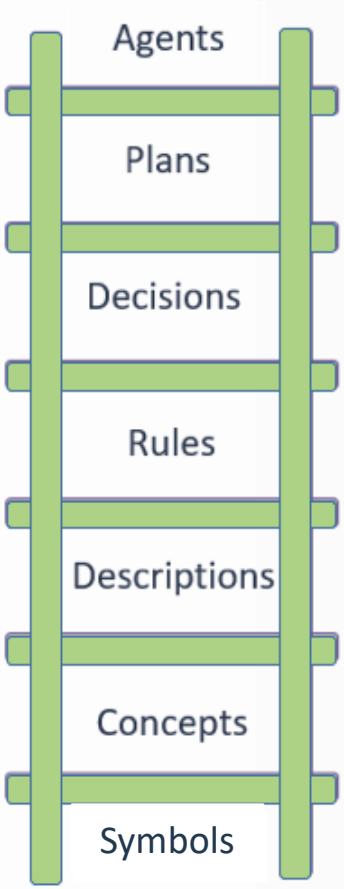
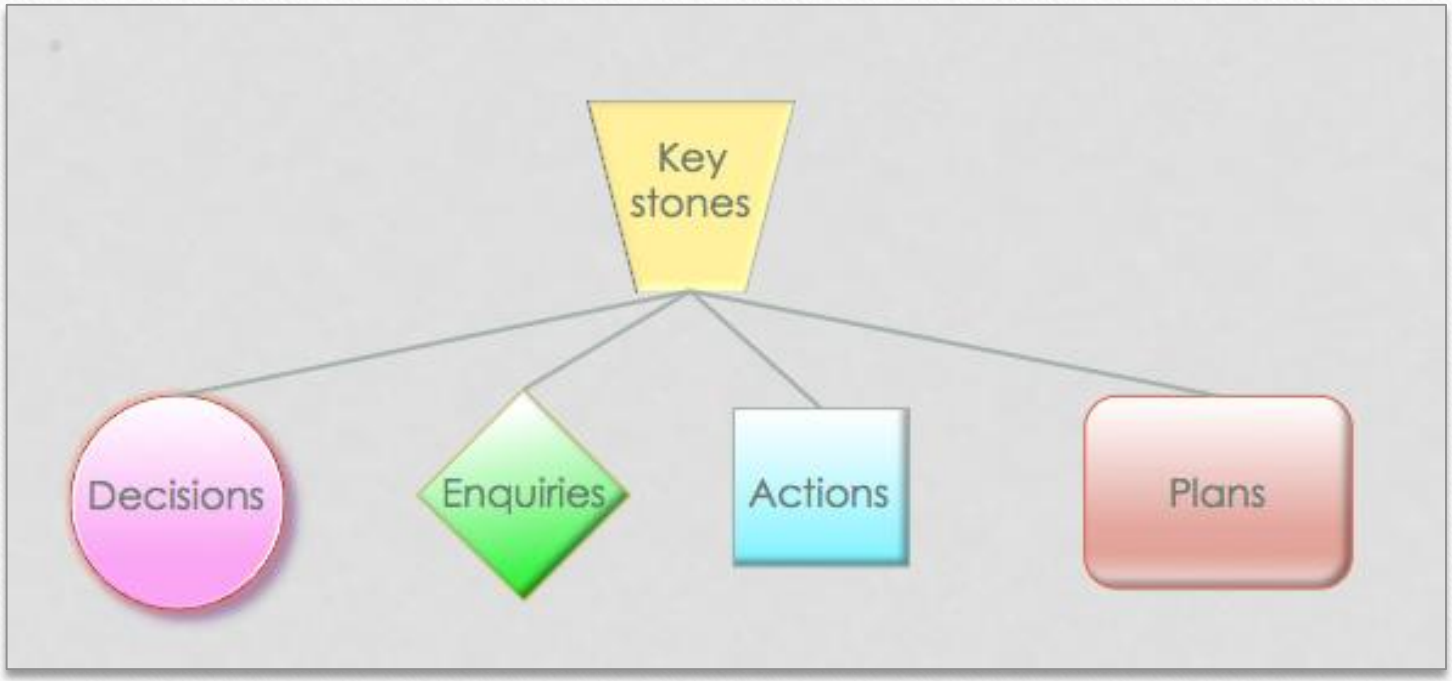
OpenClinical

An open access platform for creating and publishing open source, executable, models of best clinical practice ("publets")

