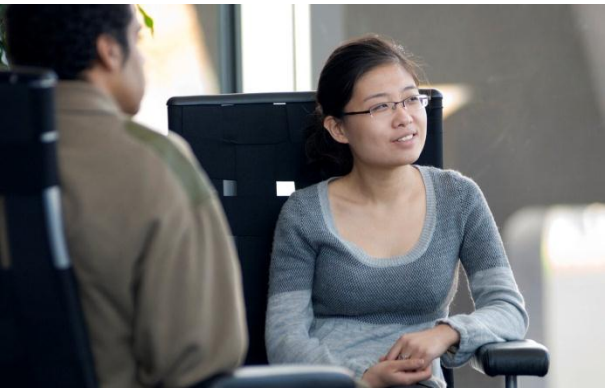

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The Remote Control Hospital: Healthcare in the Age of Robotic Medicine

HEALTHCAREDESIGN CONFERENCE

Remote Control

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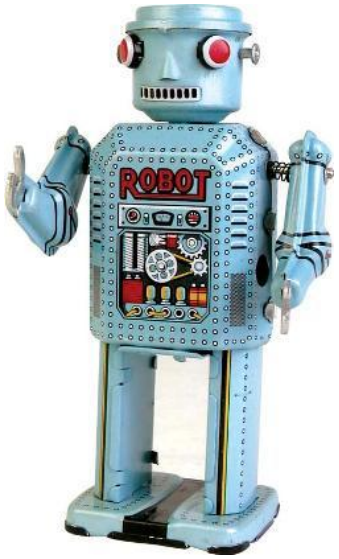

David Gillespie, AIA
Architect, Associate
SSOE Group

Jim Otte, NICET IV
Data / Fire / Security Specialist,
Senior Associate
SSOE Group

SSOE Group is a privately held international engineering, architecture, and construction management firm – ranked 11th nationally (Building Design+Construction, 2012). SSOE was selected as one of the fastest-growing firms by Inc. Magazine, 2012.

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Remote Control

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David Gillespie, AIA, LEED® AP
David is with SSOE in the Birmingham AL office.
David is a registered architect with more than 20 years of experience who started his career in historic preservation and migrated to healthcare, mission critical and industrial projects. He is also responsible for mitigation risk and hazard assessments, as well as reliability surveys. David was the project architect for a number of healthcare facilities, most notably the design of the first all-digital hospital covering more than one million SF. David has also designed more than 20 data center projects for universities, Co-Lo companies and healthcare facilities. He is a graduate of Auburn University with a Bachelor's in Architecture.

Jim Otte
Jim is with SSOE in the Toledo, Ohio office.
Jim has over 21 years of experience in engineering and design of electronic, telecommunications and data networks in the healthcare industry. Throughout this time, Jim has served as a consultant for many global firms, and has been hired by the ATF, DOD and many government organizations including design of several VA and Air Force facilities. Jim holds several certifications and has a top secret clearance. At SSOE, Jim leads a group of 20 engineers who are dedicated in designing networks and high end security systems.

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Questions related to specific materials, methods, and services will addressed at the conclusion of this presentation.

Learning Objectives

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1. Understand the current state of robotics in healthcare.
2. Understand that the health care industry is at the forefront of the technological revolution, with massive change being driven by advances in robotics, diagnostics and monitoring, electronic medical records, patient information systems and digital imaging technologies.
3. Understand that these advancements enhance patient care but require real-time access to volumes of information and reliable transmission of large files like patient x-rays or digital scans.
4. Understand that transitioning between paper records and electronic records require enhanced reliable security.

CONTINUING EDUCATION AIA

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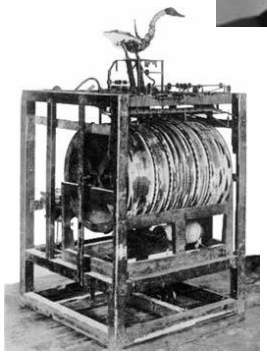
High tech from the old world

3500BC

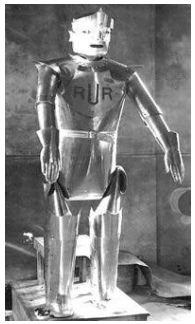
1495 AD

1564 AD



1737 AD

1818 AD



1921 AD

2003 AD

20xx

Technology

The Fundamental Concept of Robotic Technology and telemedicine is a transition from

tissue and instrument

to information and energy.

Technology

HEALTHCAREDESIGN CONFERENCE

Modern History:

- Robot Karel Capek coined the word in 1921

1985 first medical use - Puma 560 neurosurgical biopsies

1987 with the first laparoscopic colon surgery was performed

1992 ROBODOC with IBM developed a robot for joint replacement

1993 AESOP first endoscopic robot to receive FDA approval

1998 Dr. Friedrich-Wilhelm Mohr uses a robot to assist in the 1st heart bypass

2003 da Vinci receives FDA approval for robotic laparoscopic surgery

2008 ROBODOC receives 510(k) FDA approval for their THA robot

2010 first truly robotic surgery performed

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Current State of Robotics

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The global robotic surgical market size is currently estimated to be approximately $1 billion and is estimated to grow to $5 billion by 2015 with potential for placement of 6,000 robotic surgical systems.

Robotic Surgery Equipment Manufacturing report

Hospitals have often been thought of as centers of innovation. The infrastructure to support that going forward needs to be in place now.

