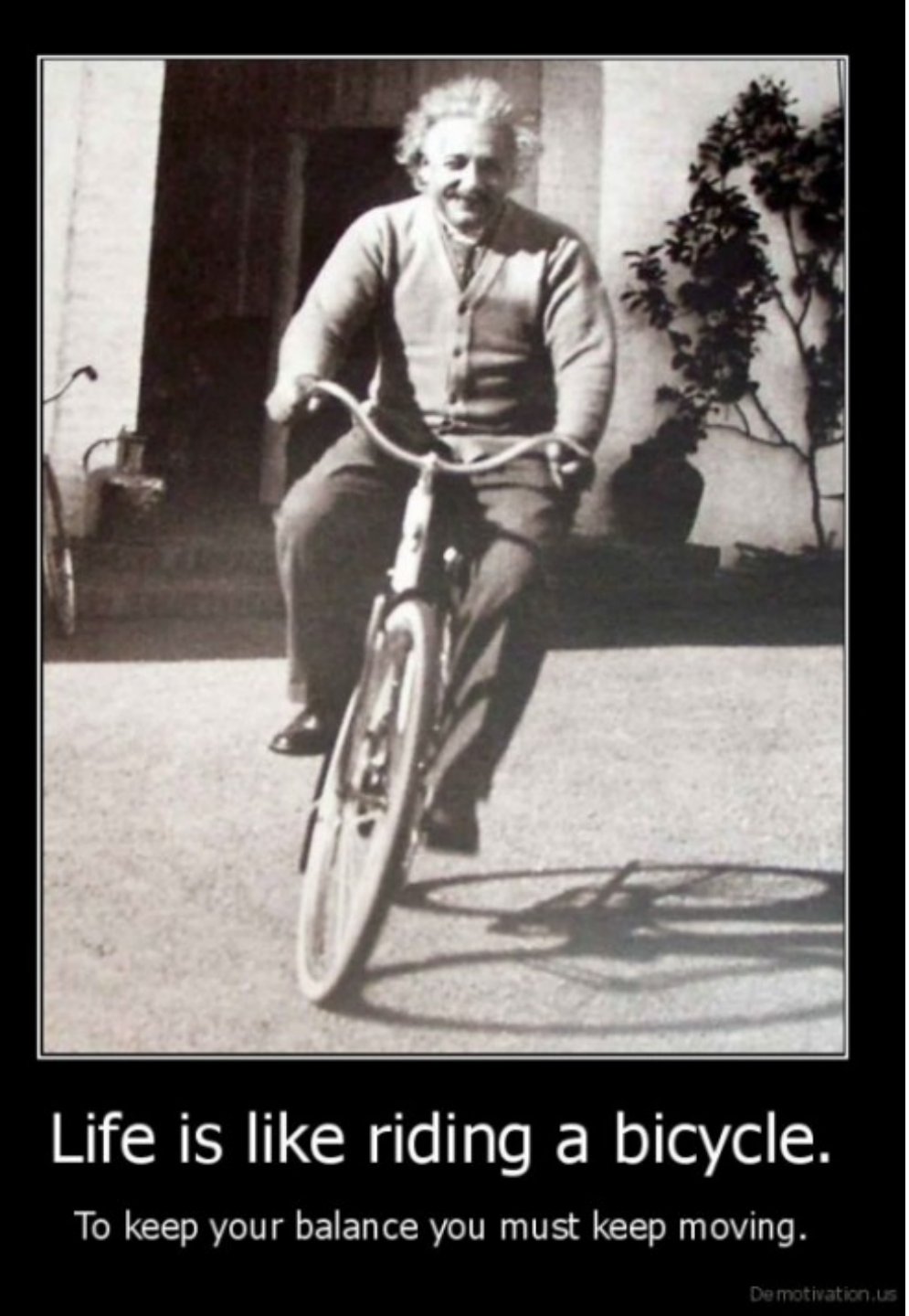


Ουρολογία μετά το 2025

Δ. Χατζηχρήστου

Σύγκρουση συμφερόντων

Receipt of grants/research supports:	Eli Lilly, Medispec
Receipt of honoraria or consultation fees:	Menarini, Eli Lilly
Participation in a company sponsored speaker' s bureau:	Medispec, Menarini, Eli Lilly, Bayer

News

ΚΑΤΙ ΠΟΥ ΞΕΧΝΑΜΕ!

31 January 2017

Boost non-technical skills for more success in the OR

The operating room can be a complex and highly stressful environment for any surgical team. To achieve successful outcomes for patients, technical skills are not enough. "About 70 to 80% of the crucial surgical skills are non-technical skills," says Mr. Kamran Ahmed of King's College London. Alarmingly enough, one of the major causes of surgical error is underdeveloped non-technical skills.

At the upcoming 32nd Annual EAU Congress (EAU17) in London, the European School of Urology (ESU) will offer the Hands-on Training course "Non-Technical Skills in Urology" from 25 to 27 March at 10:00 to 12:00, and again at 14:00 to 16:00. The ESU aims to raise awareness of the many benefits of non-technical skills in operating-room practice. The course is the first of its kind. The ESU team will be led by Ahmed (Course Director), Prof. Prokar Dasgupta and Prof. Muhammad Shamim Khan of Guy's & St Thomas' Hospital.

31 January 2017

Boost non-technical skills for more success in the OR

The operating room can be a complex and highly stressful environment for any surgical team. To achieve successful outcomes for patients, technical skills are not enough. "About 70 to 80% of the crucial surgical skills are non-technical skills," says Mr. Kamran Ahmed of King's College London. Alarmingly enough, one of the major causes of surgical error is underdeveloped non-technical skills.

70-80% των χειρουργικών δεξιοτήτων δεν είναι τεχνικές δεξιότητες!

Επικοινωνία
Εργασία ομάδας
Λήψη αποφάσεων
Ηγεσία
Διαχείρηση

What are non-technical skills?

Non-technical skills are defined as skills unrelated to the technical completion of surgical procedures. Similar to technical skills, non-technical skills are not inborn. These must be developed through diligent practice and training.

"The course will focus on communication, teamwork, decision-making, leadership and management skills," said Ahmed. "We aim to help cultivate these skills in the participants. We will train them to clearly and effectively communicate with their team. This is so they would know how to make quick, appropriate decisions when there's difficulty in procedures, or when a situation needs to be salvaged immediately, for example."

News

10 January 2017

YUO launches Leadership for Medical Professionals Course

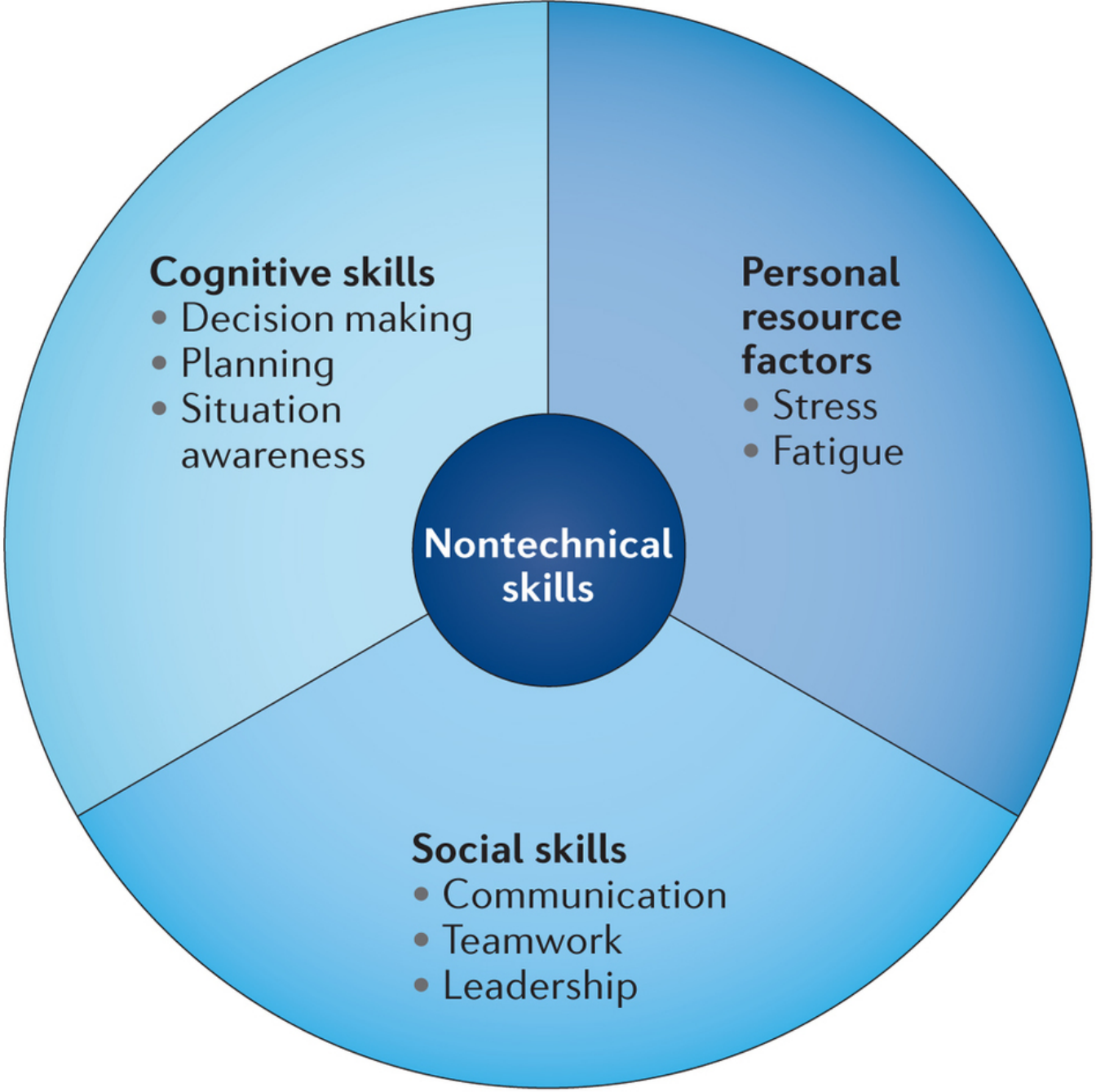
Do you wish to hone your management and leadership skills or sharpen your decision-making abilities?

The **EAU Young Urologists Office (YUO)** may have the right programme for you in London during the Annual EAU Congress. The YUO will hold a new course on Monday 27 March 2017, from 08:30 to 11:30, to provide recommendations on how to develop leadership and management skills.

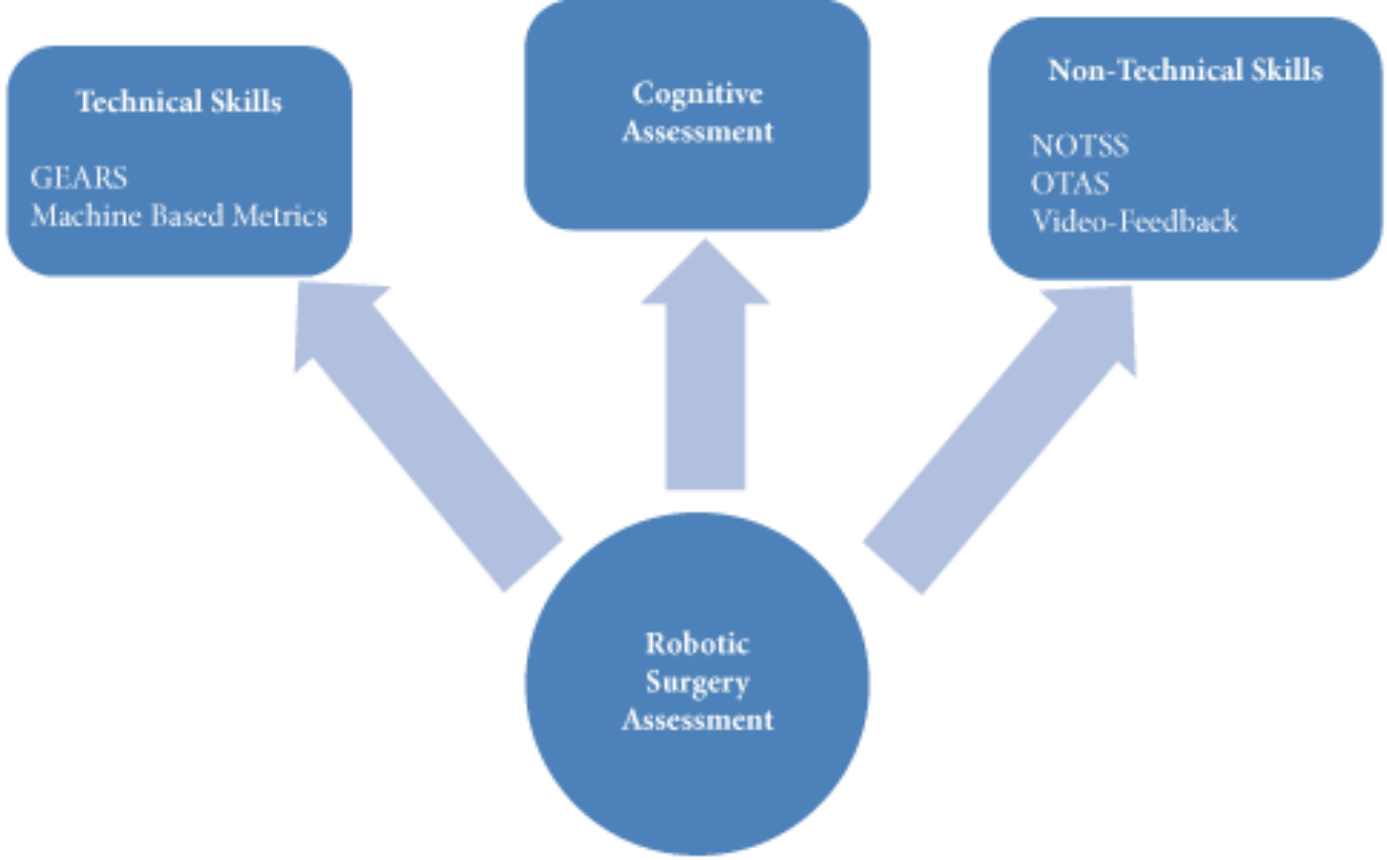
"Around 30 participants from across Europe will be selected for the three-hour course which will provide

Ηγεσία: και αυτό μαθαίνετε!

"The emphasis is on the development and successful implementation of a personal and creative leadership style and business strategy. After the course, participants will learn to be more decisive in reacting on developments within their organization, more effective and efficient in management-skills," said Sedelaar.



Aydin A, et al: *Nature Reviews Urology* 13, 503–519 (2016)



Situation awareness	Developing and maintaining a dynamic awareness of the situation in theatre based on assembling data from the environment (patient, team, time, displays, equipment); understanding what they mean, and thinking ahead about what may happen next.
Decision-making	Skills for diagnosing the situation and reaching a judgement in order to choose an appropriate course of action.
Teamwork and communication	Skills for working in a team context to ensure that the team has an acceptable shared picture of the situation and can complete tasks effectively
Leadership	Leading the team and providing direction, demonstrating high standards of clinical practice and care, and being considerate about the needs of individual team members.

Guru KA, et al: BJU Int 2015; **115:** 166–174

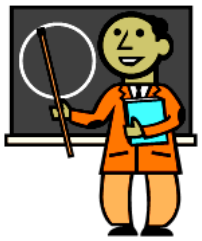
Driver Training

Technical Skills

TECHNICAL TRAINING

How to drive a car –

- Effects of controls
- How to maintain the vehicle
- Rules and regulations



Intellect -
Tools to work with

Non-Technical Skills

NON- TECHNICAL TRAINING

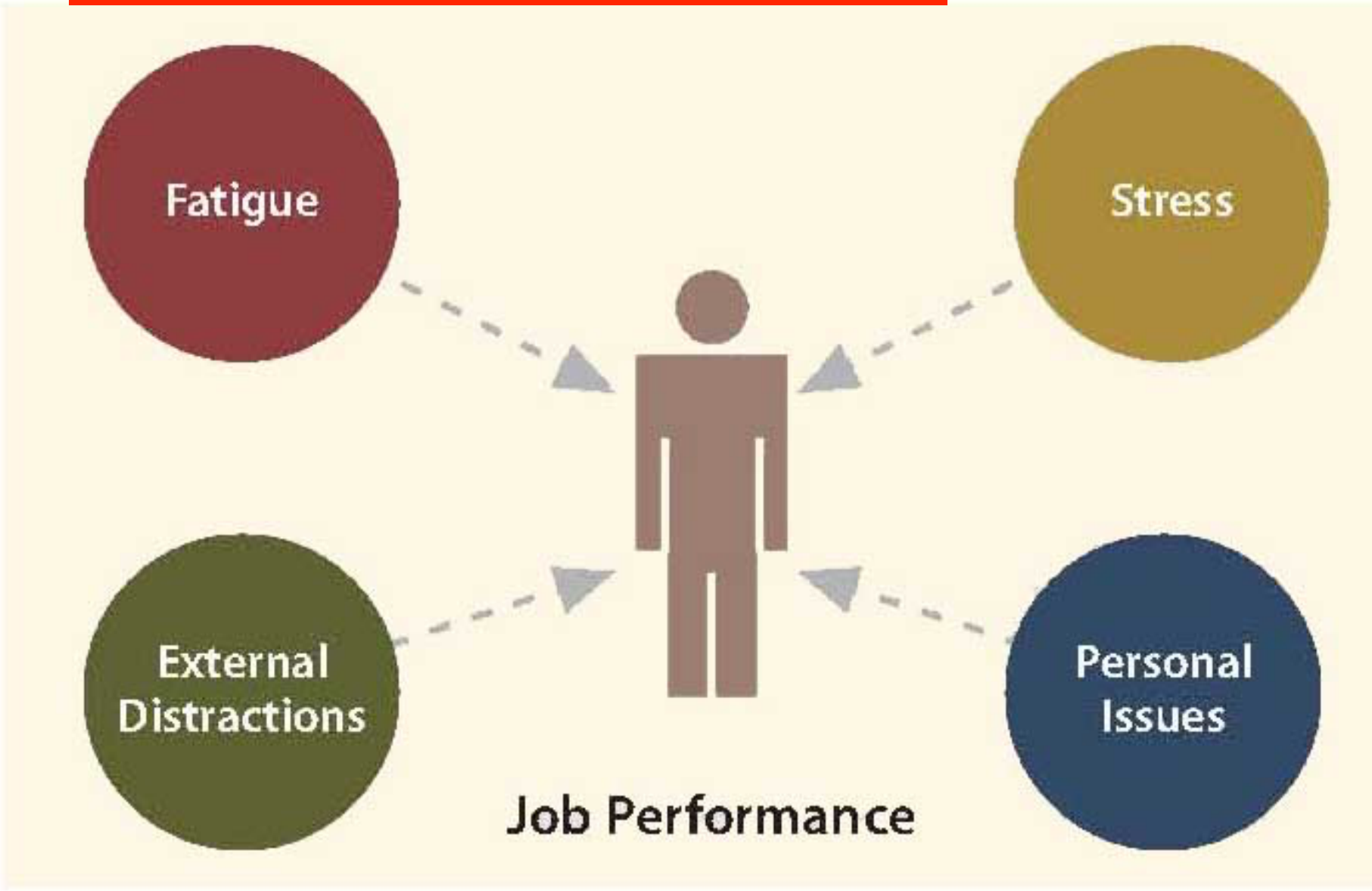
Driving Culture –

- Effect of driving when tired
- Managing the urge to speed
- Courtesy on the roads

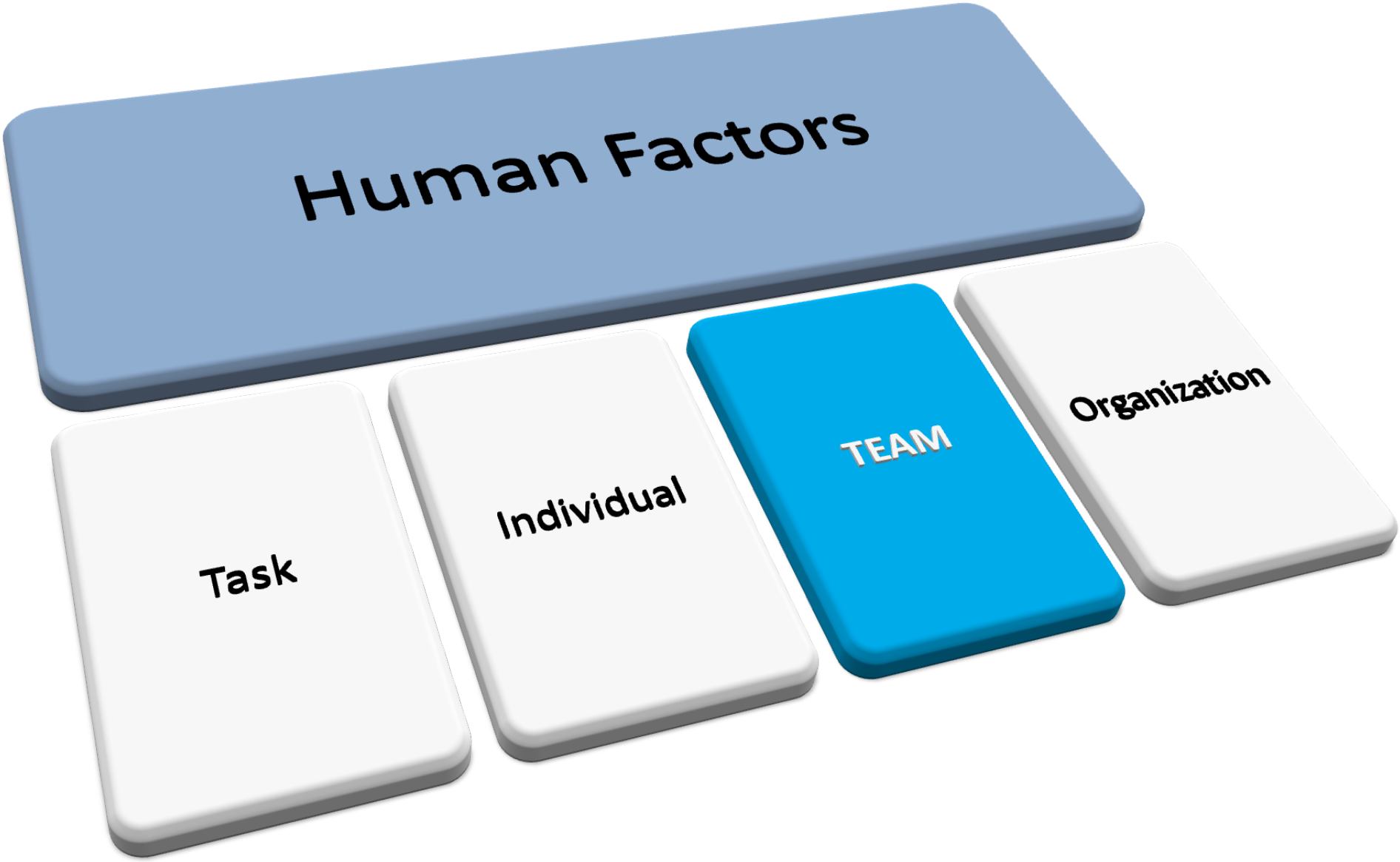
Behaviour –
Will to use tools

LEARNER DRIVER

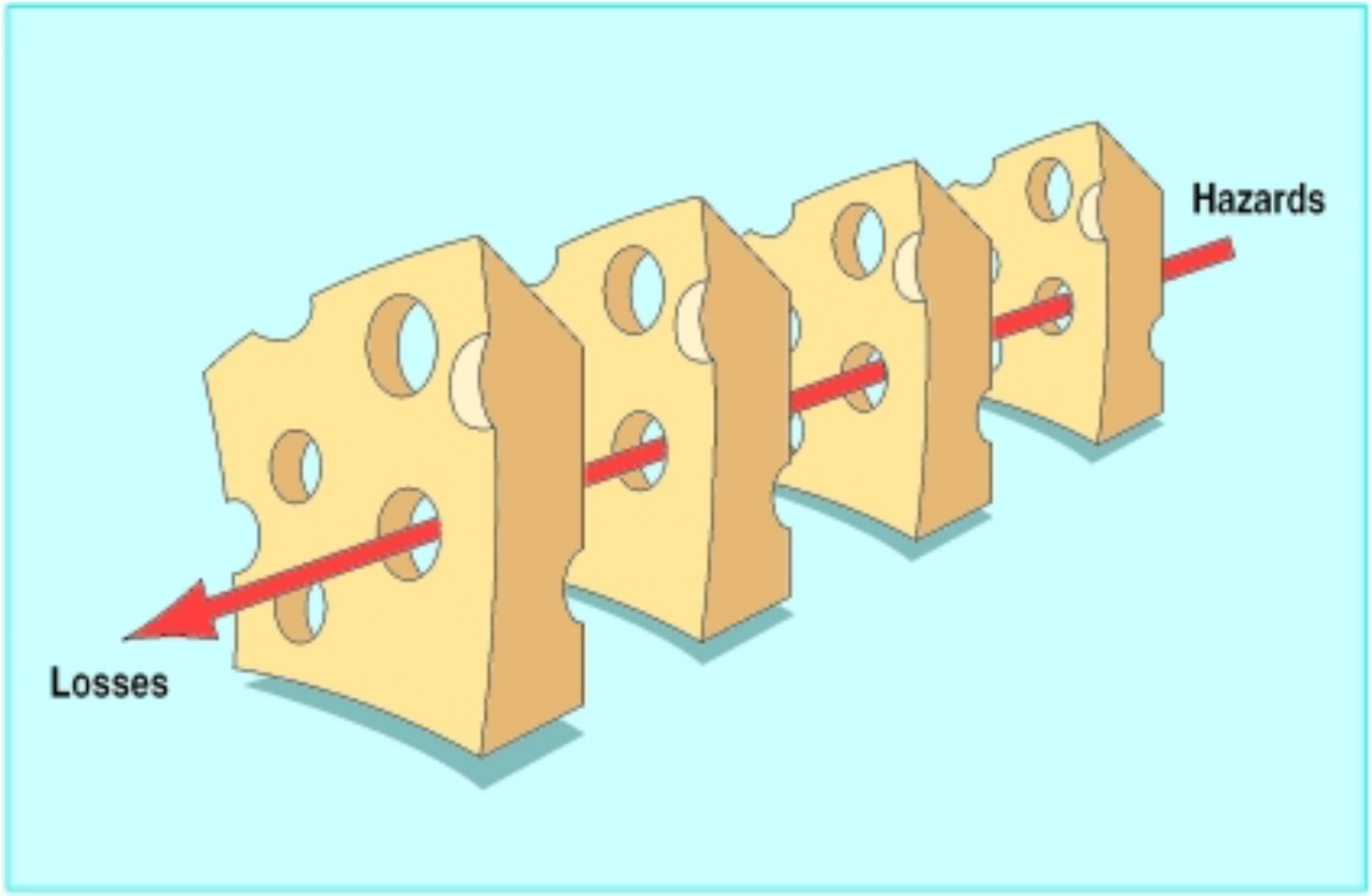
Η απόδοσή μας δεν είναι σταθερή!



Ο ανθρώπινος παράγοντας!



