


Why is eHealth so hard?

Hildegard Franke
freshEHR Clinical Informatics

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About me

Hildegard Franke

- Health informatician
 - Director freshEHR Clinical Informatics
- GP system supplier background
 - Training
 - Clinical Modelling
 - Product Management
 - Terminology
-  'archetype wrangler' and 'hacker'



Is it so hard?

- The banks can do it
- why not healthcare ?



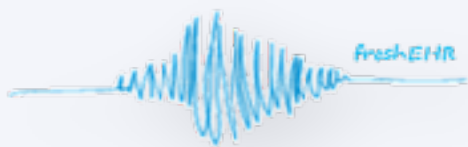
5 Things Preventing Technology Adoption In Health Care | Forbes

Scoop.it!



From www.forbes.com - September 13, 2014 11:15 PM

Health information is “Nasty”



Health information is “Nasty”

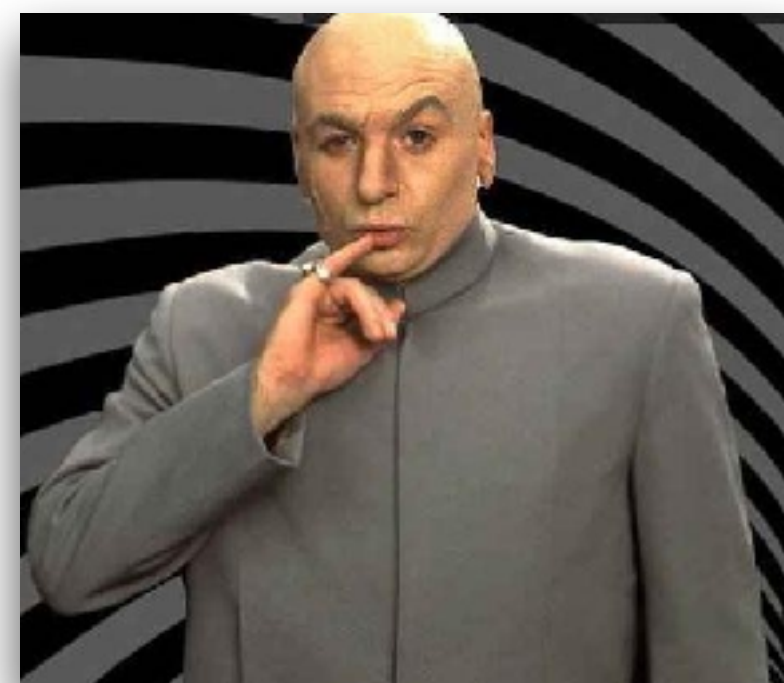
- Healthcare data is highly complex and ever changing
 - Biological
 - Cultural
 - Political
 - Huge and segmented populations
 - Safety-critical
 - Poor infrastructure
- Getting good requirements from clinicians is hard



Health information is



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Health information is “Superknifflig”

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Health information is



knifflig

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Healthcare is powered by information

- To facilitate immediate care
 - Aide-memoire for clinician
 - Automate business processes
 - Trigger decision support
- To facilitate review of care quality
 - Quality registers / audit
- To inform healthcare management
- To inform research
 - 'Big data', analytics
 - Clinical trials



Why is health information so hard?

- Very different kinds of information
 - Biological concepts
 - Documentation of care
- Compressed, summarised information
 - Reporting
 - Making sense of complex care
- Large number of complex datatypes
 - not just string, numeric, url, date




Health information

- Biological 'real world' concepts
 - Symptoms, examinations
 - Lab tests, imaging results
 - Illnesses, procedures
 - Medications, devices
- Documentation of care
 - Point of care (Diagnosis name, date of onset, date diagnosed, grade/stage)
 - Medico-legal context (who, when, why, what, how)



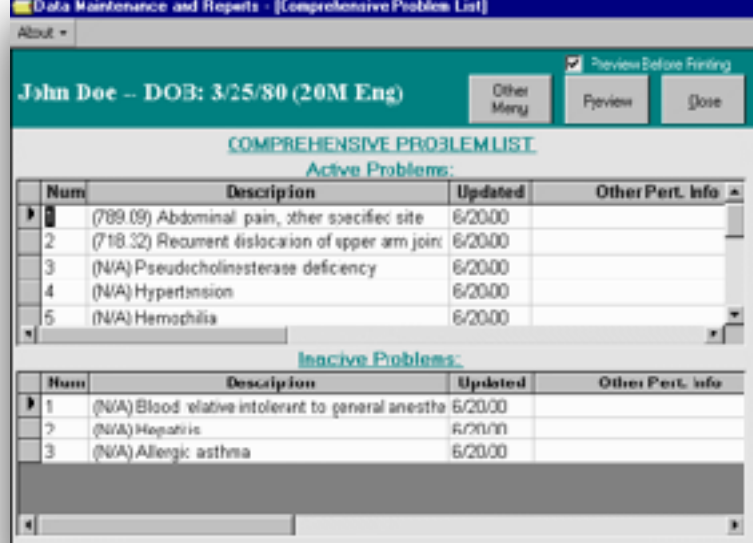
Health information

- Compression and processing of health information
 - Registries
 - Research
- Handling 'health status'
 - 'Curated' problem lists