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Technology

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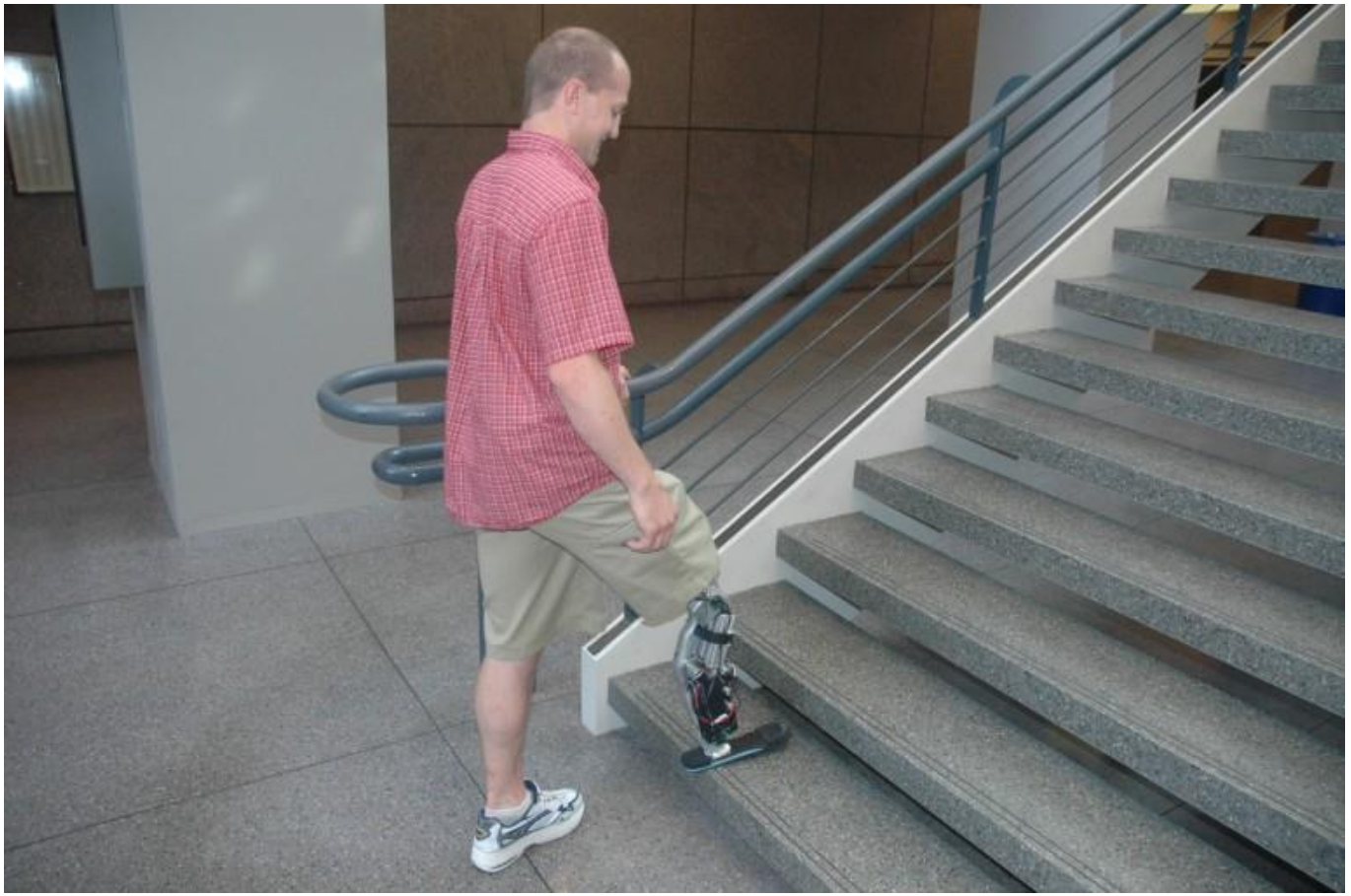
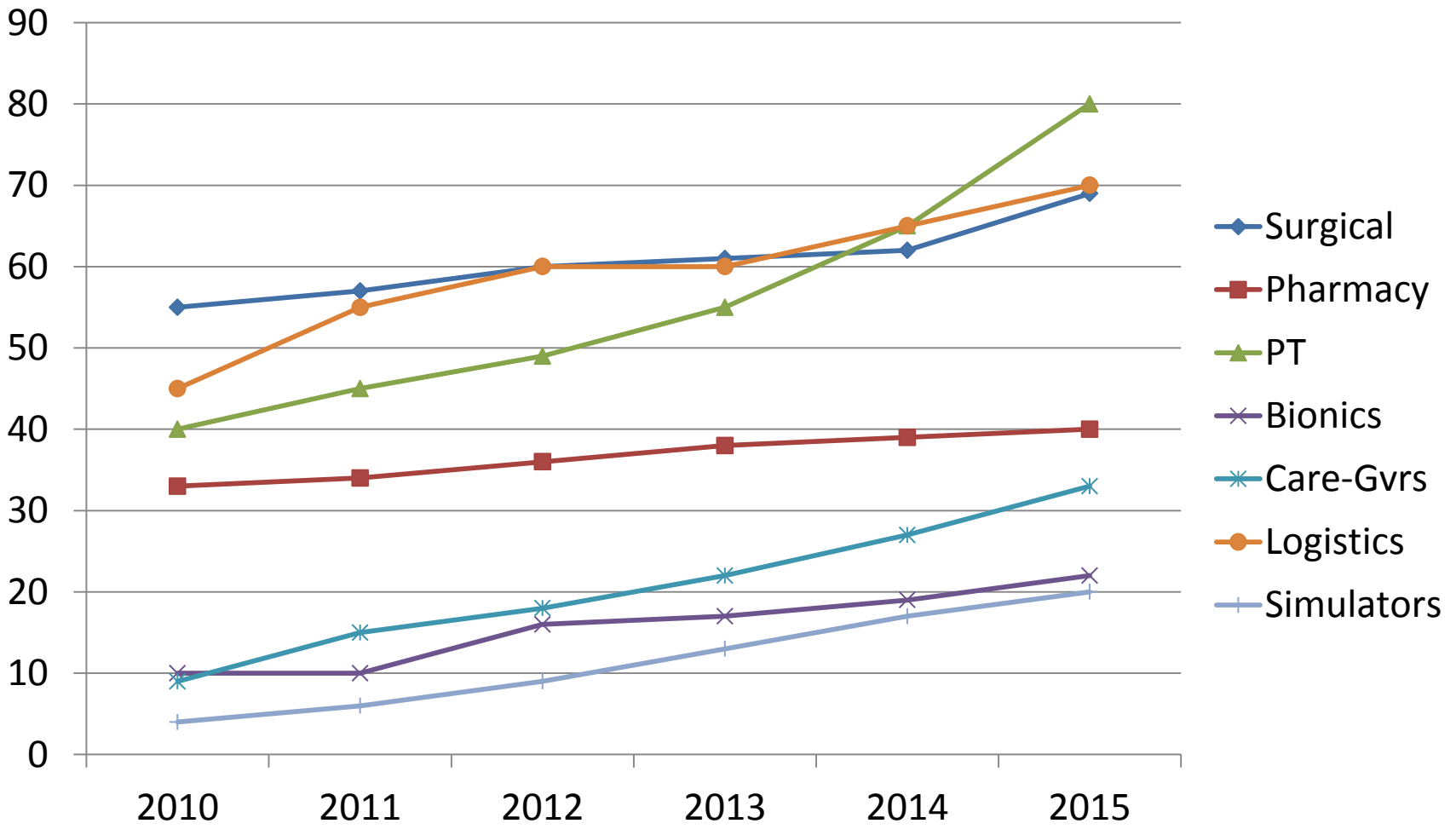
Overview of robotic applications in HC

- **Surgical** – robotic procedures
- **Physical Therapy** – range of motion, flexibility
- **Bionic prosthetics** – replacement limbs, organs
- **Care-Giver** – patient interaction (2 way A/V)
- **Simulators** – procedure planning, education
- **Pharmacy** – compounding & dispensing
- **Logistics** – materials handling, delivery

Technology



Market Growth



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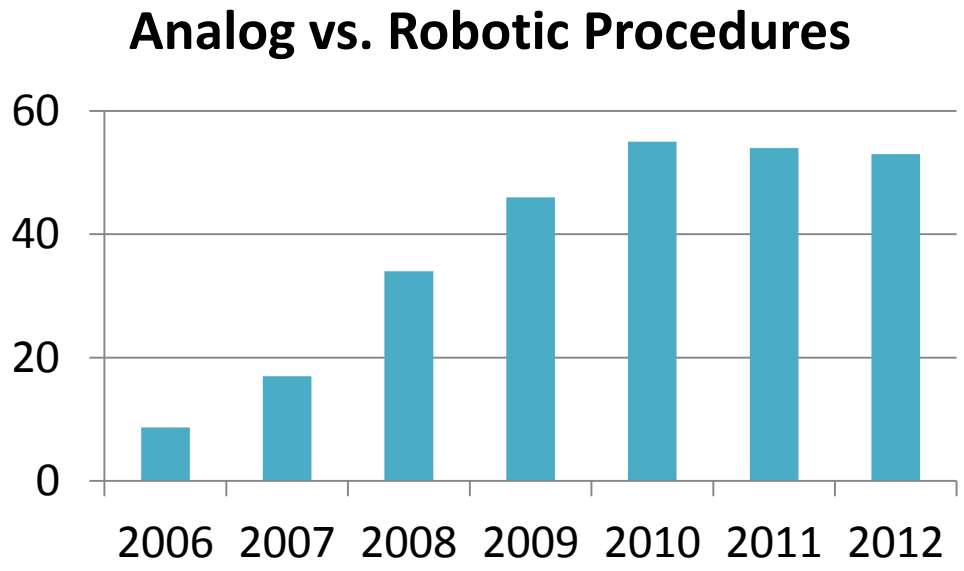
- Adoption rates for robotic assisted surgeries are increasing.



Radical prostatectomies utilizing the da Vinci Surgical System as reported in 2012 ASCO Journal.

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Robotic Surgery Technology

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Intuitive has installed more than 1,840 da Vinci systems worldwide.

© 2011 Intuitive Surgical, Inc.