Ελβετικό τυρί: το μοντέλο του λάθους



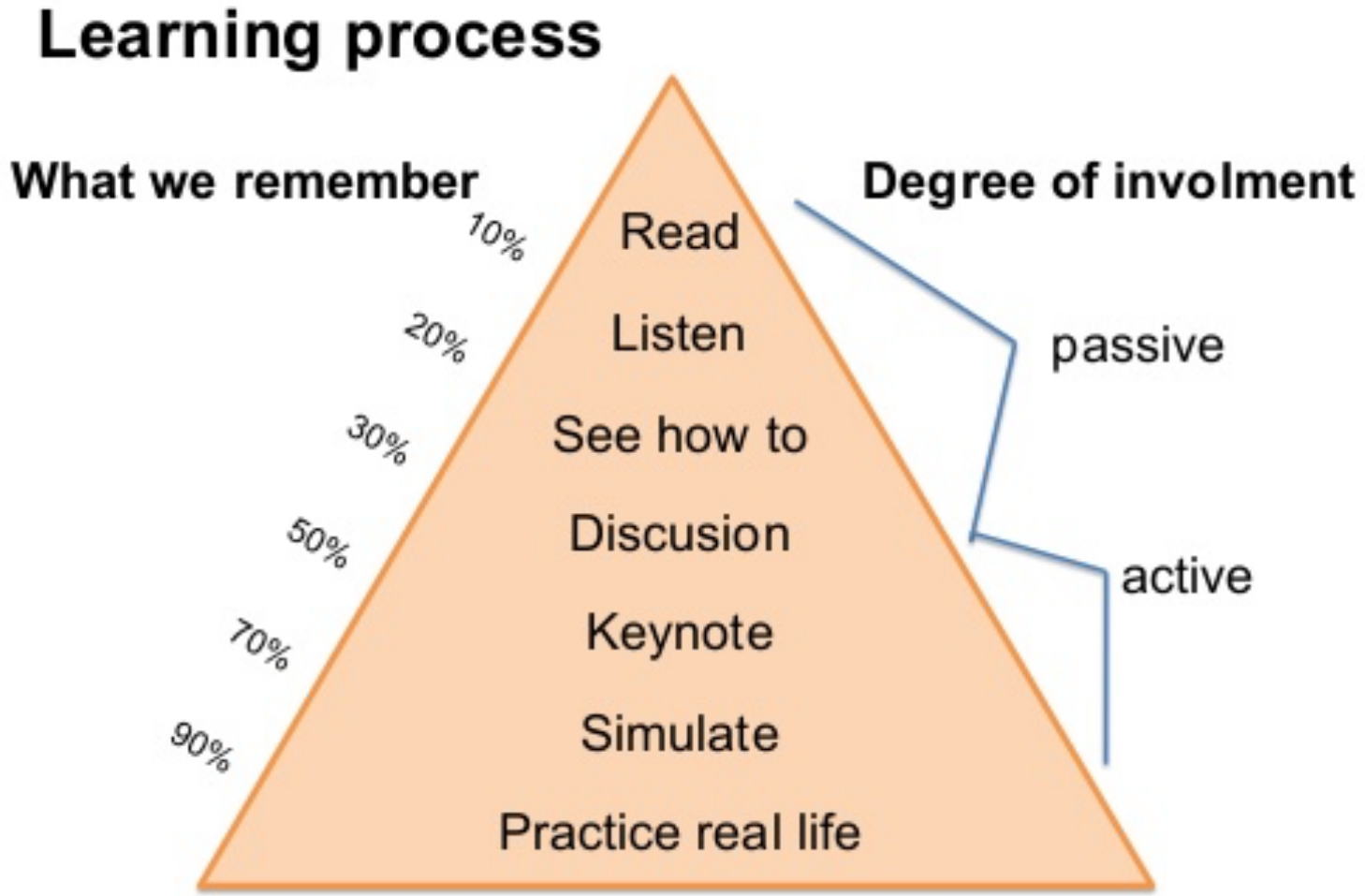
Reason, A: BMJ. 2000 Mar 18; 320(7237): 768–770.


Memory
Attention
Speed
Focus
Creativity
Flexibility

Η μάθηση θέλει πρακτική!

Máster
Enfermo crítico
y emergencias

Universitat de Barcelona
Facultat de Medicina



Το τέλος του «βλέπω – κάνω» και στην χειρουργική!

BJUI
BJU INTERNATIONAL

How to develop a simulation programme in urology

Kamran Ahmed, Tarik Amer, Ben Challacombe, Peter Jaye*, Prokar Dasgupta and Mohammad Shamim Khan

*MRC Centre for Transplantation, King's College London, King's Health Partners, Department of Urology, Guy's Hospital, and *Department of Accident and Emergency, St Thomas Hospital, London, UK*

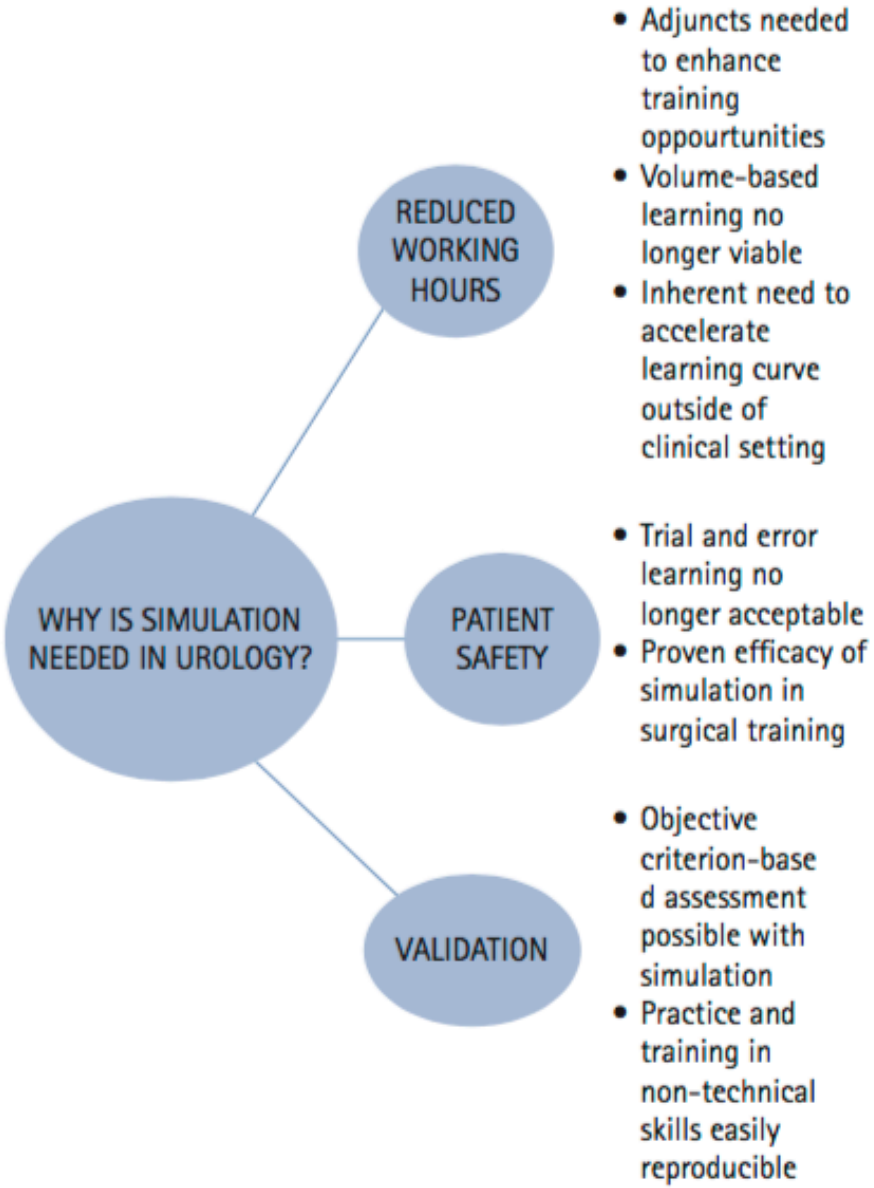
Accepted for publication 15 March 2011

Fixed performance-based outcomes of inanimate trainers and simulators have been praised as useful adjuncts in urology for reducing the learning curve associated with the acquisition of new technical and non-technical skills without compromising patient safety. Simulators are becoming an integral part of the urology training curriculum and their effectiveness is totally

What's known on the subject? and What does the study add?
Inanimate trainers and simulators have been shown to facilitate the skill acquisition of urologists. However, there are significant challenges to integrating standalone simulation programmes into mainstream urology curricula.

This study provides a framework to overcome these challenges and discusses the advantages of centralised urology simulation centres and their potential to serve as key adjuncts in the certification and validation process of urologists.

Οι επιπτώσεις της προσομοίωσης είναι τεράστιες!



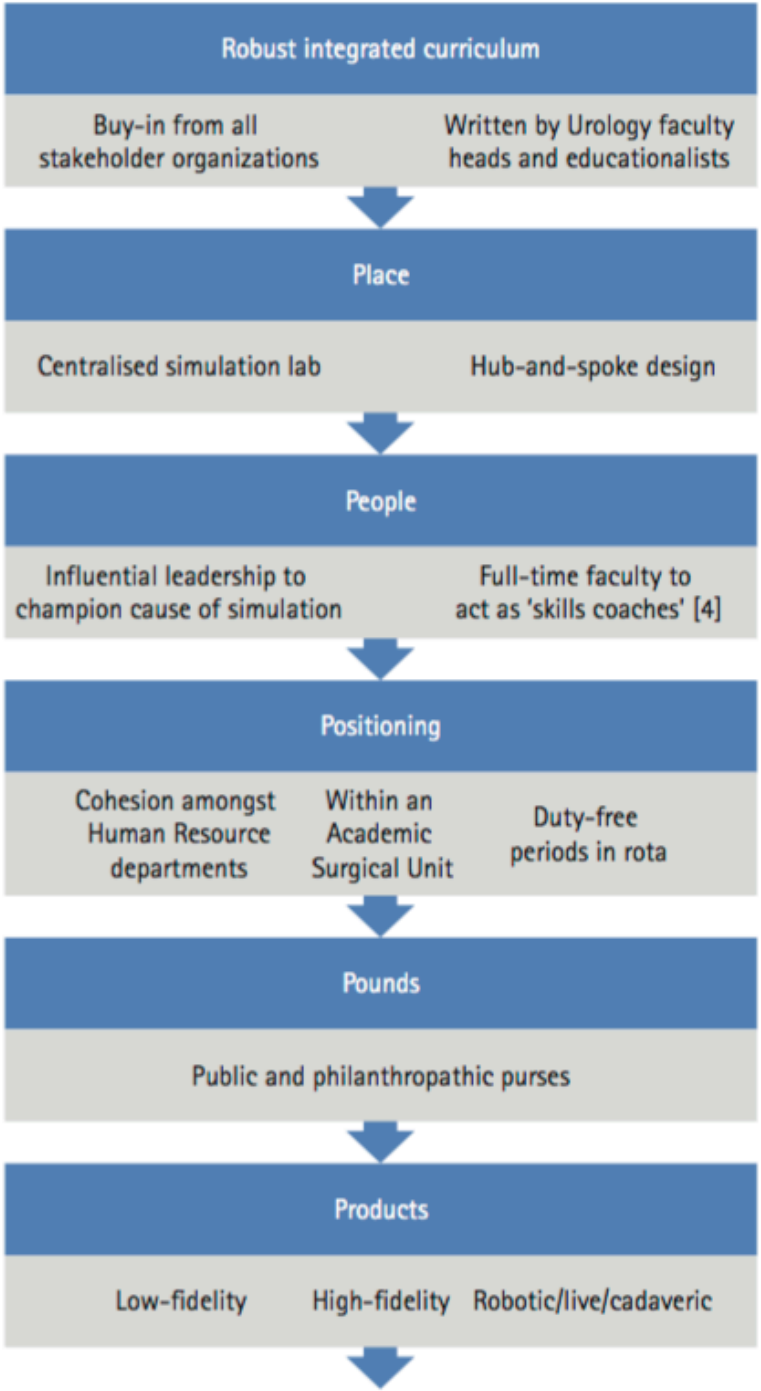
Προσομοιωτές στην Ουρολογία

TABLE 1 High-fidelity training models for incorporation in a proposed curriculum [10]

Model	Manufacturer	Task	Model type
Uroscopic trainer	Limbs and Things, Bristol, UK	Ureteroscopy	Bench
Scope trainer	Mediskills, Northampton, UK	Ureteroscopy	Bench
UROMentorTM	Simbionix, Cleveland, OH, USA	Ureteroscopy	Virtual reality
Bristol TURP Trainer	Limbs and Things,	TURP	Bench
PERC MentorTM	Simbionix	Percutaneous nephrolithotomy	Virtual reality
Procedicus MISTTM nephrectomy simulator	Mentice, Gothenburg, Sweden	Retroperitoneal radical nephrectomy	Virtual reality
Porcine kidney model	–	Percutaneous open renal surgery	Animal

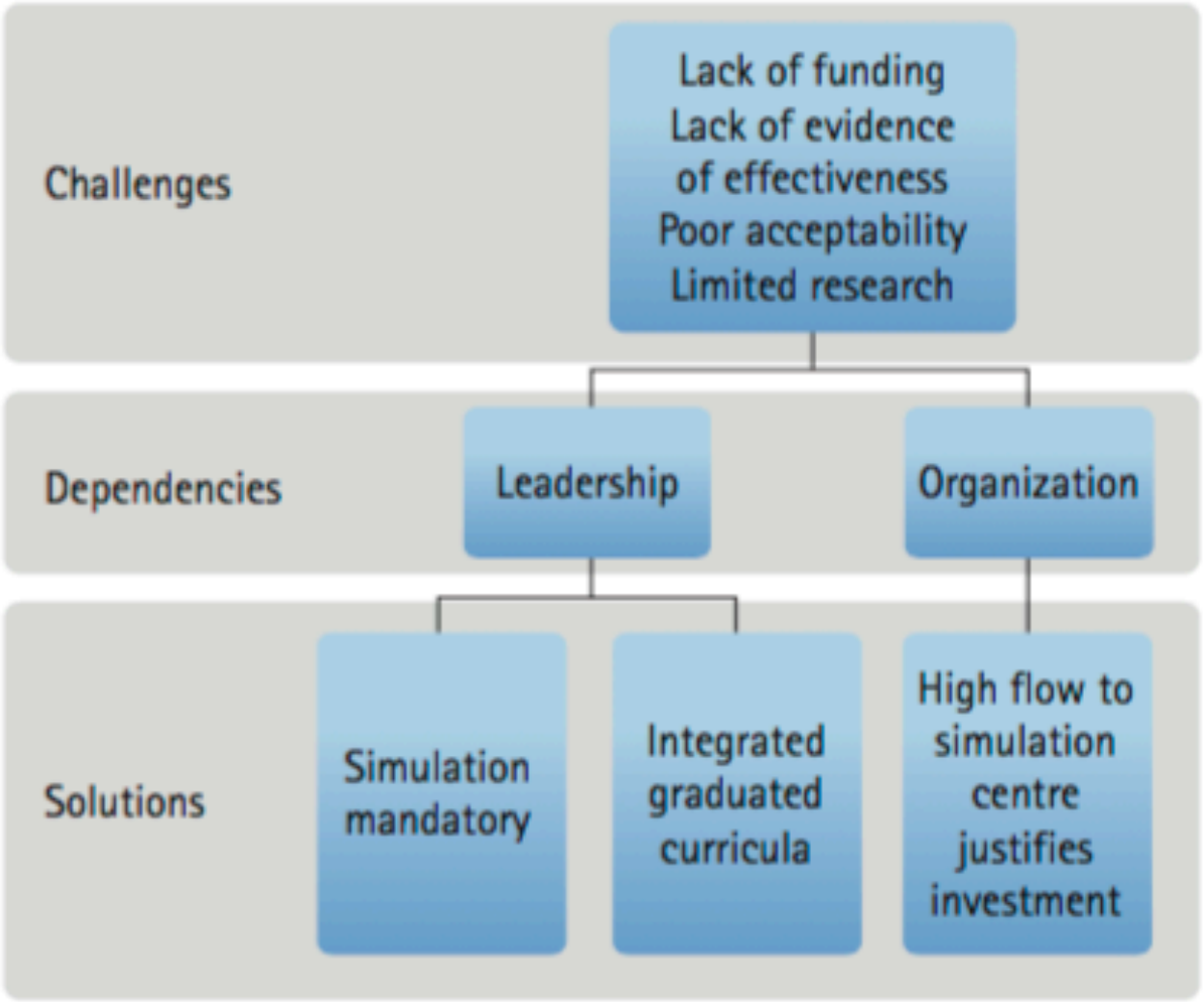
Το Curriculum των ειδικευομένων Ξαναγράφεται!

FIG. 3.
Flowchart outlining the development of an integrated urology simulation programme.



Τα προβλήματα πολλά...

FIG. 4.
Anticipated challenges in developing a sustainable urology simulation programme [11].



Το μέλλον δεν θα συγχωρέσει τα λάθη που κάνουμε!

BJUI
BJU INTERNATIONAL

Urology training: past, present and future

Rishma Gohil, Reenam S. Khan, Kamran Ahmed, Pardeep Kumar, Ben Challacombe, Mohammed Shamim Khan and Prokar Dasgupta

MRC Centre for Transplantation, King's College London, Department of Urology and Urology Simulation Centre, Guy's Hospital, London, UK

Accepted for publication 26 July 2011

Since 2004 the estimated available training time, for all doctors, has dropped from 30 000 h to ≈8000 h. By decreasing the initial stages of the learning curve, medical simulation has the potential to compensate for the reduced time available to train urologists. The current urological training pathway consists of 2 years of foundation year training, 2 years of core surgical training, followed by 5 years of specialty training. Training time pressures and the expansion of treatment techniques have led to a trend towards increased sub-specialization in urology. To optimize patient care, training programmes must evolve, taking into account several key issues and in accordance with advances in urological care.

What's known on the subject? and What does the study add?
Dedicated training hours for surgeons are falling as the complexity of techniques and patient expectations are increasing. Urologists therefore need to train in more sophisticated and effective ways.

This article looks at past and current urological training and suggests emerging and innovative ways to teach the next generation of urologists.

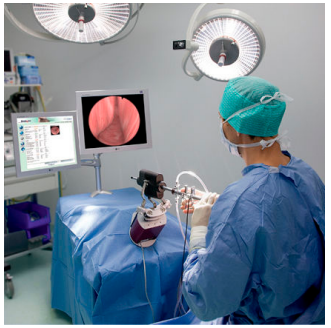
KEYWORDS

urology, education, simulation, training, assessment

Τύποι προσομοιωτών: η επανάσταση εφαρμόζεται!

i. Mechanical simulators (dry-lab training);
ii. Hybrid simulators, which also involve a box containing objects and organs, but performance is assessed by a computer that can give feedback according to programmed metrics. Simple metrics in urology include time of procedure, economy of movement and collisions;
iii. Virtual reality (VR) simulators, which allow trainees to interact with three-dimensional computer databases in real time.

- With CT/MRI, there is now even the technology to practise operations before the real procedure. This practice has the potential to enhance patient safety in future.
- Telementoring techniques allows an experienced surgeon to assist or direct a junior operating at a distance by indirectly observing procedures and offering advice or directing surgical steps.



Η αξιολόγηση!

The Journal of Urology

Volume 196, Issue 2, August 2016, Pages 312–320

Review Article

Current Status of Simulation and Training Models in Urological Surgery: A Systematic Review

Abdullatif Aydin, Ahmed M.A. Shafi, Muhammad Shamim Khan, Prokar Dasgupta*, Kamran Ahmed*

MRC Centre for Transplantation, King's College London, Department of Urology, Guy's and St. Thomas' NHS Foundation Trust, and King's Health Partners, London, United Kingdom

Accepted 13 January 2016, Available online 23 March 2016

- A total of 91 validation studies were identified pertaining to training models in
  - endourology (63),
  - laparoscopic surgery (17),
  - robot-assisted surgery (8) and
  - open urological surgery (6), with a total of 55 models.
- Of the included studies:
  - 6 were classified Level 1b,
  - 9 Level 2a,
  - 39 Level 2b and
  - 19 Level 2c.
- Of all the training models the URO Mentor™ was the only one to receive a level of recommendation of 1.

Η αξιολόγηση!

ELSEVIER

The Surgeon

Volume 14, Issue 6, December 2016, Pages 301–307

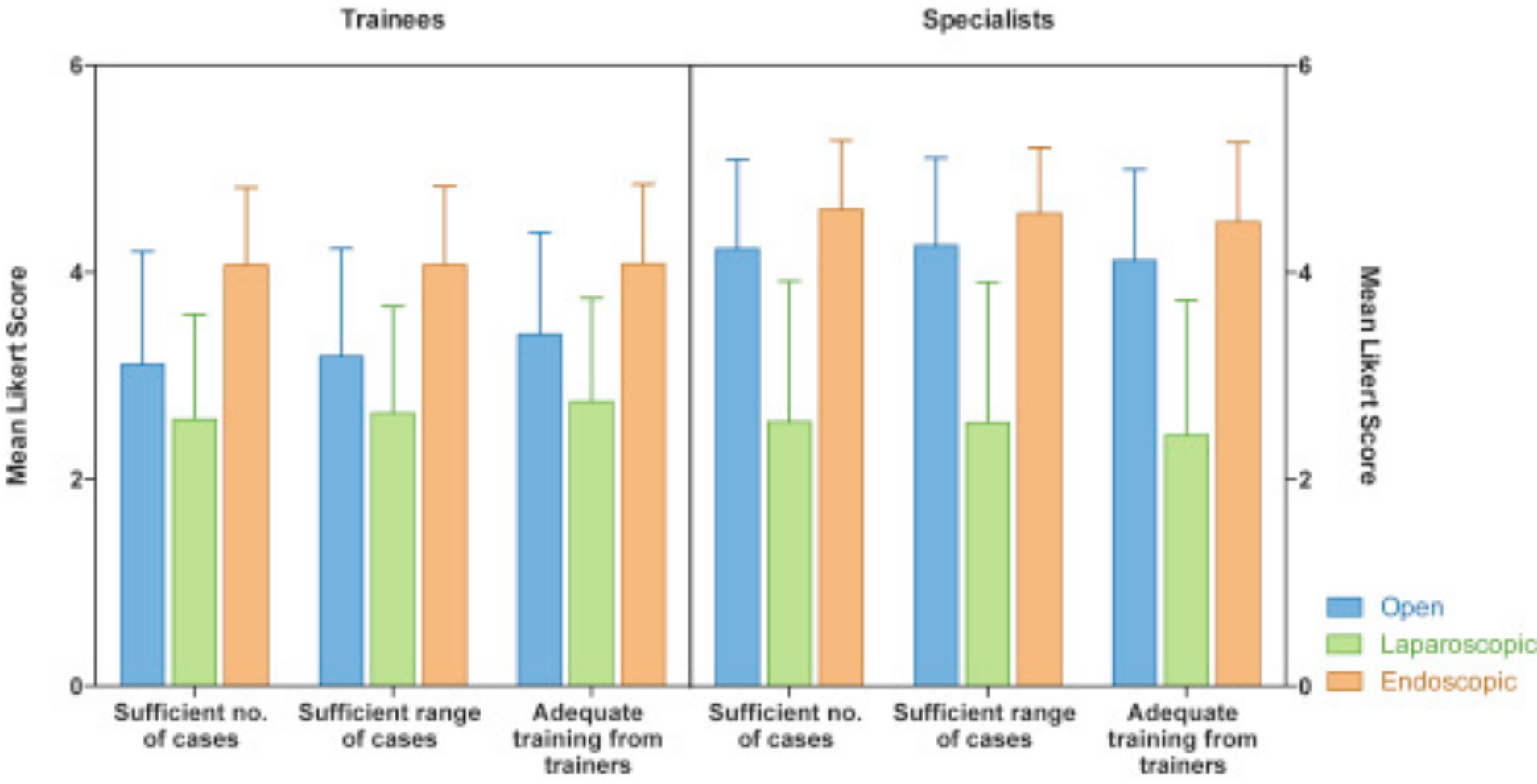
The role of simulation in urological training – A quantitative study of practice and opinions

Abdullatif Aydin[a], Kamran Ahmed[a,*], Ahmed M.A. Shafi[a], Muhammad Shamim Khan[b], Prokar Dasgupta[a, b]

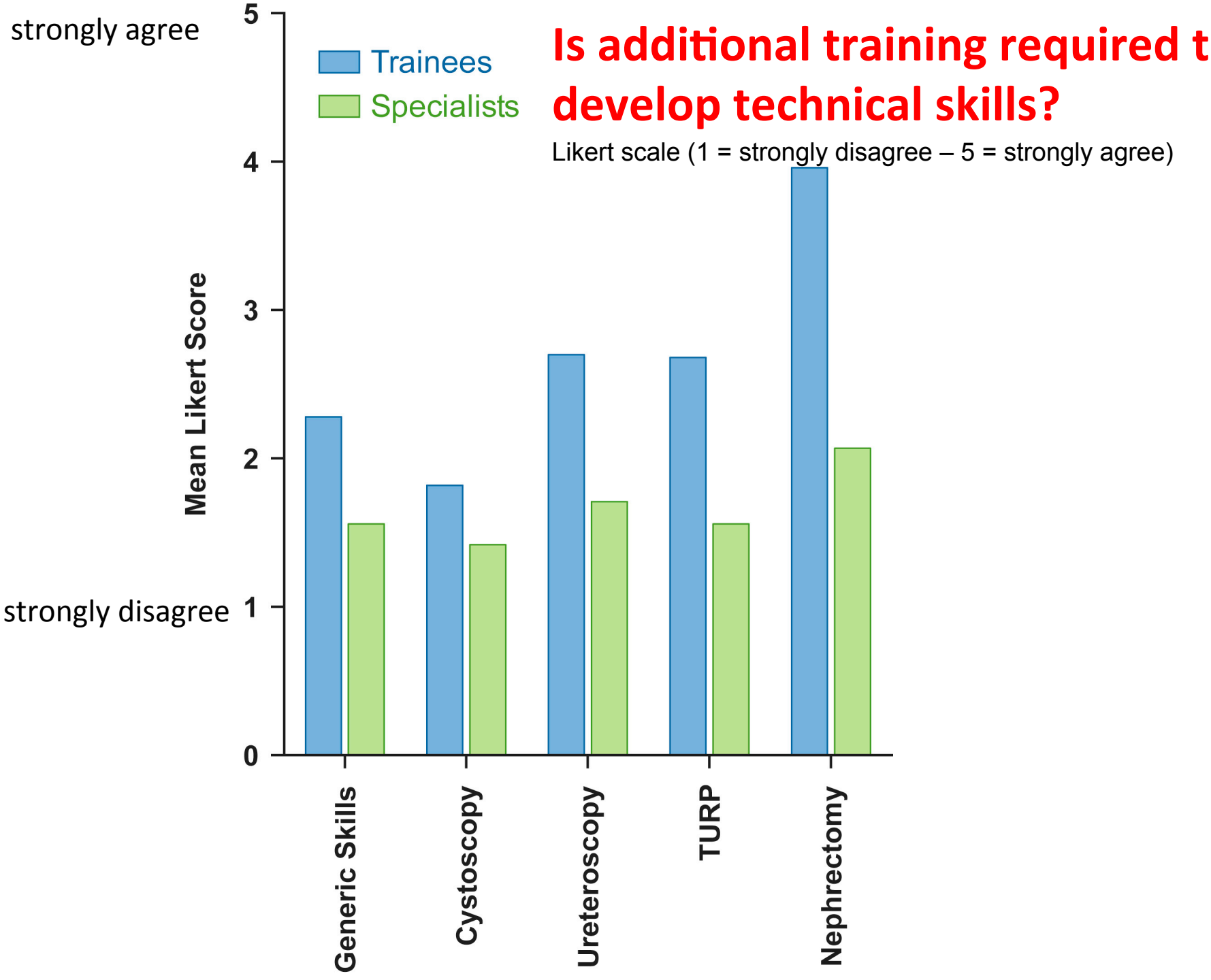
[a] MRC Centre for Transplantation, King's College London, United Kingdom