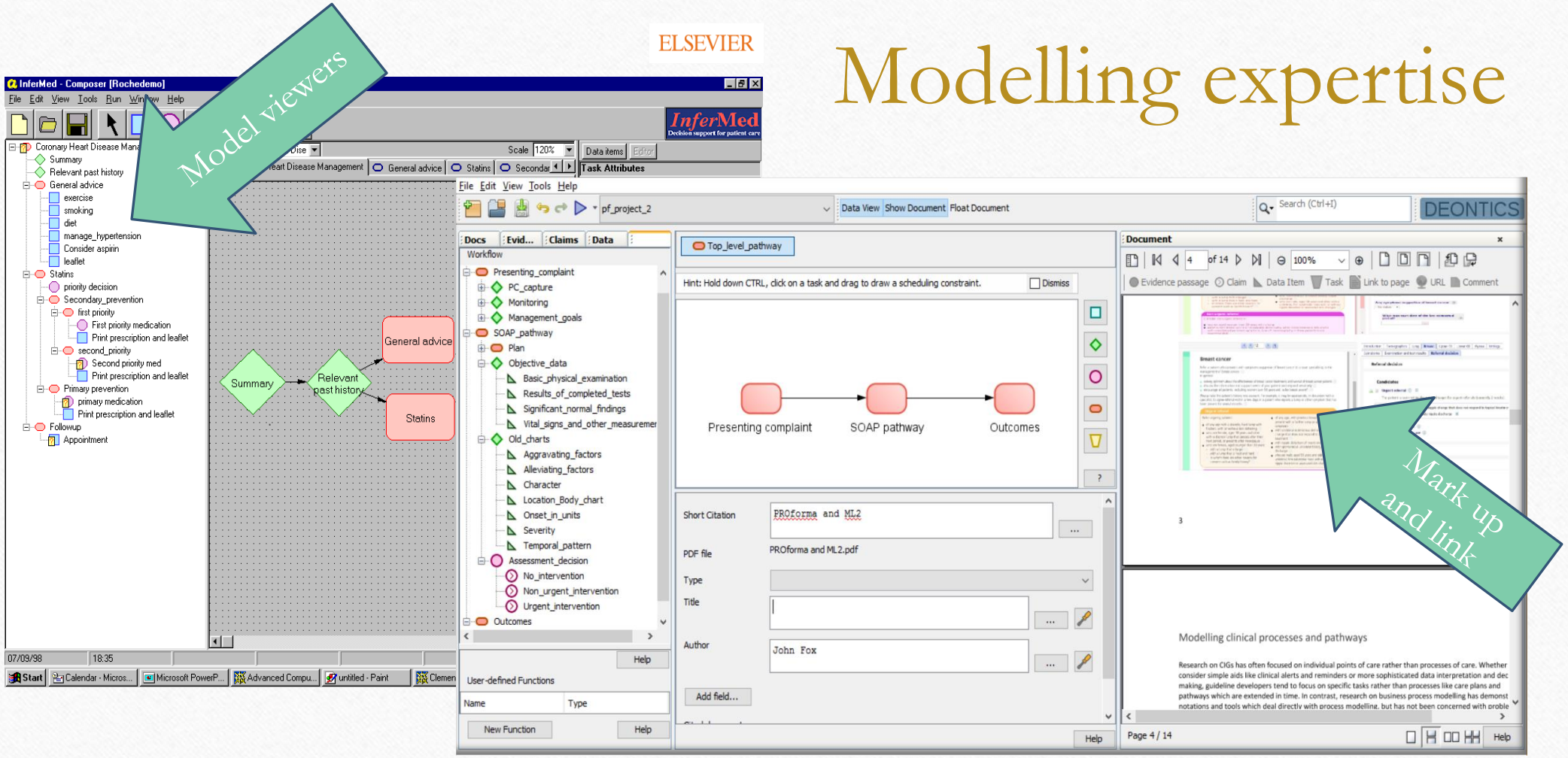
The knowledge ladder



PRO*forma*:
executable models of tasks and processes



Modelling expertise



Example: multidisciplinary decision making

Vivek Patkar, Ioannis Chronakis, Dionisio Acosta, Mo Keshtgar, J Fox *BMJ Open*, 2012

Demo

Meeting browser :: Patient browser

CREDO MDM (Breast)

Select a meeting

Sat 13th Apr 2013 10:00AM

Patient List

- Reference Patient (F:52) *Post-op / M Keshtgar*
- Maria Dawn (F:69) *Post-op / Tim Davidson*
- Joanna Knight (F:47) *Post-op / D Ghosh*
- Suzan McGinn (F:58) *Post-op / Tim Davidson*
- Michele Robbinson (:57) *Post-op / D Ghosh*
- Sarah Hibbert (F:66) *Known advanced cancer / A Jones*
- Lizzy Smith (F:61) *Diagnosis & work up / M Keshtgar*
- New Patient (F:46) *Diagnosis & work up / M Keshtgar*

Secure | https://demos.deontics.com/credo/enactment/BiblioViewer.do?sessionId=c9f5c068ab09f21f_32ffee5a_161bcba3d...

Automatic Zoom | NICE_CG80_2009

Audit :: Manager

Print summary | Notebook | Close discussion

5.1 Introduction

A proportion of patients with early invasive breast cancer will have occult metastatic disease at the time of diagnosis and will relapse at a later date. The purpose of adjuvant systemic treatment is to reduce this risk. Adjuvant therapy options include endocrine treatments, chemotherapy and targeted biological agents (such as trastuzumab, please see page 63); the selection of these is based on tumour and patient characteristics (see Chapter 4). Endocrine therapies include direct treatments such as tamoxifen and aromatase inhibitors and indirect treatments such as radiation menopause, medical oophorectomy by luteinising hormone-releasing hormone agonists (LHRHa)