FIGURE 1. The da Vinci SI Surgical System

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Robotic Surgery costs and #'s

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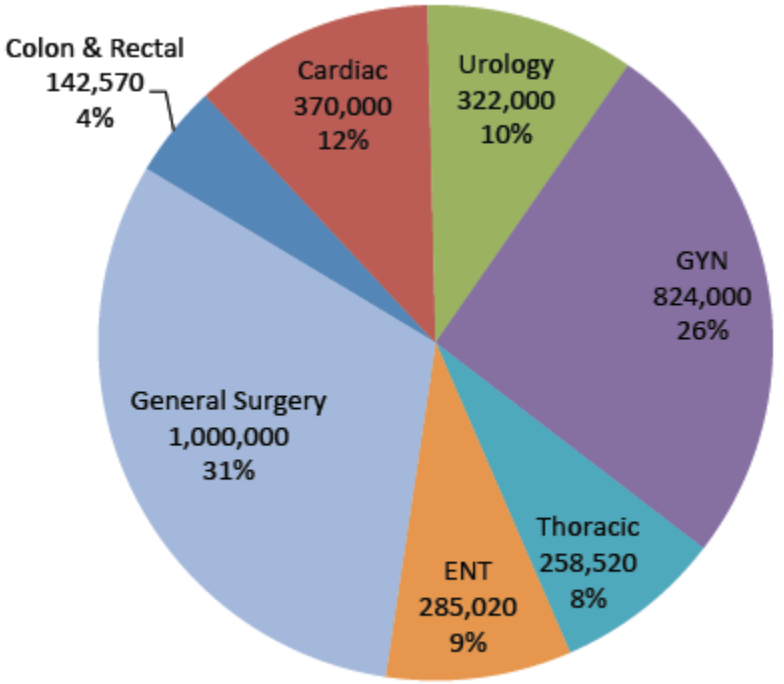
2010 220,000 robot-assisted surgeries
2011 360,000 robot-assisted surgeries
majority are Hysterectomy and prostate

For robotic prostate removal costs
about $10,000 on average
$9,300 laparoscopic surgery
$8,900 open surgery

For robotic kidney removal costs are
about $13,900 on average
$11,200 laparoscopic surgery
$12,600 open surgery

Breakdown of total surgeries



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Treatment Comparative Data

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Outcome	dVP	Open	Lap
Cancer control			
T2 margin status	2.5%	5.9%	7.7%
Complications			
Estimated blood loss (EBL)	109 ml	1355 ml	380 ml
Length of stay (LOS)	1.2 days	3 days	2.5 days
Major	1.7%	6.7%	3.7%
Minor	3.7%	12.6%	14.6%
Urinary function			
3 month	89%	54%	62%
6 month	95%	80%	77%
12 month	97%	93%	83%
Sexual function			
12 month	86%	71%	76%

Robotic
Laparoscopic
Prostatectomy

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Robotic Surgery Now and Future

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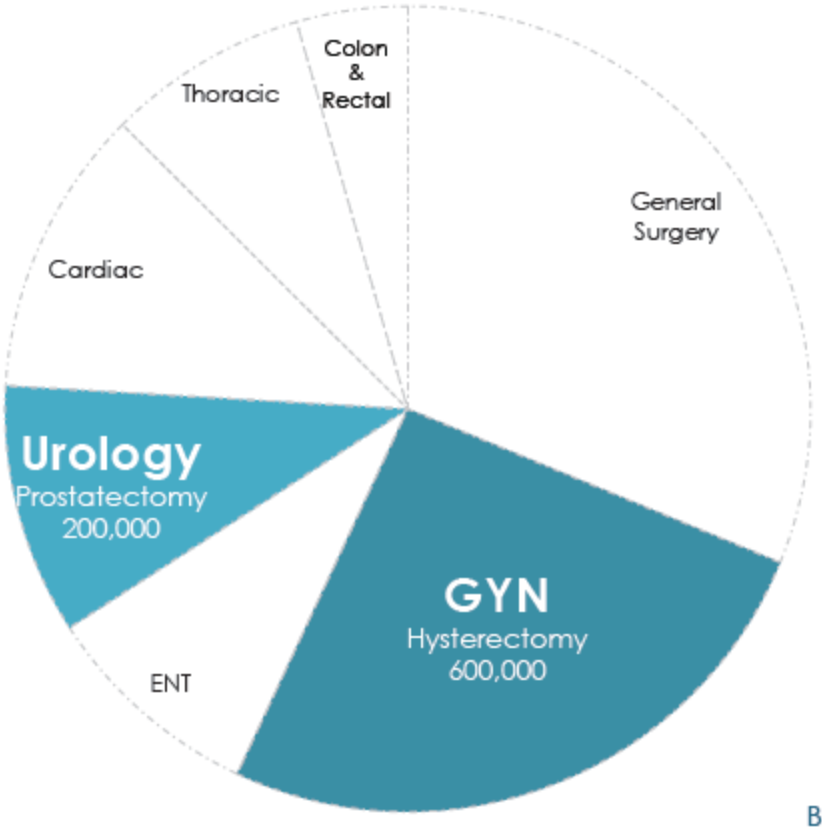
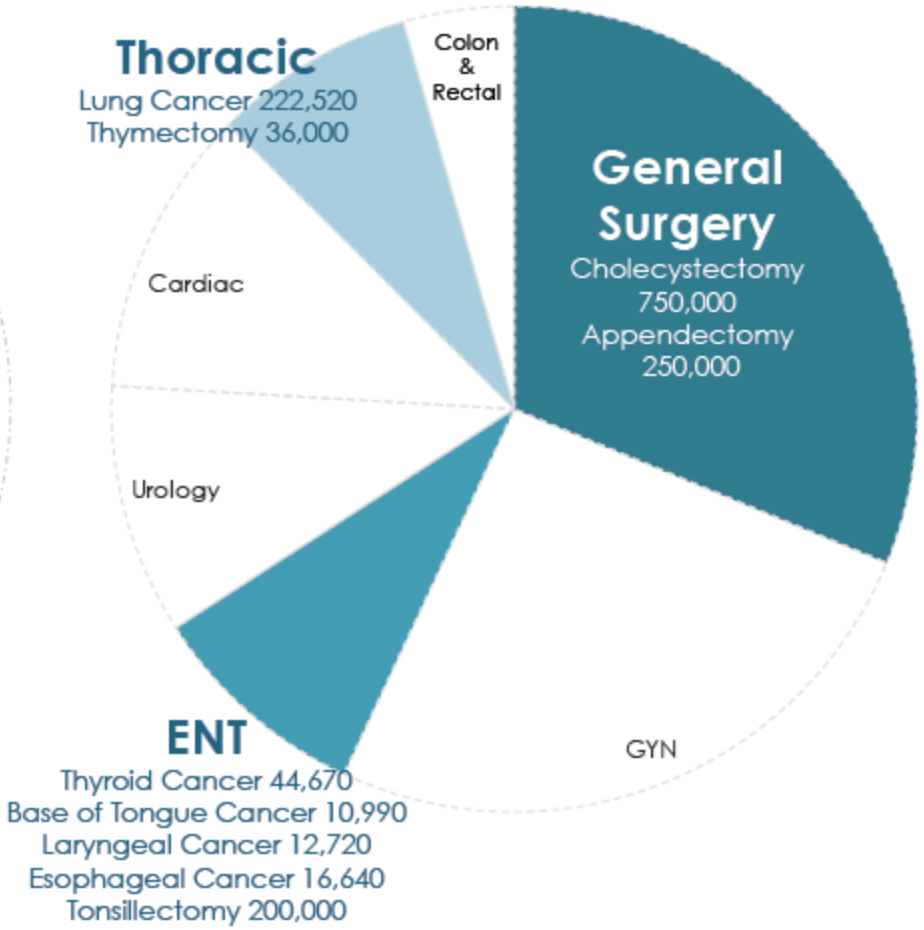
Current



Future



Source: American Cancer Society, public company filings

Robotic Surgery Advantages

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Surgeons / Physicians
- Improved patient care
- Enable complex tasks
- True-life 3-D vision
- Enhanced dexterity
- Superior ergonomics
- Comfortable seated posture
- Less blood loss
- Smaller incisions
- Scalable motions
- Elimination of tremor

Patients
- Shorter hospitalization
- Reduced pain
- Faster recovery times
- Smaller incisions, resulting in reduced risk of infection, blood loss and scarring
- Autologous donation not required (i.e. Pre-surgery personal blood donation)

