

# AUGMENTING HEALTH PROFESSIONALS AND EMPOWERING PATIENTS WITH NEW TECHNOLOGIES

**Panos Bamidis**

Assoc. Prof, School of Medicine, Aristotle University of Thessaloniki, Greece  
Visiting Prof, Leeds Institute of Medical Education, University of Leeds, UK

**Founder**

LLM Care Ecosystem & EIPonAHA Reference Site  
Thessaloniki Active & Healthy Ageing Living Lab (ThessAHALL)

**President, Greek Biomedical Technology Society (ELEBIT)**

**President, Society of Applied Neuroscience (SAN)**



panagiotis.bamidis  
[pdbamidis@gmail.com](mailto:pdbamidis@gmail.com)

<http://medphys.med.auth.gr>  
[www.llmcare.gr](http://www.llmcare.gr)



@MedicalPhysicsA  
@Bamidis

# Apple, iPhone 8 – Augmented Reality

CIRCUIT BREAKER / APPLE / MOBILE

## Apple shows off breathtaking new augmented reality demos on iPhone 8

by Nick Statt | @nickstatt | Sep 12, 2017, 2:36pm EDT



SHARE



TWEET



LINKEDIN



NOW TRENDING





**Improved Imaging,  
Emerging Imaging**



**Consumer facing technology**



**Disease Managemnet technology**



**EHR improvement**



**The cloud**



**Hospital & patient medical devices**



**Interoperability  
Tele-medicine/mhealth**



# Future MDs, today?

Democratising education and  
disrupting clinical practice  
with technology

performed the world's first virtual reality operation  
recorded and streamed live in 360-degree, or  
immersive, video in 2016.  
It was viewed live by 55,000 people in 142 countries  
and downloaded 200,000 times on YouTube

## HEALTH

### Why Doctors Are Using Snapchat Glasses in Operating Rooms



Surgeon Shafi Ahmed poses for a photograph wearing a pair of Snap Inc. Spectacles inside his operating theater at the Royal

The World's most watched doctor!

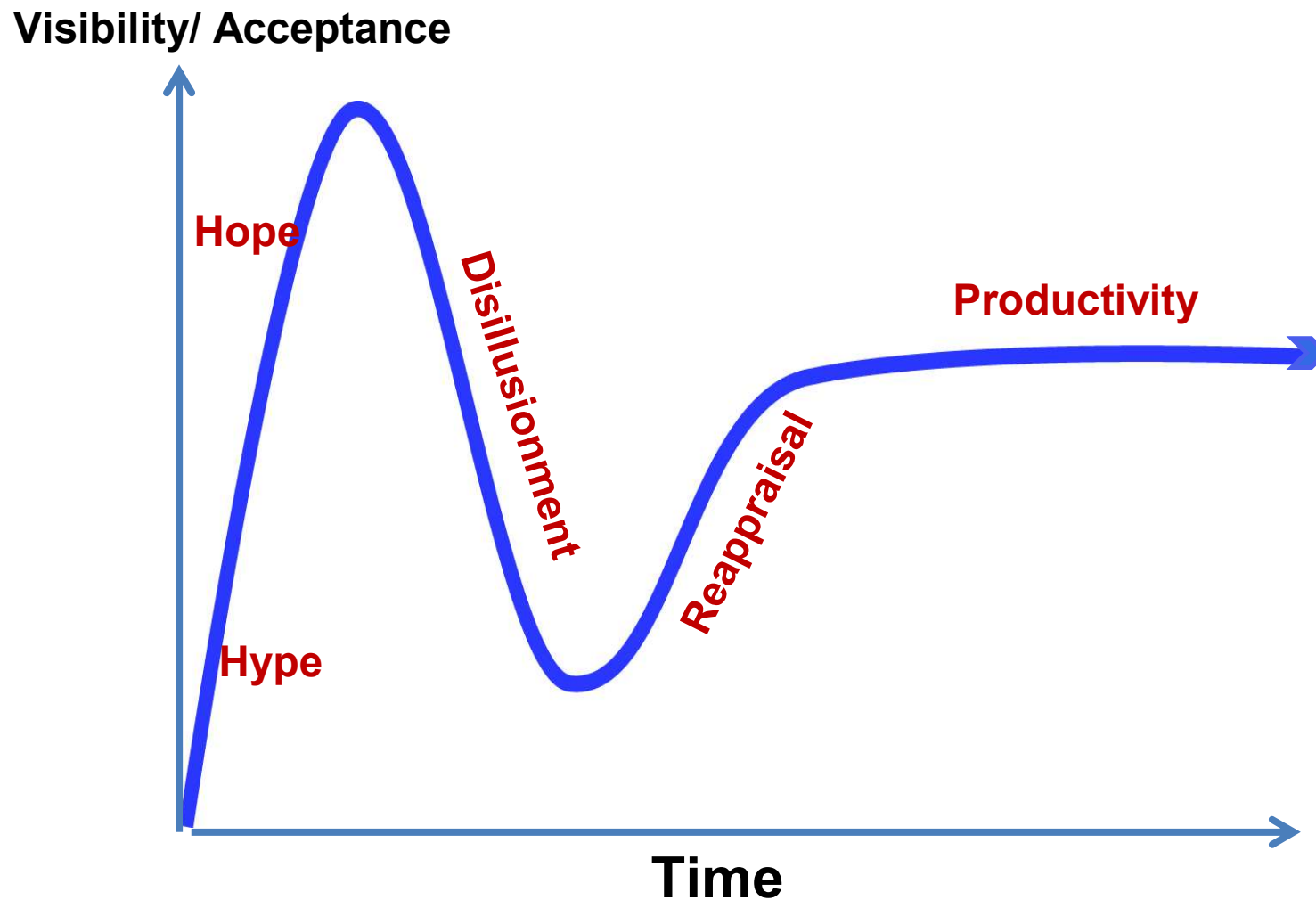
# Disruption in clinical education?

Lancet Commission on Global Surgery estimated in 2015 that 5 billion people lack access to safe, affordable surgical and anesthesia care, leading to about **17 million deaths annually**. Saving lives will require a doubling of the surgical workforce, or an extra 2.2 million surgeons, anesthesiologists and obstetricians over 15 years...



Shafi used MS HoloLens headsets to virtually bring together surgeons from London and Mumbai ... to operate together on a bowel-cancer patient. Each colleague was able to view tumor scans that appeared as 3D holograms, and could “see” each other as graphic avatars, standing and speaking as if together in the operating room in London...

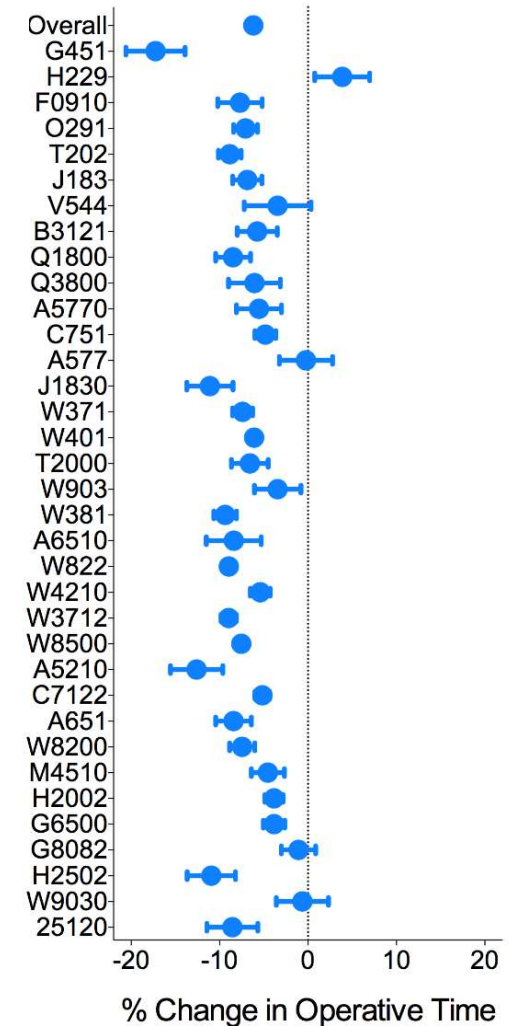
# eLearning – the cycle of acceptance



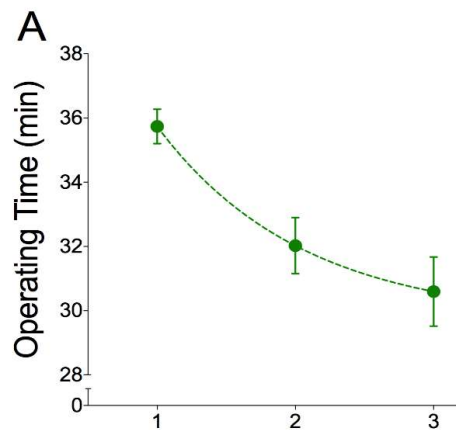
# Warming up surgeons



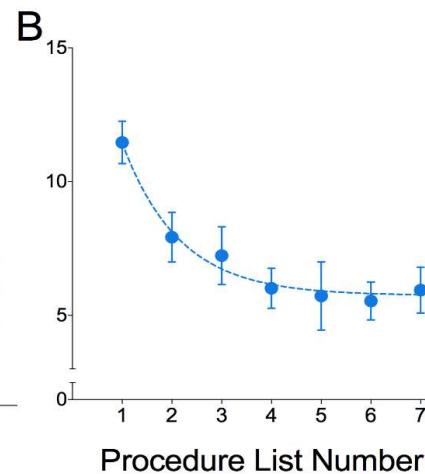
UNIVERSITY OF LEEDS



## Inguinal Hernia Repair



## EGD



**da Vinci** *Si* HD  
SURGICAL SYSTEM

THE LEEDS  
TEACHING HOSPITALS  
**Charitable  
Foundation**  
REGISTERED CHARITY NUMBER 1075308