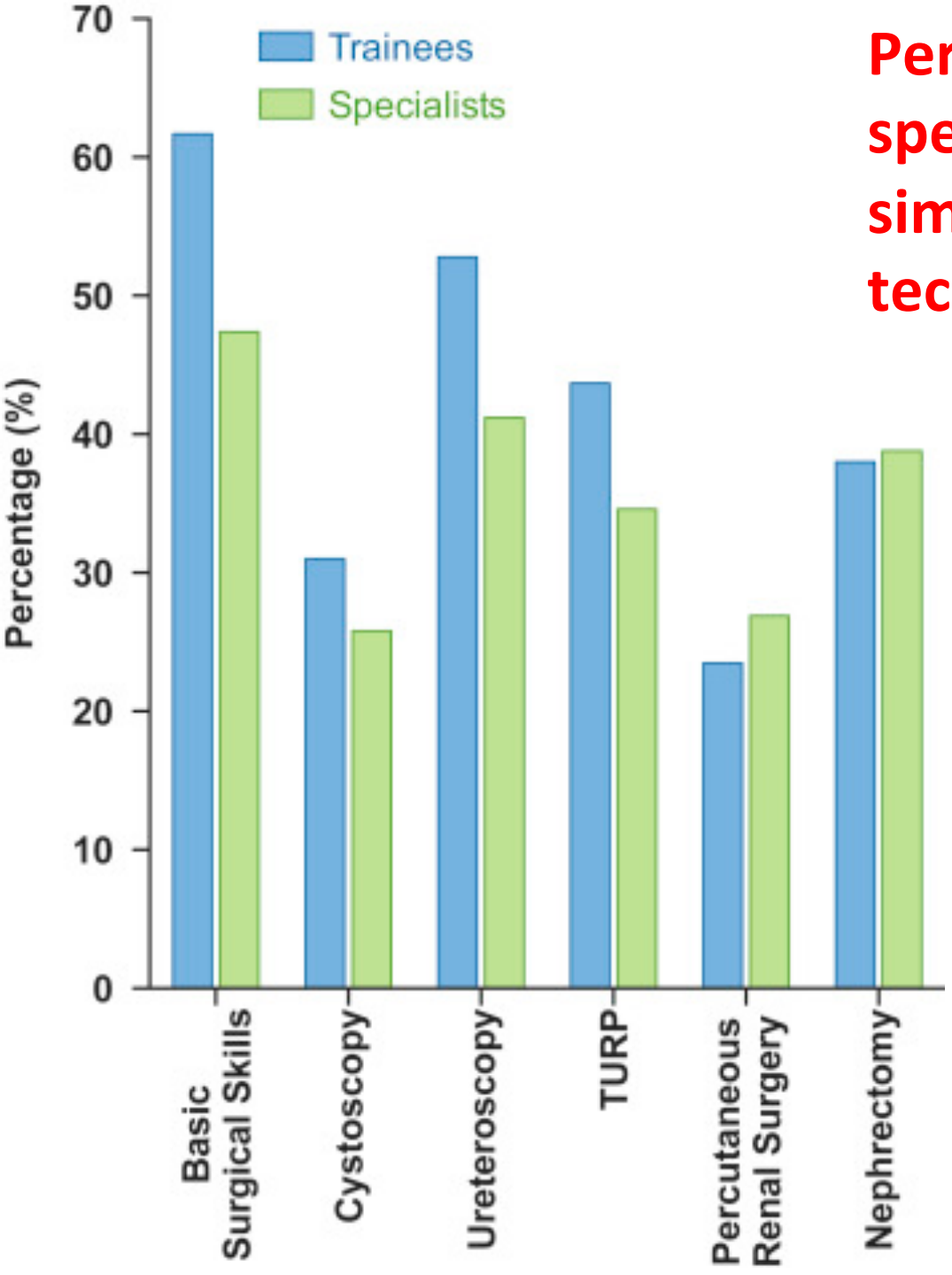
[b] Department of Urology, Guy's and St. Thomas' NHS Foundation Trust, United Kingdom

Was training sufficient to develop the necessary technical skills in open, laparoscopic and endoscopic procedures?



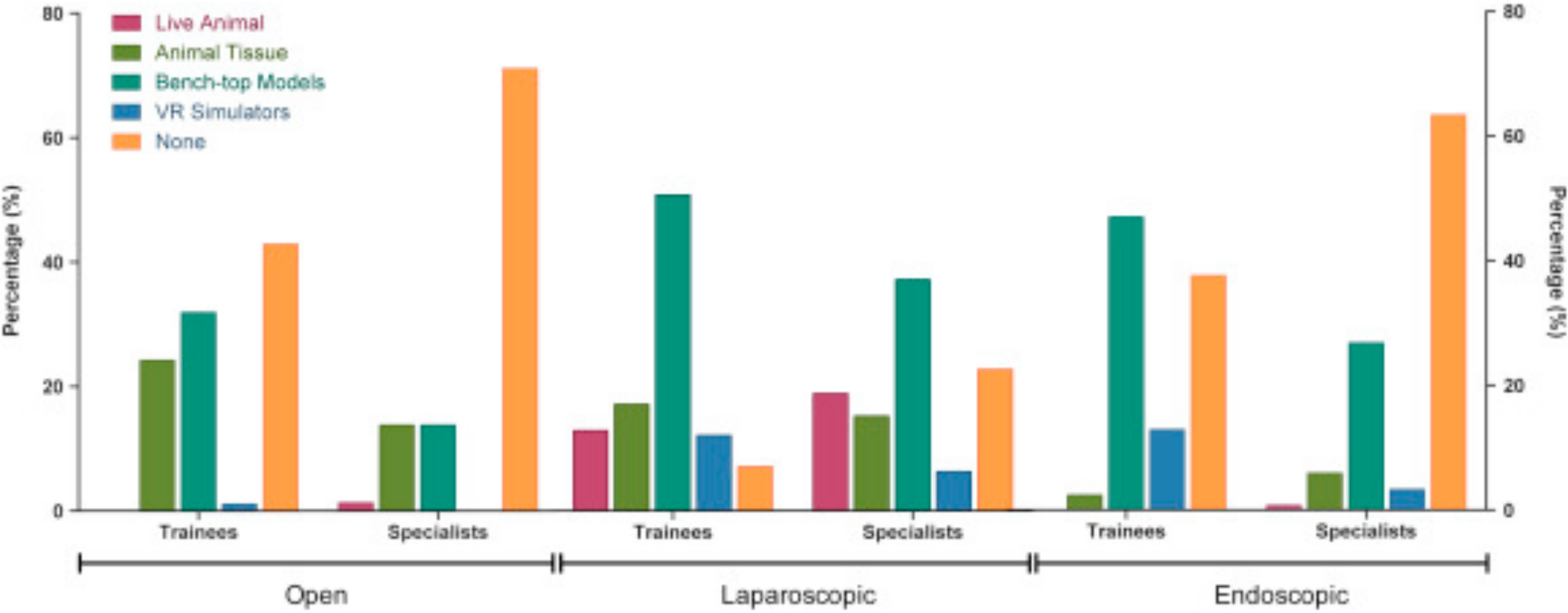
Likert scale (1 = strongly disagree – 5 = strongly agree)


strongly agree
strongly disagree
Trainees
Specialists
Is additional training required to develop technical skills?
Likert scale (1 = strongly disagree – 5 = strongly agree)
Mean Likert Score
5
4
3
2
1
0
Generic Skills
Cystoscopy
Ureteroscopy
TURP
Nephrectomy

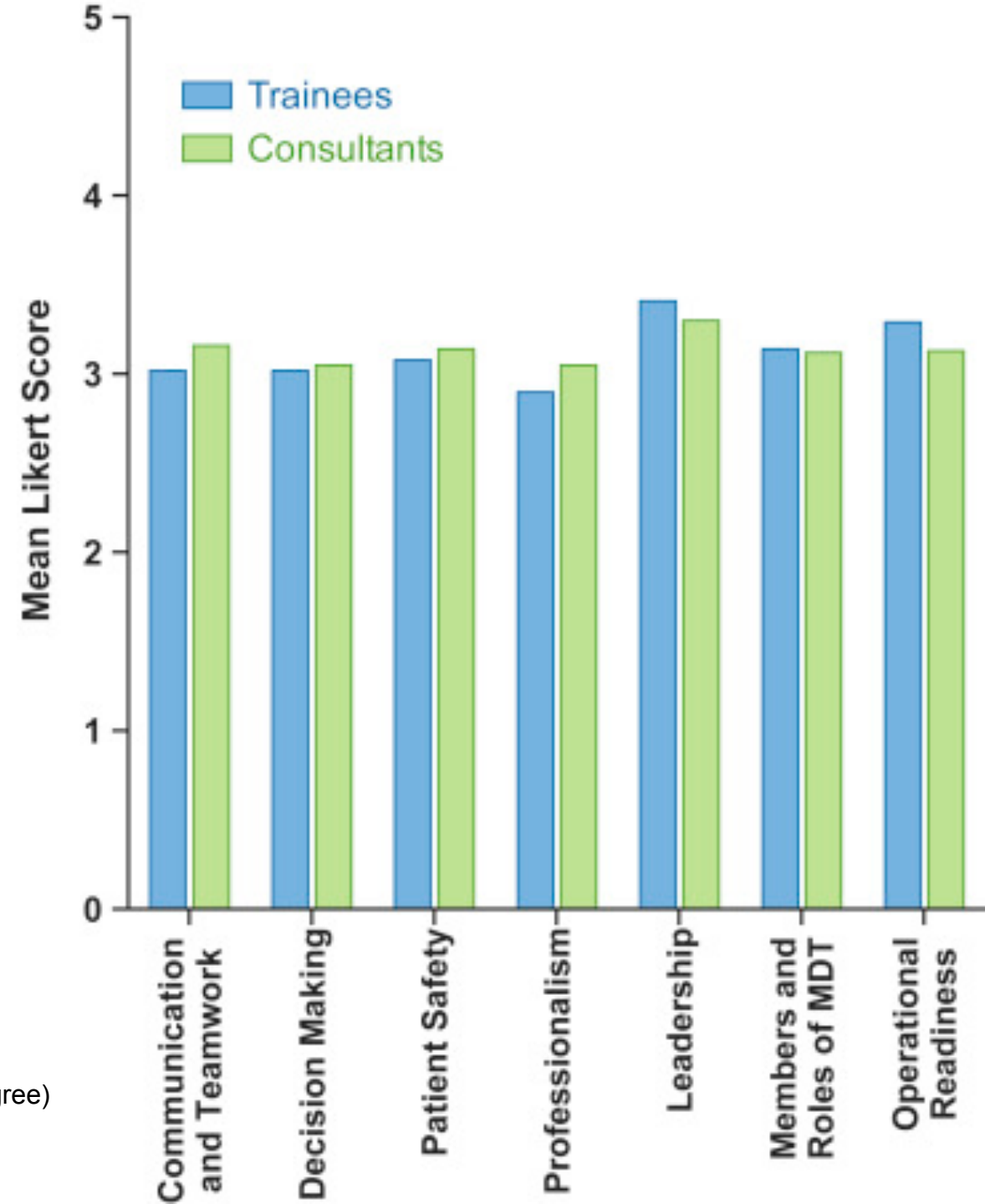


Percentage of trainees and specialists who had simulation experience in technical skills training

Which simulation model?



Further training is required to enhance the following Non-Technical Skills.



Likert scale (1 = strongly disagree – 5 = strongly agree)

6 μήνες έρευνα υποχρεωτική στην ειδικότητα και στην Ελλάδα!

“Whether or not a trainee produces revolutionary research, it can be argued that the process of:

- ✓ conceptualizing a research question,
- ✓ designing a study,
- ✓ analysing the results and
- ✓ presenting the work

are all valuable skills that every clinician should have.

Exposure to research is useful for clinicians to be able to:

- ➢ critically appraise information
- ➢ use evidence-based medicine in their clinical practice

Σε λίγα χρόνια μόνο videos!

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- Video abstracts

Video abstracts

Revolutionising the concept of video abstracts

Our contact with technology has shortened our attention spans. The digital era means we are used to getting information mostly in abbreviated forms and are confronted with too many choices on the internet. The new habits of consuming information are also applicable to scientific research and this means different requirements are needed for those producing content.

In this document, you will find step-by-step guidance for creating a video abstract, from conception to production. The guide can support you to produce your own video abstracts, taking account of the different equipment and budget people have.

Please note that you will be responsible for the project from beginning to end.* After the video submission, our multimedia team will review it, suggest any potential changes and then publish it.

If you have any questions throughout the process, please email multimedia.journals@bmj.com and our Journals Multimedia Editor, Leticia Amorim, will get in touch with you.

Τα χρόνια της ειδίκευσης

FIG. 1.

The training pathway. FY, foundation year; CT, core surgical training; ST, specialty training; CCT, Certificate of Completion of Training.

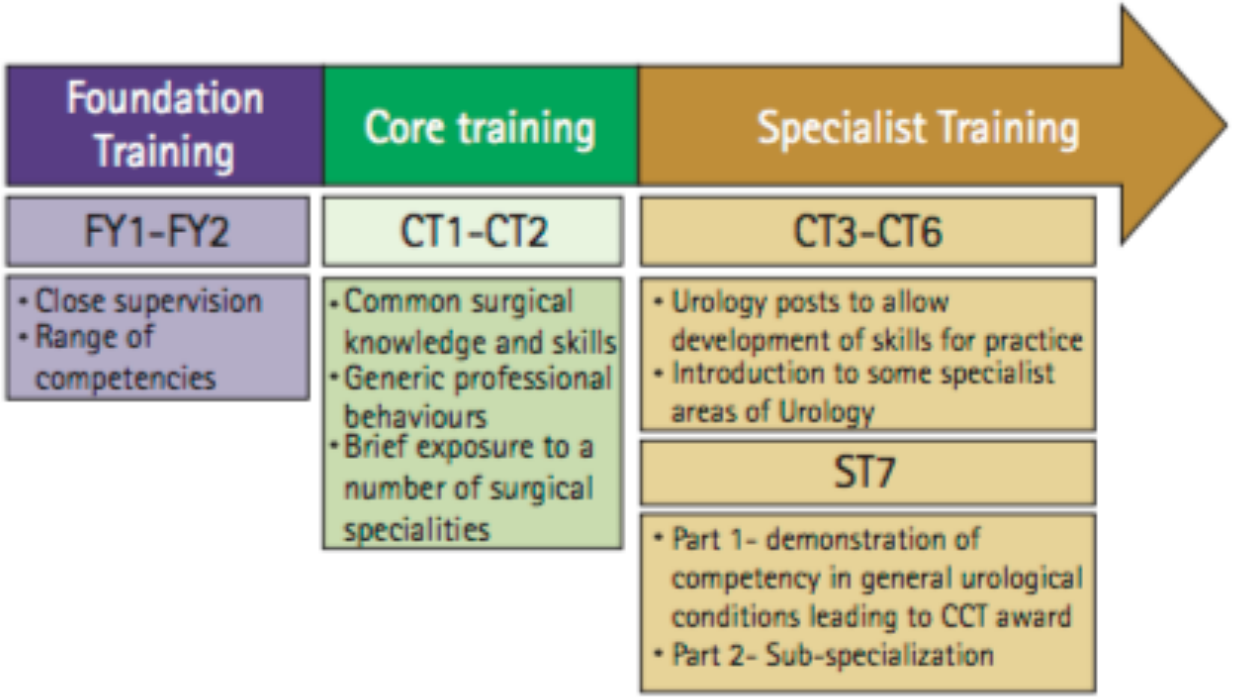


TABLE 2 Recommendations for the future of urology training

Recommendations

1. Greater use of validated simulation methods, particularly VR simulation, in core urology training and assessment.
2. Development of curricula for training in newer technologies, e.g. robot-assisted surgery.
3. Protected research time for trainees.

Το μέλλον «λέγεται» ρομποτική χειρουργική!

ELSEVIER

European Urology Focus

Available online 17 February 2016

In Press, Corrected Proof — Note to users

Platinum Priority – Review – Education

Training Modalities in Robot-assisted Urologic Surgery: A Systematic Review

Catherine Elizabeth Lovegrove[a], Oussama Elhage[a], M. Shamim Khan[b], Giacomo Novara[c], Alex Mottrie[d], Prokar Dasgupta[a], Kamran Ahmed[a,*]

[a] MRC Centre for Transplantation, NIHR Biomedical Research Centre, King's Health Partners, King's College London, London, UK

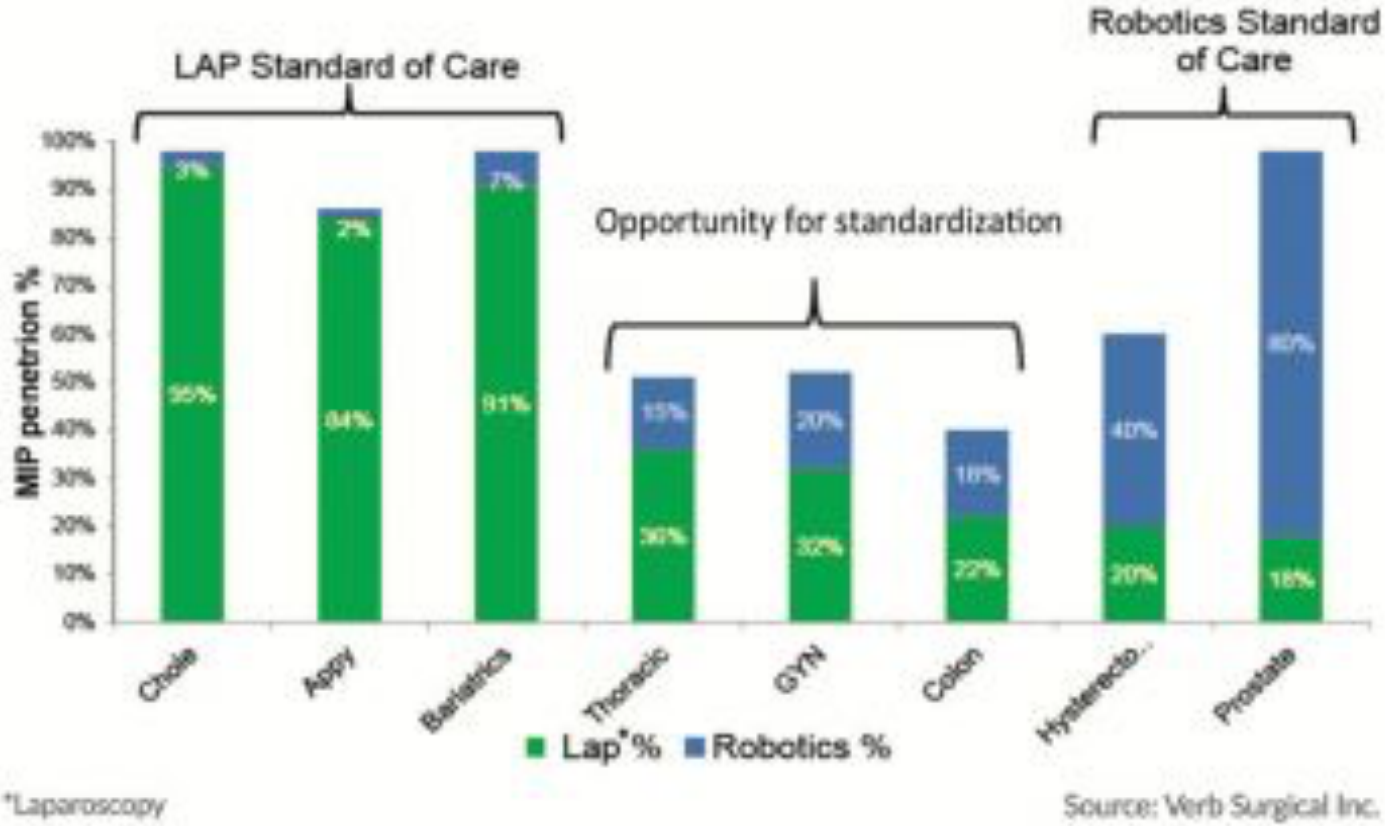
[b] Departments of Urology and Nephrology & Renal Transplantation, Guy's & St Thomas' Hospital, London, UK

[c] University of Padua, Padua, Italy

[d] O.L.V. Vattikuti Robotic Surgery Institute, Aalst, Belgium

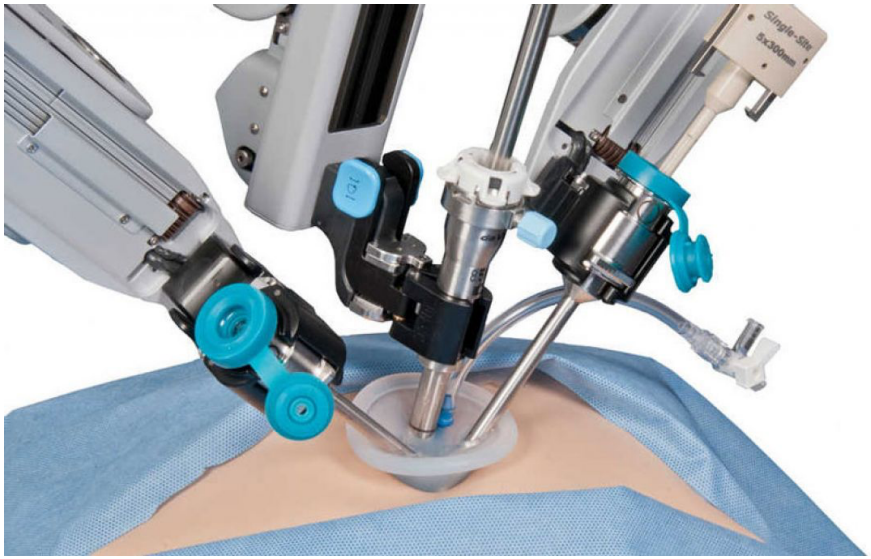
Accepted 11 January 2016, Available online 17 February 2016

Minimally Invasive Procedure Penetration
(US, 2015)



*Laparoscopy

Source: Verb Surgical Inc.



Το μέλλον «λέγεται» ρομποτική χειρουργική!

- More than 3,600 of its da Vinci machines in hospitals around the world.
- The number of surgical procedures, ~700,000 in 2015, has steadily risen and was 15% year-over-year 2014 to 2015.
- According to Fortune, within five years 1/3 of U.S. surgeries (from 15% today) will be performed with robotic systems.
- Nevertheless, an increasing number of new players are entering the marketplace.

Intuitive Surgical

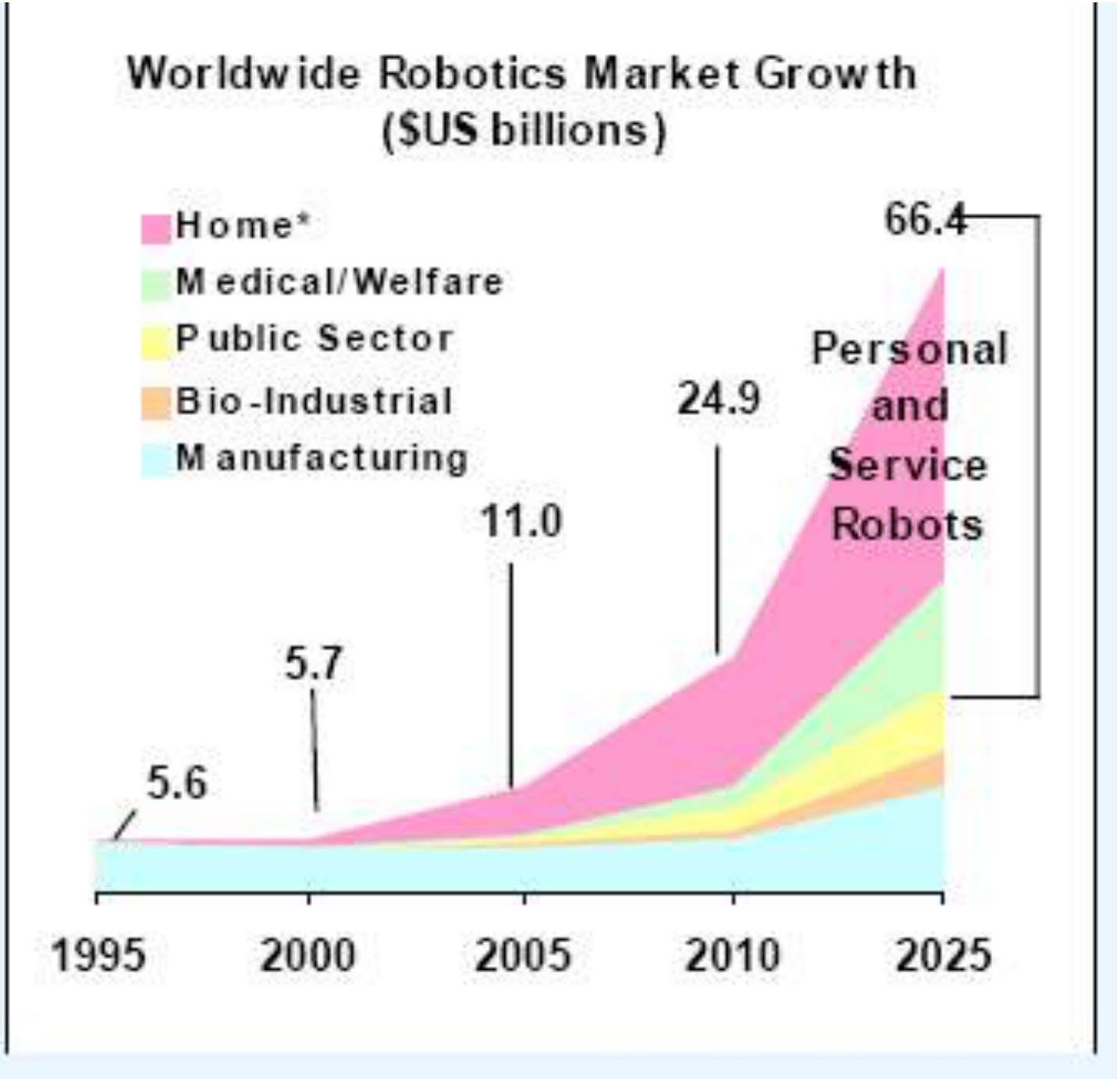
Intuitive is quite profitable. In their most recent quarterly earnings report (Q2 2016) they showed 16% growth year-over-year and net income of $185 million for the quarter, compared with $135 million for the same quarter of 2015.