Hospitals
- Increased efficiency
- Potential reduced costs
- Potential reduced Litigation
- Marketing Tool

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Robotic Surgery Disadvantages

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- High purchase and maintenance cost
- Requires a cultural shift in hospital
- Increased space in procedure and operating rooms, storage and maintenance areas
- The potential possibility of intra-operative mechanical failure
- Steep learning curve
- Lacks tactile and force feedback
- Operation may take longer due to set-up
- No additional insurance to offset higher costs

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Robotic Surgery Technology

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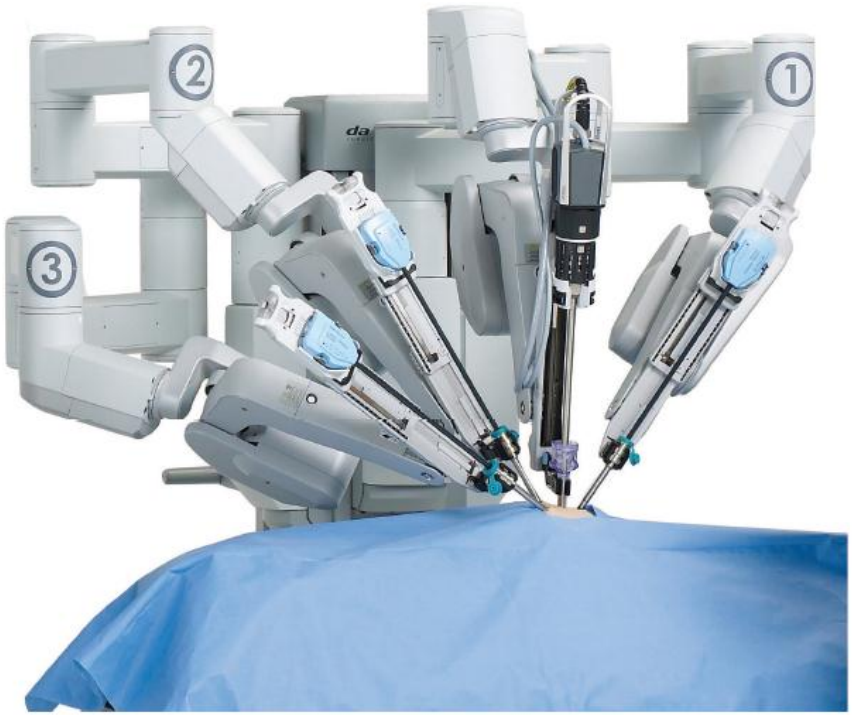
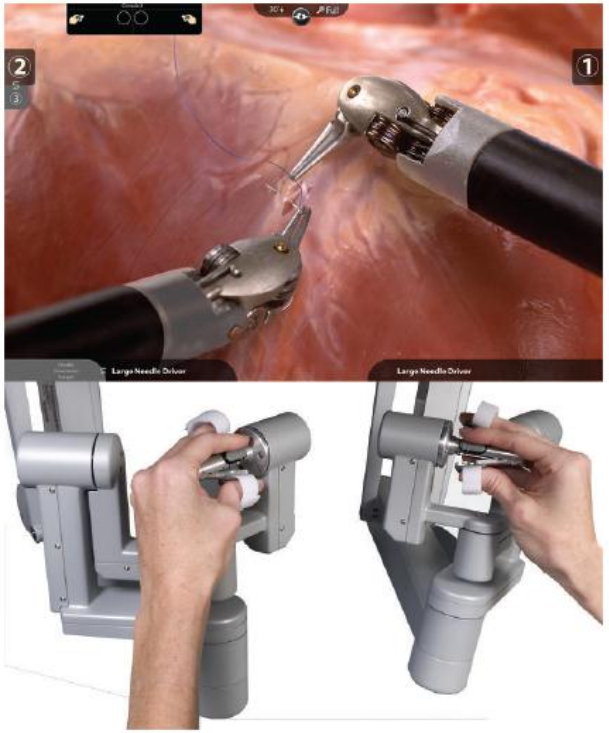
Da Vinci



Da Vinci Si patient-side cart



Da Vinci EndoWrist and controllers

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Robotic Surgery Technology

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Accuray CyberKnife

Robotic Surgery Technology

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The Raven (I and II)

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Robotic Surgery Technology

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Amadeus

Titan aims to have its Amadeus Composer ready for tissue and animal feasibility studies this year, initiate human clinical trials in 2013, and apply for Food and Drug Administration clearance in 2014.

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Robotic Surgery Technology

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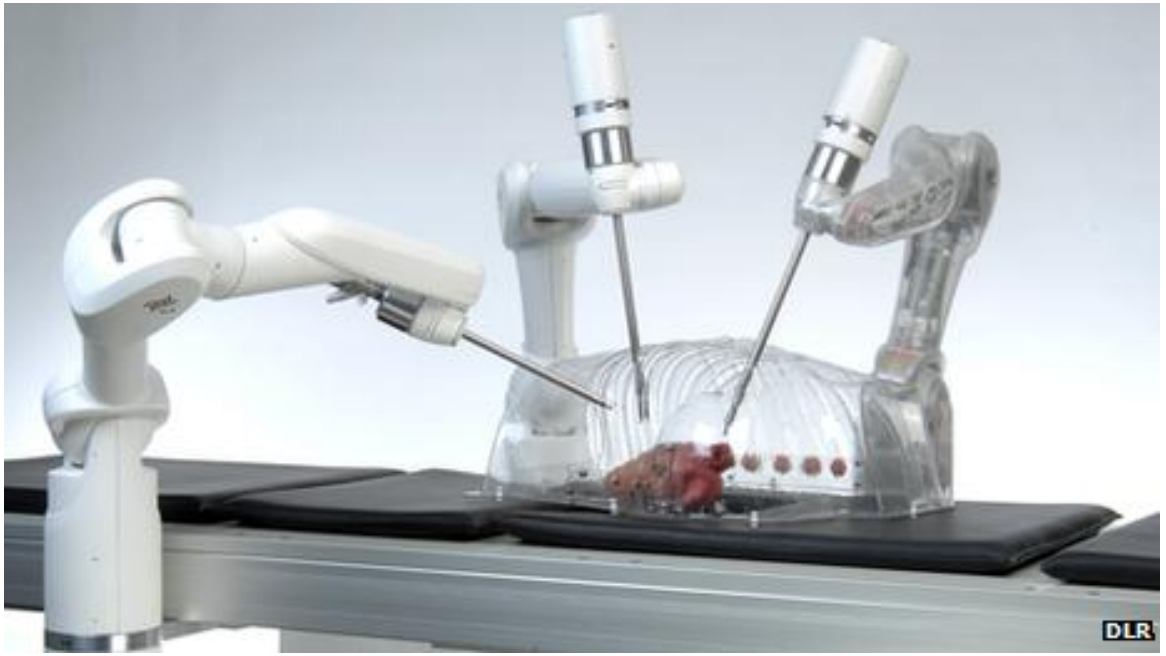
The DLR MiroSurge Robotic Surgery System

The ultimate ambition is robot supported surgery on the beating heart. The application of the heart-lung machine would become obsolete for a whole variety of procedures



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Robotic Surgery Technology

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CorPath 200 System by Cordius Vascular Robotics

- ***July 25, 2012 —*** Corindus Vascular Robotics, a leading developer of precision vascular robotics announced FDA 510(k) clearance has been granted for the CorPath 200 System to be used in percutaneous coronary interventions (PCI).

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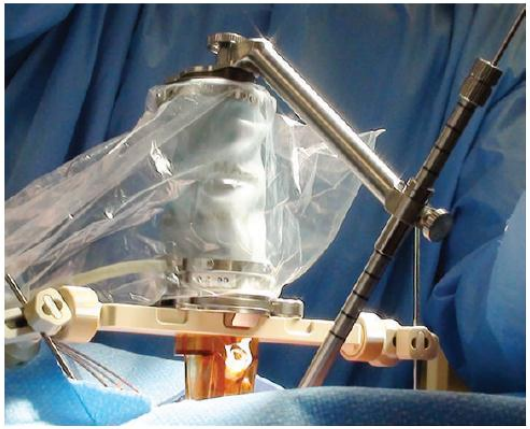
Robotic Surgery Technology

(a) NeuroMate by Renishaw

(b) Pathfinder by Prosur-



(c) Renaissance by Mazor Robotics

(a) Robodoc by Curexo Technology Corp.