**MRC**

Medical  
Research  
Council

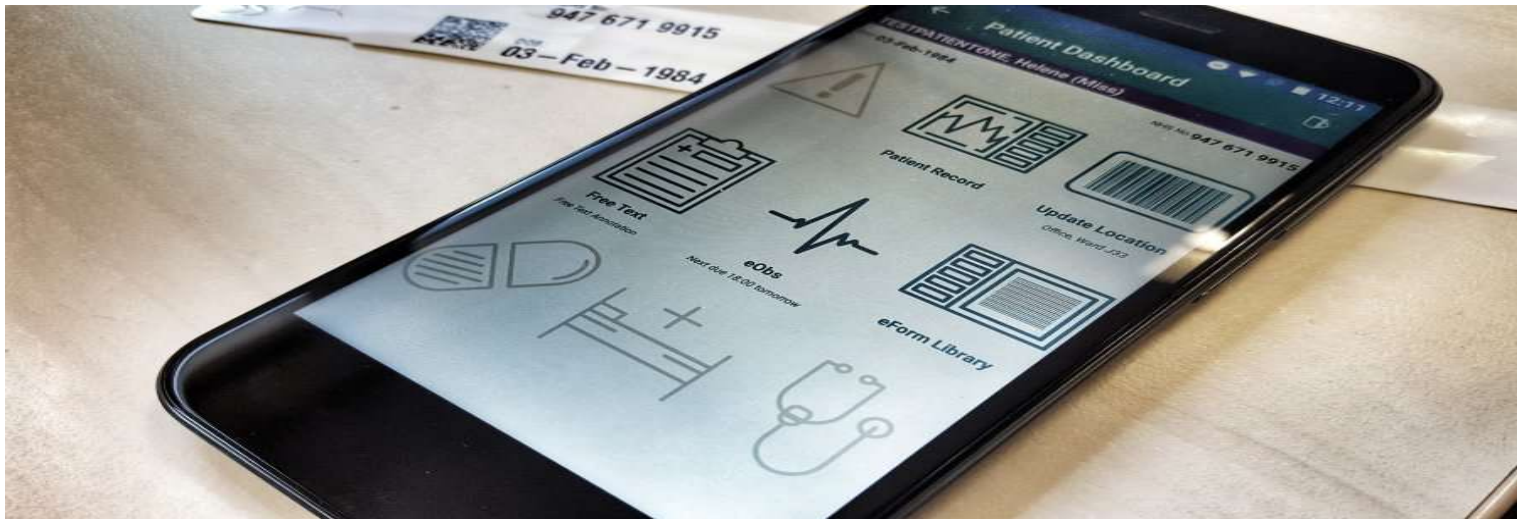
M Mon-Williams, Keynote, 3<sup>rd</sup> Int. Conf on Medical Education Informatics (MEI2018)

# Technological Innovations in everyday health care practice...



## Innovation & Leeds

Leeds Teaching Hospitals Trust has built its own EHR known as PPM+. This is now a platform for delivery of mobile, location based care information & the Leeds Care Record.



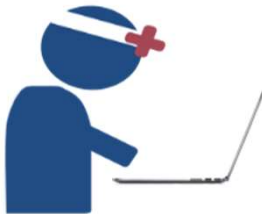
## Innovation & the future



**CHAT BOT:** AI supporting search capability within the EHR and the possibility of AI support for patient interaction.



**MOBILE FIRST:** Ensure all clinical teams have responsive kit that can be used to adapt to the changing needs effectively. Deliver choice.



**VIRTUAL CONSULT:** Enable clinical contact with patient virtually but within a secure and contextualised environment.



**CLINICALLY IMPACTFUL GENOMICS:** Enable a MDT view of geneticists opinion in rare disease and cancer.



**CLINICIAN PROXIMITY:** Enable technology to prompt clinical time based on location in the hospital.



**CLOUD FIRST:** Remove reliance on LTHT infrastructure and move to an agile, secure and waste resistant model.



PHS

*Personalised Health Systems (PHS) provide continuous, quality controlled, person-specific healthcare services and empower people anytime & anywhere*

Active citizen/patient participation

**Mobile, wearable, implantable devices/sensors**

# The Quantified Self



Quantified Self  
self knowledge through numbers

Self-  
measuring...  
monitoring...  
estimating...  
knowing...  
...through numbers...  
and digitisation of daily activities

Image: The Economist



# Wearable fitness trackers to support physical activity in breast cancer

*"If you get to say 8,000 [steps] in a day, you're more motivated to do those extra 2,000 because you're so close. It's like 'Why would I stop now?' I might as well keep going." - 52 patient participant*

“Wearable Activity Trackers are perceived as useful and acceptable interventions by postmenopausal breast cancer survivors” – Study findings



<http://www.pcadvisor.co.uk/reviews/gadget/3495685/fitbit-force-review/>

Nguyen, Nga H., et al. "A qualitative evaluation of breast cancer survivors' acceptance of and preferences for consumer wearable technology activity trackers." Supportive Care in Cancer (2017): 1-10.

**Slide adapted from Luis Luque (@luisluque)**

# Sleep, Stress and Cancer

The image displays three screenshots of a smartphone application titled "Write Journal". The app is used for daily stress and sleep reporting. The first screenshot shows the "APR 1, 2013 Stress Questionnaire (Daily)" with two clock-based questions: "Q. What time did you fall asleep last night? What time did you get up this morning?" and "Q. How many times did you wake up during your sleep?". The second screenshot shows a vertical slider for "Q. How would you rate the quality of your sleep last night?" with a score of 7, ranging from "Very Good" to "Very Bad". The third screenshot shows a selection of seven emoji faces for "Q. Please choose the expression that most closely matches your feeling." and a vertical slider for "Q. Please indicate the your anxiety level." with a score of 6, ranging from "Extremely anxious" to "Not anxious at all". A "Send" button is visible at the bottom of the third screenshot.

Daily Collection of Self-Reporting Sleep Disturbance Data via a Smartphone App in Breast Cancer Patients Receiving Chemotherapy: A Feasibility Study

Article in Journal of Medical Internet Research 16(5):e135 · May 2014

DOI: 10.2196/jmir.3421 · Source: PubMed · License: CC BY 2.0

Slide adapted from Luis Luque (@luisluque)

# AI in healthcare?



[About](#) [Product](#) [Blog](#) [NHS](#)

[Sign up](#) [Log in](#)

[Download App](#)




[About](#) [Product](#) [Blog](#) [NHS](#)

[Sign up](#) [Log in](#)


[Download App](#)



## Ask Babylon →

 Hi Alex, how can I help?

I've got a really bad headache  
and I don't know what to do...

 No problem, let me ask  
you a few questions



## Talk to a doctor →



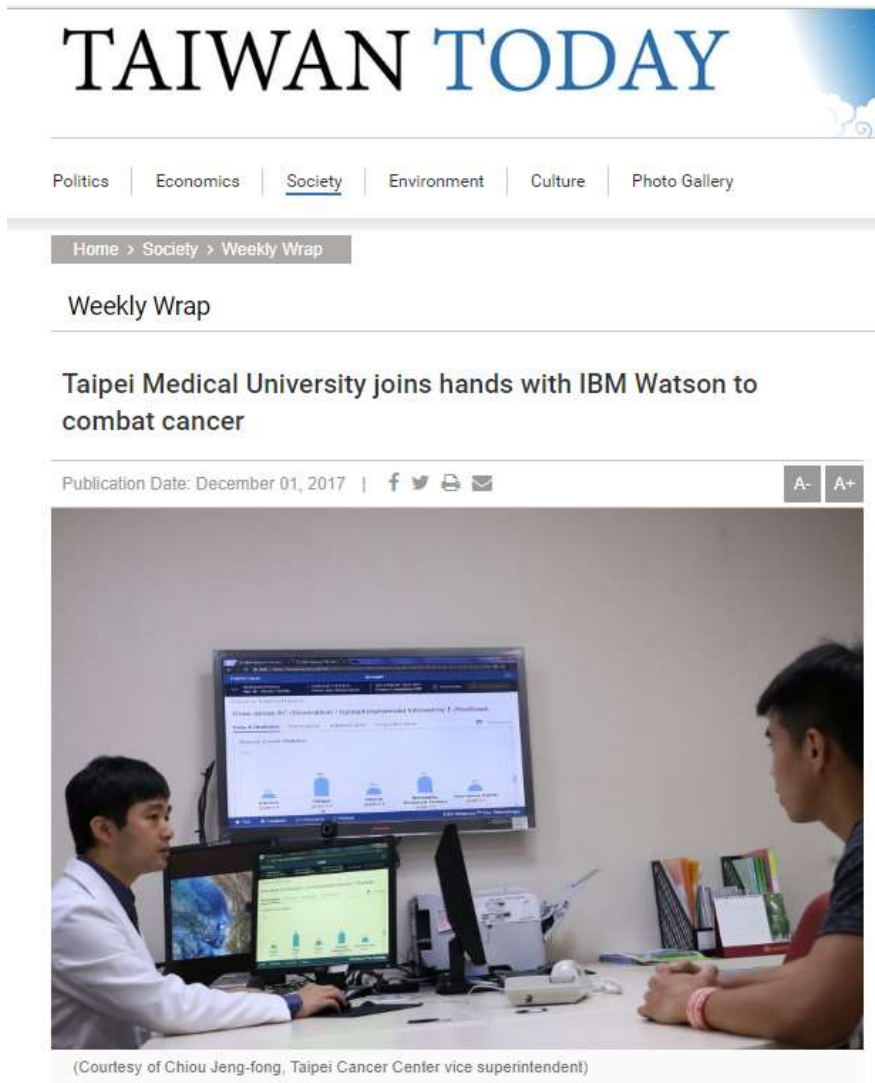
## Healthcheck →

Coming soon

100 bil investments...

