

Decision Support and Clinical Knowledge Management

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Architects of Online Health Knowledge
for
Clinical Decision Support

Introduction

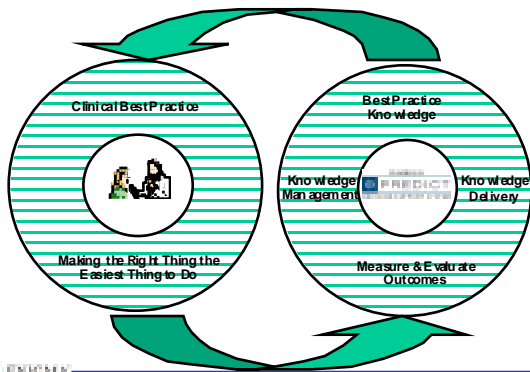
- PREDICT – an innovative, flexible decision support system for delivering best practice knowledge at the point of care
- Collaboration between Enigma and the University of Auckland



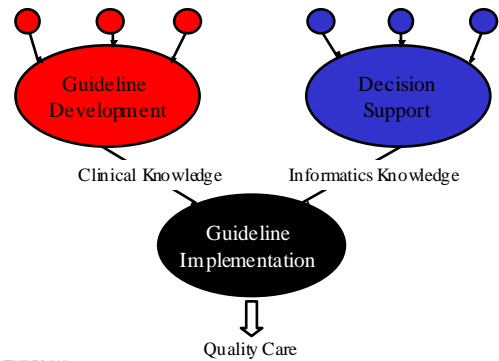
- Clinical, epidemiology, economics and informatics
 - Guideline development, guideline translation, knowledge representation, systems design
 - Improved risk prediction / risk modification
 - Outcomes analysis



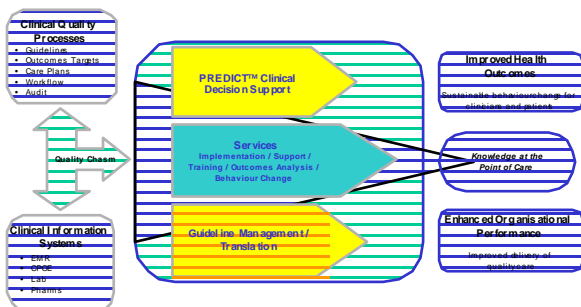
PREDICT™ – Knowledge at the Point of Care



PREDICT Collaboration – Knowledge & Informatics



PREDICT Knowledge Principles



PREDICT Knowledge Model – Principles

- Patient specific, best practice advice delivered at the point of care in real time
- "Right knowledge, right place, right time"
- Fully integrated with existing information systems
- Enhances clinical workflow and does not intrude into practitioner / patient interaction
- Adaptable to reflect locally agreed clinical management
- Reflects "real world" clinical management
- Makes content / rules management sustainable and distributable
- Use open standards and agreed architectures
- Able to handle multiple conditions / situations

Clinical Knowledge Architecture

- Need to adopt an agreed international standard - What precedents exist?
- A wide variety of methods to support the computerisation of guidelines have been or are being developed by the Health Informatics community.
 - Historic focus on on guideline representation
 - Urgent need to for delivery of patient-specific knowledge
- Architectures include:
 - Systems which are rule-based eg Arden Syntax, logic-based, eg PROforma, network-based eg PRODIGY, workflow-based, eg GUIDE, or mixed, eg GLIF, GEM and CPGA.
- None is ideal and all have their strengths and weaknesses



Appropriate Architecture for Clinical Knowledge

- HL7 is becoming the de facto standard setter for this area
 - Two directly relevant groups; Decision Support Technical Committee, Guideline Special Interest Group
 - Models derived from GLIF (Guideline Interchange Format)
 - Knowledge model for guideline documents
 - Focus on use of XML (HL7 v3.0)
 - Currently two models under review
 - GEM (Guideline Element Model - Shiffman)
 - Clinical Practice Guideline Architecture (CPGA - Purves)
 - Key Issues
 - Guideline representation √
 - Representation of Knowledge Components ?
 - Functionality inherent to architecture ?
 - Interfacing - use of CDA (Clinical Document Architecture)

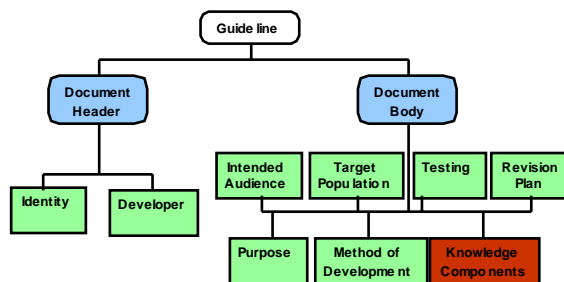


Architecture Should Facilitate Editorial Processes

- Ensure structure is an inherent part of the content creation process
 - Enables end-user to create scenarios and matching recommendations
 - Avoids writing logic strings
- User Friendly; little opportunity for error and low support needs
- Centralised - available Online to ensure version control, compliance with architecture and co-ordination of activity
 - Enable distributed editing to meet capacity and local variation need
 - Facilitates localization
 - Provides editorial authorization, version control, roll back