(b) RIO by MAKO Surgical Corp.

(c) iBlock by Praxim Inc.

Robotic Surgery Technology

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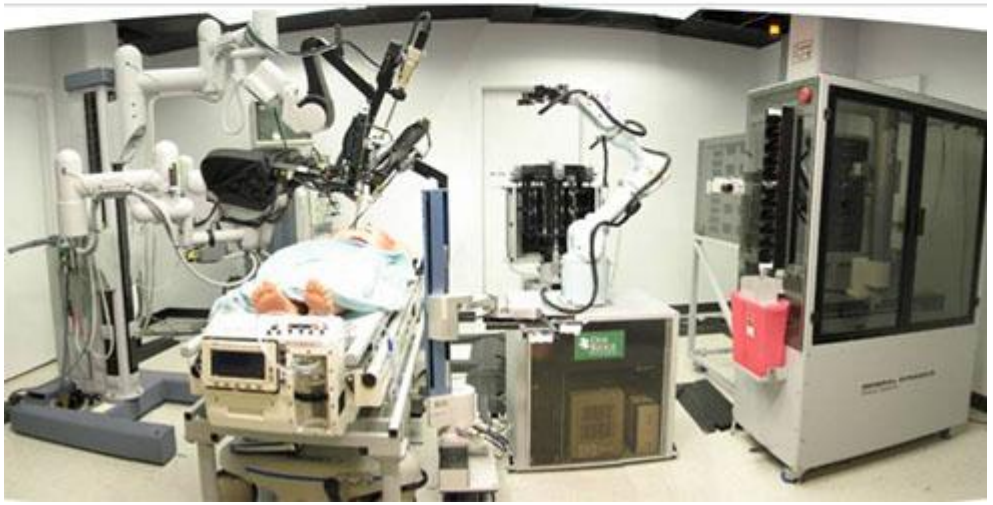
Trauma Pod

LSTAT unit



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Physical Therapy
range of motion, flexibility

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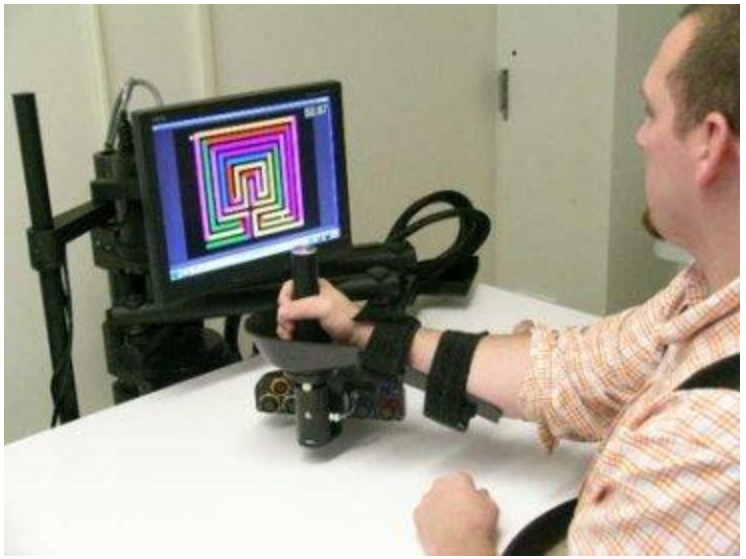

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Bionic prosthetics
replacement limbs, organs

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Care-Giver
patient interaction (2 way A/V)

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- Enhanced navigation capability
- Incorporates autonomous navigation
- Real-time access to important clinical data, enabling a range of new workflow improvements for physicians, nurses and other patient care team members.
- Equipped with the ability to connect with diagnostic devices such as otoscopes, ultrasound and electronic stethoscope.
- iPad user interface

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Simulators
procedure planning, education

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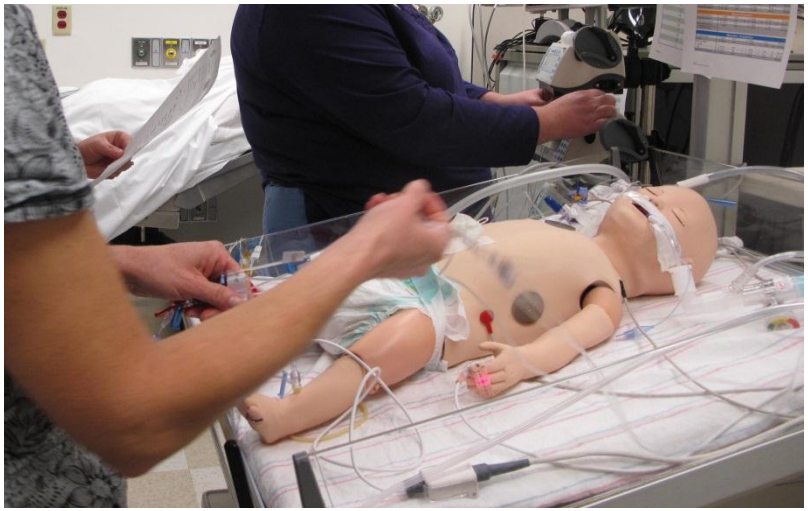

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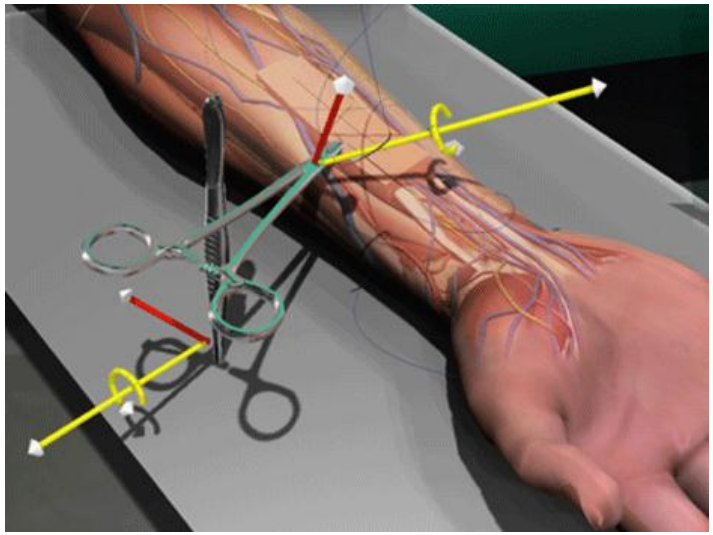
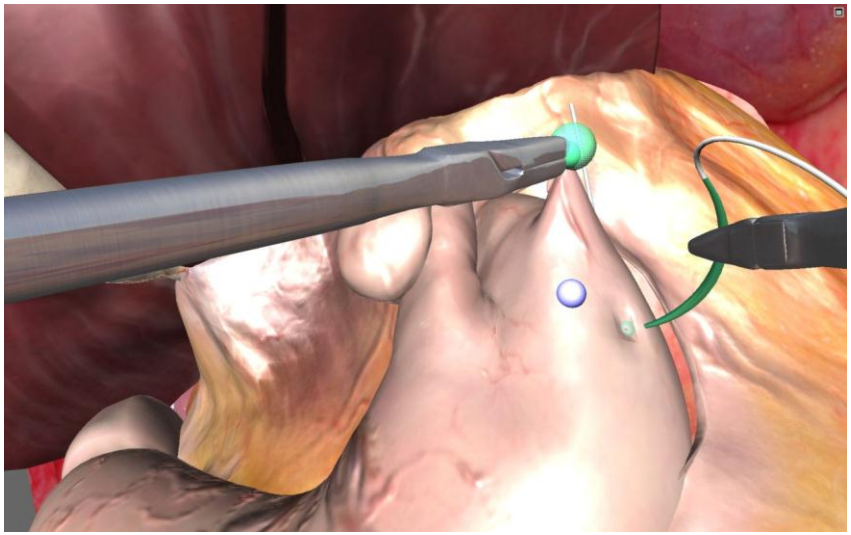
Robotic Surgery Learning

Physicians say there is a learning curve with robotic surgery, just as there is with regular laparoscopy. Studies estimate the learning curve for regular laparoscopic and robotic radical prostatectomy at 150 or more cases, notes a *2009 Journal of the American Medical Association* article.