<https://www.babylonhealth.com/about>

# IBM Watson ... in Taiwan



## TMU-IBM Joint Symposium on Innovation in Data Science and Artificial Intelligence in Health Care (JCMIT2017)

### Information:

Date: August 18<sup>th</sup>, Friday, 2017

Venue: B2 Conference Hall, Taipei Medical University Daan Campus, Taipei, Taiwan

### Chairman:

Yu-Chuan (Jack) Li, M.D., Ph.D., Professor and Dean, College of Medical Science & Technology, Taipei Medical University, Taipei, Taiwan

### Organized by:

- International Center for Health Information Technology of Taipei Medical University, Taiwan
- Taiwan Association for Medical Informatics (TAMI)


### Sponsored by:

- Ministry of Science and Technology, Taiwan (R.O.C.)
- Ministry of Health and Welfare, Taiwan (R.O.C.)

<https://taiwantoday.tw/news.php?unit=11&post=125887>



# Emerging Healthcare model

- Old:
    - Emphasis on **disease events/cases**
    - **Sparse monitoring**
    - Diagnosis and therapy
    - Care at **hospital**
    - **Passive** patients
    - **Rare use of technology**
  - New:
    - Emphasis on chronic care
    - **Continuous monitoring**
    - **Prognosis and Prevention**
    - Daily living, home care
    - Patient as a collaborator, self-care
    - Technology dependence
- 

**What can we do about it (at a higher level)?**

# Topol Review

**NHS**  
*Health Education England*

**Preparing the healthcare workforce to deliver  
the digital future**



Developing people  
for health and  
healthcare

[www.hee.nhs.uk](http://www.hee.nhs.uk)

P Mitchell, Keynote, 3<sup>rd</sup> Int. Conf on Medical Education Informatics (MEI2018)

# The panels

**Genomics**



**Digital  
medicine**

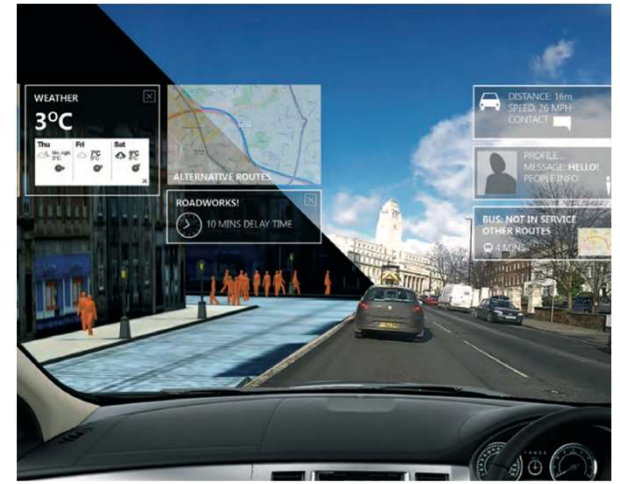
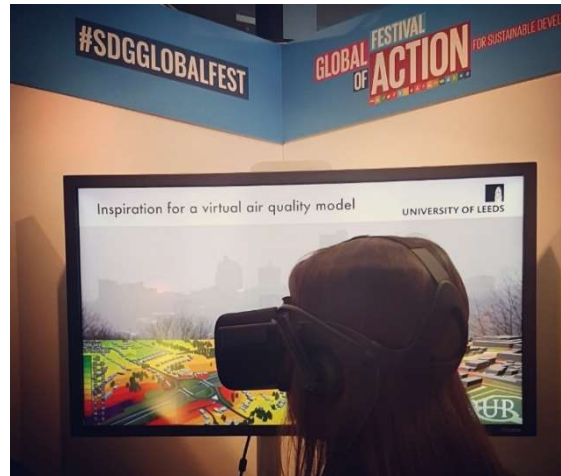


**Artificial  
intelligence and  
robotics**



P Mitchell, Keynote, 3<sup>rd</sup> Int. Conf on Medical Education Informatics (MEI2018)

# Improving health and education

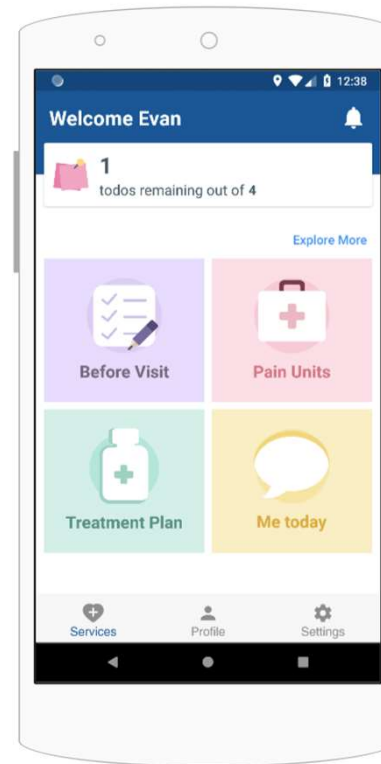




# Activity Trackers



## Chronic Pain Management



# MEDICAL PHYSICS LABORATORY

School of Medicine, Aristotle University of Thessaloniki



## Self-Management Tools

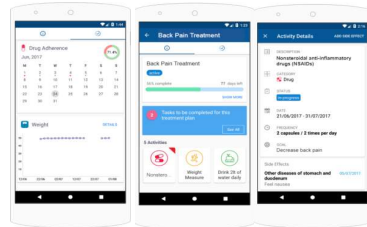
Treatment remote monitoring  
with sensors, e.g. sleep, activity



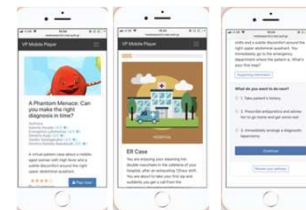
### Pain Assessment



### Individualized Treatment Plan



### Patient Education



### Peer Support Community Portal



### Patient-Doctor Communication



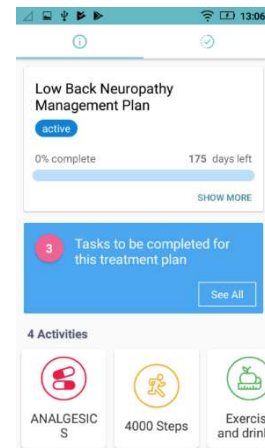
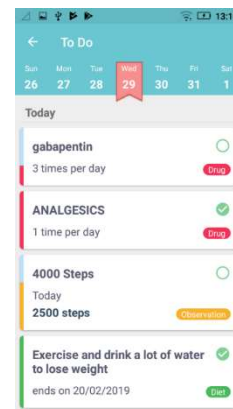
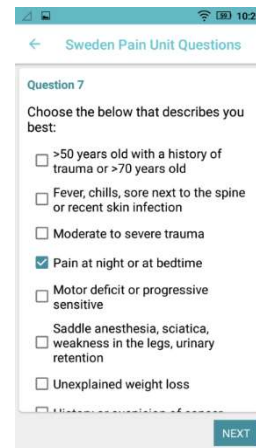
## Monitoring and control...



**Activity Statistics**  
Calories/Steps/Distance

**Biometric Statistics**  
Heart Rate/Respiration Rate  
etc.

**Sleep Statistics**  
Hours awake/asleep, light vs  
deep sleep, awakenings





## MEDICAL PHYSICS LABORATORY

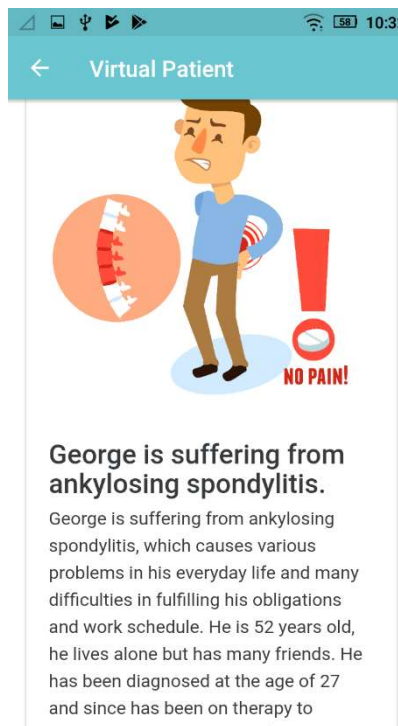
School of Medicine, Aristotle University of Thessaloniki



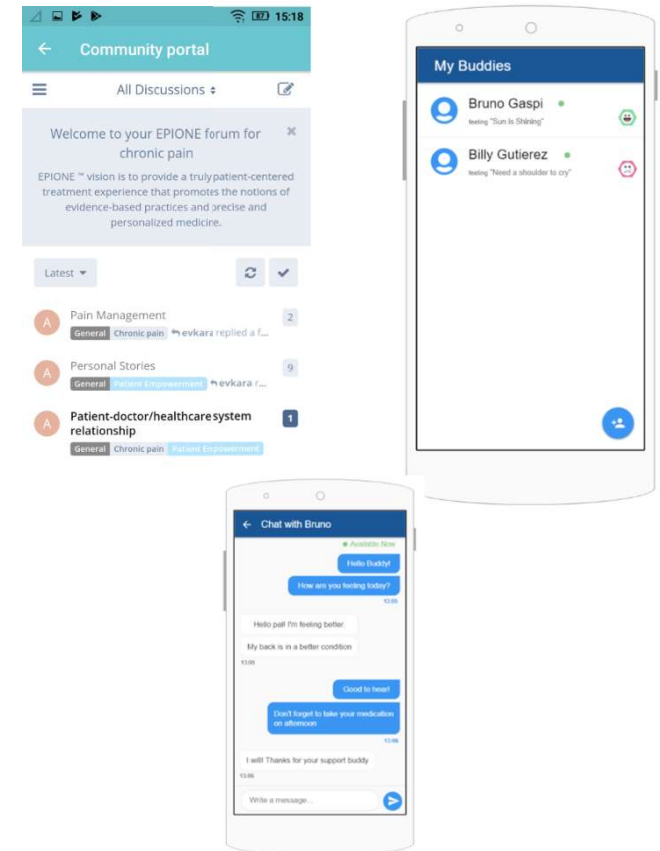
Self assessment with **chatbot**  
Automated and intuitive  
way of self-observation