Intuitive also has problems: according to its 2015 Annual Report, the company is a defendant in 92 individual product liability lawsuits about patients who were either injured or died. The company is also a defendant in a Missouri lawsuit that represents 55 plaintiffs. To settle other lawsuits Intuitive recorded pretax charges of $13.8 million and $82.4 million in 2014 and 2015, respectively.

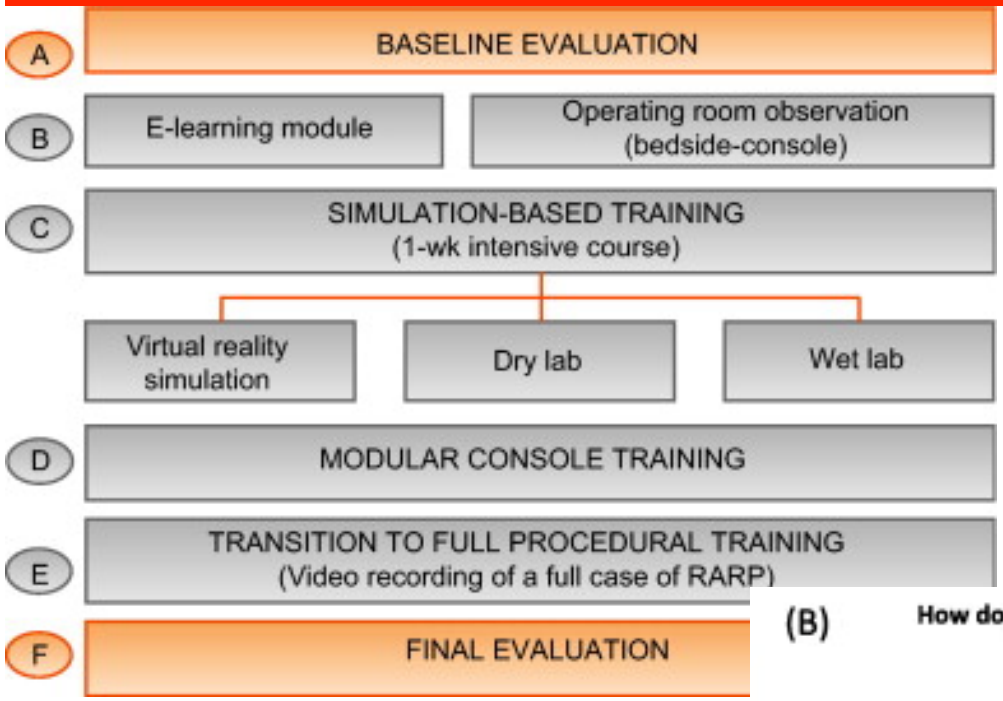
https://www.therobotreport.com/news/as-intuitive-surgical-continues-to-shine-competitors-are-entering-the-fray

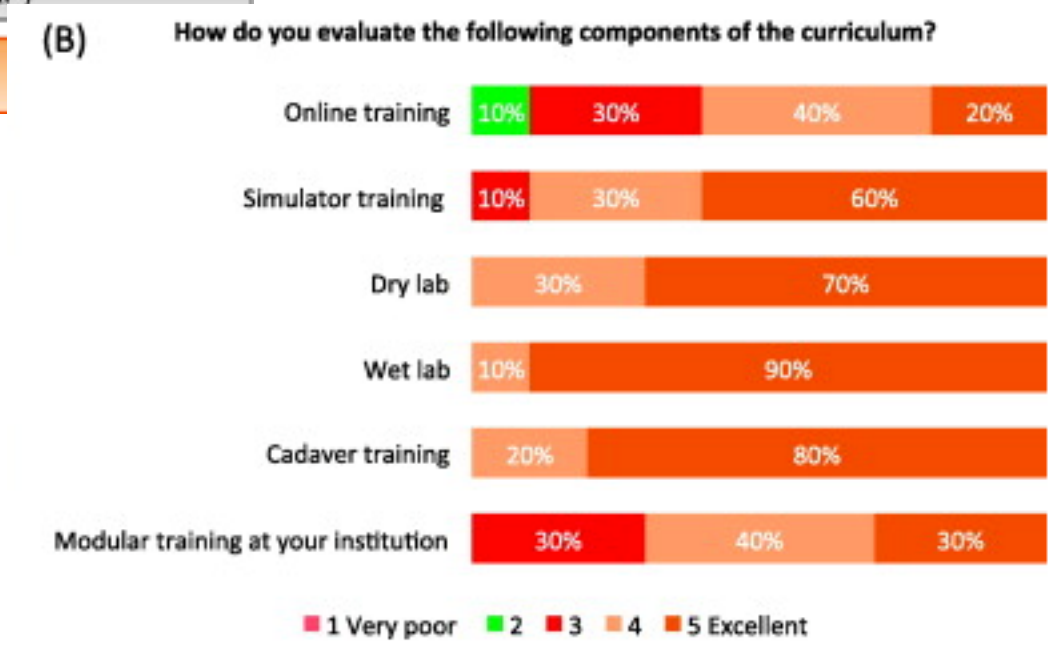
Το μονοπώλιο τελείωσε επιτέλους!

1. **Verb Surgical**, with deep pockets from partners Google/ Alphabet and Johnson & Johnson
2. **Medtronic** bought Covidien to launch its surgical robot before mid-2018
3. **TransEnterix** acquired the surgical robotics division of SOFAR Spa, an Italian healthcare and pharma company which has spearheaded the TELELAP ALF-X
4. **Titan Medical** is developing the Sport Surgical System which will debut in the United States mid 2017
5. **Medrobotics**' Flex Robotic System provides robot-assisted visualization and surgical site access
6. **Medtech** designs, develops and markets ROSA, a new generation of robotic assistance for the express purpose of improved surgical techniques.
7. **Cambridge Medical Robotics (CMR)** is a UK startup developing a universal robotic system for minimal access surgeries.
8. Others, developing robotic surgical devices, particularly in **Korea, Japan and China**


Worldwide Robotics Market Growth
($US billions)
Home*
Medical/Welfare
Public Sector
Bio-Industrial
Manufacturing
66.4
Personal
and
Service
Robots
24.9
11.0
5.7
5.6
1995
2000
2005
2010
2025

Η ανάγκη για ενα curriculum στην ρομποτική χειρουργική!





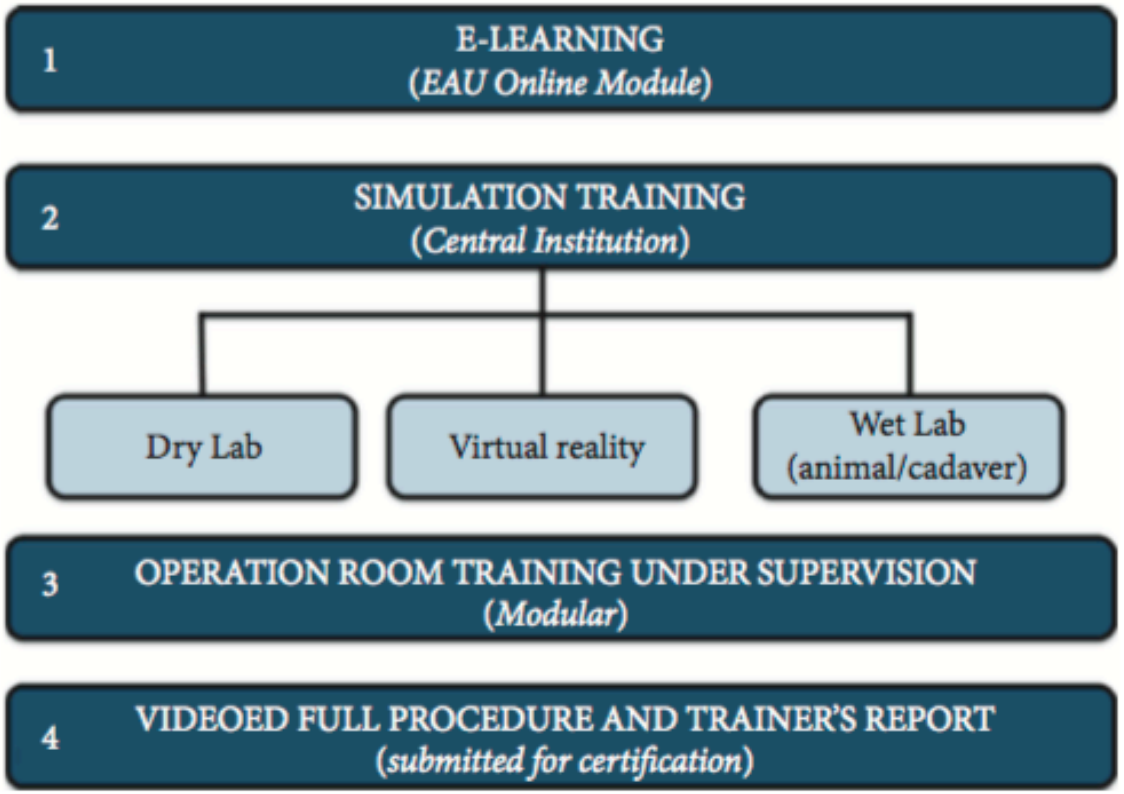
Volpe A, et al: Eur Urol, 68:292-299, 2015

BJUI
BJU International
Robotics and Laparoscopy

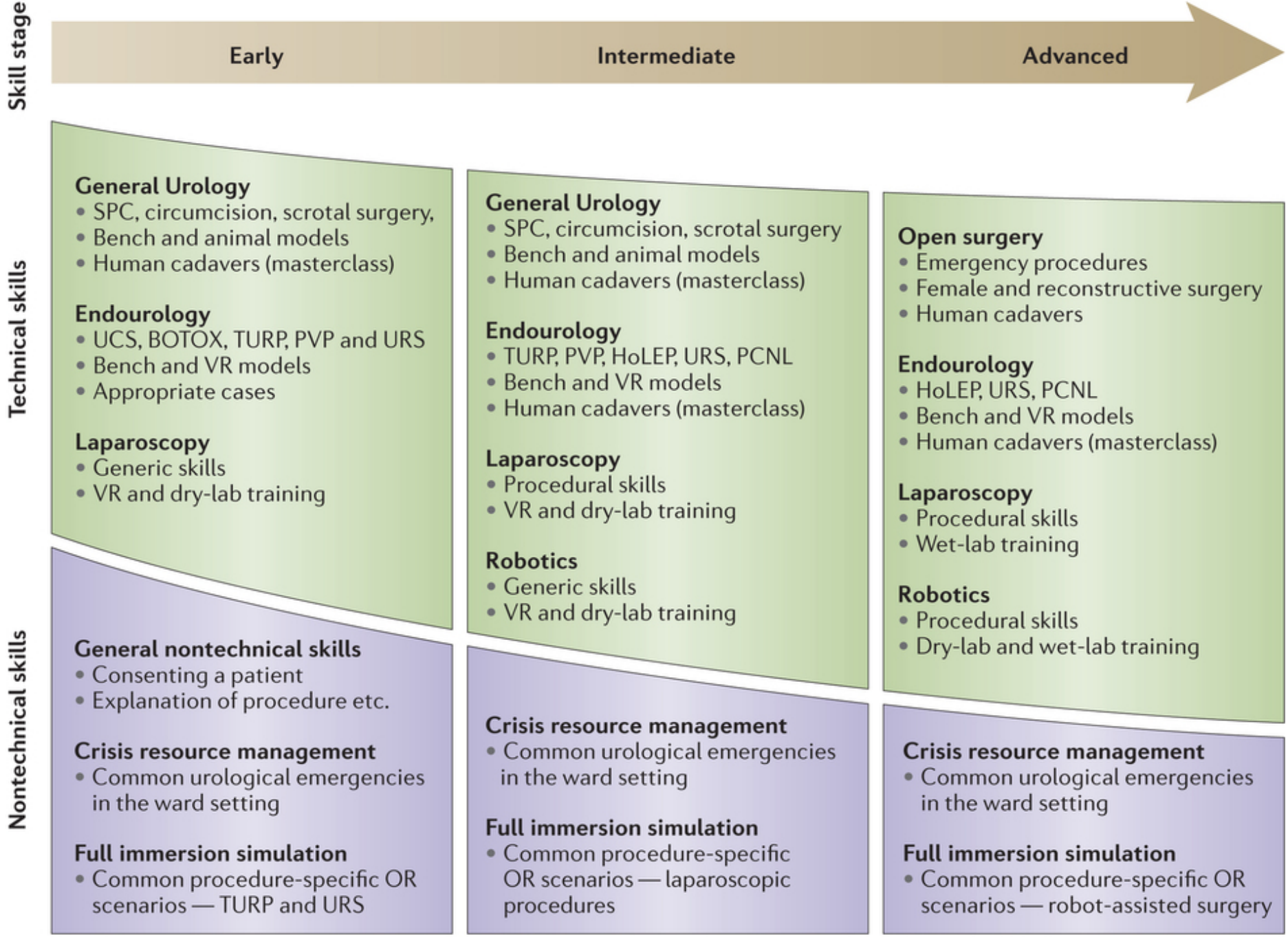
Development of a standardised training curriculum for robotic surgery: a consensus statement from an international multidisciplinary group of experts

Kamran Ahmed, Reenam Khan, Alexandre Mottrie[1], Catherine Lovegrove, Ronny Abaza[2], Rajesh Ahlawat[3], Thomas Ahlering[4], Goran Ahlgren[5], Walter Artibani[6], Eric Barret[7], Xavier Cathelineau[7], Ben Challacombe, Patrick Coloby[8], Muhammad S. Khan, Jacques Hubert[9], Maurice Stephan Michel[10], Francesco Montorsi[11], Declan Murphy[12], Joan Palou[13], Vipul Patel[14], Pierre-Thierry Piechaud[15], Hendrik Van Poppel[16], Pascal Rischmann[17], Rafael Sanchez-Salas[7], Stefan Siemer[18], Michael Stoeckle[18], Jens-Uwe Stolzenburg[19], Jean-Etienne Terrier[20], Joachim W. Thüroff[21], Christophe Vaessen[22], Henk G. Van Der Poel[23], Ben Van Cleynenbreugel[16], Alessandro Volpe[1,24], Christian Wagner[25], Peter Wiklund[26], Timothy Wilson[27], Manfred Wirth[28], Jörn Witt[26] and Prokar Dasgupta

Fig. 4 Proposed curriculum.



Ahmet K, et al: BJU Int 2015; 116: 93–101



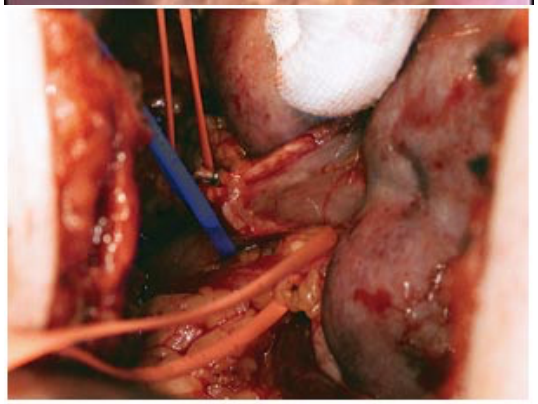
Aydin A, et al: *Nature Reviews Urology* 13, 503–519 (2016)

Μια πρόταση για την ειδικότητα στην Ουρολογία

- **1ος χρόνος:** εικονικοί ασθενείς και εκπαίδευση σε βασικές κλινικές (και απεικονιστικές) και χειρουργικές δεξιότητες σε προσομοιωτές (dry lab και μοντέλα εκπαίδευσης) – **εξετάσεις E-BLUS (EAU)**
- **2ος χρόνος:** έρευνα στην Ουρολογία και εκπαίδευση στα εργαλεία της ενδοουρολογίας και χρήση τους σε υβριδικούς προσομοιωτές και wet lab
- **3ος χρόνος:** γενική Ουρολογία / κλασσική Ουρολογική χειρουργική + ενδοουρολογία και εκπαίδευση σε προσομοιωτές εικονικής πραγματικότητας σε λαπαροσκοπική/ρομποτική χειρουργική
- **4ος χρόνος:** υποειδικότητες Ουρολογίας - εικονικοί ασθενείς (δύσκολα περιστατικά) και εκπαίδευση σε προσομοιωτές εικονικής πραγματικότητας
- **5ος χρόνος:** χειρουργική εκπαίδευση σε όλο το φάσμα των κλασσικών επεμβάσεων (ανοικτών – λαπαροσκοπικών - ενδοουρολογικών)

ΛΗΨΗ ΕΙΔΙΚΟΤΗΤΑΣ – ΕΞΕΤΑΣΕΙΣ FEBU

- **6ος χρόνος:** εξειδίκευση (προαιρετικά)



SIMULATE
Simulation in Urological Training & Education

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Research Group

Η χαμένη ευκαιρία του κ. Σοφρά...

WHAT IS SIMULATE ?

SIMULATE is the name of a Research Group, based in the Olympus Simulation Lab at Guy's Hospital and affiliated to the MRC Centre for Transplantation and Vatikutti Institute of Robotic Surgery, King's College London. The group are led by Professor Prokar Dasgupta, Chair for Robotic Surgery and Surgical Innovation, Vatikutti Institute of Robotics & MRC Centre for Transplantation, King's College London. The group have and aim to conduct research to provide high-level evidence for simulation-based training in Urology.

Prof. Prokar Dasgupta

Co-Lead

Professor of Robotic Surgery & Surgical Innovation
Vatikutti Institute of Robotics, MRC Centre for Transplantation, King's College London
Consultant Urological Surgeon, Guy's St. Thomas' NHS Foundation Trust

Prof. M. Shamim Khan

Co-lead

Professor of Urology and Surgical Education, MRC Centre for Transplantation, King's College London
Consultant Urological Surgeon, Guy's St. Thomas' NHS Foundation Trust

Mr. Kamran Ahmed

Co-Lead

NIHR Academic Clinical Lecturer, MRC Centre for Transplantation, King's College London
Urology Specialist Registrar, London Deanery

CHANTLER SIMULATION & INTERACTIVE LEARNING CENTRE

ABOUT US

OUR FACILITIES

TEACHING AND ASSESSMENT

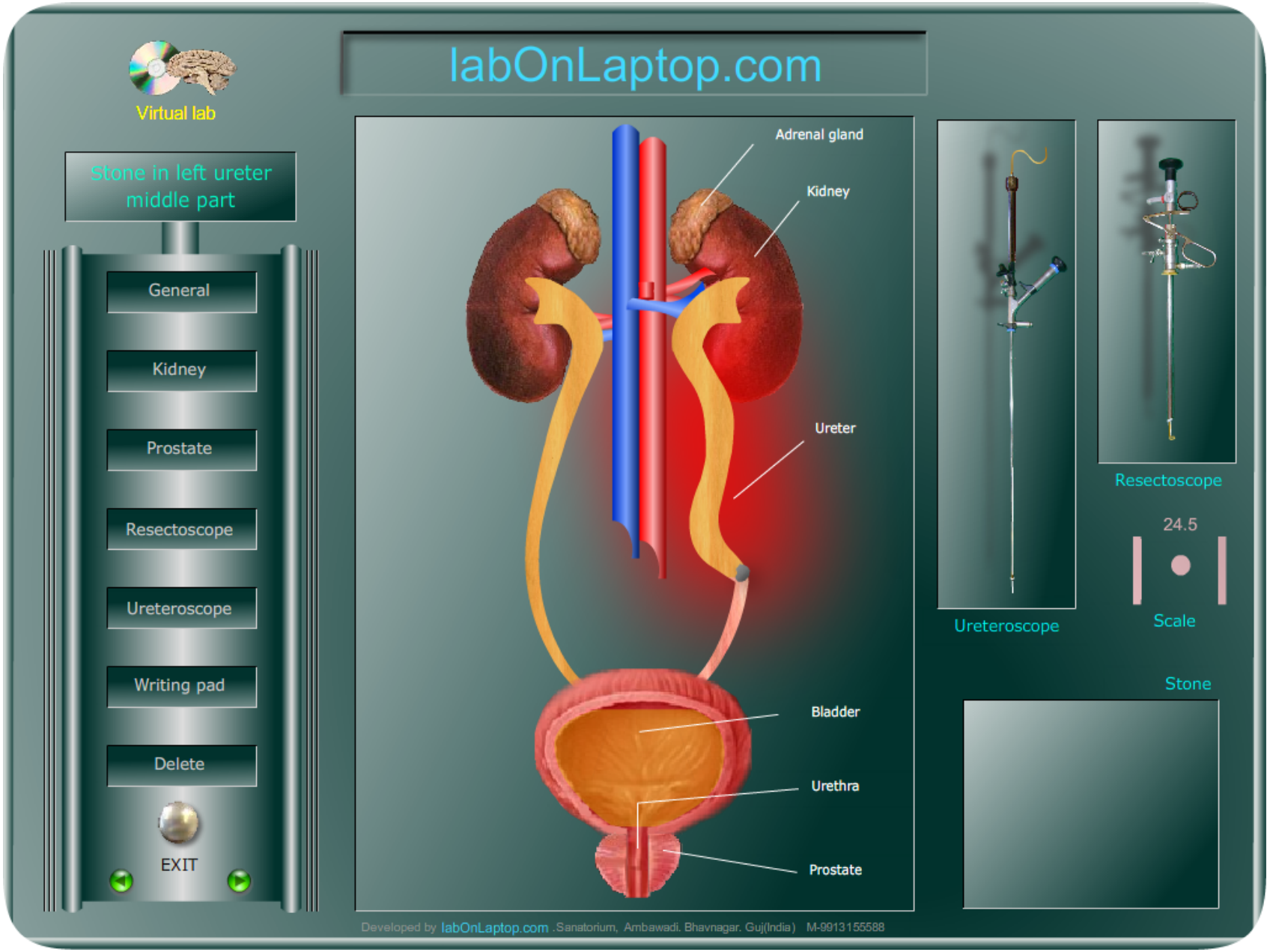
RESEARCH ACTIVITIES

CONTACT US

Find out more about our space, equipment and learning rooms as well as how to book our facilities.

View our timetabling service and find out how students, staff and members of the public can book our rooms and facilities.

Our Centre offers a wide range of interprofessional clinical and patient focused teaching and learning experiences.



http://labonlaptop.com/Store/product/virtual-urology-simulated-operation-theatre/

Making Science Exciting!

Children's Urology teamed up with Austin's children's museum, The Thinkery, to give families a peek into what it's like to be a surgeon. Children (and adults!) had a chance to test drive the da Vinci medical robot, a technology used in complex pediatric urology procedures. The goal was to expose children to science and innovation using an interactive surgical simulation. Click here to learn more.

VIRTAMED

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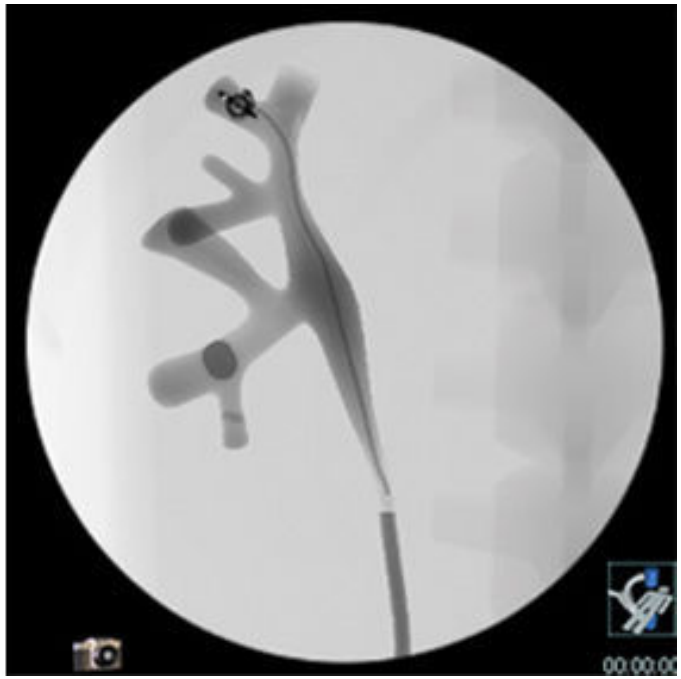
VirtaMed UroSim™

- Full BPH education: TURP, TURB, laser
- Hands-on urologic surgery with highly realistic tactile feedback
- Use of original instruments eases transfer of skills to the OR

VirtaMed UroSim™ provides simulation training for TURP, TURB, laser BPH with Thulium or HoLEP, and morcellation. During the training, urologists learn how to master instruments and manage complications without involving live patients. Didactic


Craniocaudad: 0 Orbital: -20
X-ray
Reset




Simbionix

VIRTAMED

VirtaMed UroSim™

- Full BPH education: TURP, TURB, laser
- Hands-on urologic surgery with highly realistic tactile feedback
- Use of original instruments eases transfer of skills to the OR

VirtaMed UroSim™ provides simulation training for TURP, TURB, laser BPH with Thulium or HoLEP, and morcellation. During the training, urologists learn how to master instruments and manage complications without involving live patients. Didactic content and expert movies exemplify best techniques. Individual courses allow for personalized urologic surgery training.

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Health

'Huge leap' in prostate cancer testing

By James Gallagher
Health and science reporter, BBC News website

20 January 2017 | Health

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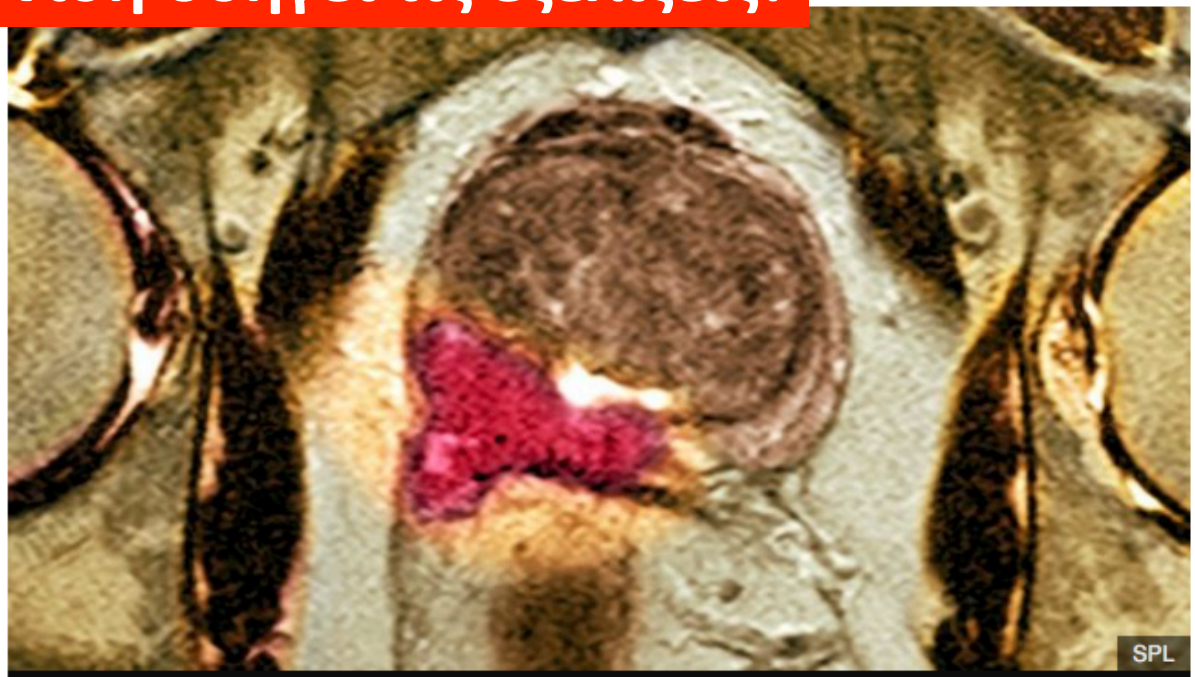
Η απεικόνιση οδηγεί τις εξελίξεις!