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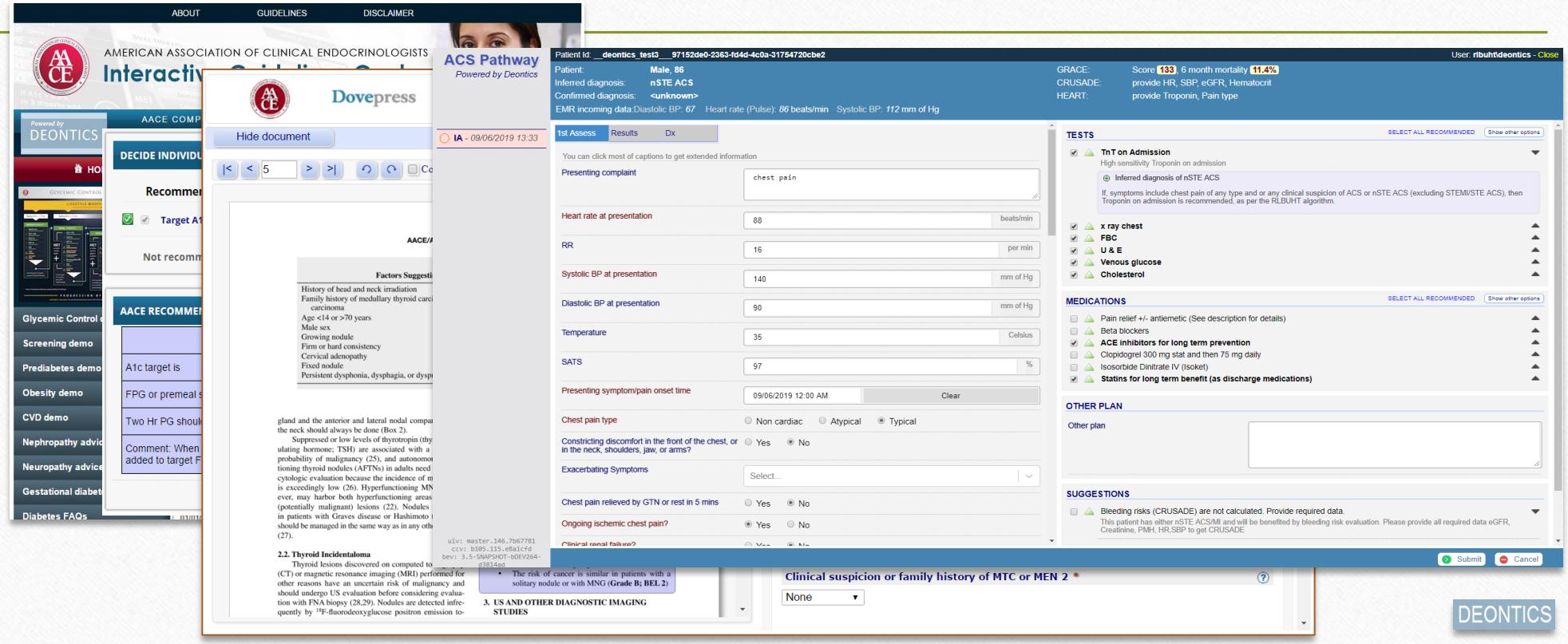
DEONTICS

Demos

Example: smart care pathways

Peleg et al, *Endocrine Practice*, 2015



Clinical tasks	Trials and evaluations
Routine prescribing by GPs	Walton et al *British Medical Journal* 1996
Mammogra	
Genetic risk	
Genotyping antiretrovira	
Chemothera	
Early referr	
Cancer risk	
Hospitalisa	

Clinical tasks	Trials and evaluations
Genetic risk assessment, planning	Glasspool et al, *J Cancer Education* 2010
Multidisciplinary decision making	Patkar et al, *BMJ Open* 2011
Investigation, diagnosis of thyroid	Peleg et al, *Endocrine Practice* 2015
Diagnosis and treatment of stroke	Ranta et al, *Neurology* 2015
Shared decision-making chemotherapy	Miles et al, *BMJ Open* 2017
Diagnosis of hyponatremia	Gonzales et al *Int J Med Informatics* 2017
Detection and Diagnosis of ophthalmic disease	G Chandrasekaran PhD Thesis (2017)
Kidney donor workup and eligibility	Knight et al *Transplantation.* (2018)

Scaling up

Scale and scope of medical practice

1. Diseases and conditions (14,000-100,000)
2. Decision types (diagnosis, treatment, prescribing … > 20)
3. Users (GP, specialist, nurse, pharmacist, patient … > 20)
4. Kinds of care pathways (> 20)
5. Co-morbidities and polypharmacy (*potentially exponential*)
6. Local hospital and service variants (*indefinite*)

100,000 -10,000,000 individual "apps"?

Demo

Crowd sourcing executable models: *publets*

Proc. AMIA 2001

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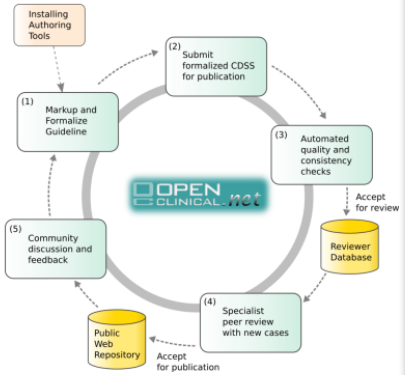
Home | Demonstrations | Repository

Welcome to OpenClinical.net

Methods and technologies to author, maintain, publish, trial and deploy



OpenClinical.net knowledge publishing lifecycle

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Repertoire

Cancer and neoplasms
Cardiovascular Diseases
Dental healthcare
Emergency medicine
Endocrinology
Gastroenterology
Haematology
Mental Health
Neurology
Ophthalmology
Respiratory medicine

Reusable components
Hubs and collaborations
Teaching and training

Private area: Login

Repertoire: an

OpenClinical collaborators
repository of "enactable" gu
social care guidelines Open
situation-specific advice an

The central goal of the OpenClinica
organisations to create and publish
social care. Repertoire will be a pub
expertise and knowledge of best pra
and safety during a process of care

Registered OC.net members can "e
and other non-commercial purposes
also download the knowledge base
create an adapted version suitable

During the launch phase of OC.net
viewed as suitable for research and
care and we take no responsibility f
services@openclinical.net.