Virtual patient  
**Educational episodes**  
Learning via simulation



**Peer support – social networking**





LLM Care is  
an EIP on AHA  
candidate  
Reference Site

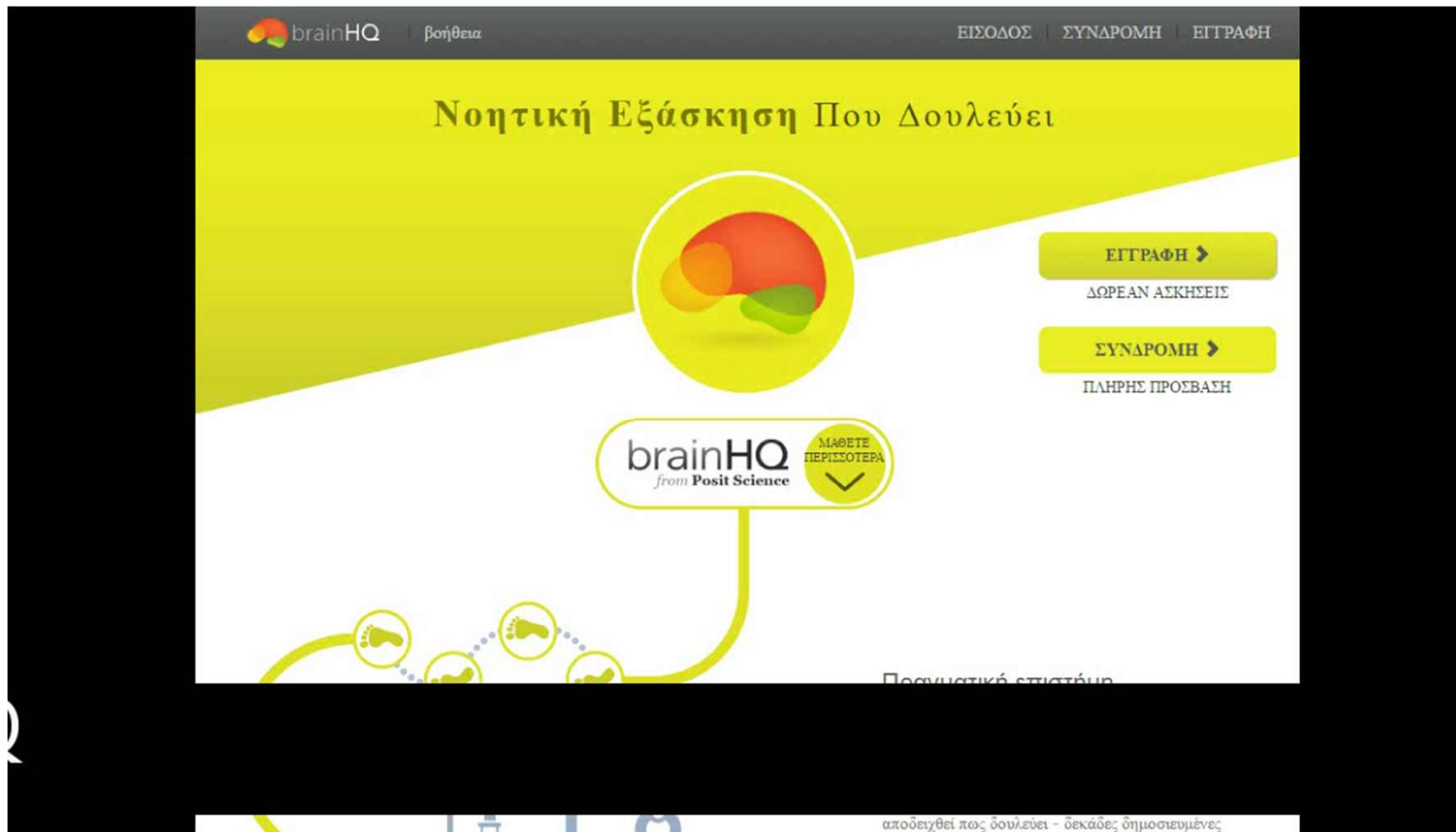


multi-dimensional  
evaluation  
of results

# WebFitForAll



# BrainHQ



European  
Network of  
Living Labs

Thessaloniki Active and Healthy Ageing Living Lab

 **THESS HALL**

[www.aha-livinglabs.com](http://www.aha-livinglabs.com)





# CAPTAIN

H2020 PM-15 project



Ministerial role

## Minister of State for Apprenticeships and Skills

Organisations: [Department for Education](#)

Current role holder: [The Rt Hon Anne Milton MP](#)

### Contents

- [Responsibilities](#)
- [Current role holder](#)
- [Previous holders](#)
- [Announcements](#)

### Responsibilities

The minister's responsibilities include:

- apprenticeships including the apprenticeship levy, traineeships and institutes of technology
- technical education and skills, including T-levels
- careers education, information and guidance
- post-16 funding (including support for young people and adult learners)
- further education colleges, sixth-form colleges and local patterns of provision (including area reviews and city deals)
- adult education, including the National Retraining Scheme and links to

Education, Skills...

# WHY EDUCATION; WHY SKILLS;

Quality education for healthcare workforce ...  
is key for a quality healthcare system...

# Develop Lifelong Learners

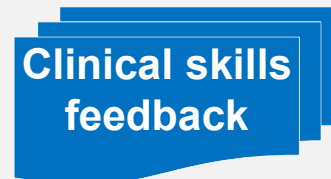
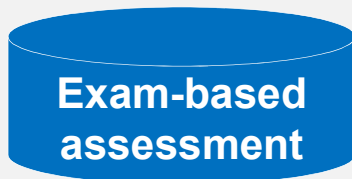


## Putting students in charge of their learning

Possess **self-determination** skills to:

- identify their areas of strengths and weaknesses;
- set personal learning goals;
- develop ways to achieve these goals;
- become ready to deal with complex future problems;
- constantly seek ways to improve their practice.

# Digitalisation of Learning



## ***‘Digital Companion’*** for Personalised Adaptive Learning

- ***‘learning support at your fingertips’***
- fosters the development of self-regulated learning skills
- co-designed with students and tutors



# Work Streams

Visualisations

Text Analytics

Interaction

Co-Design with Students and Tutors

Data Management

# mEducator (www.mEducator.net)

- A Best Practice Network (BPN)
  - **eContentplus 2008** EC programme (ECP-2008-EDU-418006)
  - May 2009 – April 2012
- Developed and compared two different solutions/frameworks
  - Solution 1 = mEducator2.0  
(based on Social Media/Web2.0)
  - Solution 2 = mEducator3.0  
(based on Web3.0/semantic web)
- Scope: to draw best practice recommendations