A Guideline Architecture - Delivers Form and Functionality

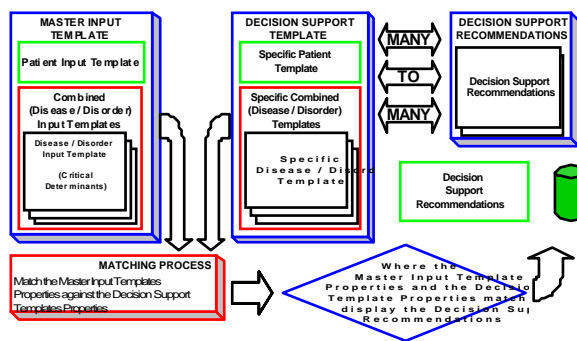


Advanced Knowledge Representation - Scenario-based Model

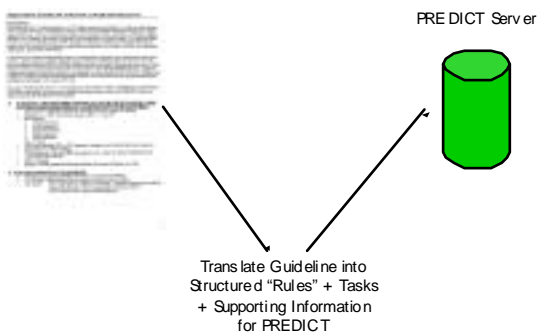
- Models decision making on a patient scenarios / patient states not algorithms
- These can be written as Knowledge Components in Guideline Schema
- Better approximation to clinical decision making and enables fast delivery of patient specific advice
- PREDICT creates structured evidence-based recommendations, stored in a knowledge base
- Recommendations are linked to specific clinical scenarios (infinitely variable) defined by a template of clinical inputs (BP, cholesterol, etc, etc)
- Builds in the theory of decision tables (Shiffman)



Scenario-based Model

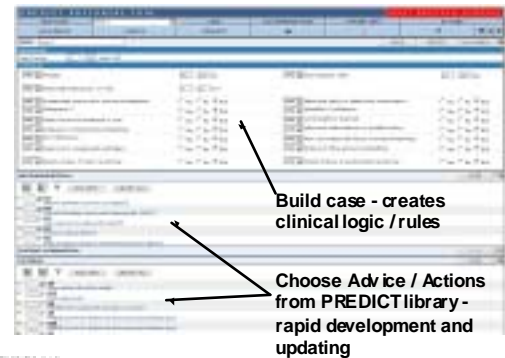


Guideline Translation



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PREDICT™ Editorial Tool Builds Scenarios - Rapid, Flexible Content Management



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PREDICT Scenario Model - Technical Advantages

Technical Requirement	Existing Solutions (Algorithms)	PREDICT™ (Scenarios)
Patient specific advice delivered in real time	Rules represented as algorithm or logic embedded in existing clinical information systems provides limited scope to handle clinical complexity or patient specificity	Scenario-based methodology delivered from a true clinical decision support application
Scalable solution for multiple diseases / conditions	Not achievable with rules hardcoded into application	Architecture designed to provide scalability and flexibility
Facilitates the translation of a clinical guideline into clinical rules supportable by clinical applications	Requires translation of clinical information into logic statements. Very few people have the skills to do this	Clinical scenarios written in natural language and provide a easy understood method for translation
Able to handle the wide range of clinical knowledge required for effective decision making	Not achievable	Key feature of the application
Single point of access for clinical knowledge management and real time updating	Not provided and updates need to be distributed in application updates	Key feature of the application. Updates available to all users as soon as editorial changes made
Empowers end-users to maintain content	Not provided	Achieved through user-friendly editorial tools

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Issues - Management and Governance

- Guideline / Evidence Issues
 - Gaps and logic conflicts
- Guideline Translation
 - Technical - Critical Determinants and Knowledge Components
 - Efficiency/ Workflow / Skills
- Governance / Management
 - Governance Group - oversight and direction
 - Clinical Quality - sign off on clinical knowledge, rules and guideline localisation
 - Clinical Project Management - co-ordination
 - Training
 - Content management and editorial
 - Technical implementation and ongoing support

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Experience with the PREDICT System

- Now use in a variety of clinical knowledge management projects
 - Chronic disease management: CVD, diabetes
 - Workplace injury and rehabilitation
 - Primary - secondary referral management
 - Prioritisation for secondary / tertiary services
 - Preventative screening
- Variety of clinical delivery system
 - Community, primary and secondary
 - New Zealand, US and Australia
 - Standalone and fully integrated

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What We Have Learnt!

- Importance and value of standards
- Importance of process and wide scale buy-in (governance)
- Importance of knowledge architecture is hard to grasp
- Ensuring a manageable process is critical but elusive
- Separate document model from execution
- Flexibility of scenario model and its ability to contribute to realisation of implementable guidelines
 - Knowledge at the point of care achievable today
 - Assists in guideline translation - 'real world' gaps in knowledge, logic conflicts
 - Localisation
 - Distributed, 'non-expert' authoring
- Issues to be addressed
 - Firm agreement on standards
 - Improved implementation for guideline authoring

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