View Repertoire

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Concept

Think of it as like music!
Lifecycle
Priorities
Community principles
Quality and safety
Project history
Blogs and pubs
Site map

Private area: Login

Imagine ...

... a healthcare organisation such as NICE in the UK or NGCH in the USA publishes a standard of best practice as a specialist clinical guideline or care pathway. However the guideline team is a member of the OpenClinical collaboration and goes on to prepare a *machine executable* version of the guideline using *open logic standards* supported by OpenClinical.net.

Countless organisations publish clinical guidelines, quality standards and other material on open access repositories for anyone to use. However general guidance can also be enhanced in many ways by linking it to *patient-specific* and *point of care* services. Using the OpenClinical tools and methods the guideline development team introduces clinical data recording and patient-specific safety and quality reminders, decision making, workflow management and other functions. Finally the team publishes its machine executable clinical guideline on *Repertoire*, the OpenClinical open access repository.

OpenClinical guidelines can be downloaded by members of the OpenClinical community for research and trials, to update them in the light of new research, or to challenge the current consensus about "best practice". Clinicians and researchers can download them from anywhere in the world and adapt them to meet their local demography and case-mix, operational policies and constraints and, if appropriate, republish a new variant on *Repertoire* for others to adopt, or modify further.

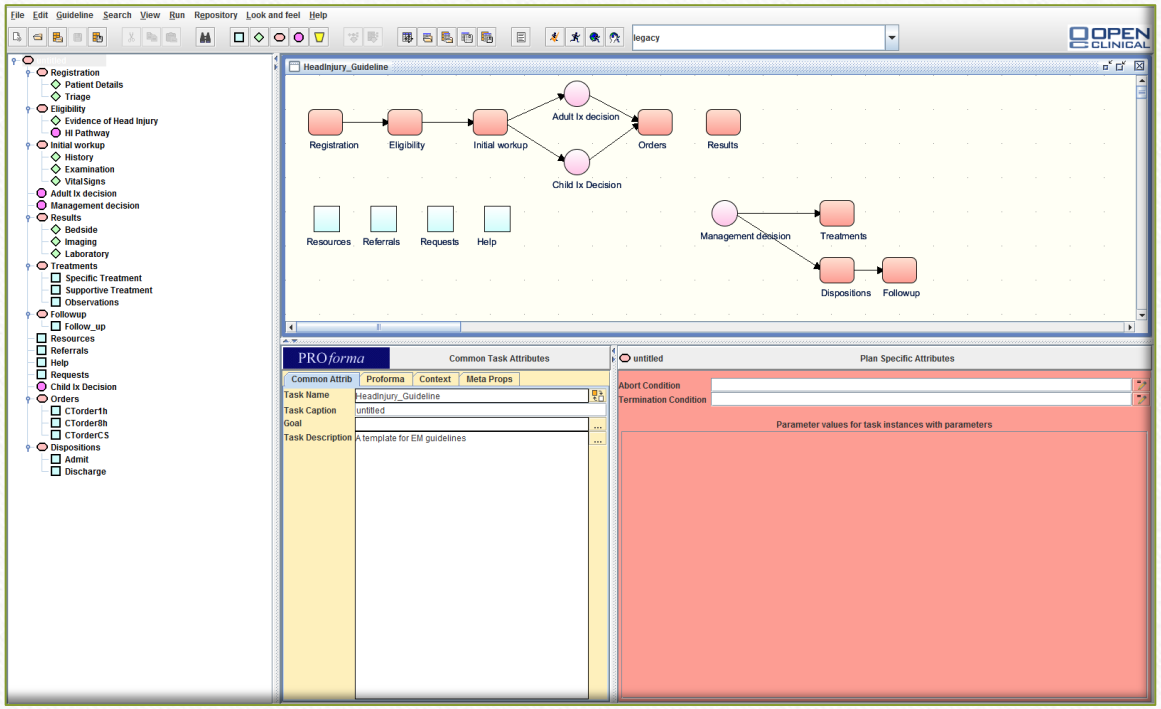
"Imagine the stimulus that a well-researched, evidence-based repository of standardized medical knowledge, with tools for delivering patient-specific advice at the time of need, would have on the ability to deliver computerised decision support services" Robert A Greenes (Ed) Clinical Decision Support: The Road Ahead, New York: Academic Press, 2007.

musescore

https://musescore.org/en

OpenClinical authoring tool: *Tallis*

info@openclinical.net



Bespoke platform for Open Access and Open Source publishing on OpenClinical

in development

Repertoire *alpha* (2015)

Demo

Guideline: Royal College. Physicians **Author** Annick Labadie, University of Oxford

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Clinical Guideline for Secondary Stroke Prevention

Save | Restart | Print | Quit

Clinical services

Anticoagulation Therapy Decision

Anticoagulation Therapy Decision

Treatment Specifications:

- **Elligible patients**: Anticoagulation treatment should be recommended in every patient with persistent or paroxysmal atrial fibrillation (valvular and non valvular)
- **Elligible patients**: anticoagulation treatment should not be used for patients in sinus rhythm unless a major cardiac source of embolism has been identified.
- **Treatment onset**: Anticoagulation treatment should not be started until 14 days have passed from the onset of disabling ischaemic stroke.
- **Patients with recurrent TIA or stroke**: should be managed in the same way as those who had a single event. More intensive antiplatelet therapy and anticoagulation should only be given as part of a clinical trial or in exceptional clinical circumstances
- **Patients identified with cerebal venous sinus thrombosis**: should be given full dose anticoagulation (initially full-dose heparin and then warfarin (INR 2-3)) unless there are comorbidities that preclude its use
- **Patients with stroke seocondary to acute arterial dissection**: treated with either anticoagulants or antiplatelet agents, preferably as part of a randomised controlled clinical trial to compare the effects of the two treatments
- **Patients with antiphospholipid syndrome** who have had an acute ischemic stroke should be managed in the same way as people with acute ischemic stroke without antiphospholipid syndrome

note: the guideline does not specify if treatment onset for patients with cerebral venous sinus thrombosis or acute arterial dissection is the same as for other patients. Guideline does not specify if patients with recurrent stroke must have atrial fibrillation for antiplatelet or anticoagulation to be administered.

Candidates

✓ Anticoagulation treatment is not recommended or can not be started at present. (Score: 4.0)

- A minimum of 14 days from onset of disabling event have not yet passed. (Weight: 4.0)
- Patient has antiphosholipid syndrome. and should be treated the same way as a patient without antiphospholipid syndrome. (Weight: 0.0)

✗ Initially full dose heparin and then warfarin (INR 2-3) (Score: -2.0)

- Patient has antiphosholipid syndrome. and should be treated the same way as a patient without antiphospholipid syndrome. (Weight: 0.0)
- This specific treatment plan only applies to patients with cerebral venous sinus thrombosis. (Weight: -2.0)

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Clinical Guideline for Secondary Stroke Prevention

Clinical services

Anticoagulation Therapy Enquiry

Anticoagulation Therapy Enquiry

Enquiry Specifications:

The guideline suggests various anticoagulation treatment schemes, an specified by the guideline in choosing anticoagulants are: presence of exclusion o brain hemorrhage by imaging, recurrence of event, presen

note: This section of the guideline is very unclear. Certainly needs cl

Stroke secondary to acute arterial dissection

- no
- unknown
- yes

Patient Cardiac Rhythm

- atrial fibrillation
- in sinus (normal) rhythm
- other arrhytmia
- unknown

Unknown

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Clinical Guideline for Secondary Stroke Preventio

Clinical services

Decision Support Menu

Decision Support Menu

AVAILABLE DECISION SUPPO

Lipid lowering treatment to evaluate appropriateness c

Anti-thrombotic treatment to evaluate appropriteneso

Anticoagulation treatment. to evaluate appropriteness

Hypertension Control Therapy. to evaluate appriete

Carotid Stenosis Interventions to evaluate whether car

Repertoire *alpha* (2015)

Demo

Example cancer pathways

Vivek Patkar, breast surgeon (Cancer Research UK)

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Repertoire

Cancer and neoplasms
Cardiovascular Diseases
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Endocrinology
Gastroenterology
Haematology
Mental Health
Neurology
Ophthalmology
Respiratory medicine

Reusable components
Hubs and collaborations
Teaching and training

Private area: Login

Oncolo

Cancer known
can be detecte
imaging. Once
treated with ch
location of the
few types of ca
cancer caused

At the launch
representing th

- Breast Can
  Applications
- Colon Canc
  Applications
- Lung cance
  Applications
- Testicular c
  Applications

Breast Cancer

this, with possibly life-expectancy being one
the richest countries live much longer than t
in rich and poor countries are also contribut

Acknowledgement: *Medical News Today*

- **Familial risk assessment (legacy)**
  Guideline for recording family history of b
- **Early Referral for suspected breast ca**
  This application advses whether to refer a
- **Triple Assessment for suspected brea**
  Decision support for diagnosis and mana
- **Management of confirmed breast cancer**
  Decision support for management of confirmed breast cancer by multidisciplinary teams

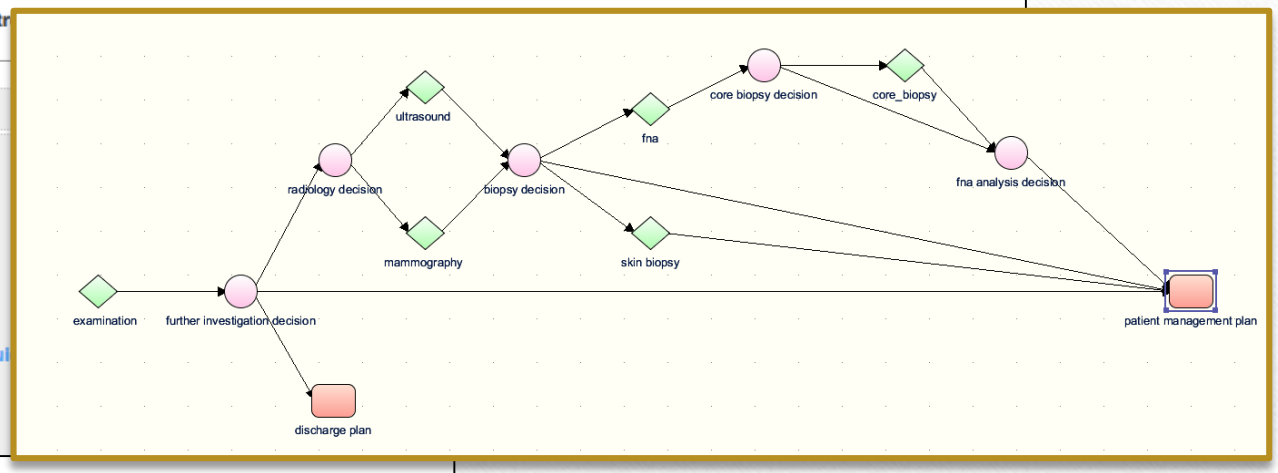
Triple assessment guideline for secondary care 2006 version