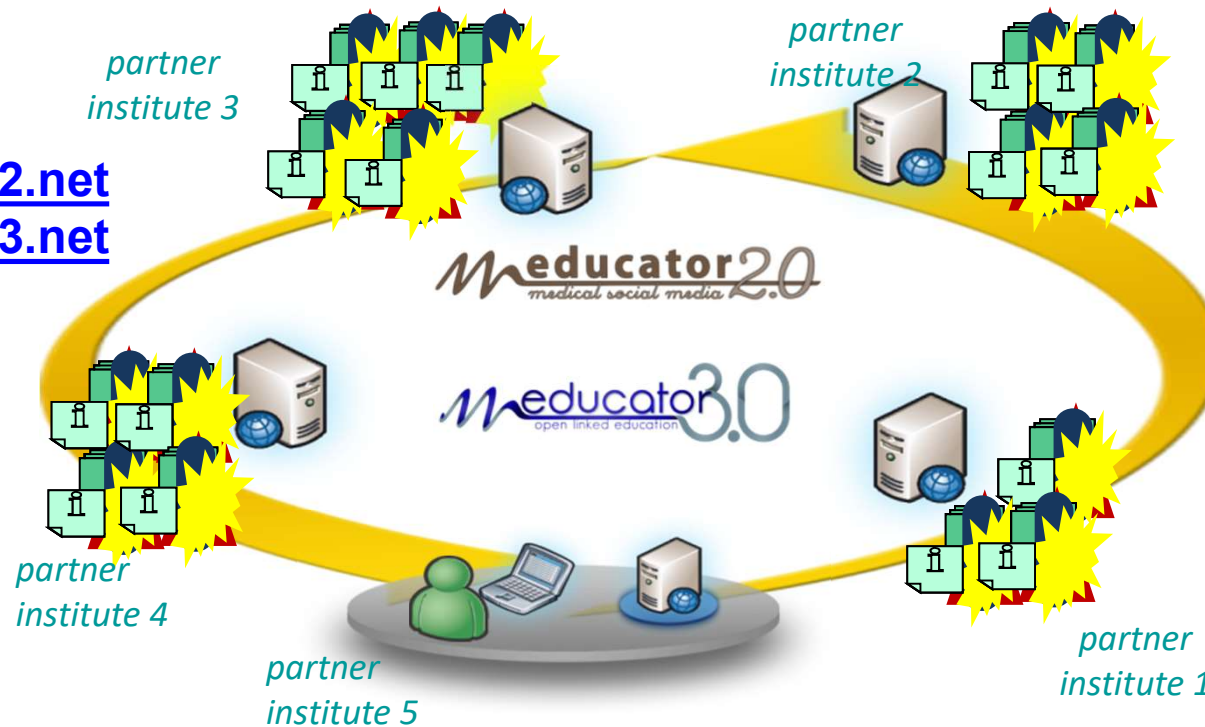




# The main product/service

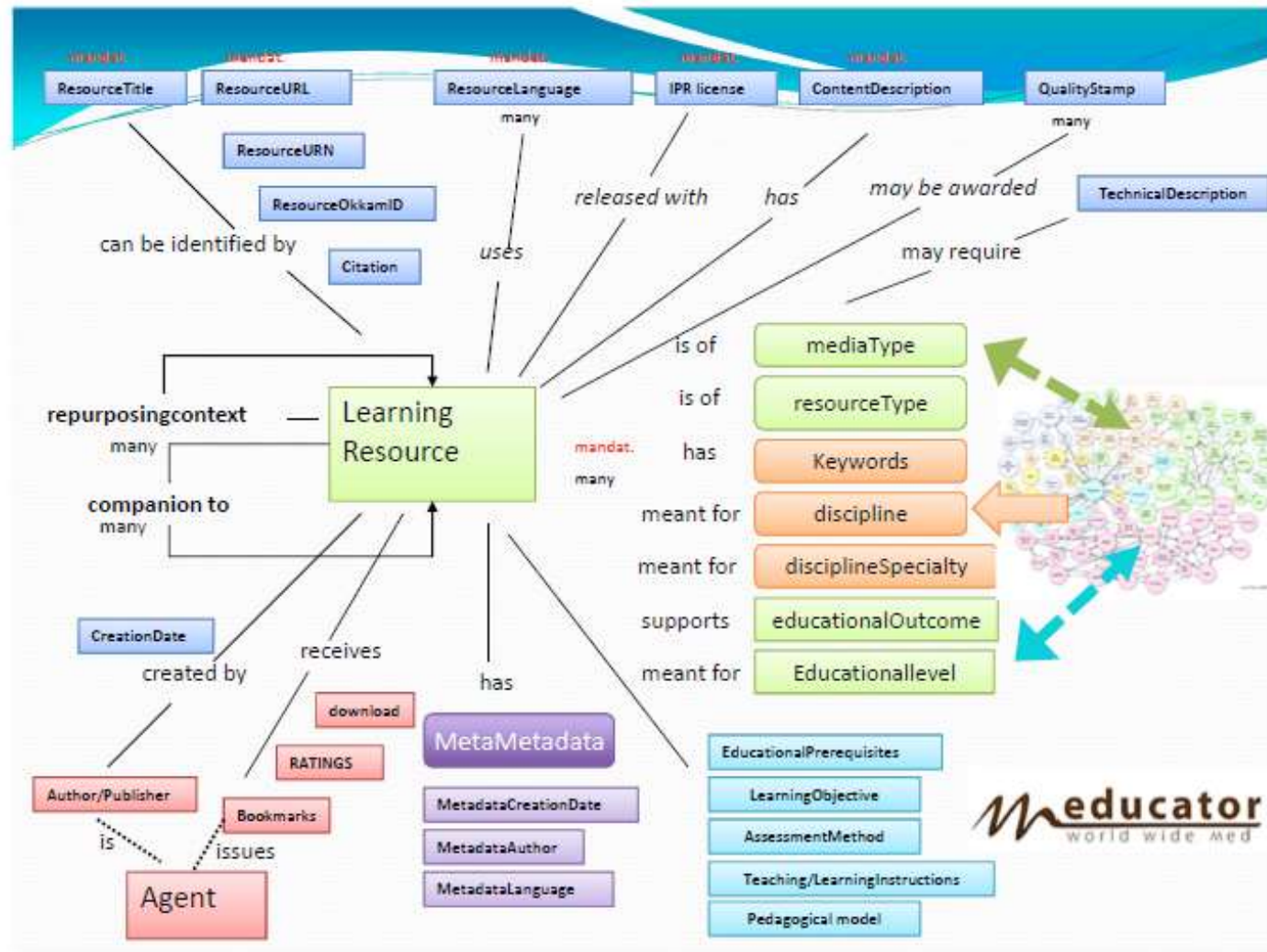
1. mEducator 2.0: loosely coupled LCMSs via mashup technologies (Web2.0)
2. mEducator 3.0: LCMSs linked via (semantic) linked services (Web3.0)

[www.meducator2.net](http://www.meducator2.net)  
[www.meducator3.net](http://www.meducator3.net)



**meducator**  
world wide med

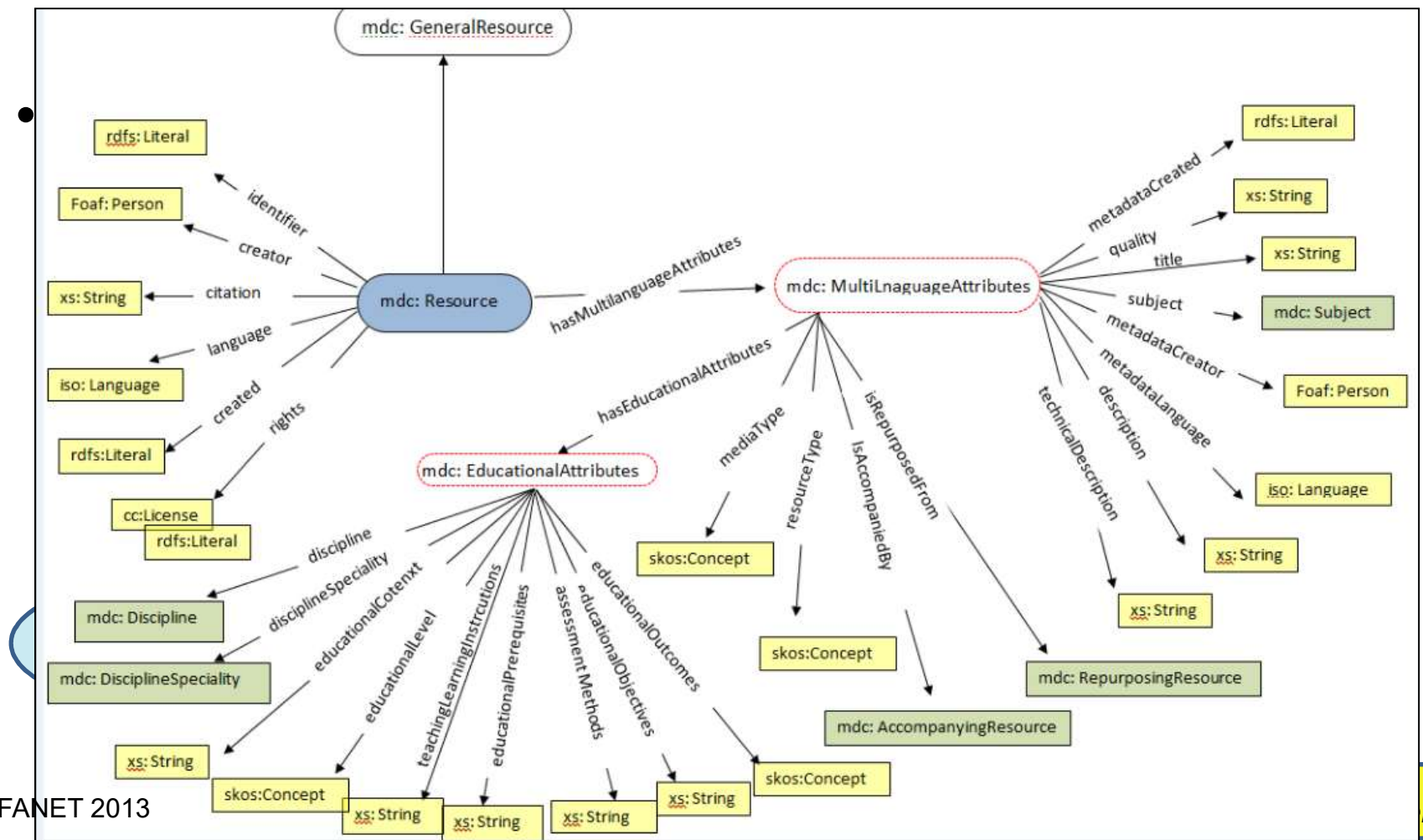
# The mEducator Learning Resource Space



- Giordano et al, Developing controlled vocabularies for educational resources sharing: a case study,'
- Mistopoulou et al, Connecting medical educational resources to the Linked Data cloud: the mEducator RDF Schema, store & API; both in Proc. of 1st Int. Workshop on eLearning Approaches for the Linked Data Age (Linked Learning 2011, in ESWC2011)

# mEducator Metadata Scheme

## RDF Model

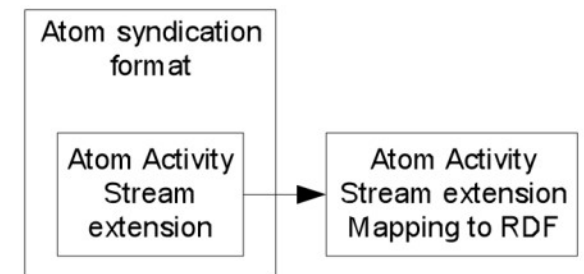




# Attention metadata (AM)

- **Goal:** modeling user activity within the content sharing platforms to provide recommendations
- **Proposal:** extend the ATOM schema
- **Advantages:**
  - More intuitive and richer than other AM schemas (e.g., CAM)
  - Easily extensible
  - AAIR mapping (Atom Activity Streams in Vocabulary) designed for social web as starting point

