

## "Clinical Decision Support Standards and Systems - Global Updates"

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### Introduction

- New Zealand has a wide range of clinical knowledge projects relevant to this issue
  - NZGG Evidence Based Clinical Management
  - ACC Treatment Profiles
  - Elective Services Primary Management / Referral Guides
  - Condition specific projects: Diabetes, KidsLink
  - DHB Initiatives: Disease Management, Physician Order Entry
  - IPA Initiatives: Disease Management
- The goal is to support quality content generation which is widely available integrated with disparate CIS, delivered locally and effects improvements in clinical outcomes



### Introduction

- In the last few years many of these projects have made use of the digital medium for content management
  - Savings in time and cost
  - Increase flexibility for updating and delivery
- However this raises a number of issues
  - Content
    - Creation of content: an agreed structure required
    - Ongoing management of content: more frequent update making version control critical
    - Reliability and validity
  - Functionality
    - Delivery of knowledge at the point of care is critical
    - Integral to clinical workflow
  - Interfacing
    - Access to content: needed at the point of care
    - Integration with other CIS
    - Data transfer, messaging and scheduling
- Standards, coding and vocabularies identified as critical to success



### Introduction

- To be effective, these tools need to be linked to the patient's record, use standard medical vocabularies and codes, should have clear semantics, must facilitate knowledge maintenance and sharing.
- They need to reflect key elements in the guideline authoring process, such as management goals, evidence levels, and version, while allowing adaptation for local conditions.
- At the same time they must make explicit the "knowledge components", such as advice, actions or supporting information which need to be interpretable by an information system if decision support is to become realistic and meaningful.



### Challenges - Providing Form and Functionality

- Electronic clinical knowledge has multiple purposes.
- Systems solution must reflect the needs of **form** (presentation of information for browsing) and **functionality** (actionable within information systems)
  - Content development system
    - Information Management structure & integrated processes for development, editing & improvement
  - Content management system
    - Content database management structure and processes
  - Functionality
    - Application within clinical information systems
  - Integration
    - Communications and exchange structure
    - Available within a wide range of information system from multiple vendors



### Introduction

- 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, however the objective is to achieve support for five principle tasks:
  - Interpreting data, Making decisions, Setting goals, Determining actions, Sequencing / Refining actions

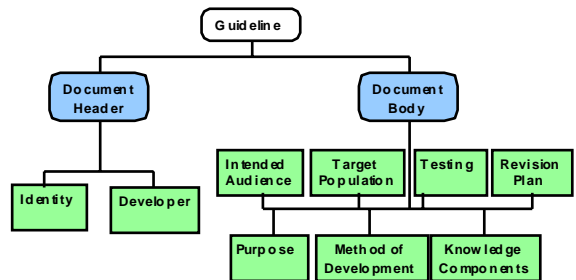


## Appropriate Architecture for Clinical Knowledge

- HL7 has become 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 ?
  - Links with CDA



## Example of a Guideline Architecture - GEM



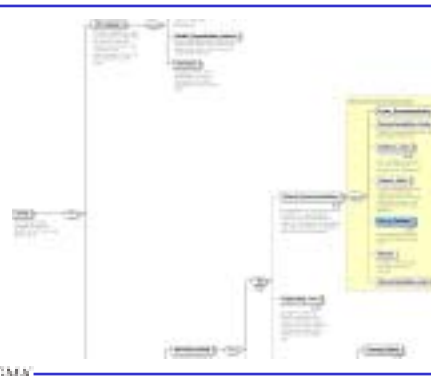
JAMIA 2000



## GEM Schema



## CPGA Schema



## Architecture Well Suited to Structured Guidelines



Sections in the Guideline Document Correspond to Elements in the Schema

Graphics, Tables and Charts Can be Handled



## GEM / CPGA Debate

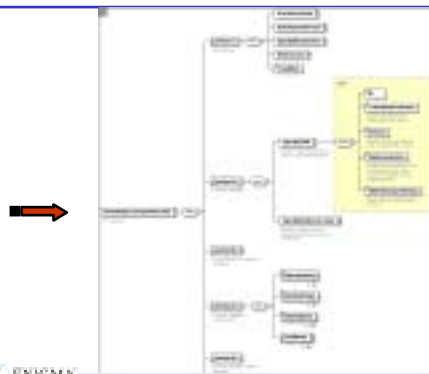
- Objective is to develop and agree a single standard with stability
- GEM, for markup and structure of completed guidelines
  - Standardization by ASTM, a user base, existing tools, and funding for work with GEM
- CPGA focus is on aiding in the creation and refinement of guidelines
  - All of the GEM elements can be found in the CPGA model?
  - Differences in the detail of modeling of the "knowledge components", (logic and process flow in recommendations)
- Urgent need to bring the two camps together
  - Single model with flexibility for development / refinement
  - Mapping to the RIM would assist
- Personal view
  - GEM the better guideline representation
  - CPGA has advanced Knowledge Component thinking / CDA



