

Decision support and the EHR

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Requirements

- Clinicians are interested and seek this support
- Integrated into usual practice, 'just-in-time'
- Guidelines reflect best practice
 - Up-to-date, 'lifecycle' management
 - Error free, not overly inclusive
 - Adapted to clinical environment
- Information is available and used - relevant
- Knowledge is available – Indexing, searching



Safety approach

- Make a difference to patient outcomes
- Prevent harm
 - Falls
 - Pressure areas
 - Medications
 - ◆ Medication collaboratives
 - Infection
 - Blood
- Systems
 - Organisational change
- Measurement – collecting data

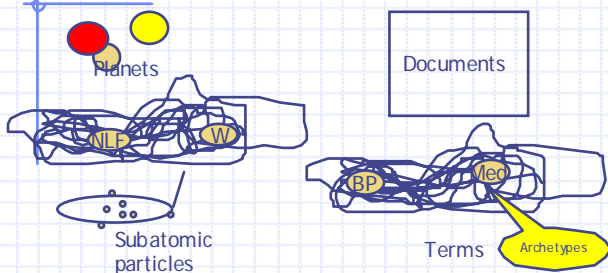


Unreasonable suppositions

- Considerably over estimate the benefit of decision support
- Underestimate the benefit of an integrated care EHR
- Underestimate the political difficulties of achieving a shared EHR environment
- Over-estimate the cost



Chaos



Prescribing

- Pregnancy
- Breast feeding
- Paediatrics
- Geriatrics
- Dental
- Surgical
- Interactions, washout
- Medical condition
- Lab. value alerts, alterations
- Patient monitoring
- Use in sport
- Patient specific
 - Preferences
 - Previous adverse reactions
 - Contraindications



Breast feeding

Inference Engine



Pregnancy < 5 yrs, Breast feeding?

EHR

IF No – OK
If Yes and Pregnancy > 2yrs then check
If ? then record answer



Checks

- Drug to drug
- Drug to allergy, adverse reactions
- Drug to allergy class
- Drug to health issues
- Drug to food – [administration]
- Dose range checking
- Duplicate therapy (ATC classes)



What do we need for DS?

- Drug codes
 - Dumb as you like
 - Classification is sufficient for major gains
 - Map to EAN, ATC when available
 - Deals with important allergies
- Disease codes
 - Classification is sufficient for major gains
 - ICD-10-AM
- Dose range checking
 - Age
 - Weight



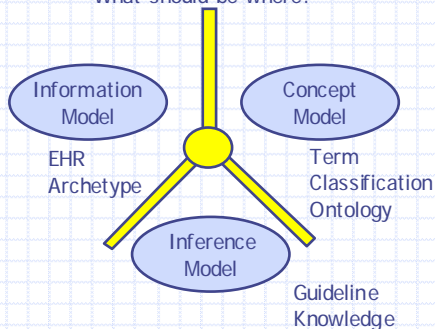
Three models – Rector A.

- **The Information Model:** what has been observed, ordered or done – the healthcare record.
- **The Inference Model:** what should be inferred or done – decision support including guidelines, protocols and warnings
- **The Concept Model** or “Ontology”: what is necessarily or at least prototypically true – terminology and the background common knowledge base of anatomy, physiology, etc.

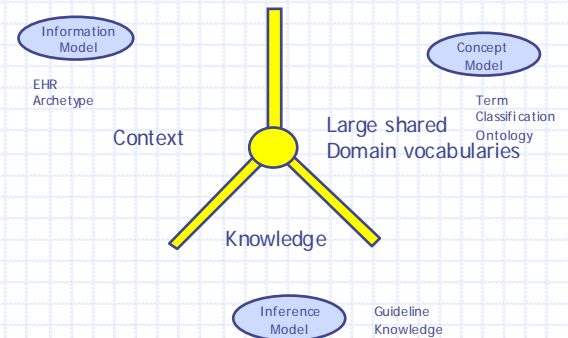


Three models

What should be where?

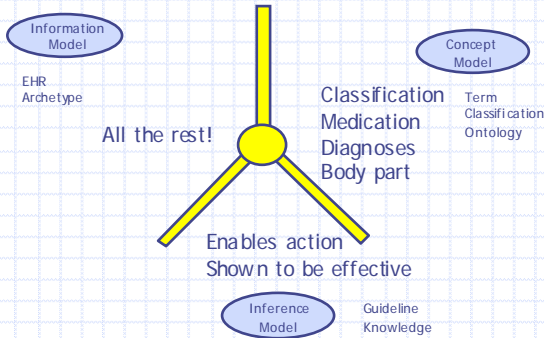


Three models - strengths





Three models – what matters



Some difficulties for terminology

- Mother dies of MI at age 102
- 5 of 7 first degree relatives have breast cancer under 50
- Husband's father has Huntingdon's Chorea
 - Mild onset age 62
- Systolic blood pressure of 180 on 24 hour reading when making love
- White coat hypertension (27%)
- Systolic blood pressure of 180 during exercise ECG



Some difficulties for inferencing

- Patient is a smoker and this has been discussed on numerous occasions
- The patient is on three medications for hypertension
- The patient insists he/she is allergic to paracetamol but takes Mersyndol
- At the last consult 2 days ago, the inference engine suggested alteration of medication – this was declined by the patient
- The patient does not like to take antibiotics in any circumstances



Archetypes



Queries based on *openEHR*

Most recent WEIGHT in kg

```
SELECT TOP 1
Entry (openEHR.observation.weight)\History \
offset(*)\AT0001\value WHERE
Quantity .units = "Kg"
```



Queries based on *openEHR*

Birth WEIGHT in gm

```
SELECT TOP 1
Entry (openEHR.observation.weight)\History \
offset(*)\AT0001\value WHERE
Quantity .units = "gm" AND
Date = Patient.Date_of_birth
```



Queries based on *openEHR*

Birth WEIGHT in gm

```
SELECT TOP 1
  Entry (openEHR.observation.weight-birth)
  \AT0001.1\value
```



Queries based on *openEHR*

Most recent serum POTASSIUM post 1.1.2000

```
SELECT TOP 1
  Entry(openEHR.observation.pathology)\History\
  offset(*)\AT0002(LOINC::2823-3)\value
FROM Compositions(*) WHERE Composition.date >
  1/1/2000
```

This will return the latest potassium recorded in the EHR since 2000



Queries based on *openEHR*

Using a specialised archetype

```
SELECT TOP 1
  Entry (openEHR.observation.pathology.elu)
  \AT0002.2\value
FROM Compositions(*) WHERE
  Composition.date > 1/1/2000
```

This will also return the latest potassium result since 2000

Thanks

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