RDF  
sites to be used



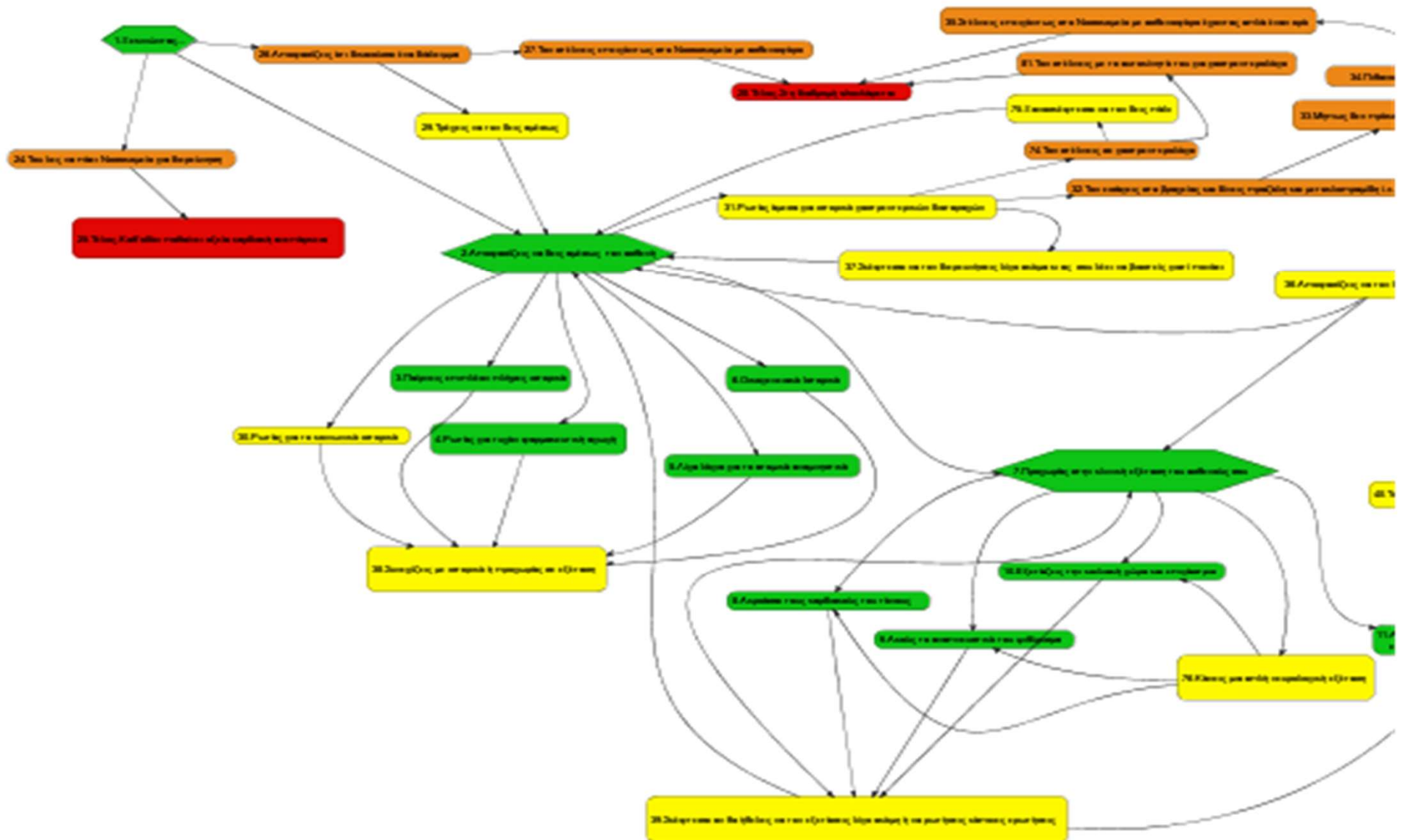
An example from

**P**roblem **B**ased **L**earning and

**V**irtual **P**atients

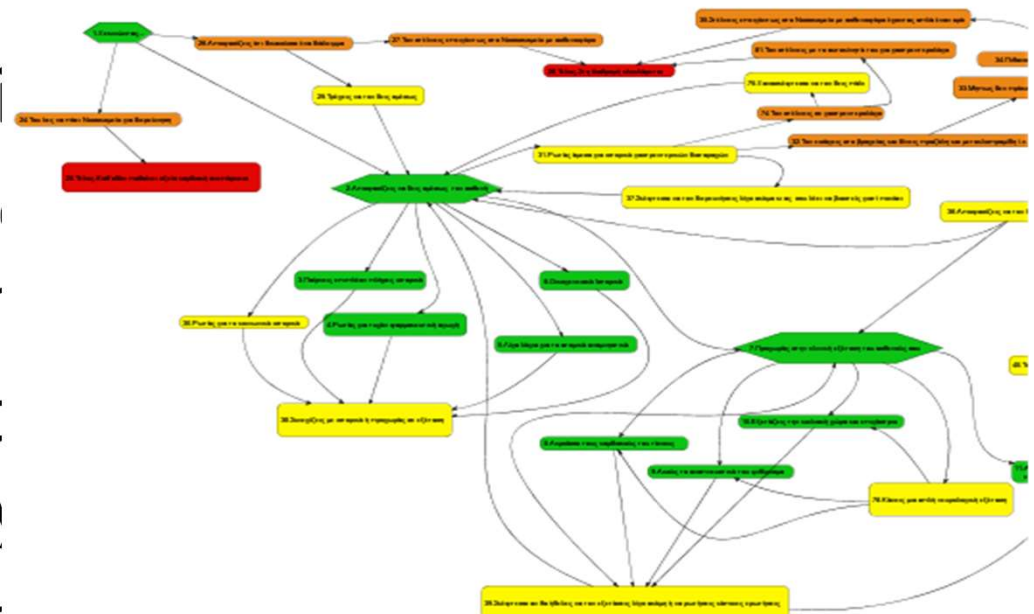
# Virtual Patients

- Interactive simulation of health care incidents
- The learners take the role of the professional, being able to:
  - diagnose
  - make therapeutic decisions
- Medical errors challenge the learners without being harmful or fatal to any real person



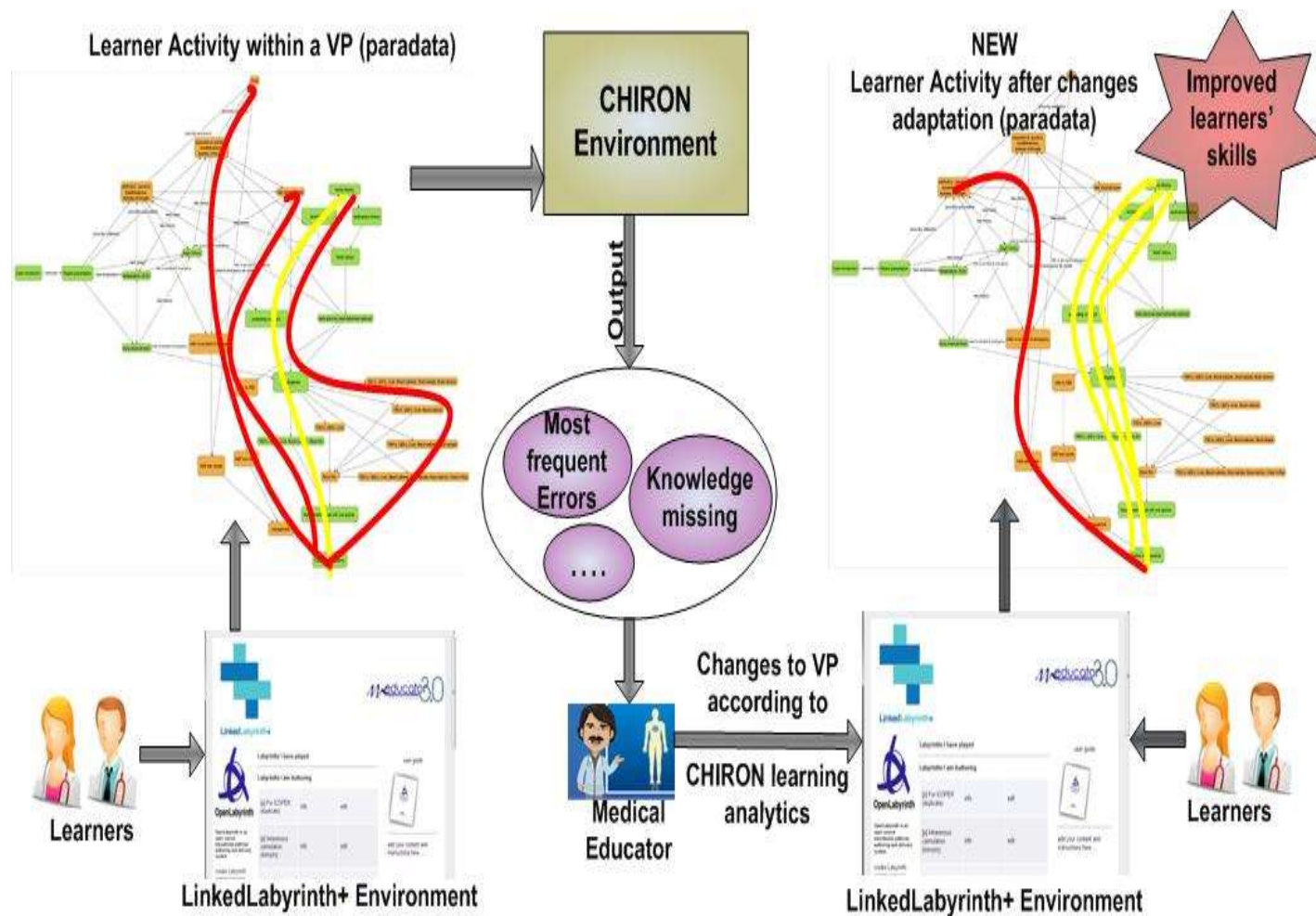
# Open Labyrinth

- Web-based Virtual Patients platform
- allows users to build pathway-based applications
- Pathways may be linear or other sequence forms
- Virtual patients are created from the many pathways
- Object referencing and reuse of media, questions, avatars etc.

