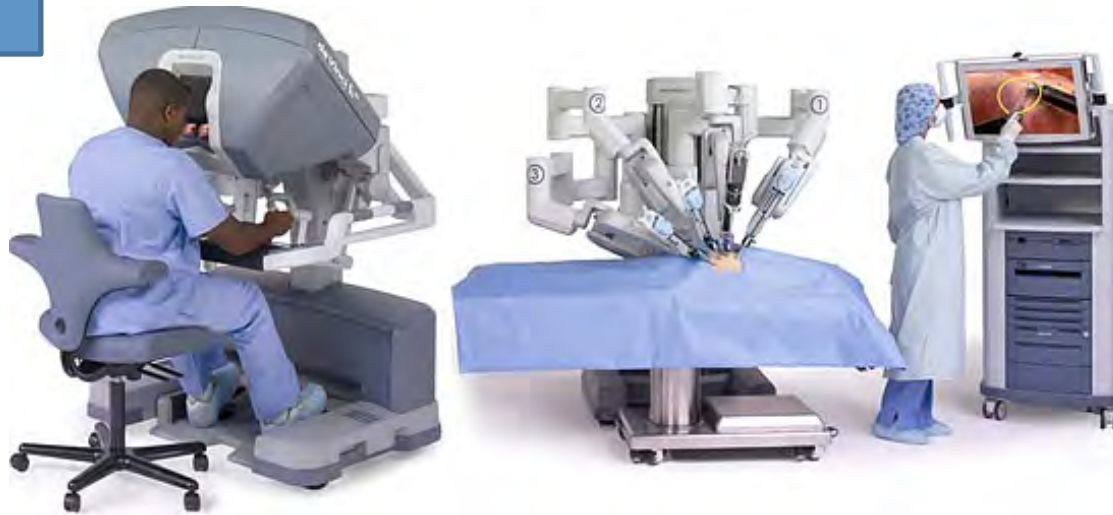
• Oscar Traynor

• Thomas Whalen

• Gregory Weinstein

Testing Environments

Robot



Simulator



#3 Validation Conference

- Criteria
 - Validate the curriculum and passing criteria that will be used to grant certification
- Multi-Institutional Study
 - 10 independent sites
 - ACS AEI accredited
 - Faculty in at least 2 specialties

Conclusions

- Objective curriculum in robotic surgery is needed for certification
- Development of such a curriculum is underway by a multi-specialty working group of experienced surgeons
- Florida Hospital is actively supporting this effort with surgical experts and grant funding

Thank You!