Scans of the prostate can show if there is a cancerous growth

3D SYSTEMS formerly Simbionix

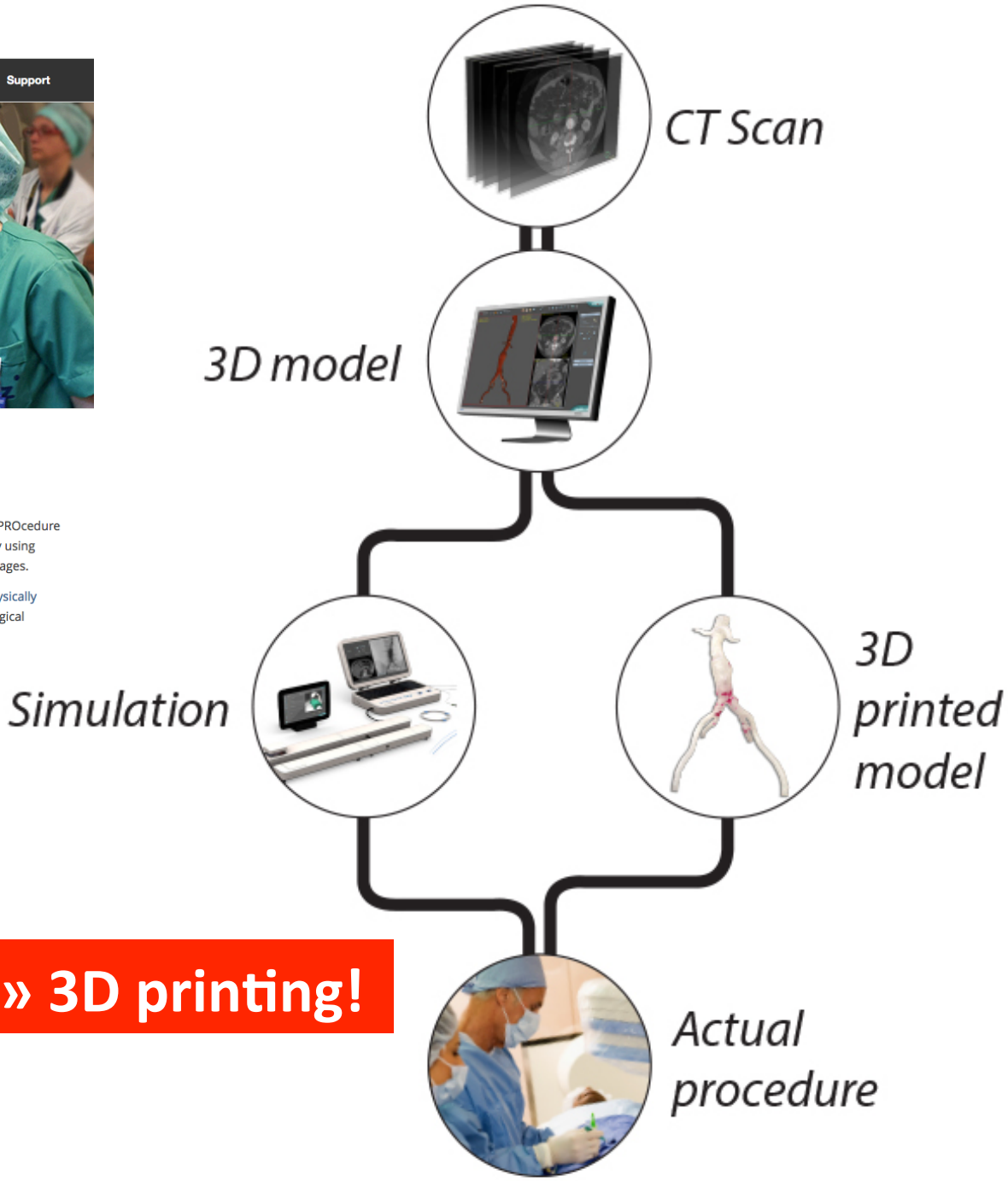
Company | Simulators | 3D Printing | MentorLearn | Preoperative Rehearsal | Sales | Support

PREOPERATIVE PROCEDURE REHEARSAL

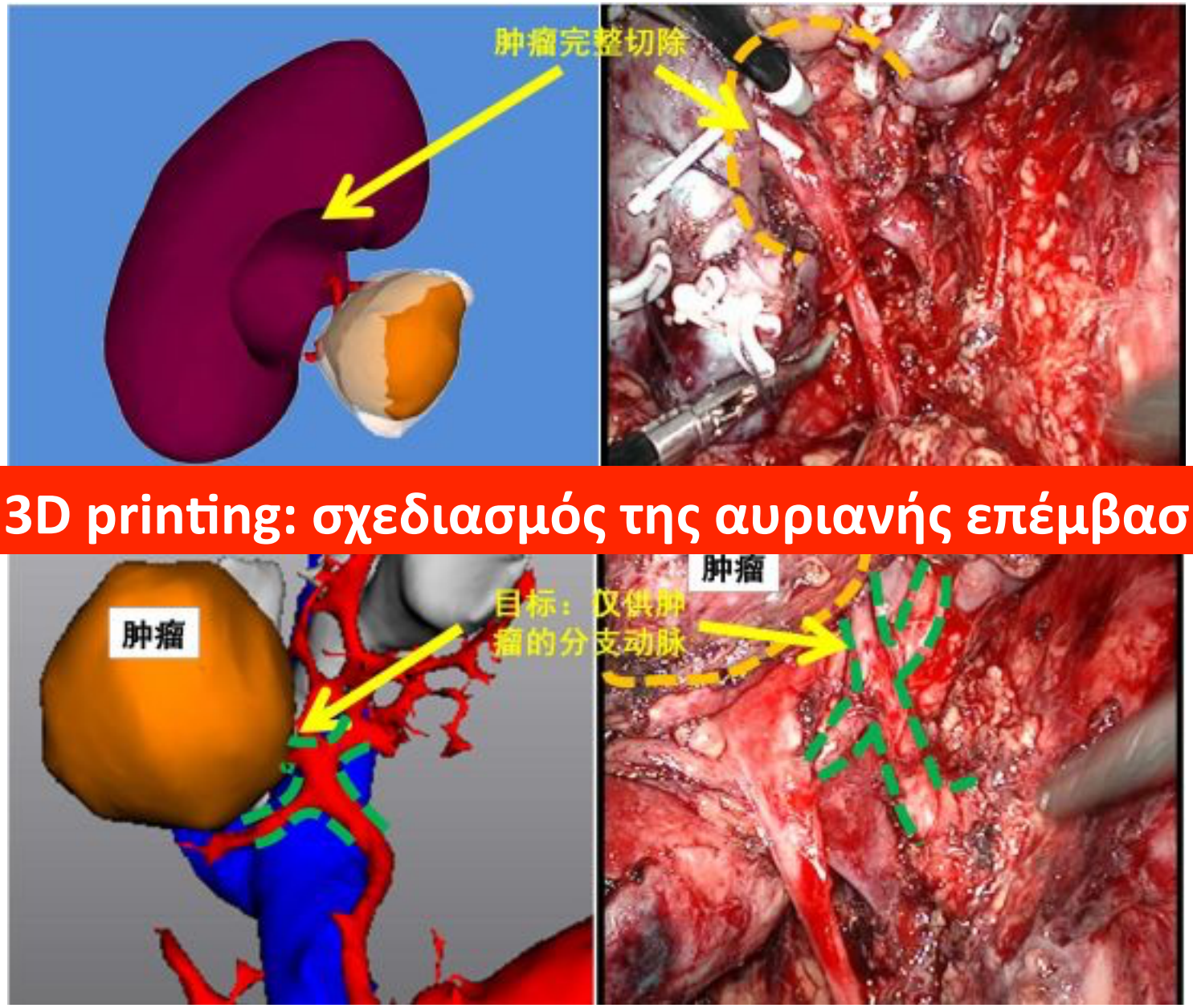
3D Visualization for Patient Specific Endovascular Procedures

Interventional procedures might pose challenges even to the most experienced physicians. The PROcedure Rehearsal Studio™ was developed to assist clinicians prepare for their upcoming intervention by using segmentation technology to create a patient specific 3D anatomical model based on scanned images.

The 3D model can be exported to a virtual simulation environment, used by CAD software or physically printed by 3D printers, for the purpose of simulating, analyzing and evaluating pre-operative surgical treatment options.



Το μέλλον «λέγεται» 3D printing!



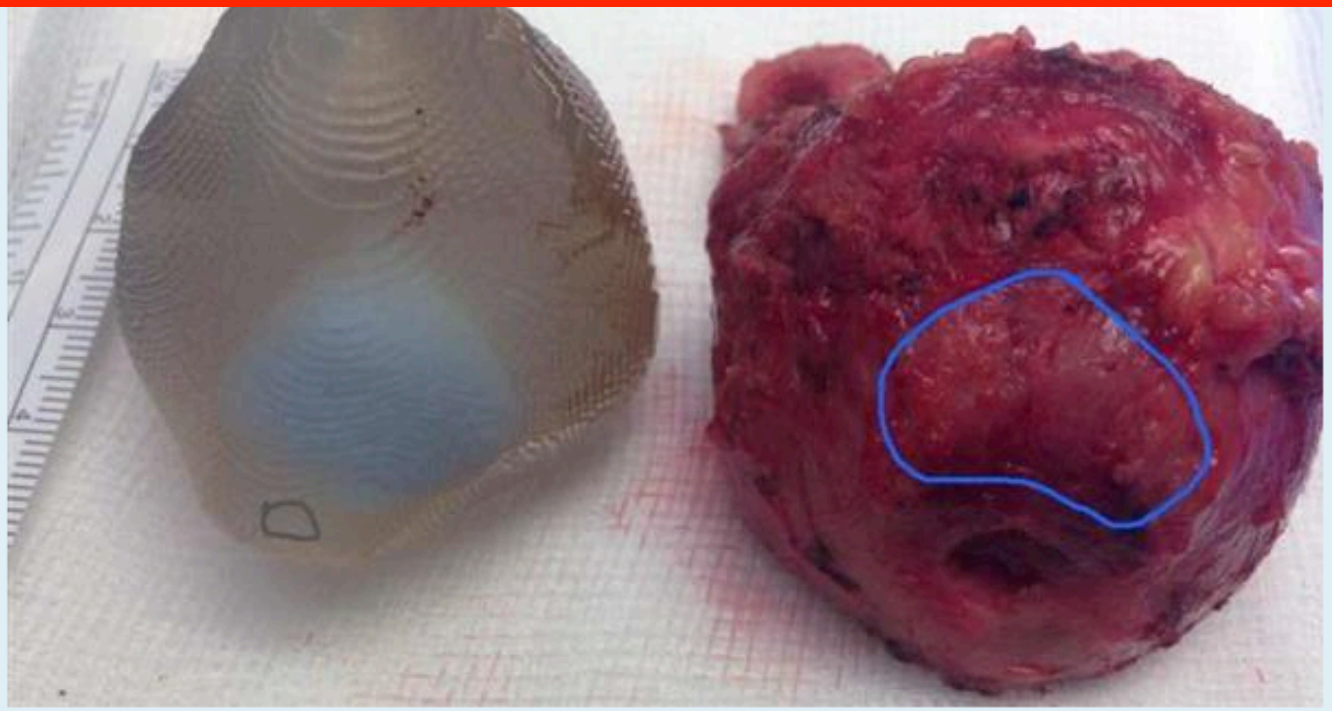
3D printing: σχεδιασμός της αυριανής επέμβασης

London doctor uses 3D printed model to successfully remove prostate tumor

Mar 4, 2016 | By Benedict

In November 2015, Prokar Dasgupta, Professor of Urology at the London Clinic, successfully removed a cancerous tumor from a patient's prostate using a 3D printed replica prostate as a pre-surgical aid. Dr Clare Allen, a consultant radiologist at the clinic, facilitated the 3D printing process.

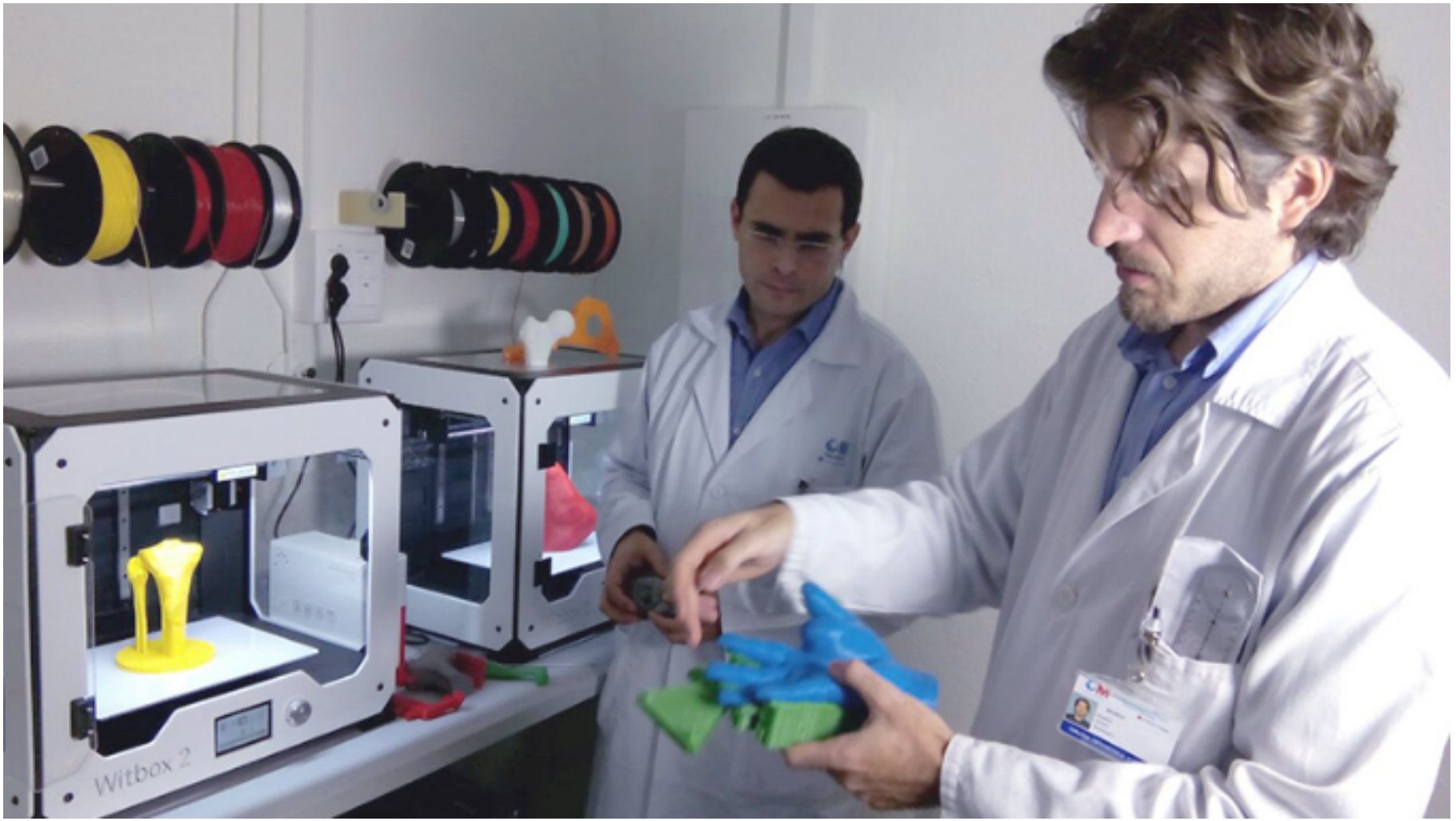
3D printing: σχεδιασμός της αυριανής επέμβασης

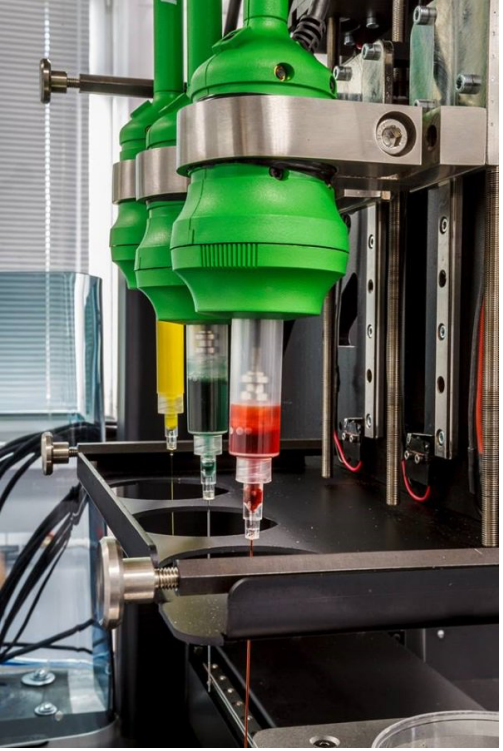


The 3D printed model (left) and removed specimen with tumor area circled

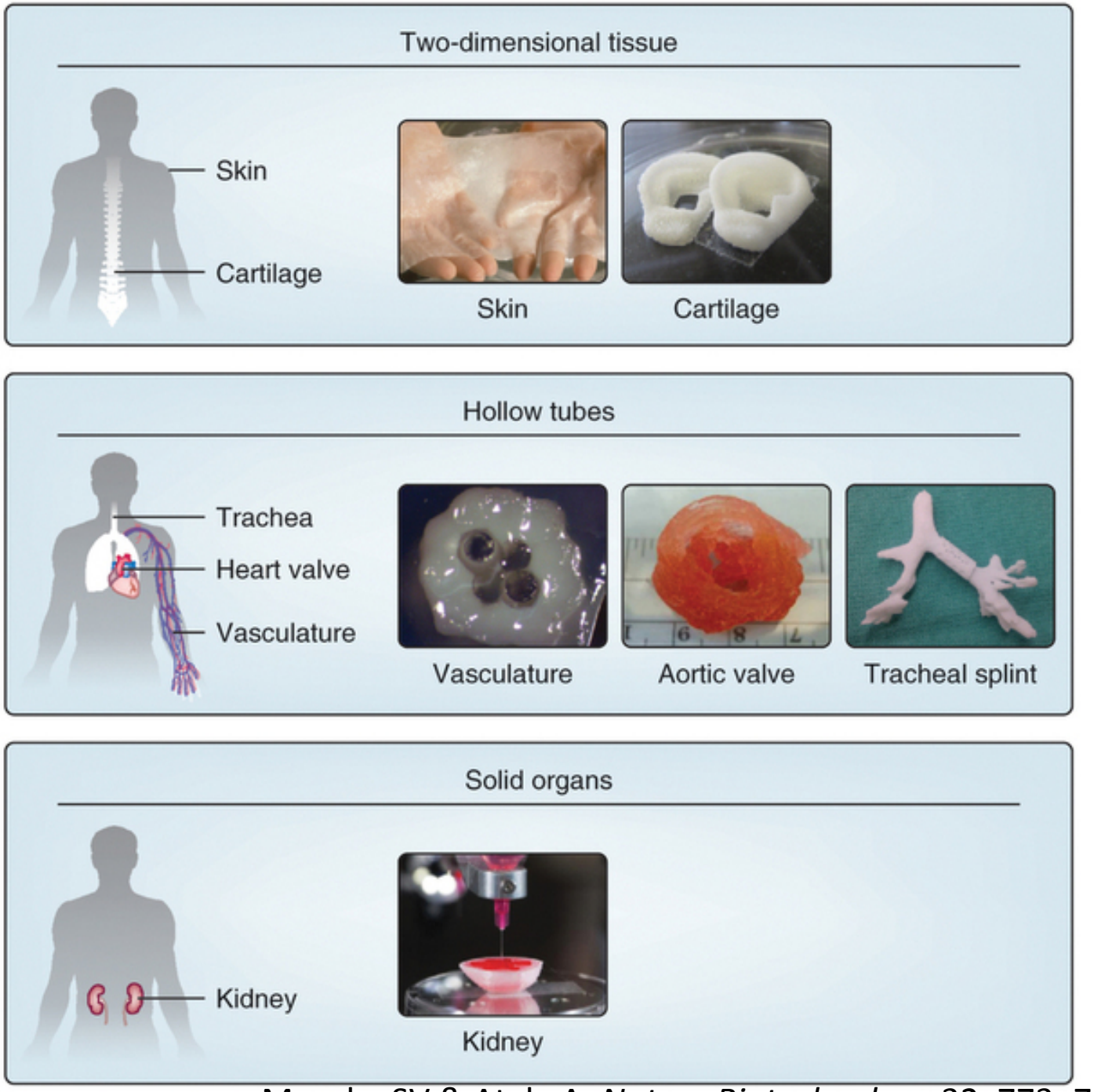
65-year-old Alexander Spyrou, a resident of London, UK, must have been extremely worried when doctors discovered a malignant tumor in his prostate. After skin cancer, prostate cancer is the most common form of cancer found in men, and although it can often be treated successfully, it is still the fifth most deadly cancer amongst males—the cancer caused 307,000 deaths in 2012 alone.

3D printing: αντικατάσταση οργάνων



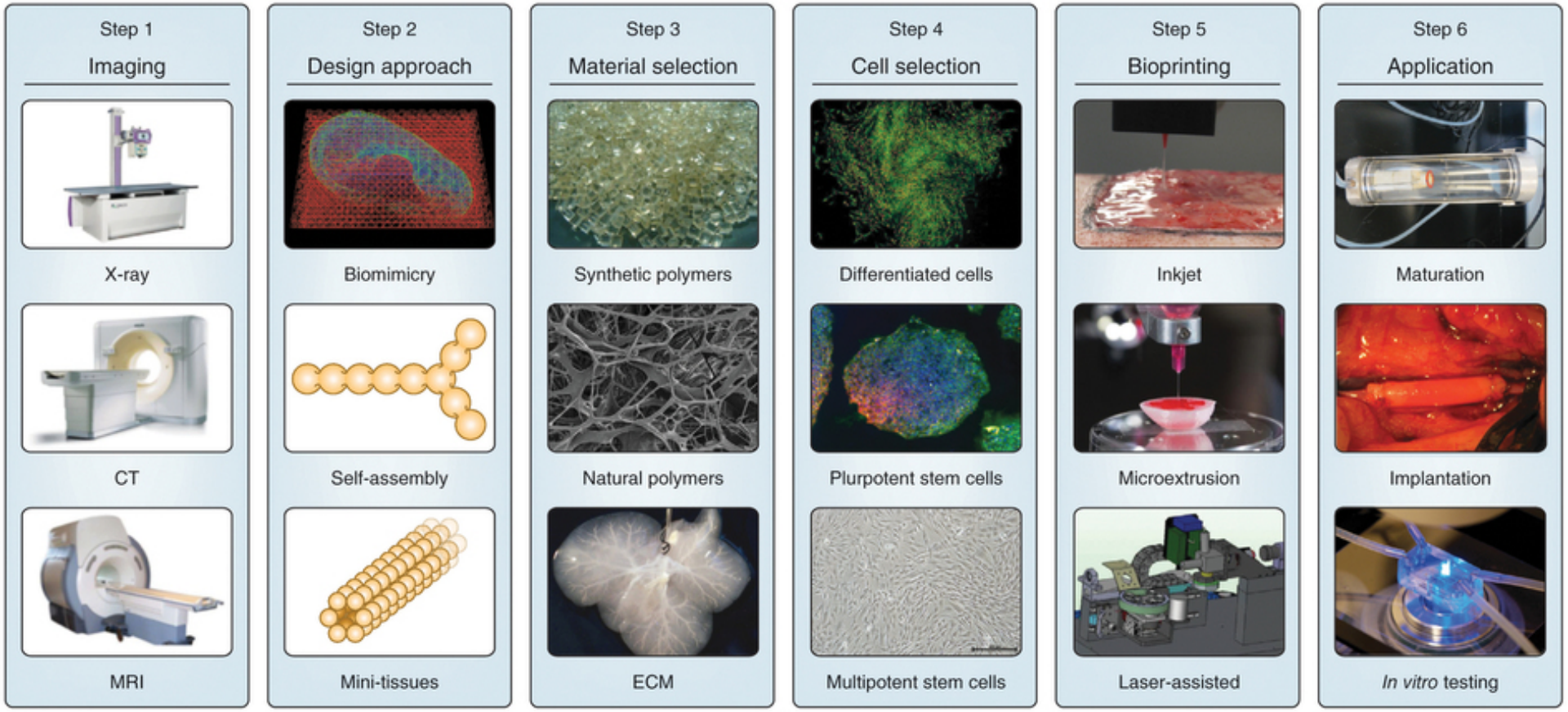


3D printing: απο μύτη σε νεφρό...



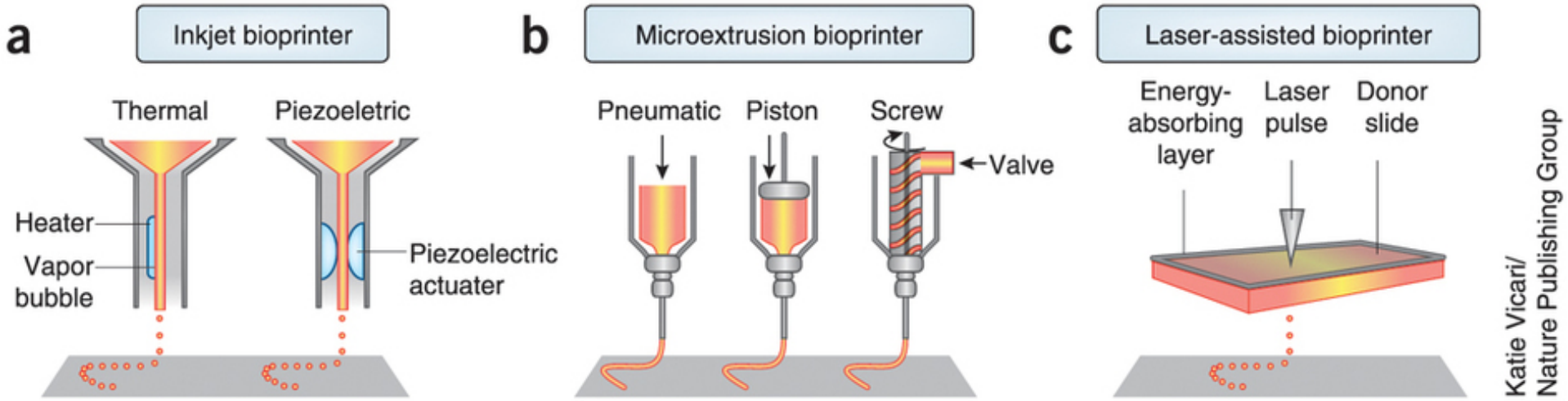
Murphy SV & Atala A: *Nature Biotechnology* 32, 773–785 (2014)

A typical process for bioprinting 3D tissues.