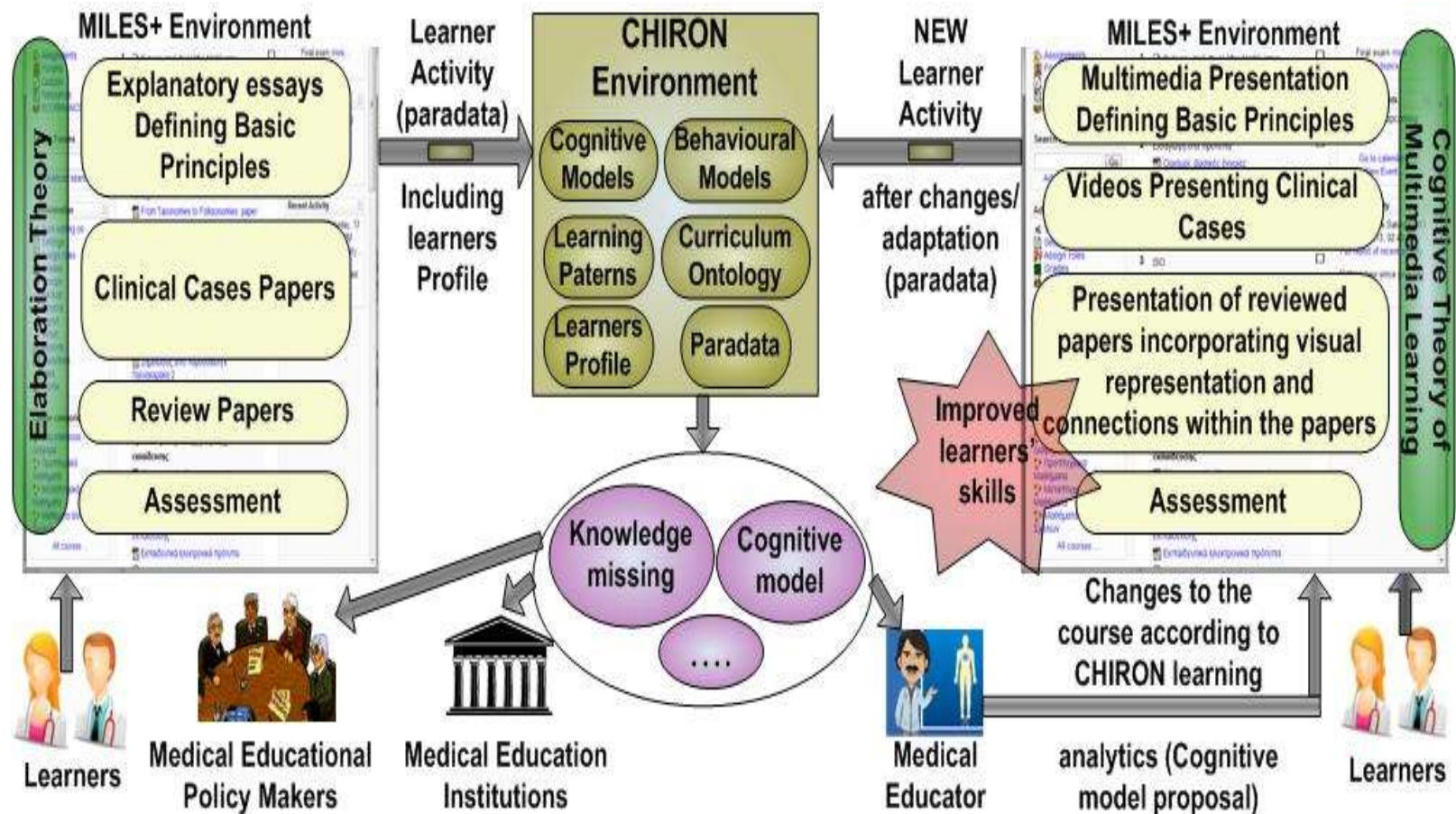




# MLA reports on the effectiveness of learning material



## MLA improves learner experience based on profiles & paradata in other learning environments



# ePBLnet: Establishment of the Supra-Regional Network of the National Centres in Medical Education, focused on PBL and Virtual Patients

[www.epblnet.eu](http://www.epblnet.eu)

Panos Bamidis  
Project Co-ordinator

Aristotle University of Thessaloniki

ePBLnet

# TAME: Training Against Medical Error

## Project partners



Karaganda State Medical University  
(Kazakhstan)



St George's, University of London  
(United Kingdom)



Karolinska Institutet  
(Sweden)



Masaryk University  
(Czech Republic)



Aristotle University of Thessaloniki  
(Greece)



Zaporozhye State Medical University  
(Ukraine)



Bukovinian State Medical University  
(Ukraine)



Astana Medical University  
(Kazakhstan)

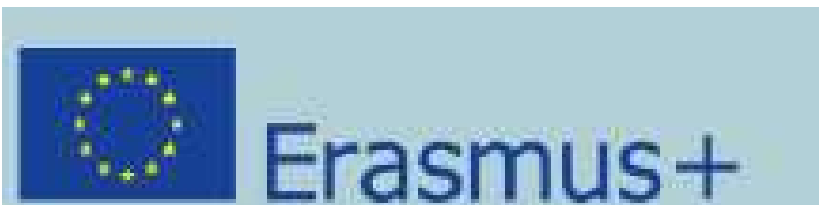


Hanoi Medical University  
(Vietnam)



Hue University of Medicine and Pharmacy  
(Vietnam)

<http://www.tame-project.org/>





# WAVES: WIDENING ACCESS TO VIRTUAL EDUCATIONAL SCENARIOS

<http://wavesnetwork.eu/>



**WAVES**

## "We are our choices"

Learning To Make Good Decisions

WAVES hosts the 3rd International Virtual Scenario Symposium

This is a WAVES Network event, which is built up from a number of projects and partners from across the world involved in the development of Virtual Scenarios for teaching, training and learning. This event brings together both business and Higher Education sectors to explore Scenario-Based Learning.

Join us to explore, discuss, and share experiences on the use of Virtual Scenarios to deliver Scenario-Based Learning, within the iconic capital city of London and enjoy breathtaking views of the beautiful London skyline during the networking event.

**Event Details**

- Grange St Paul's Hotel, London, UK
- 24th October 2018
- [elu@sgul.ac.uk](mailto:elu@sgul.ac.uk)

**Keynote Speakers**

**Diana Laurillard**  
Professor of Learning with Digital Technology, London Knowledge Labs, UCL Institute of Education, UK.

**James McGee**  
Chair, Scientific Advisory Board at Kynectiv and also an Associate Professor of Medicine at Pittsburgh School of

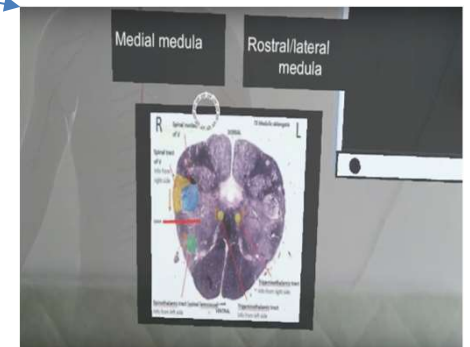
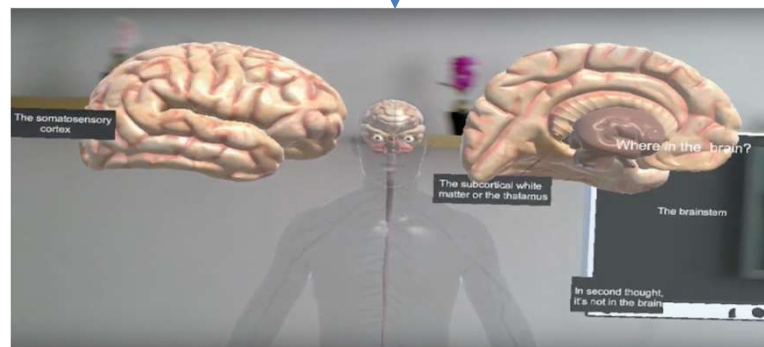
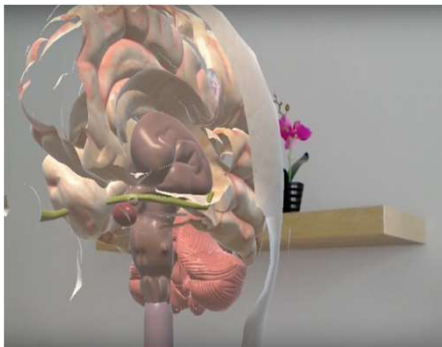
For more information and registration, visit: [www.wavesnetwork.eu](http://www.wavesnetwork.eu)

This is a FREE event, however there are limited spaces available so please register early to avoid