Play Application | Download to File | Download the Paper

Description: Triple assessment guideline for secondary care for the initial assessment of women with suspected breast cancer

Publet Intr

Gui



Repertoire *alpha* (2015)

Emergency medicine pathways by Marc Gutenstein MD

Demo

App

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Repertoire

- Cancer and neoplasms
- Cardiovascular Diseases
- Dental healthcare
- Emergency medicine
- Endocrinology
- Gastroenterology
- Haematology
- Mental Health
- Neurology
- Ophthalmology
- Respiratory medicine

- Reusable components
- Hubs and collaborations
- Teaching and training

Private area: Login

Emergencies, injuries and poisoning

Emergency Medicine was defined by the Int
Federation for Emergency Medicine in 1991 a

"A field of practice based on the knowledge a
required for the prevention, diagnosis and ma
of acute and urgent aspects of illness and inju
affecting patients of all age groups with a full
of undifferentiated physical and behavioural d
It further encompasses an understanding of th
development of pre-hospital and in-hospital en
medical systems and the skills necessary for
development."

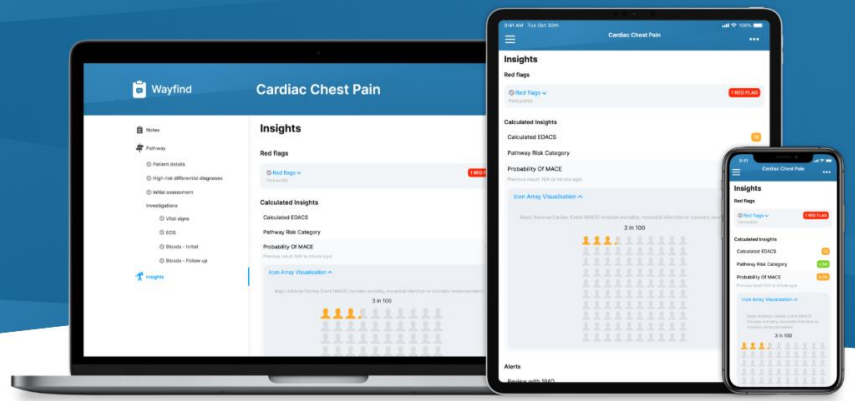
This section will contain applications related to al
of emergency medicine in primary and secondary care, major incidents etc. At the launch of *Repertoire* all applications a
intended to have only demonstration value and should not be regarded as representing the current state of medical
knowledge or practice.

- **Blunt trauma (eye)**
  Diagnosis and treatment of patients presenting with suspected blunt trauma
- **EDACS Decision Support for Chest Pain**
  A demonstration of the Christchurch Hospital 2014 Chest pain pathway using the EDACS score
- **Head Injury (NICE UK)**
  This guideline is based on NICE head injury guidelines as accessed in June 2013 and is intended to demonstrate
  of the OpenClinical platform in Emergency Medicine.
- **Head Injury (Oxford U IBME)**
  Management of head injury in the community, including an outline of the out of hospital resuscitation by paramed
  medical staff using advanced equipment and techniques
- **Knee Injury (NZ)**
  This guideline is based on ACC Knee Injury guidelines as accessed in December 2013 and is intended to demonstrate the
  use of the OpenClinical platform for the multi-disciplinary care of skeletal injuries

Wayfind

Contact Us

Introducing Wayfind. Powerful and insightful decision support for health professionals.