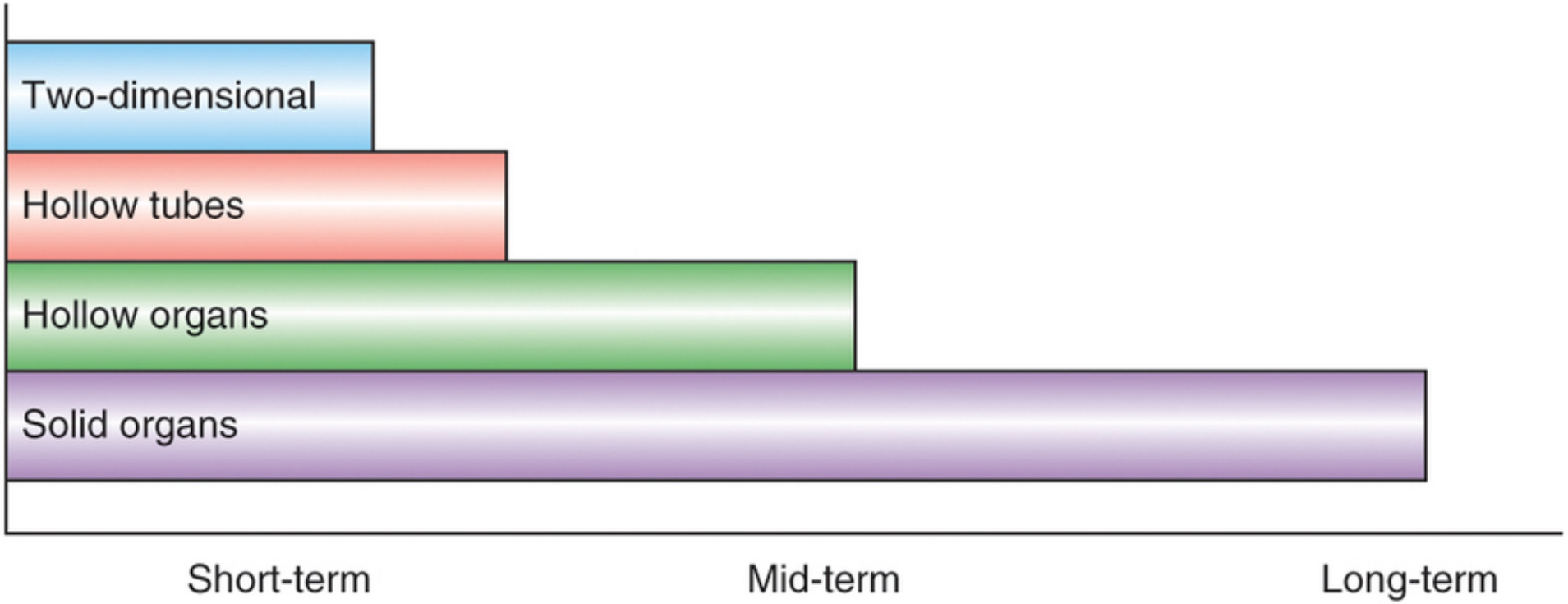
Murphy SV & Atala A: *Nature Biotechnology* 32, 773–785 (2014)

Components of inkjet, microextrusion and laser-assisted bioprinters.



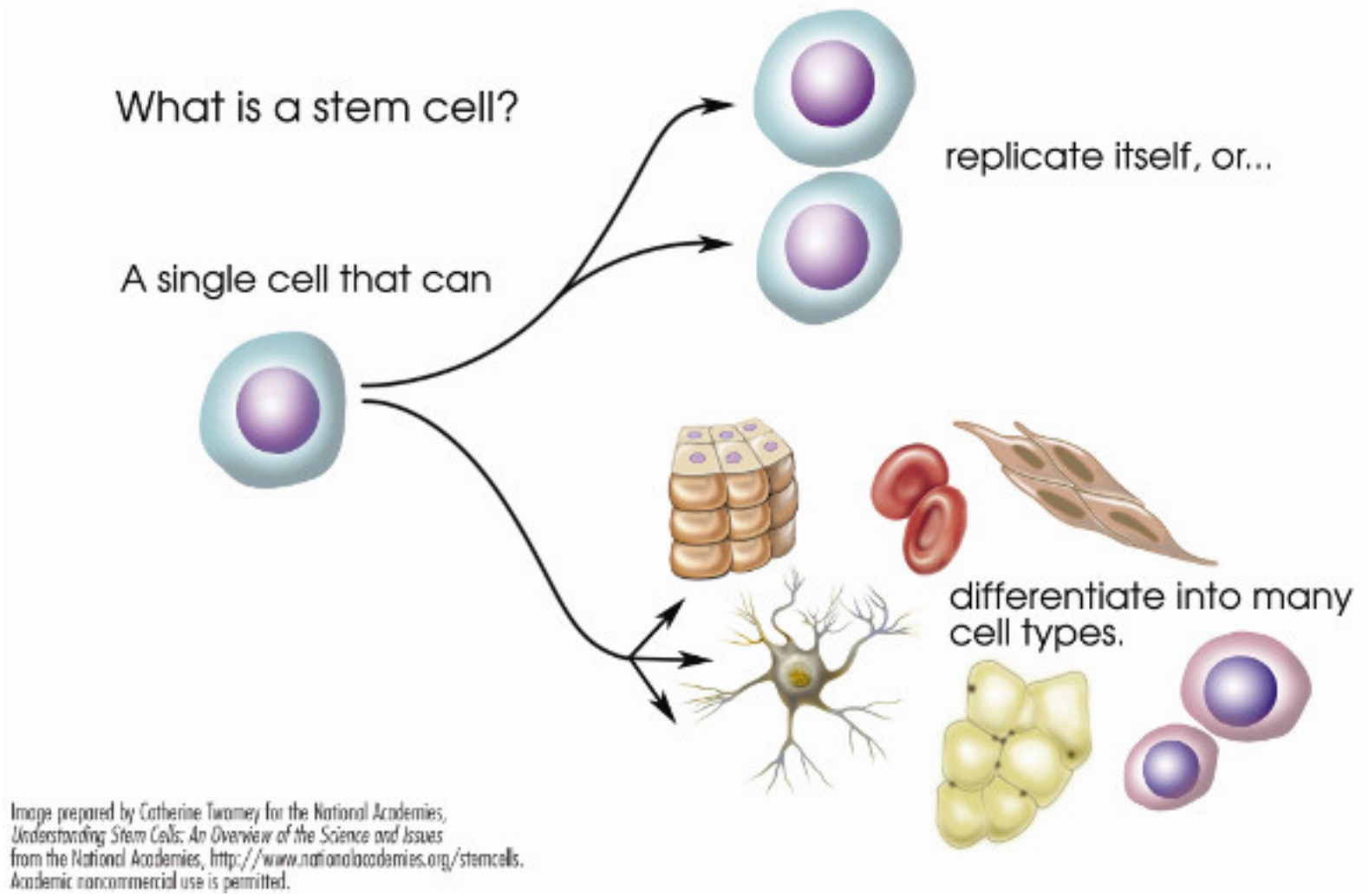
Murphy SV & Atala A: *Nature Biotechnology* 32, 773–785 (2014)

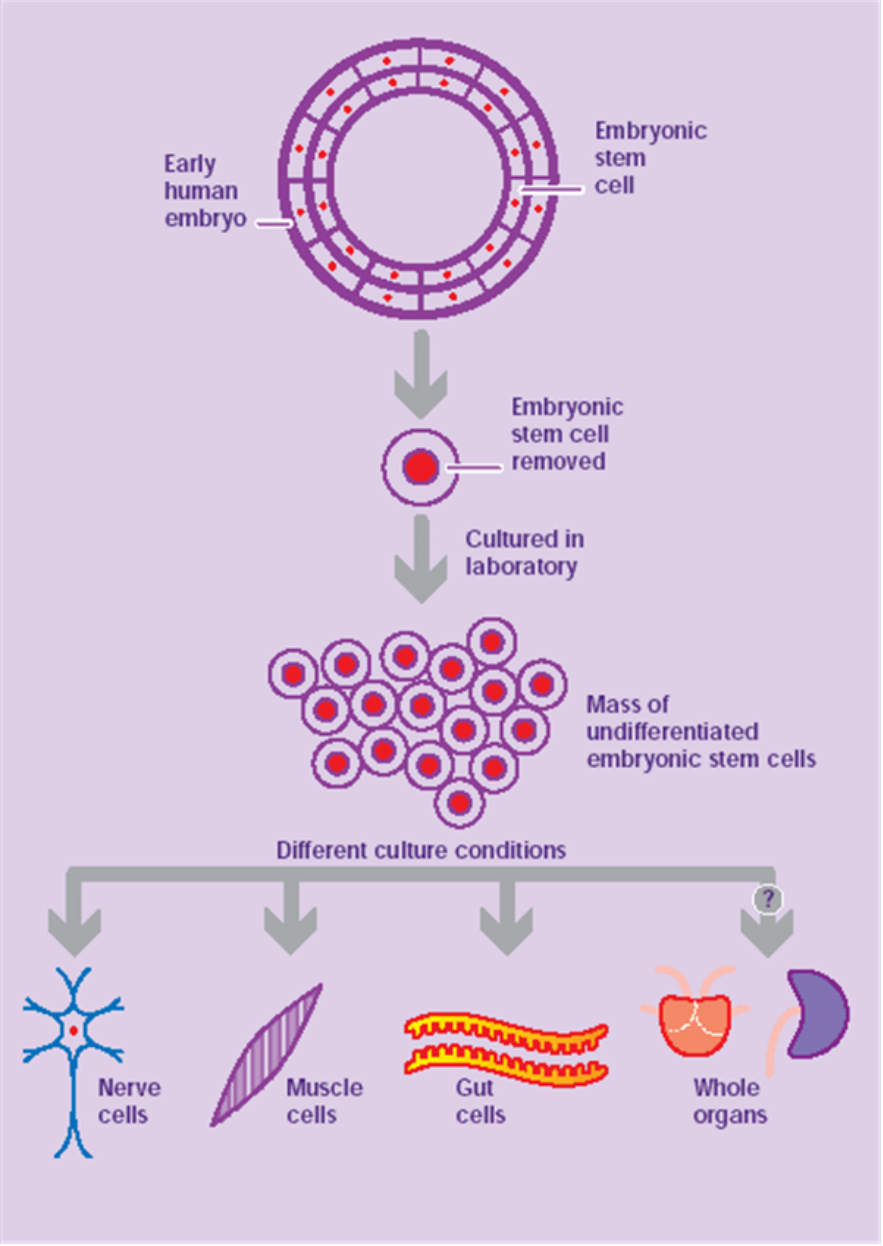
Timeframe for the development of various types of 3D bioprinted tissues.

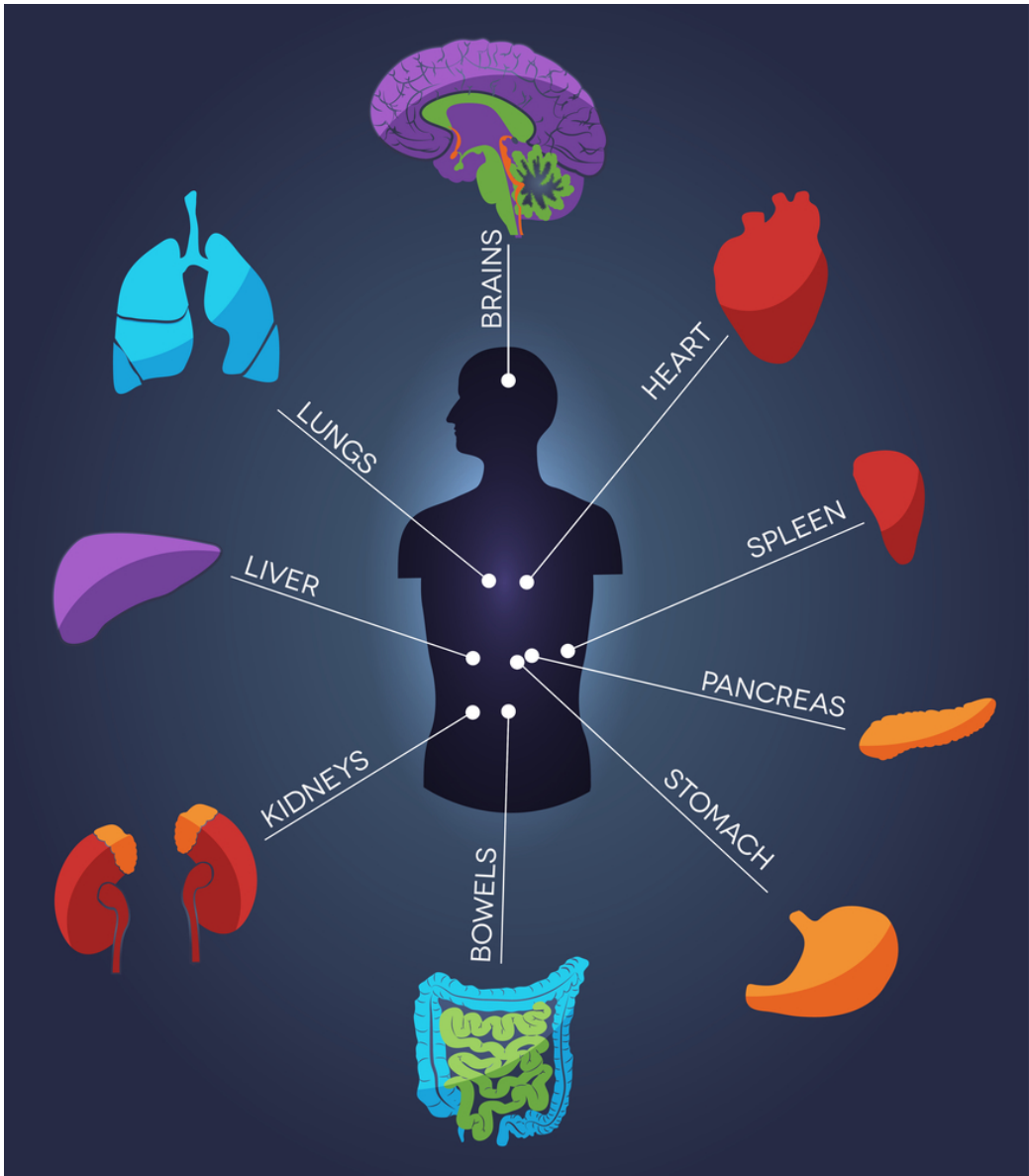


Murphy SV & Atala A: *Nature Biotechnology* 32, 773–785 (2014)

3D printing και stem cells: η πρόκληση είναι εδώ!

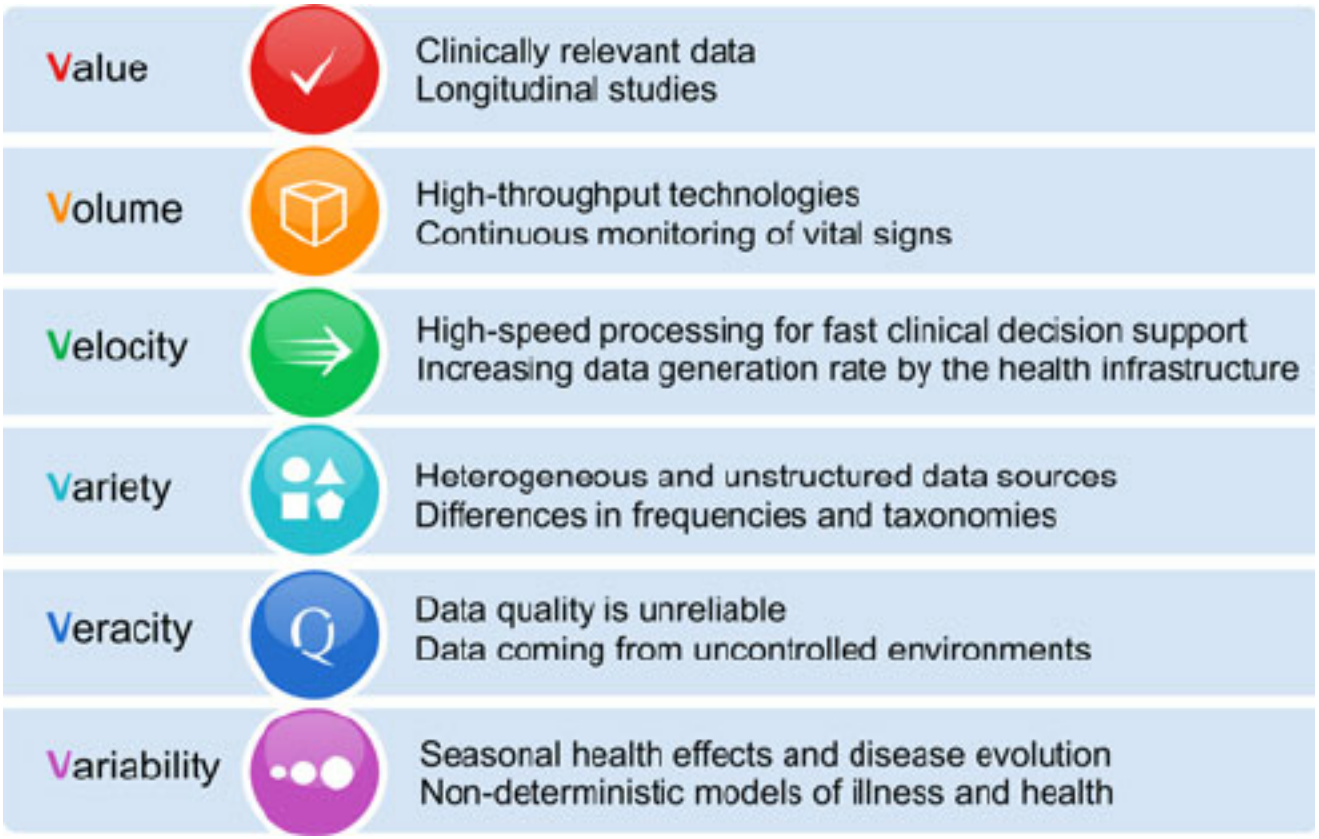



Early human embryo
Embryonic stem cell
Embryonic stem cell removed
Cultured in laboratory
Mass of undifferentiated embryonic stem cells
Different culture conditions
?
Nerve cells
Muscle cells
Gut cells
Whole organs

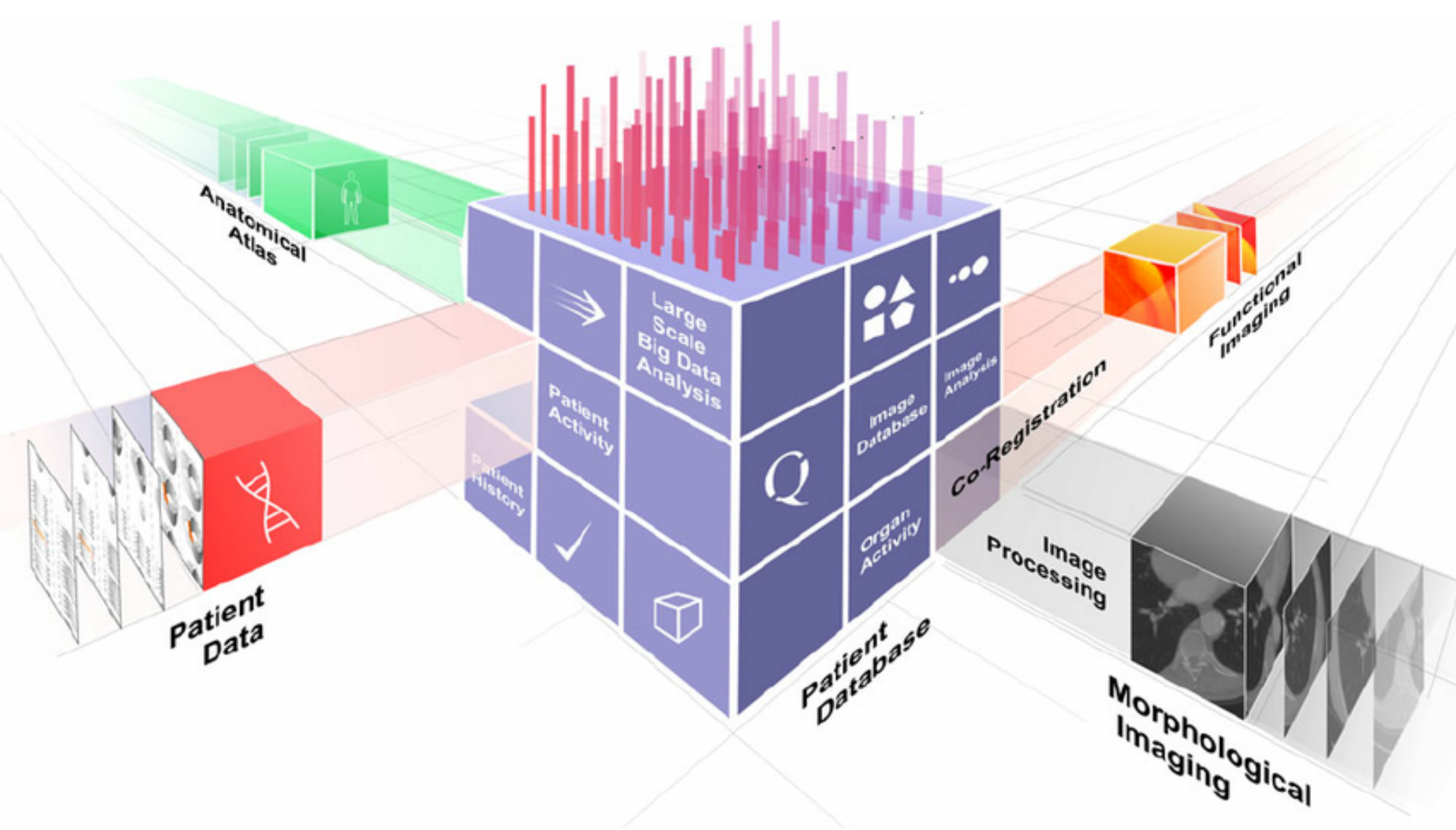

BRAINS
HEART
LUNGS
SPLEEN
LIVER
PANCREAS
KIDNEYS
STOMACH
BOWELS


Big Data
Macro
Shift

Six V's of big data



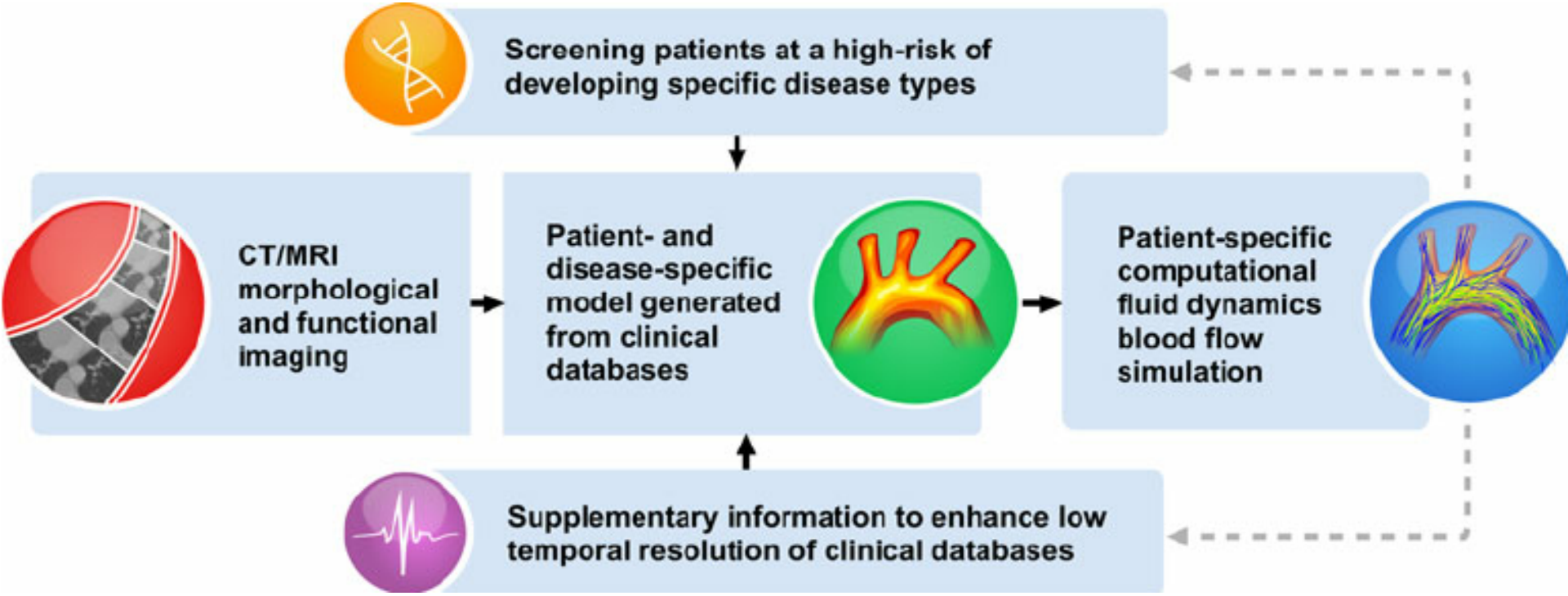
https://www.researchgate.net/publication/280124446_Big_Data_for_Health/figures?lo=1



Η μεγάλη ανατροπή στο ρόλο του γιατρού!

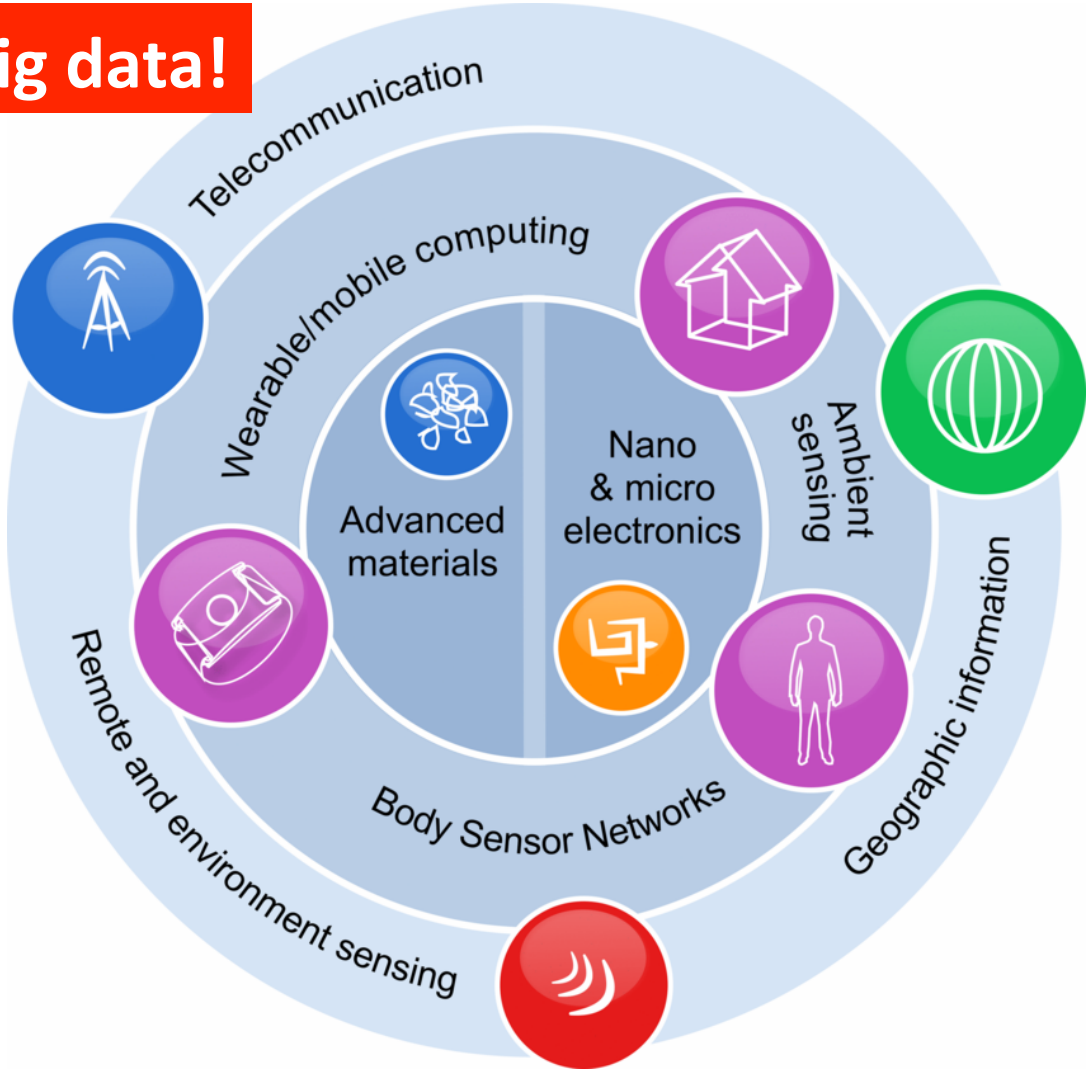
https://www.researchgate.net/publication/280124446_Big_Data_for_Health/figures?lo=1

Πρόληψη – διάγνωση – σχεδιασμός θεραπείας από υπολογιστή!