# Remarkable brain investigations-HoloLens Anatomy Teaching

## Step by step Anatomy Teaching through HoloLens



# Mixed Reality, Living Labs

## Virtual Patient scenario



<https://www.youtube.com/watch?v=MeSvPE2Q9mM>








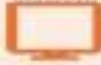








# Mixed Reality content, in a Living Lab fused with Virtual Patient scenario





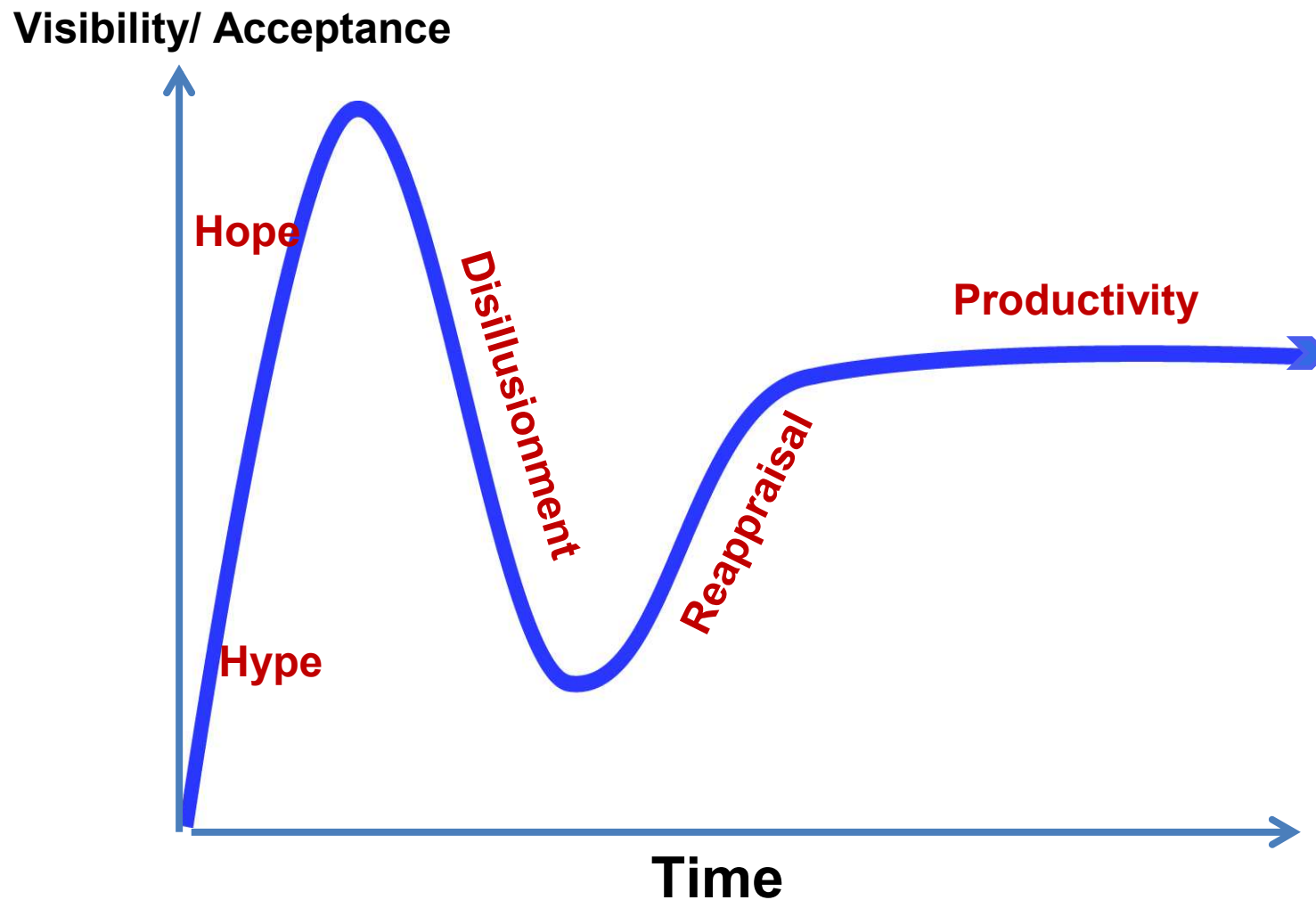
## Talking a different language

Formative experiences	<b>Maturists</b> (pre-1945) Wartime rationing Rock'n'roll Nuclear families Defined gender roles - particularly for women 	<b>Baby boomers</b> (1945-1960) Cold War 'Swinging Sixties' Moon landings Youth culture Woodstock Family-orientated 	<b>Generation X</b> (1961-1980) Fall of Berlin Wall Reagan/Gorbachev/ Thatcherism Live Aid Early mobile technology Divorce rate rises 	<b>Generation Y</b> (1981-1995) 9/11 terrorists attacks Social media Invasion of Iraq Reality TV Google Earth 	<b>Generation Z</b> (Born after 1995) Economic downturn Global warming Mobile devices Cloud computing Wiki-leaks 
Percentage in UK workforce	3%	33%	35%	29%	Employed in either part-time jobs or apprenticeships
Attitude toward career	Jobs for life 	Organisational - careers are defined by employees	"Portfolio" careers - loyal to profession, not to employer	Digital entrepreneurs - work "with" organisations	Multitaskers - will move seamlessly between organisations and "pop-up" businesses
Signature product	Automobile 	Television 	Personal computer 	Tablet/smartphone 	Google glass, 3-D printing
Communication media	Formal letter 	Telephone 	E-mail and text message 	Text or social media 	Hand-held communication devices
Preference when making financial decisions	Face-to-face meetings	Face-to-face ideally but increasingly will go online	Online - would prefer face-to-face if time permitting	Face-to-face	Solutions will be digitally crowd-sourced

Source: Bartclays, University of Liverpool



# eLearning – the cycle of acceptance





# Vision as a take home message

## Vision: **augmented minds**

- ➔ digitally empowered medical professionals
- ➔ who use technology to enhance their learning and professional development
  - take advantage of the availability of a variety of technology
  - personalise their learning by reflecting on their progress and
  - ... identifying opportunities to learn anywhere and anytime, continuously improve in their profession.

Equipping the future healthcare workforce with these

- ➔ faster adoption of new innovations
- ➔ improvements in healthcare service and delivery

**key challenge:** balance between preserving what already works and bringing innovation to address what may not be effective...

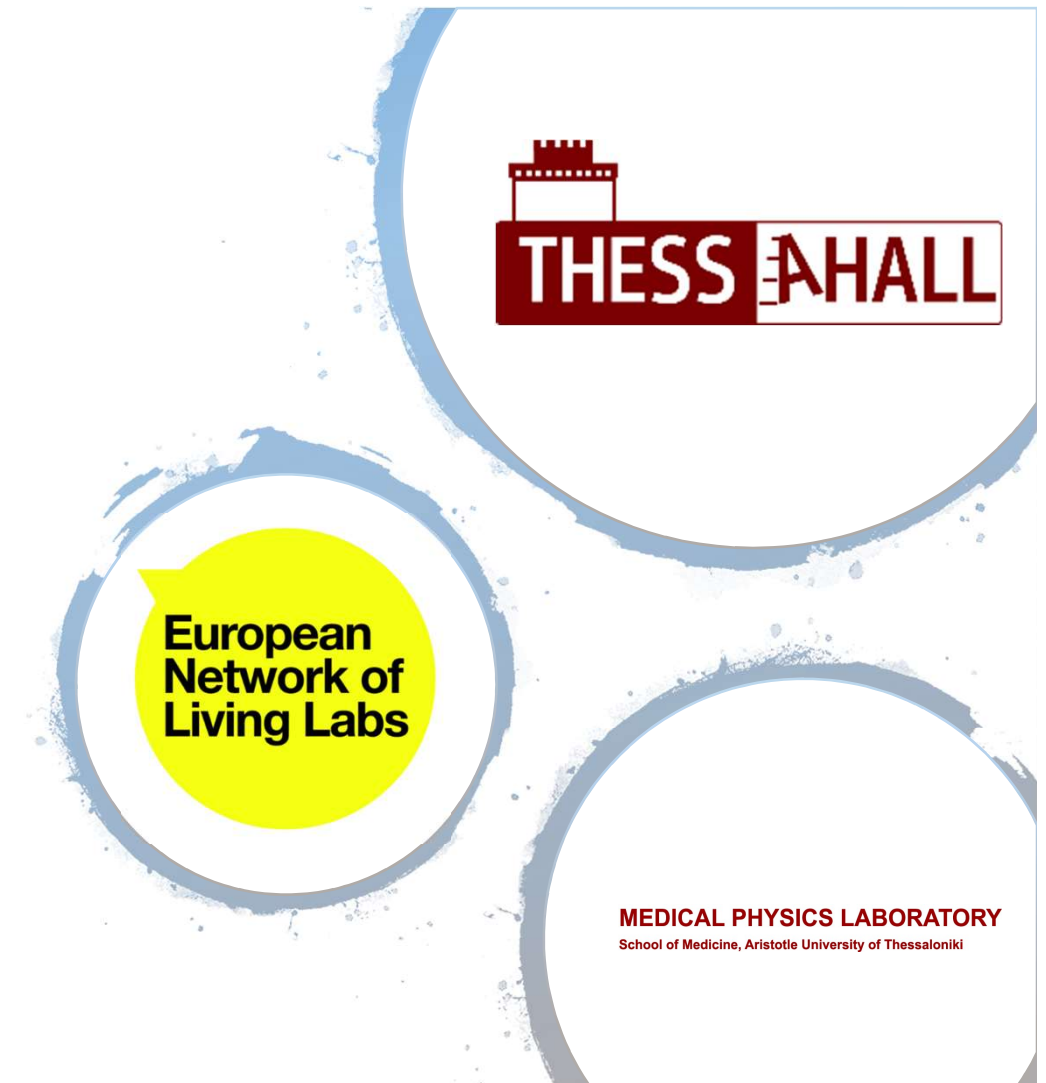


**OLLD 2019**

**“Open Living Lab Days  
International Conference”**

**Thessaloniki**

**2-5 September, 2019**





# MEDICAL PHYSICS LABORATORY

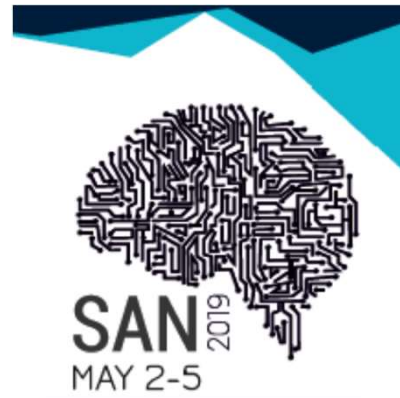
School of Medicine, Aristotle University of Thessaloniki

## SAN 2019

**“Society of Applied  
Neuroscience Conference”**

**Thessaloniki, Greece**

**2-5, May 2019**



**Society of Applied  
Neuroscience**



**SAVE  
THE  
DATE**

Thessaloniki  
Aristotle  
University  
Research  
Dissemination  
Center



**SAN** 2019  
MAY 2-5

More information concerning the SAN's functions, conferences,  
byelaws and published material can be found on:

<https://society-applied-neuro.weebly.com>

# THANK YOU - GRACIAS

## **Panos Bamidis**

Assoc. Prof, School of Medicine, Aristotle University of Thessaloniki, Greece  
Visiting Prof, Leeds Institute of Medical Education, University of Leeds, UK

### **Founder**

LLM Care Ecosystem & EIPonAHA Reference Site  
Thessaloniki Active & Healthy Ageing Living Lab (ThessAHALL)

**President, Greek Biomedical Technology Society (ELEBIT)**

**President, Society of Applied Neuroscience (SAN)**



panagiotis.bamidis  
[pdbamidis@gmail.com](mailto:pdbamidis@gmail.com)

<http://medphys.med.auth.gr>  
[www.llmcare.gr](http://www.llmcare.gr)



@MedicalPhysicsA  
@Bamidis