Pharmacy
compounding & dispensing

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More than 1/3 of all hospitals in North America use a robot for automated medication processing.

Evergreen Hospital Medical Center increased **dispensing accuracy to 99.9 percent**; **cut cart fill labor by 72 percent**; and realized nearly **$2 million** in annual savings.

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Robotic Dispensing Impact

St. Joseph's Hospital in Savannah, Georgia is already saving at least **$233,000** during yearly through its recent installation and "Go-Live" of the i.v.STATION Robot.

Candler Hospital used to pay **$6** for one dose of medication and through a robotic system they can now make the product on-site, when needed for **$2.32** per dose.

Logistics
materials handling, delivery

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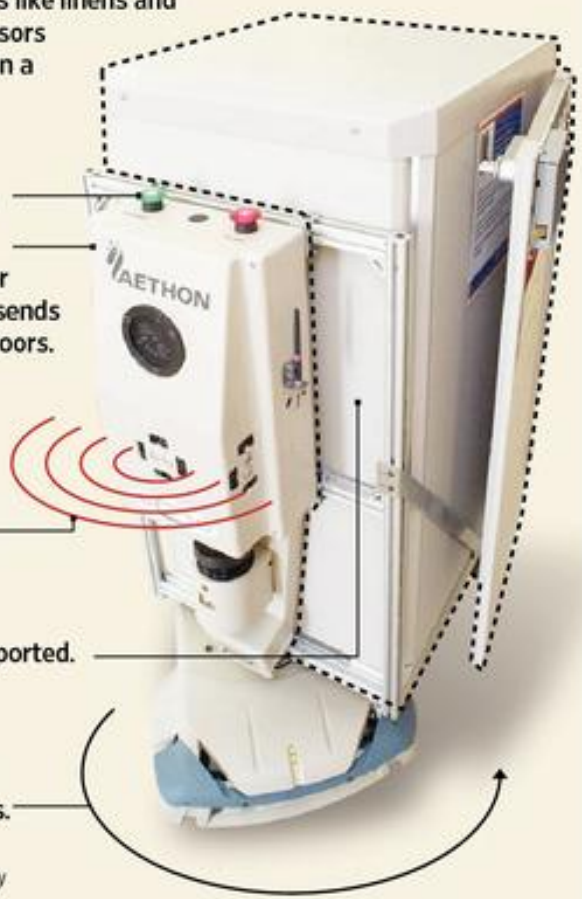
Robotic Courier

TUG, built by Aethon, is a service robot designed to haul goods like linens and medication. TUG's sensors track its location within a programmed map of the building.



Source and photo: the company

BY THE NUMBERS

Hauling power up to:
500 POUNDS

Continuous operation up to:
10 HOURS

Size:
7-1/4"H x 20"W

Weighs:
55 LBS.

Power:
FOUR 12-VOLT BATTERIES

Silicon Valley's El Camino Hospital uses:
20 AETHON ROBOTS

Health-care service robots used in the U.S.:
FEWER THAN 1,000

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Robotic Carts Impact

El Camino Hospital in California's Silicon Valley constructed its new, $470M acute care facility (450,000 sq. ft. 300 Rooms)

Purchased 19 TUGS to provide;

- deliveries to and from the laboratory and pharmacy
- materials management
- dietary and environmental services

In the first year alone the hospital saved **$650,000 in staffing expenses in the first year alone.**

Future - Trends and Development

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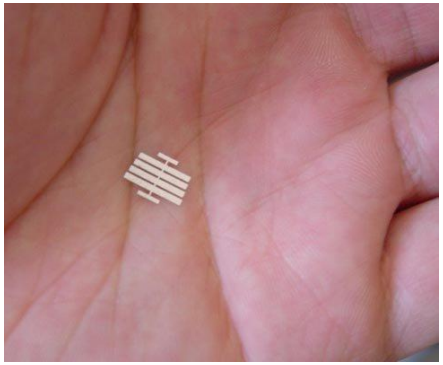
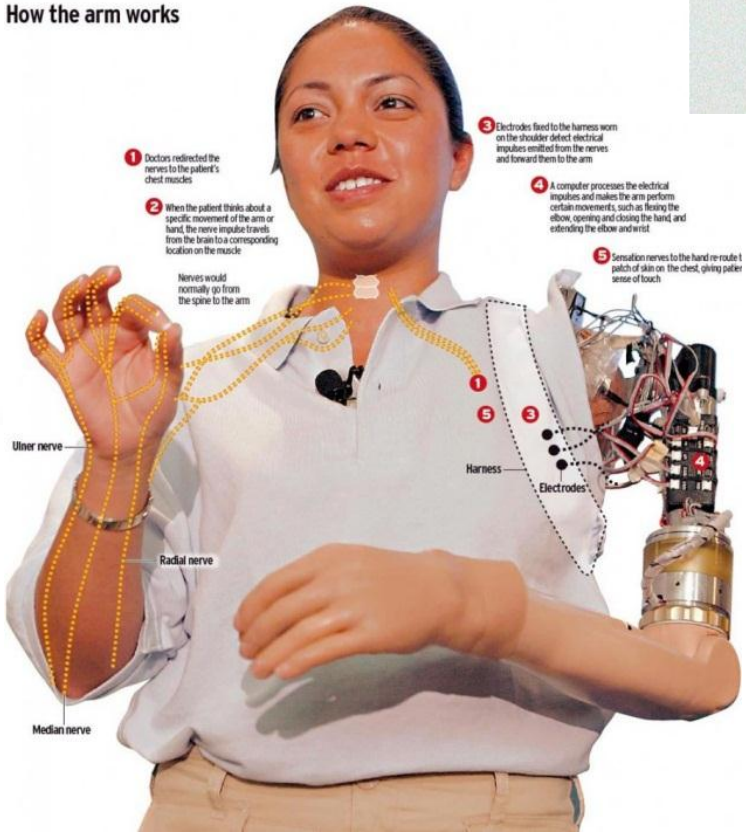
- The next 10 years





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What does this impact?

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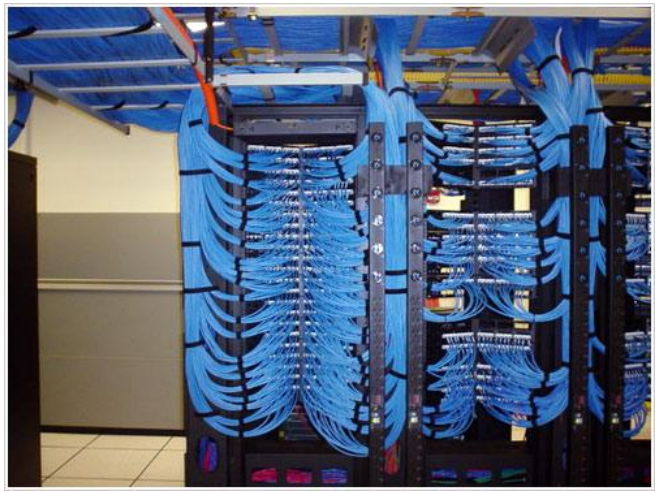
- Connectivity
- Bandwidth
- Security
- Safety
- Comfort and Control
- Efficiency
- Patient Satisfaction
- Recovery times