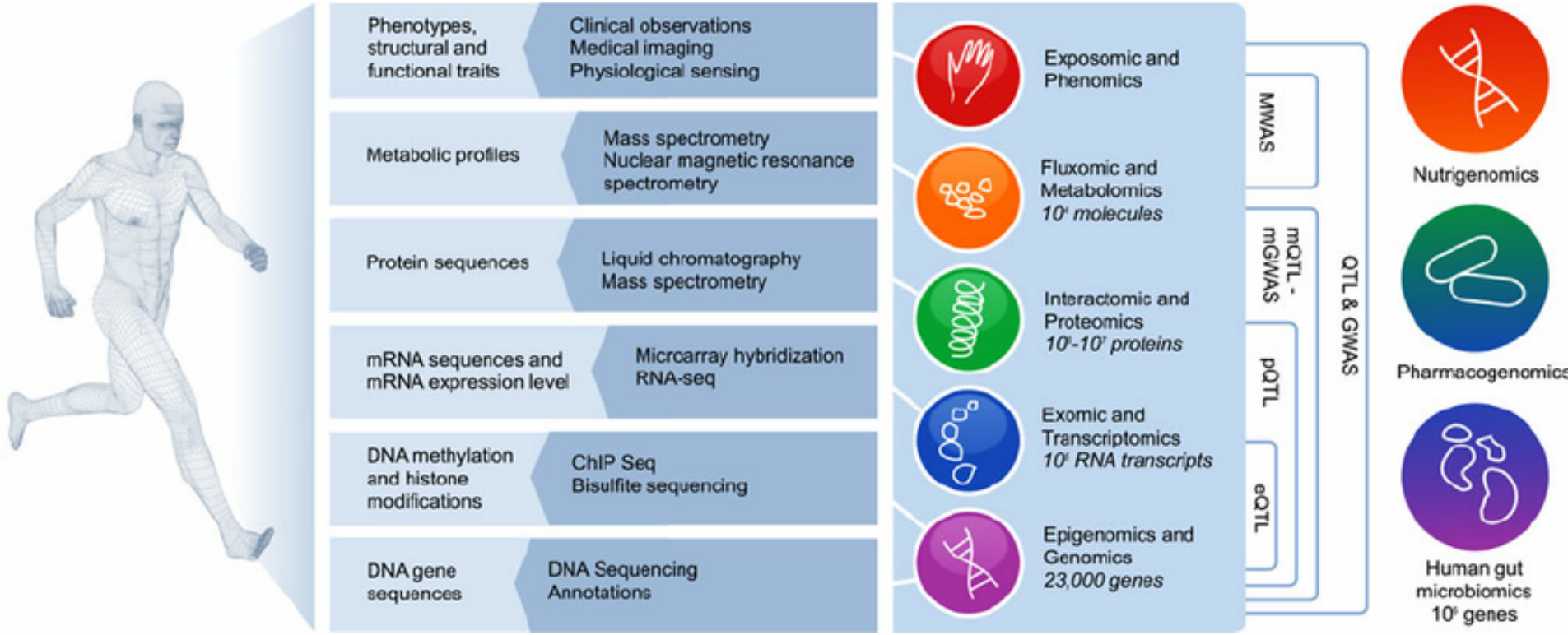


https://www.researchgate.net/publication/280124446_Big_Data_for_Health/figures?lo=1

Οι αισθητήρες των big data!



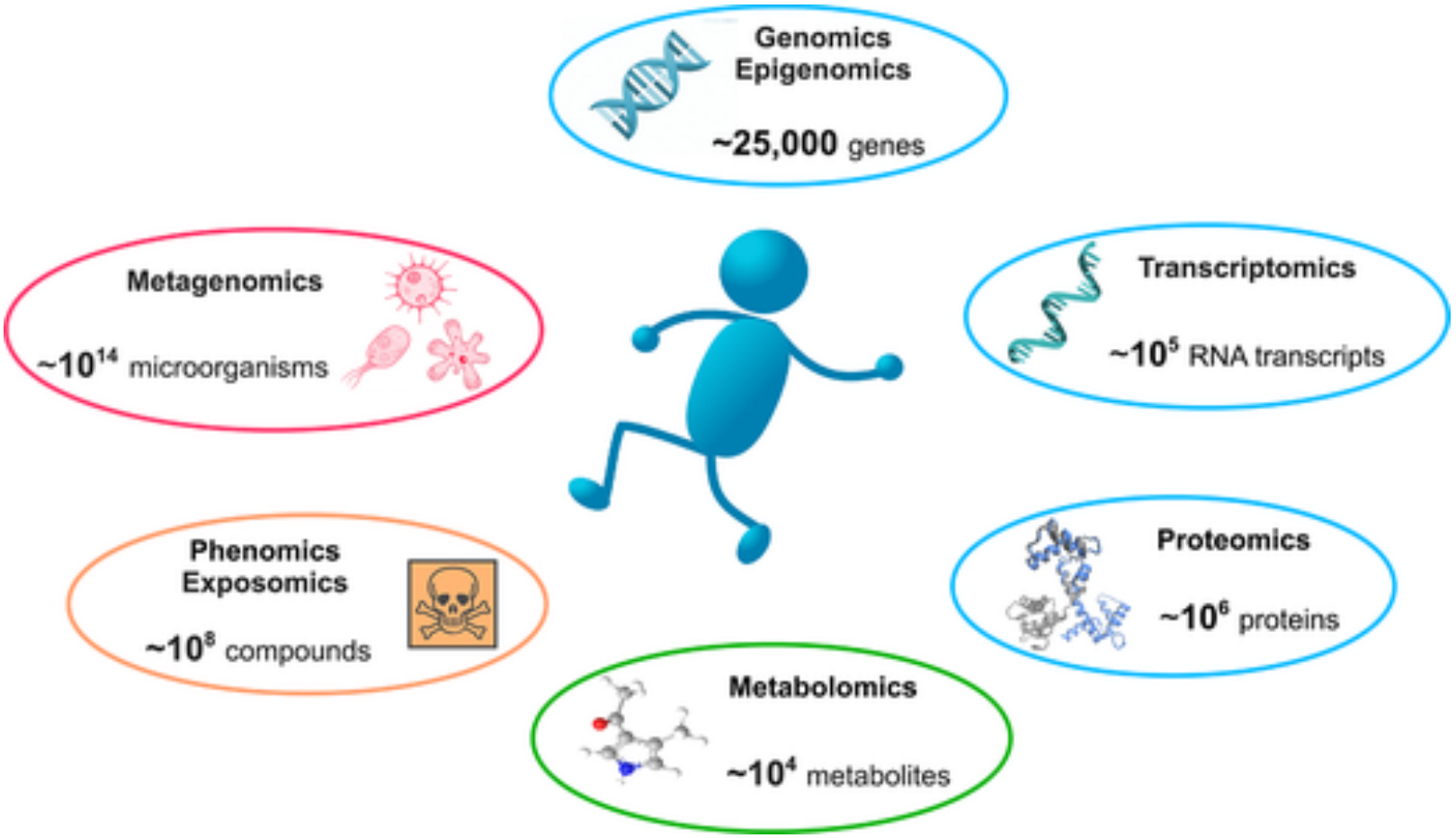
Big sensing data in health are all around us, enabled by technologies ranging from nano- and microelectronics, advanced materials, wearable/mobile computing, and telecommunication systems as well as remote sensing and geographic information systems. The inner loop presents technologies for sensor components, while the middle loop presents devices and systems potentially own by each individual or household. The outer loop presents sensing technologies required at the community and public health level.



OMICS: απο την κατηγοριοποίηση στην ιατρική ακριβείας!

Outline of the "OMICS" approach for studying disease mechanisms. OMICS aims at collectively characterizing and quantifying groups of biological molecules that translate into the structure, function, and dynamics of an organism. The OMICS profile of each individual, including the genome, transcriptome, proteome, and metabolome, should be eventually linked up with phenotypes obtained from clinical observations, medical images, and physiological signals. Different acquisition technologies are required to collect data at each biological level. Interaction within each level and across different levels as well as with the environment, including nutrition, food, drugs, traditional Chinese medicine, and gut microbiome presents grand challenges in future bioinformatics research.

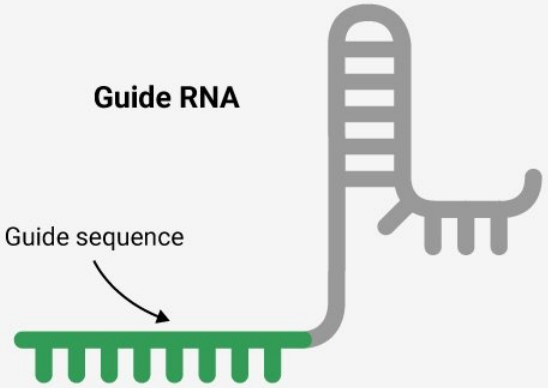
https://www.researchgate.net/publication/280124446_Big_Data_for_Health/figures?lo=1



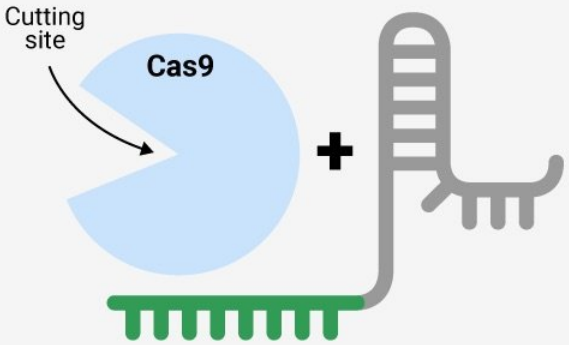
Gligorijević V, et al: Proteomics. 2016;16(5):741-58

EDITING A GENE USING THE CRISPR/CAS9 TECHNIQUE

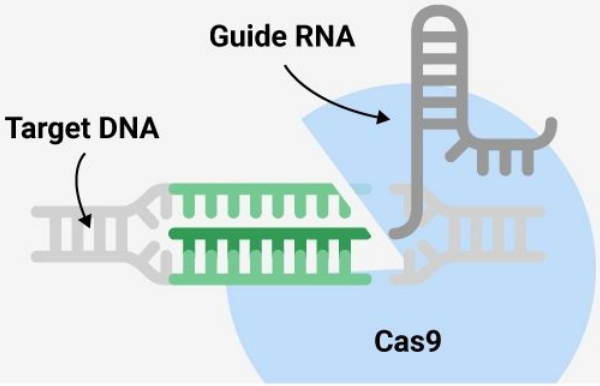
1 Scientists create a genetic sequence, called a "guide RNA," that matches the piece of DNA **they want to modify.**



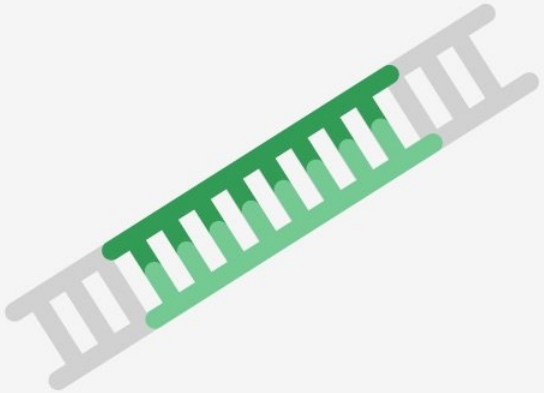
2 This sequence is added to a cell along with a protein called Cas9, which **acts like a pair of scissors** that cut DNA.



3 The guide RNA homes in on the target DNA sequence, and Cas9 **cuts it out.** Once their job is complete, the guide RNA and Cas9 leave the scene.

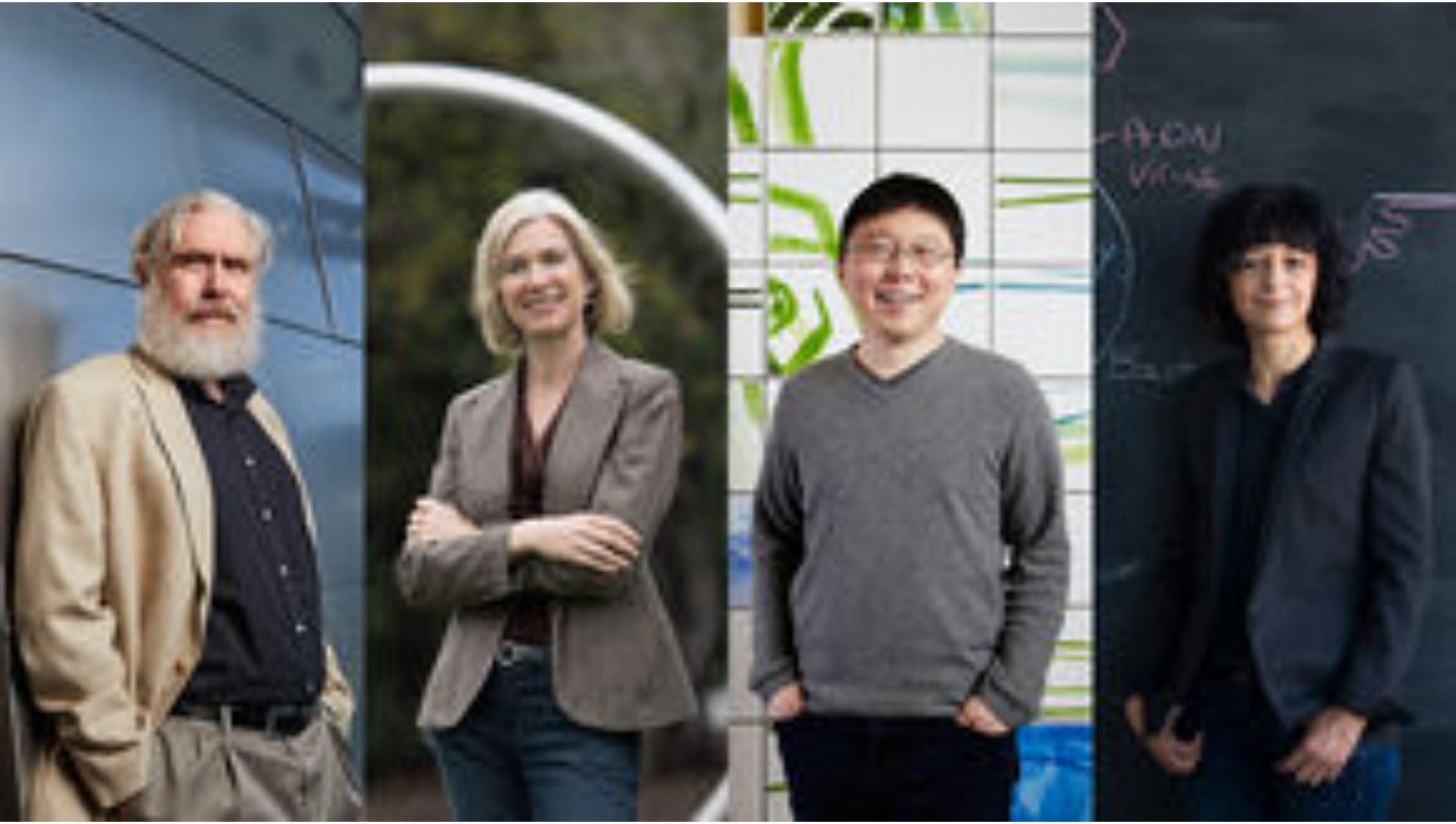


4 Now, another piece of DNA is swapped into the place of the old DNA, and **enzymes repair the cuts.** Voilà, you've edited the DNA!



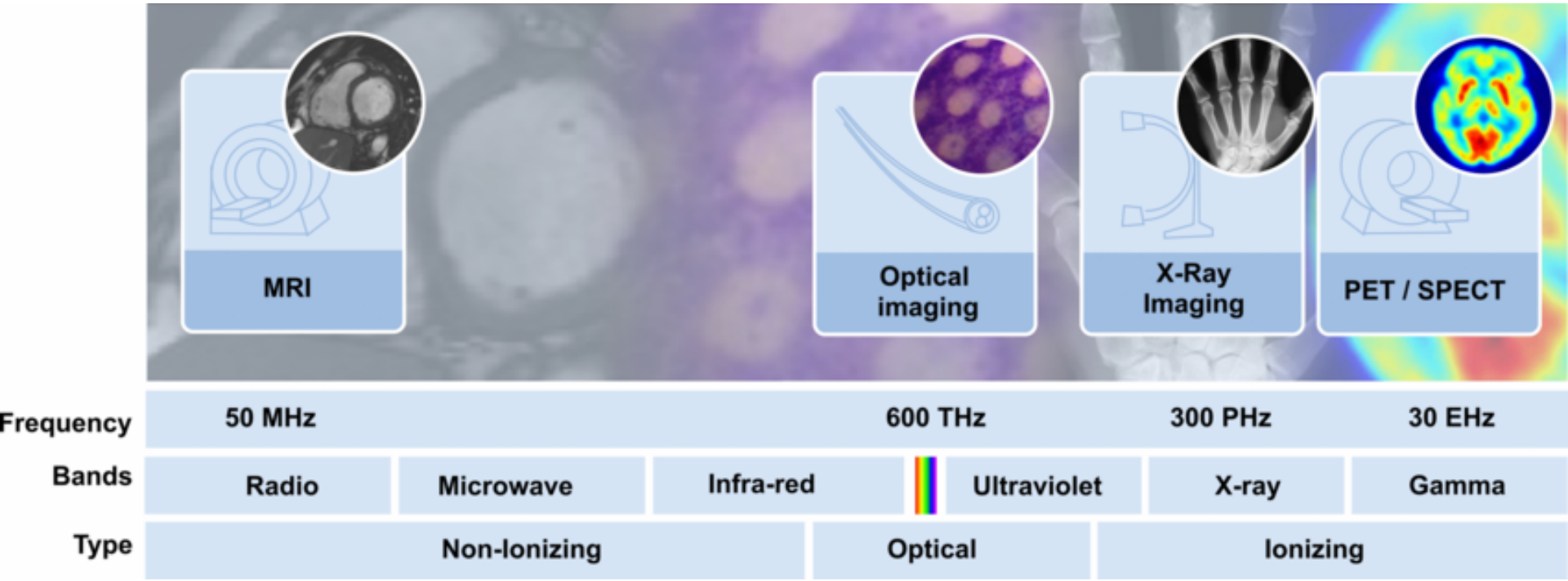
SOURCES: Nature News; Carl Zimmer

BUSINESS INSIDER



Round one of CRISPR patent legal battle goes to the Broad Institute

By Jon Cohen | Feb. 15, 2017 , 2:30 PM

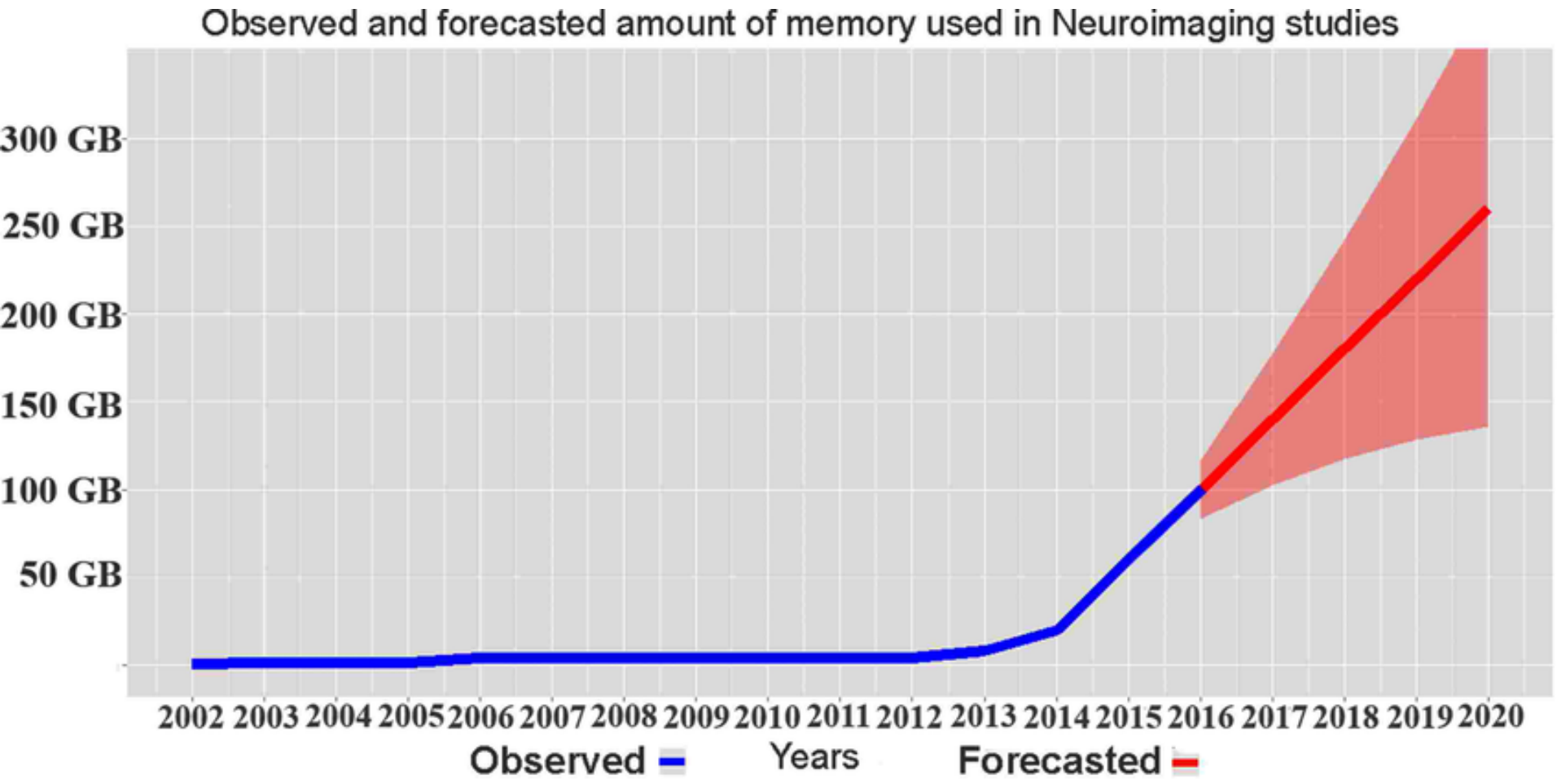


Η επόμενη ημέρα στην απεικόνιση!

Different imaging modalities across the electromagnetic spectrum. They are playing an increasingly important role in early diagnosis, treatment planning, and deploying direct therapeutic measures.