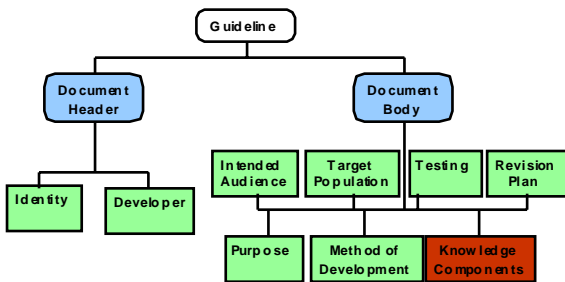
Standard Guideline Template (GEM Based)



Schema Extended to Cover Knowledge Management Requirements for Elective Services



Architecture Extensible to Handle Functional Requirements

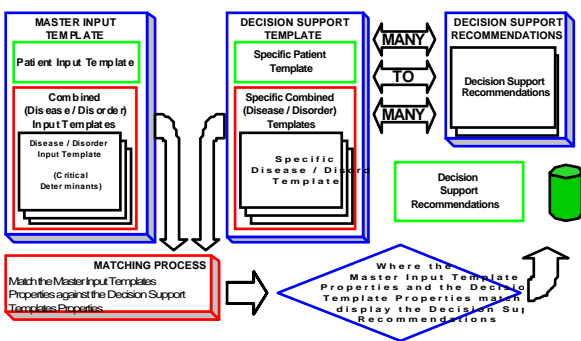


Guideline Execution - Scenario-based Model

- 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)



Scenario-based Architecture

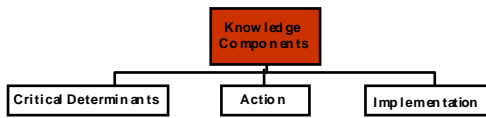


PREDICT Technology - Scenario Execution Model

- Decision Making - delivers guideline-based clinical recommendations
  - Patient centred, Relevant, Real time
- Uses existing data from EMR as inputs
  - Avoids re-keying of data
- Provides visual tools to support decision making and engage the patient
- Results - links disease, risk, and management to outcomes
  - Powerful planning tool



Practical Application – Scenarios Linked to Knowledge Components



PREDICT™ Technology – Fully Integratable with Existing EMR based CIS

**Input Template Integrates PREDICT with 3<sup>rd</sup> Party CIS using XML**

**Risk estimation algorithms**

**Structure Manages**  
 • Advice  
 • Tasks  
 • Patient Information

**Tasks can trigger POE systems**



Critical that Architecture Facilitates Editorial Processes

- Ensures 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
- 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



Standard Clinical Knowledge Architecture

- Potential exists to create standard architecture for electronic access System to clinical content
- Open specifications for integration - XML / HL7 based
  - Integration with Third Party Clinical Information Systems
  - Available for PMS and Hospital Information Systems
- Standard Template for Guideline Creation
  - "Forces" required structure
- Online Content Management
  - Editorial Tools
    - Allows direct entry of content by clinical teams
    - Holds local variations
    - Provides quality control, version control and security
- Delivers a Variety of Outputs
  - Content and "Rules" Available for Use by Third Party Developers
  - Condition and Locality specific Advice
  - Generate print output if required



Other Standards Activities

- CDA
  - Use of CDA for input templates and transfer of situation specific data, eg referrals
  - Use for interfacing / integration
- Messaging
  - Extended requirements for data transferred in referral messages, clinical data, CDSS authorisation
- Workflow / CPOE
  - Standard coding to schedule or implement a clinical task



Conclusions

- There has been significant value in evolving a nationally accepted clinical knowledge architecture
  - Development of content
  - Execution / integration
  - Transportability and sharing of information
  - Localisable
- Scenario model for execution has proved flexible adaptable and workable
- Exploring related standards
  - CDA
  - Messaging
  - Interfacing
  - Scheduling
- Issues
  - Agreement on standards
  - Stability
  - Agreed development path