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Data Transfer Rates

Typical brain CAT scan – 500+ images

10 Mb
8.65m

100 Mb
4.5m

1 Gb
2.2m

10 Gb
<30 sec

The Next Generation Hospital

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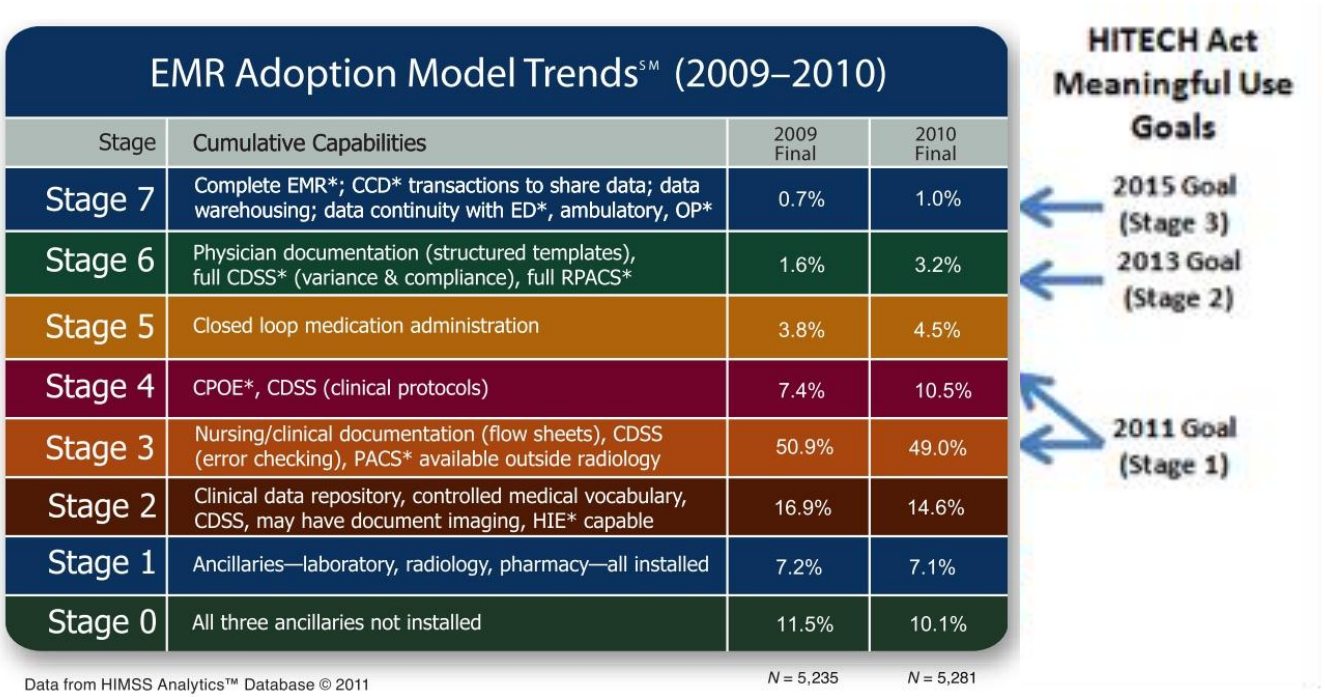
The EMR Adoption Model classifies hospitals in eight stages, with the ultimate goal of being completely paperless.



EMR Adoption Model Trends℠ (2009–2010)

Stage	Cumulative Capabilities	2009 Final	2010 Final
Stage 7	Complete EMR*; CCD* transactions to share data; data warehousing; data continuity with ED*, ambulatory, OP*	0.7%	1.0%
Stage 6	Physician documentation (structured templates), full CDSS* (variance & compliance), full RPACS*	1.6%	3.2%
Stage 5	Closed loop medication administration	3.8%	4.5%
Stage 4	CPOE*, CDSS (clinical protocols)	7.4%	10.5%
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS* available outside radiology	50.9%	49.0%
Stage 2	Clinical data repository, controlled medical vocabulary, CDSS, may have document imaging, HIE* capable	16.9%	14.6%
Stage 1	Ancillaries—laboratory, radiology, pharmacy—all installed	7.2%	7.1%
Stage 0	All three ancillaries not installed	11.5%	10.1%
		N = 5,235	*N* = 5,281

Data from HIMSS Analytics™ Database © 2011

HITECH Act Meaningful Use Goals

2015 Goal (Stage 3)

2013 Goal (Stage 2)

2011 Goal (Stage 1)

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A HC room through an Architects eyes

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Smart Suite Technology

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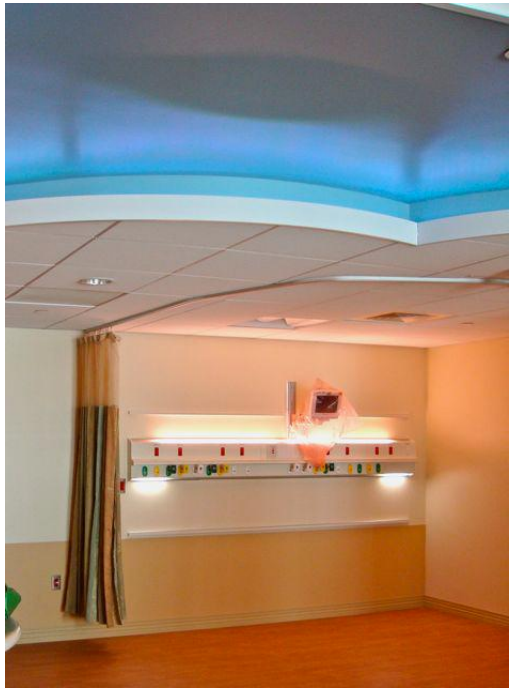
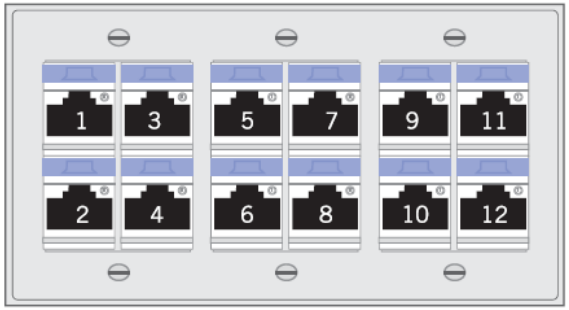
Real Life

Wireless Communication, EMR, Nurse Call, RTLS, (Education, TV, etc.), Environmental and light Controls

Patient Room Ports



Patient room connectivity needs



1 Network 1 *(Primary)*	3 Network 2 *(Internet)*	5 Patient Video *(TV)*	7 Physical Monitoring	9 Patient Phone	11 Spare
2 Medical Device 1	4 Medical Device 2	6 Remote Support *(Telehealth)*	8 Spare	10 Charting/ Stats-Portable Nurse/MD	12 Spare

Records Security

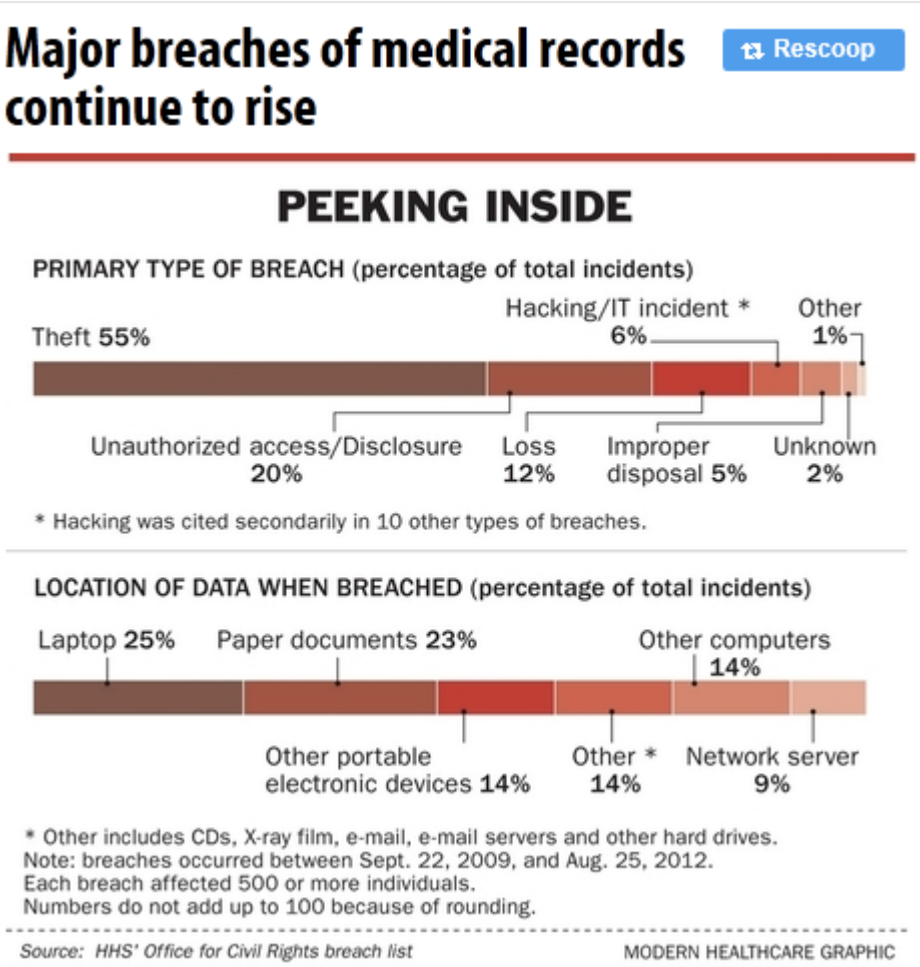
We have an equal or greater responsibility to protect the EMR as we do today with paper records.