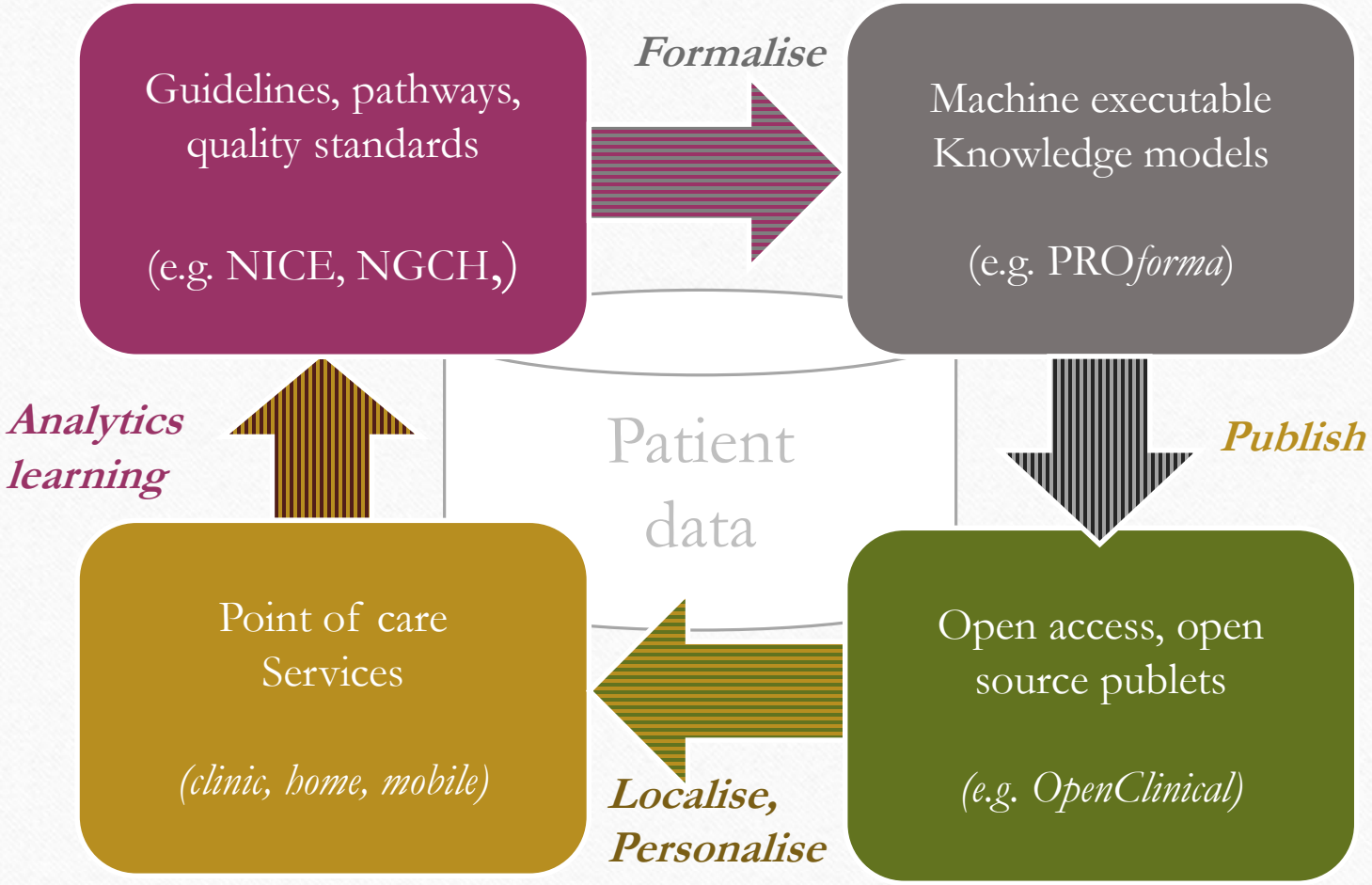
Skip options

- Learning health system
- Ecosystem
- Forward plan
- Publications
- Quit

Learning from experience

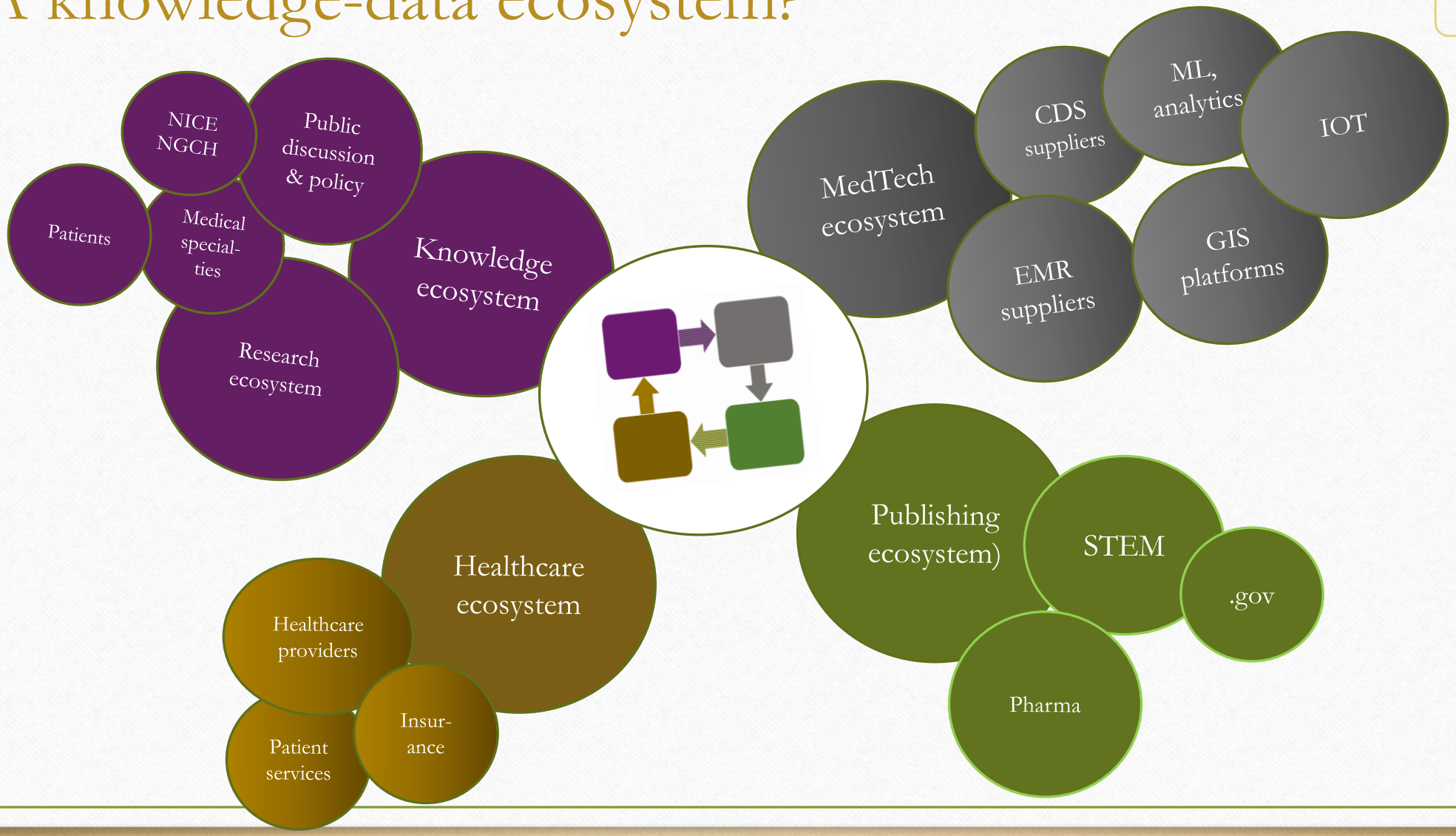
Openclinical as a model for *rapid learning systems* in healthcare