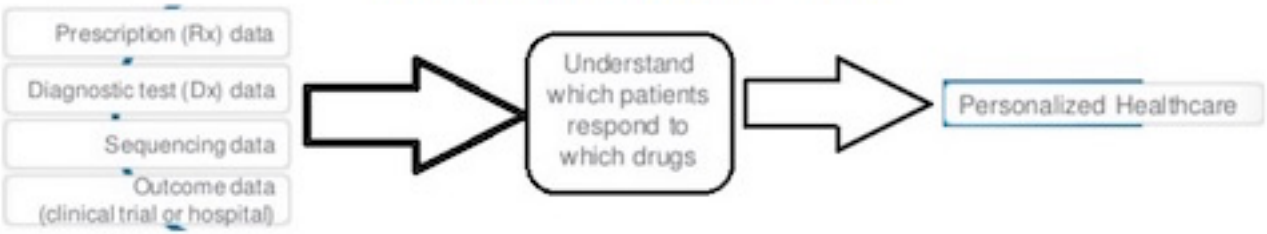
https://www.researchgate.net/publication/280124446_Big_Data_for_Health/figures?lo=1

Amount of RAM needed and forecasted to be used in neuroimaging studies



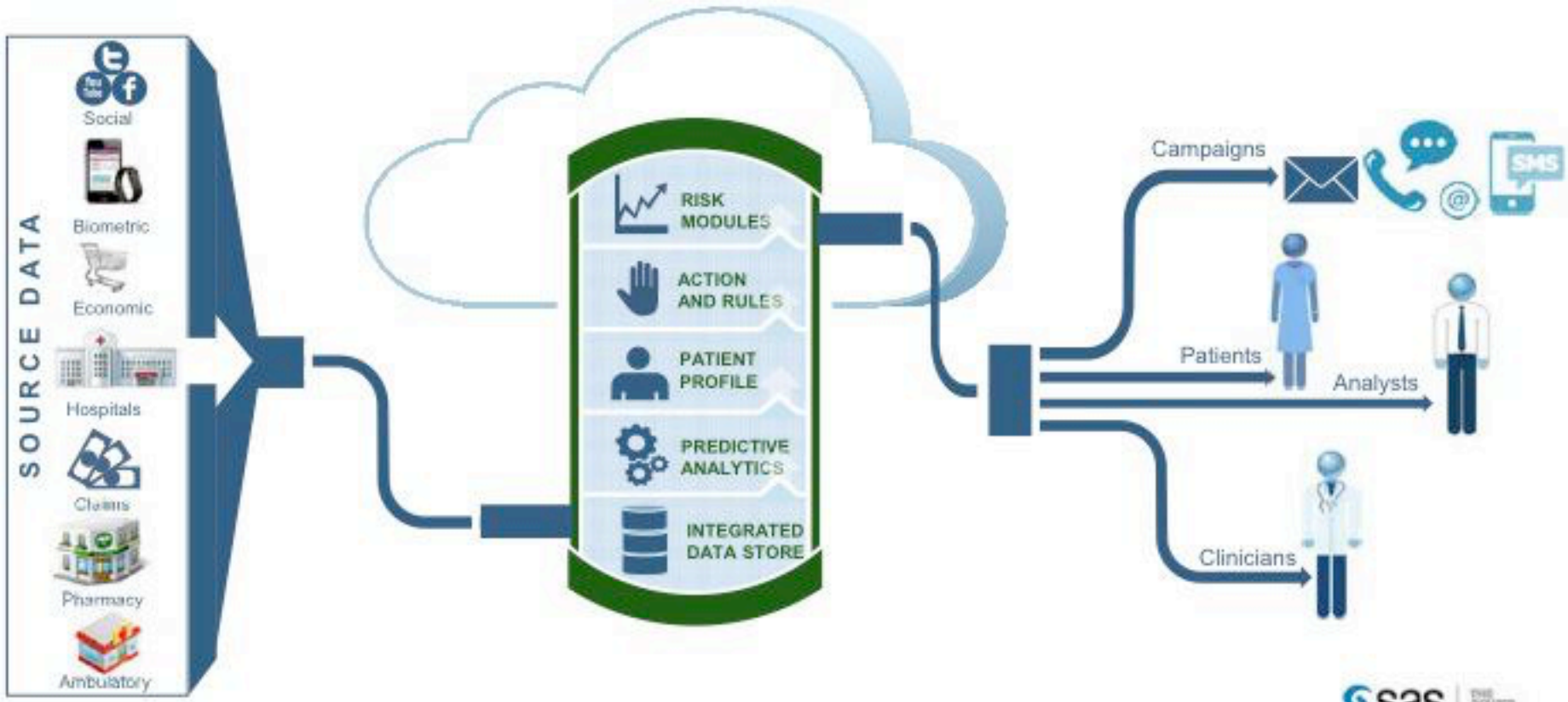
https://www.researchgate.net/publication/280124446_Big_Data_for_Health/figures?lo=1

Personalized Healthcare

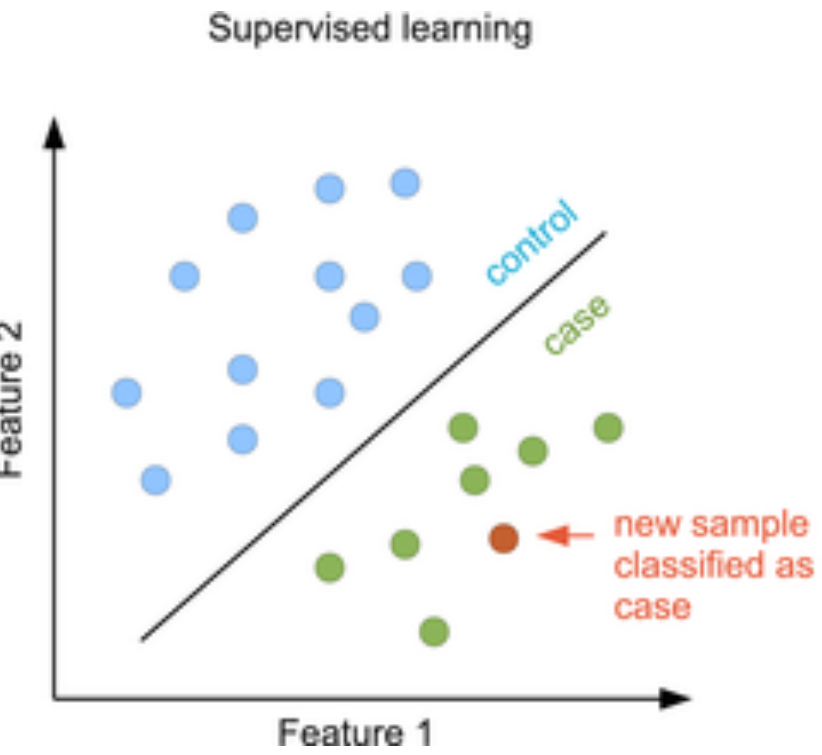


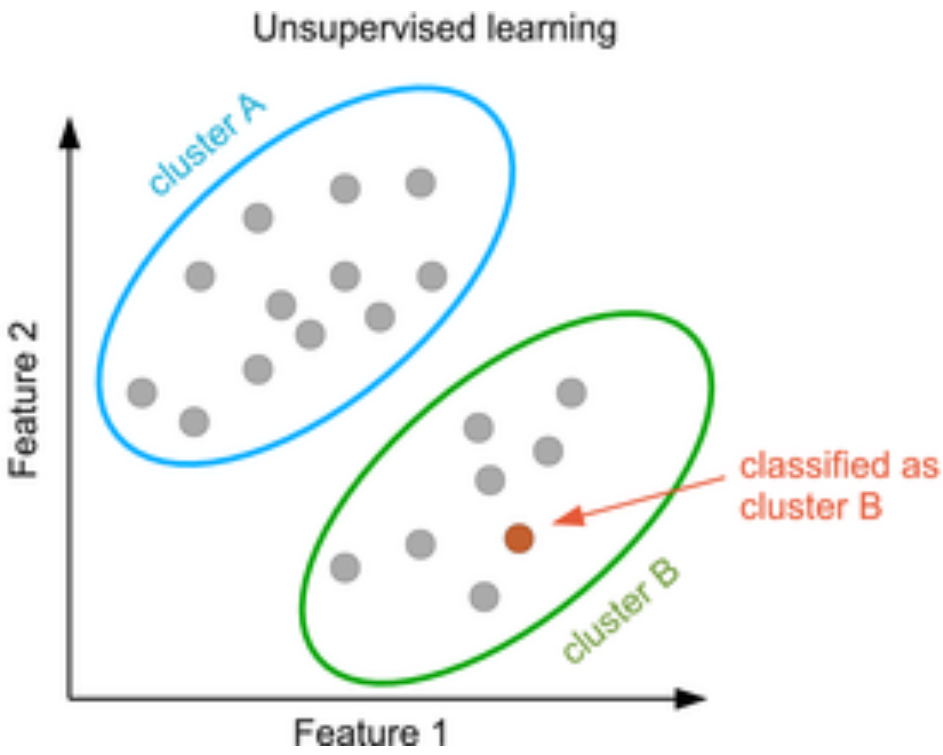
80 %

of health data is unstructured and stored in hundreds of forms such as lab results, images, and medical transcripts.



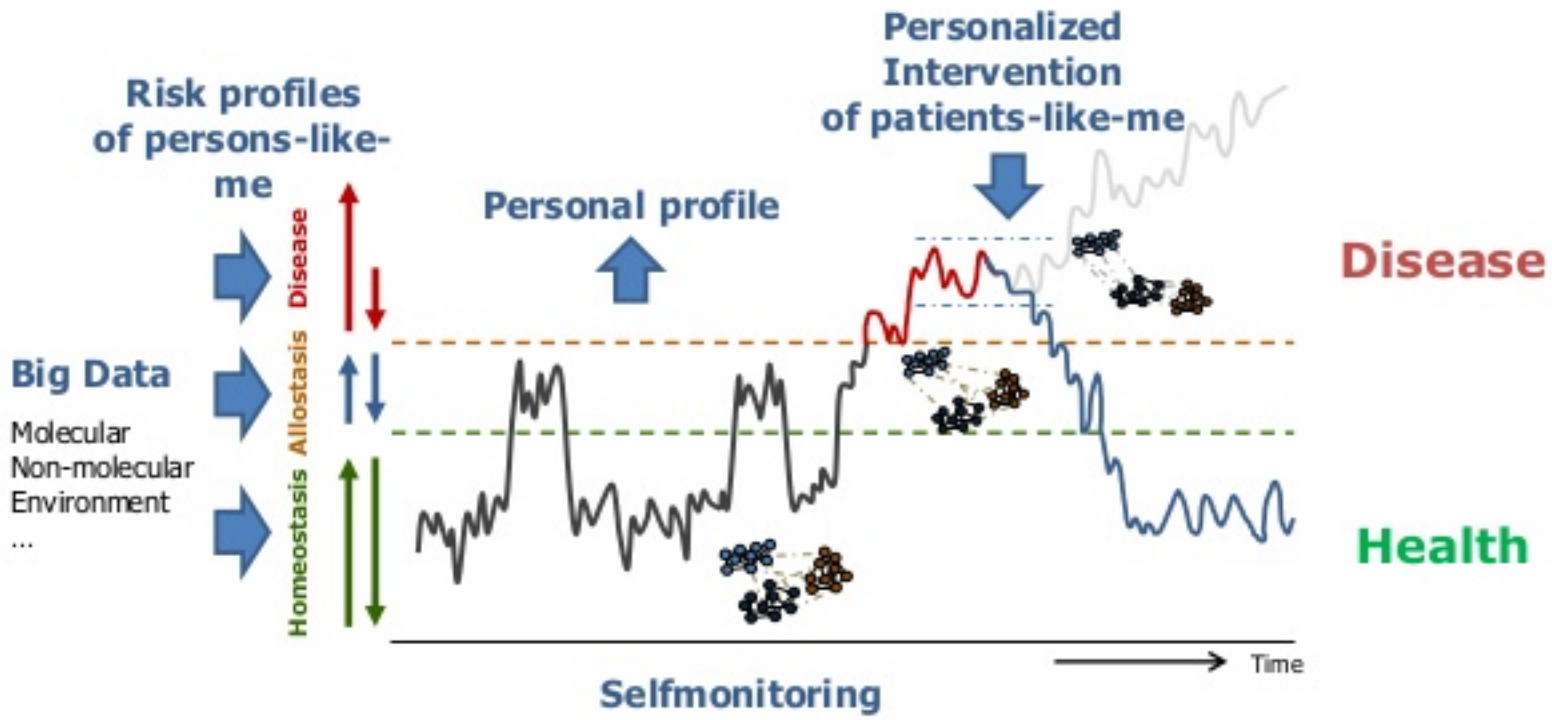
source: SAS Institute Presentation





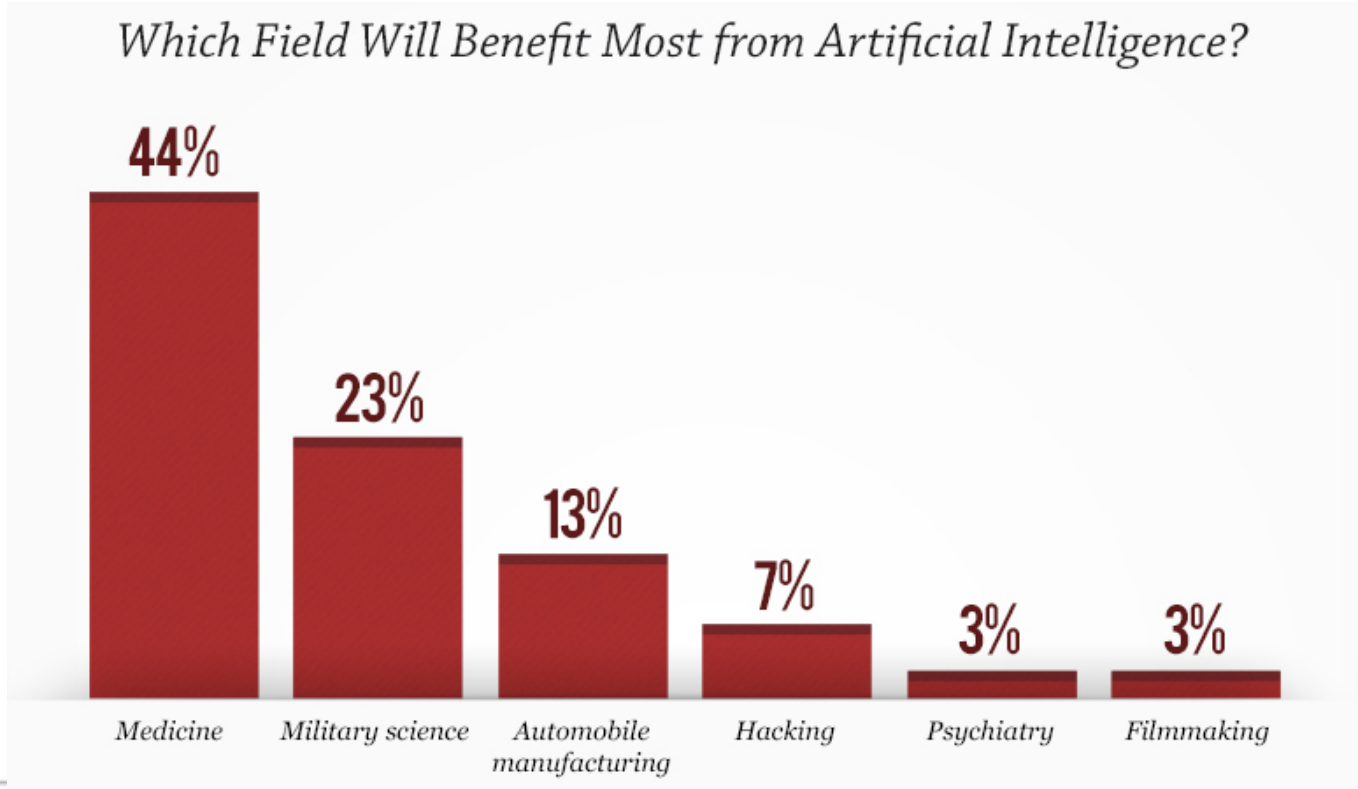
Gligorijević V, et al: Proteomics. 2016;16(5):741-58

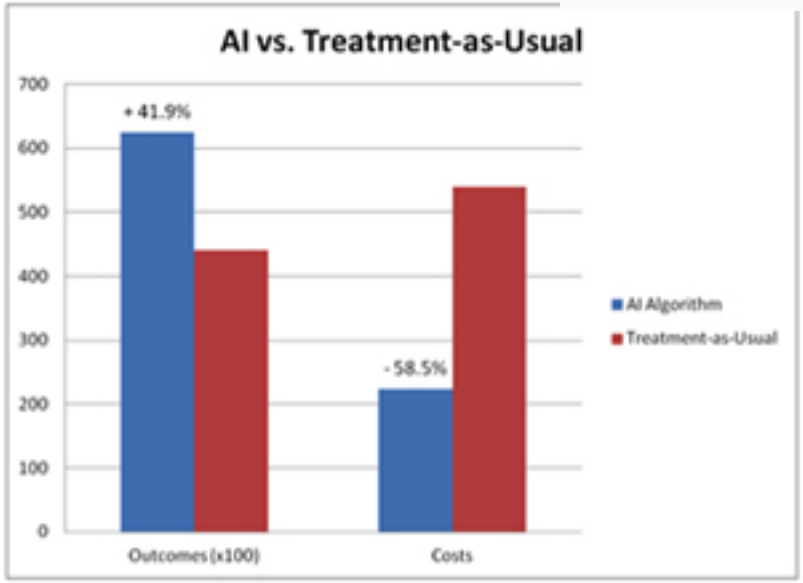
Personalized Health(care) model



Adapted from Jan van der Greef (2013)


Artificial Intelligence Helps In Making
An Intelligent Medical Diagnosis
MEDICAL
Health Care
Doctor
Hospital
Pharmacist
Nurse
Dentist
First Aid
Surgeon
Emergency
MEDICAL

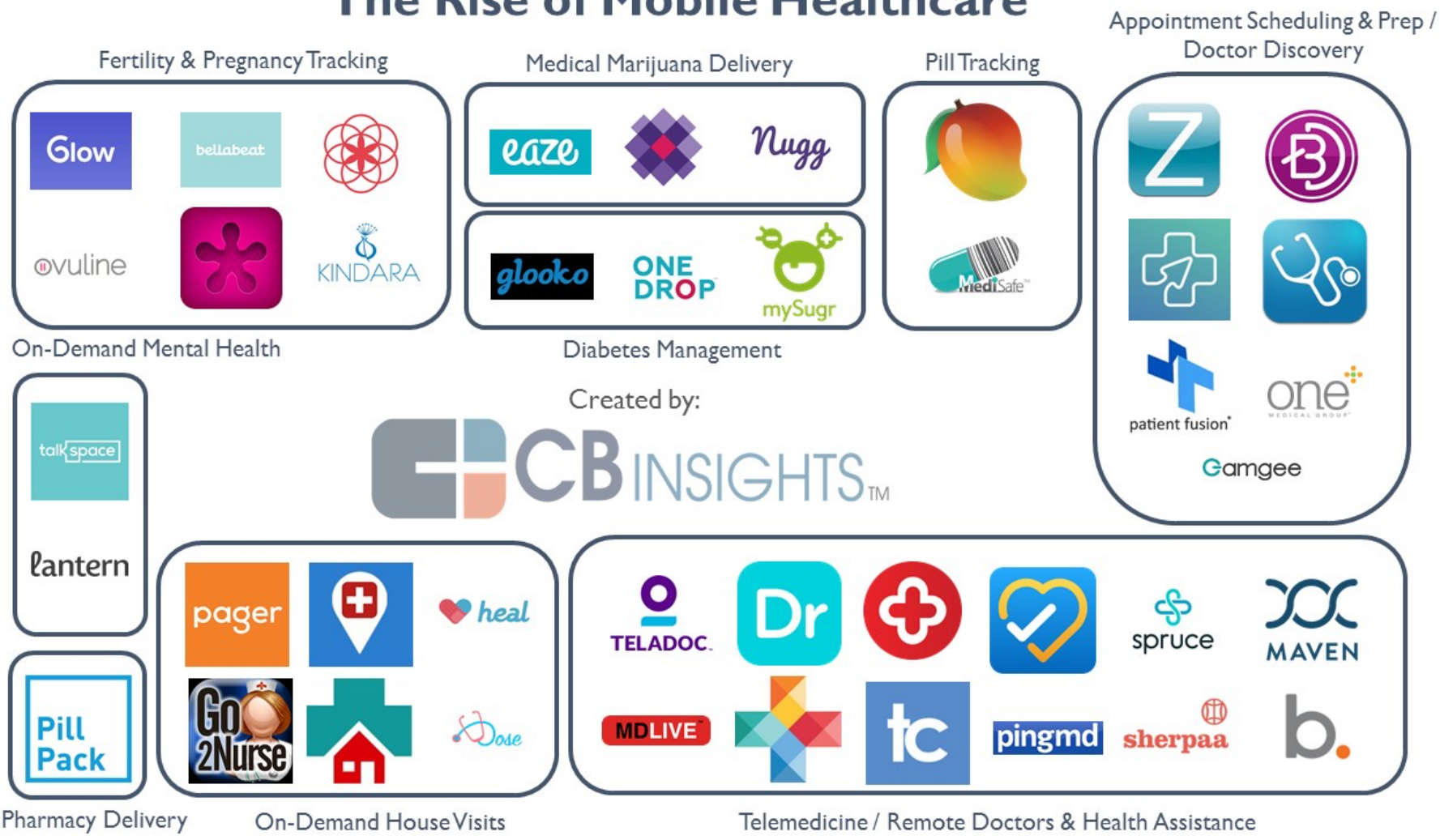

Which Field Will Benefit Most from Artificial Intelligence?
44%
23%
13%
7%
3%
3%
Medicine
Military science
Automobile manufacturing
Hacking
Psychiatry
Filmmaking

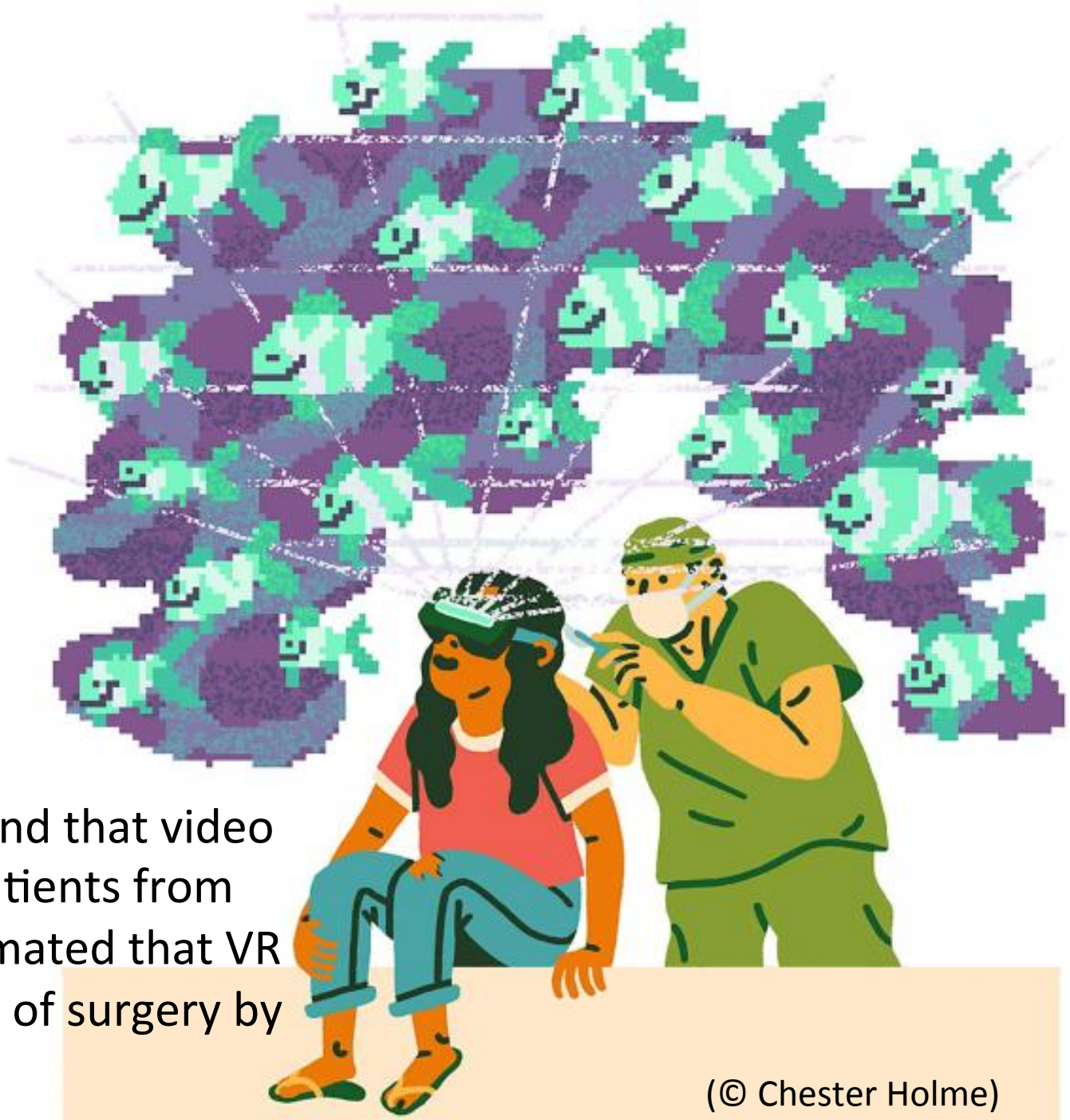

AI vs. Treatment-as-Usual
700
600
500
400
300
200
100
0
+ 41.9%
- 58.5%
AI Algorithm
Treatment-as-Usual
Outcomes (x100)
Costs

90+ STARTUPS TRANSFORMING HEALTHCARE WITH AI

CBINSIGHTS

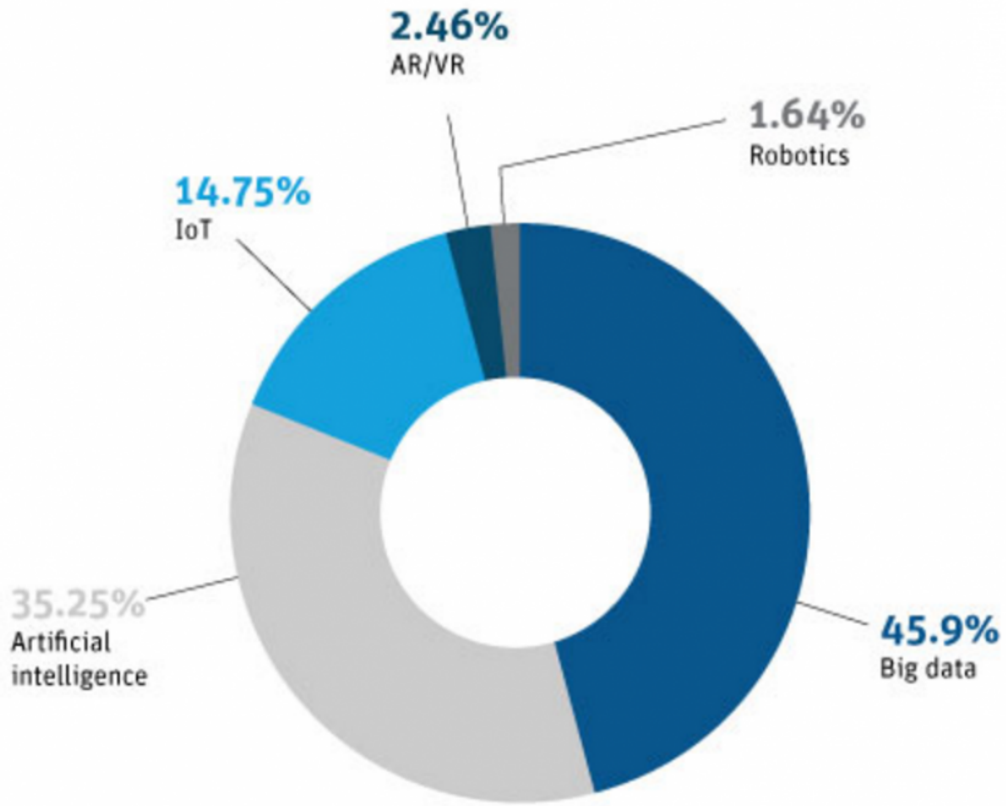
"Healthcare in a Click"
The Rise of Mobile Healthcare





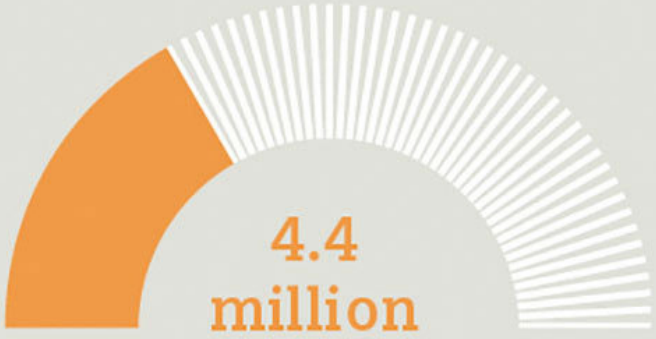
Researchers have found that video games can distract patients from pain. It has been estimated that VR could reduce the cost of surgery by around 25 per cent!

4 Which of the following technical innovations will have the greatest impact on healthtech in 2017?



http://www.mobihealthnews.com/content/silicon-valley-bank-survey-finds-big-data-ai-will-have-greatest-impact-healthcare-industry

Το μεγάλο πρόβλημα: δεν υπάρχουν 3 εκατομμύρια επιστήμονες πληροφορικής που είναι απαραίτητοι!



By 2020, 4.4 million IT jobs globally will be created to support Big Data. "But there is a challenge. There is not enough talent in the industry. Our public and private education systems are failing us. Therefore, **only one-third of the IT jobs will be filled.** Data experts will be a scarce, valuable commodity," said Peter Sondergaard, Senior Vice President at Gartner and Global Head of Research.

Η επόμενη ημέρα δεν μοιάζει πολύ με την σημερινή...

The mobile operating theatre, Igloo (Photo courtesy of © Imperial College London)