Nearly 20 million patient health records have been compromised since the Aug. 2009 Breach Notification Rule, which requires that HIPAA-covered groups give notification following a data breach involving 500 or more individuals. And breach numbers haven't shown signs of waning any time soon.

Redspin report to HHS 2011

EMR Security

Data security - Telemedicine



Records and IT Security

Handheld I.D Card Cloner! Only $40 Dollars

ADDED JUN 22, 2012, UNDER: NEWS

The blank cards and keyfobs are like 25 cents to one dollar at most. It will duplicate any ID card/plastic key etc that you use to access secure areas.

Just think of the "access cards" you can clone with this tiny device that can stay hidden in your pocket at all times. So much for security.....

Summary and next steps

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- Grow through healthcare data growth
  - Healthcare is increasing use of medical robots and savings will drive more growth
  - As a result healthcare data communications growth is robust
  - Facilities are and need to prepare for robots, additional bandwidth, network connections, security, and system integration
  - Updating healthcare's data center, data distribution and security is a method of entry
  - Your "to-do" list

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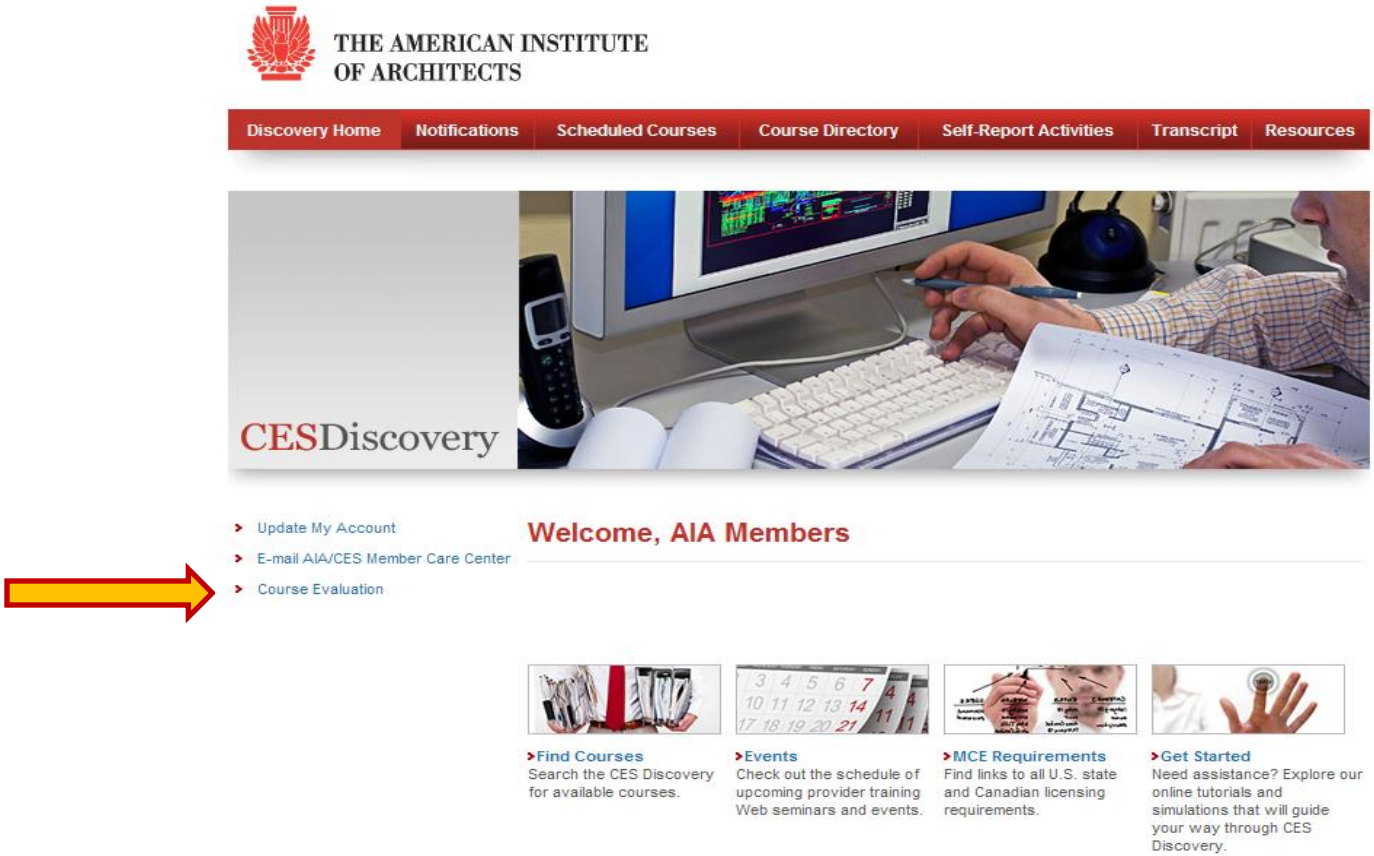
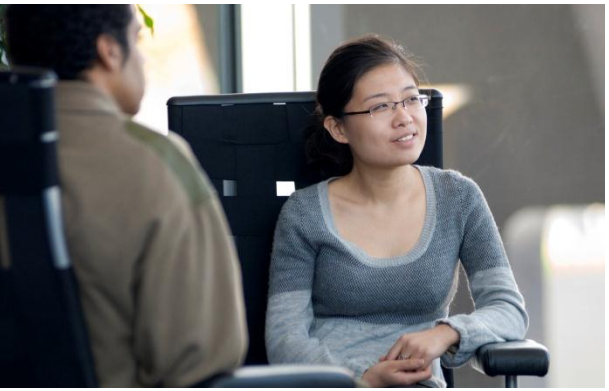
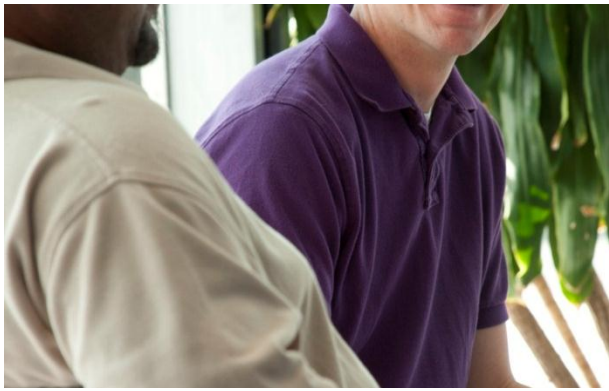
Course Evaluation

In order to maintain high-quality learning experiences, please access the evaluation for this course by logging into CES Discovery and clicking on the Course Evaluation link on the left side of the page.







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David Gillespie, AIA
Architect, Associate
SSOE Group

Jim Otte, NICET IV
Data / Fire / Security Specialist,
Senior Associate
SSOE Group