Skip options



A knowledge-data ecosystem?

Skip options



Proof of concept: *Alpha*

Phase 2: publishing

Phase 3: deploy?

Visitors

Read public content

Enact publets

Public discussion

Authors

Install tools

Compose publet

Test publet

Hubs

Author networks

Folios repository

Small trials

Private analytics

Submit

Upload

Standards checks

Specialist reviews

Revise

Publish

Repertoire repository

Open debate

Open Trials

Public analytics

Learning (RLS)

Offer

Adopt

Adapt

Integrate

Test

Licence

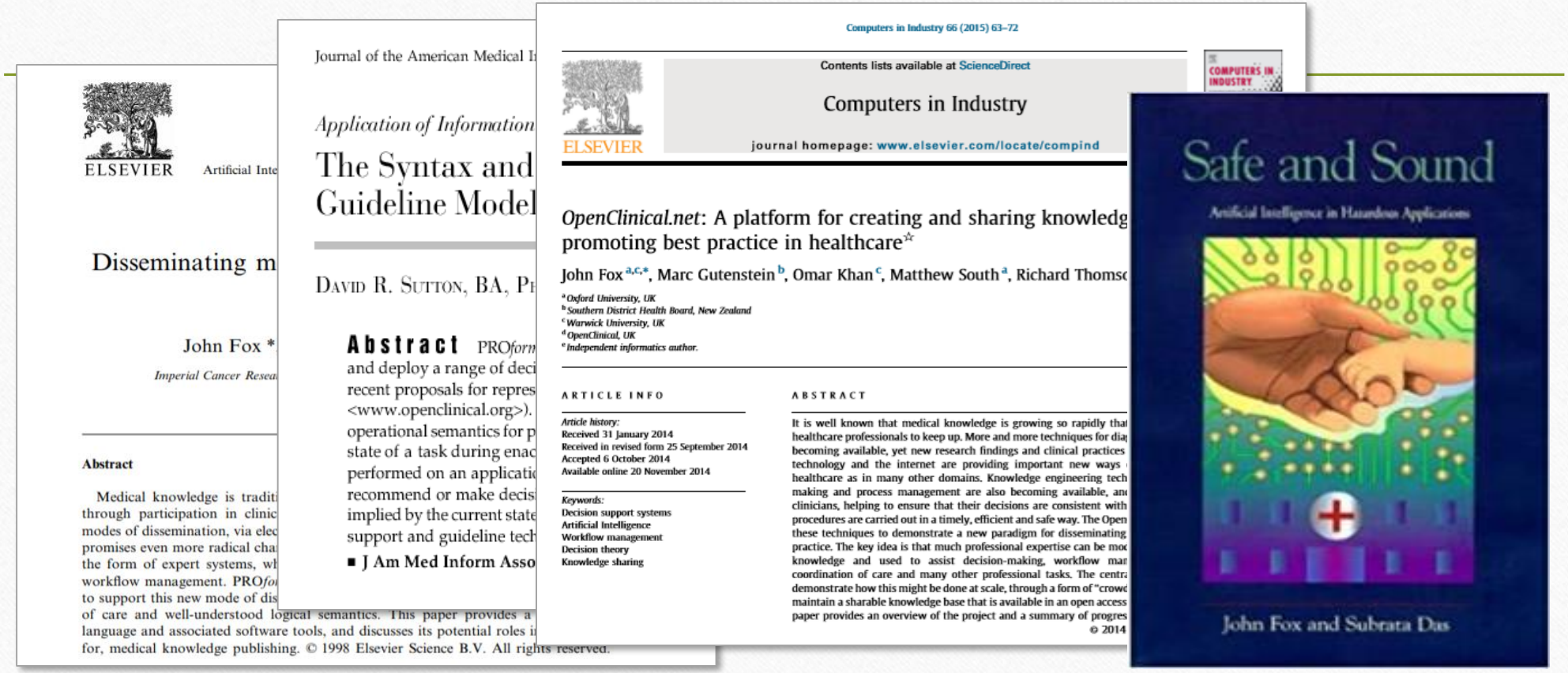
Permissions

Liabilities

Skip options

Skip options

Key publications



Thanks

info@openclinical.net