SNOMED CT Codes

| SNOMED CT | Description | Used By CDM's |
|-----------|---|---------------|
| 196298000 | Acute dentine dental caries (disorder) | 75 |
| 196298001 | Acute enamel dental caries (disorder) | 75 |
| 196298008 | Chronic dentine dental caries (disorder) | 75 |
| 442991007 | Dental caries extending into dentine (disorder) | 75 |
| 95248001 | Salivary dysfunction caries secondary to radiation therapy (disorder) | 75 |
| 95247001 | Salivary dysfunction caries secondary to medication (disorder) | 75 |
| 95248008 | Salivary dysfunction dental caries (disorder) | 75 |
| 95253001 | Secondary dental caries associated with local or systemic factors (disorder) | 75 |
| 95252004 | Secondary dental caries associated with failed or defective dental restoration (disorder) | 75 |
| 80763004 | Enamel caries (disorder) | 75 |
| 5170009 | Complex dental caries (disorder) | 75 |
| 80753001 | Arrested dental caries (disorder) | 75 |
| 95248007 | Salivary dysfunction caries secondary to aging (disorder) | 75 |
| 80667001 | Dental caries (disorder) | 75 |
| 109571003 | Primary dental caries, indeterminate origin (disorder) | 75 |
| 109572005 | Primary dental caries, cervical origin (disorder) | 75 |
| 109580003 | Caries of infancy, associated with breast feeding (disorder) | 75 |
| 109579001 | Caries of infancy, indeterminate origin (disorder) | 75 |
| 109578009 | Caries of infancy (disorder) | 75 |
| 109577004 | Primary dental caries, multisurface origin (disorder) | 75 |



Data Maintenance and Reports - [Comprehensive Problem List]

John Doe -- DOB: 3/25/80 (20M Eng)

COMPREHENSIVE PROBLEM LIST

Active Problems:

| Num | Description | Updated | Other Pert. Info |
|-----|---|---------|------------------|
| 1 | (789.09) Abdominal pain, other specific site | 6/20/00 | |
| 2 | (718.32) Recurrent dislocation of upper arm joint | 6/20/00 | |
| 3 | (N/A) Pseudocholinesterase deficiency | 6/20/00 | |
| 4 | (N/A) Hypertension | 6/20/00 | |
| 5 | (N/A) Hemophilia | 6/20/00 | |

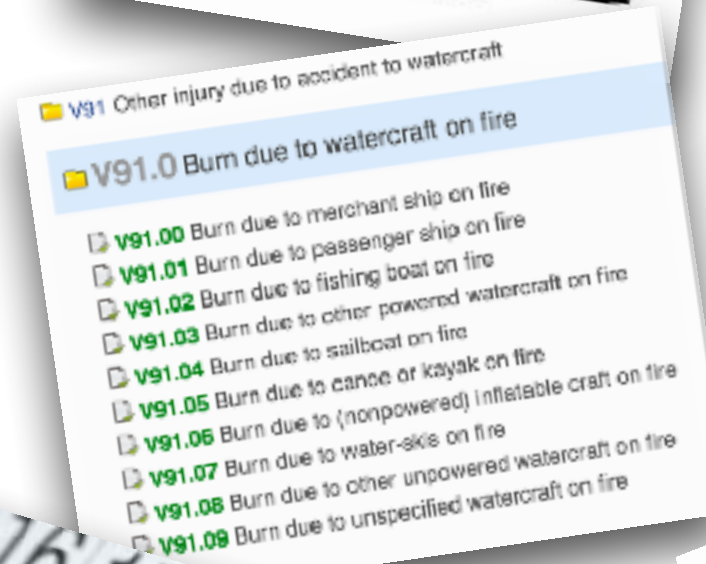
Inactive Problems:

| Num | Description | Updated | Other Pert. Info |
|-----|---|---------|------------------|
| 1 | (N/A) Blood relative intolerant to general anesthesia | 6/20/00 | |
| 2 | (N/A) Hepatitis | 6/20/00 | |
| 3 | (N/A) Allergic asthma | 6/20/00 | |

Complex datatypes

- Plain text
- Coded terms
 - external 'reference' terminologies
 - local codes and mappings
- Dates and times
- Durations
- Quantities
- Interpretations

TEXT



Medication 'dose syntax'



Code4Health



openEHR

Medication 'dose syntax'

Paracetamol liquid oral 125mg/5mls 5-10mls up to every 4-6 hours as required for pain or fever, maximum 40mls in 24 hrs

```
{  
  "Medication Name": "Paracetamol liquid 125mg/5mls"  
  "Route": "oral"  
  "Parsable dose direction": " 5-10ml ^4h/6h prn [40ml h24]  
  "Additional instruction": "for pain or fever"  
}
```

Enalapril – oral - 2.5mg once daily for 2 days, then 5mg once daily for 7 days, then 10 mg once daily indefinitely

```
{  
  "Medication Name": "Enalapril"  
  "Route": "oral"  
  "Parsable dose direction": "2.5mg od:2d;5mg od:7d;10mg od:ind"  
}
```

Medication 'dose syntax'

Product:

paracetamol 500 mg tablets – oral – DOSE take 2 – four times a day
VMP from Drug Dictionary Dose Syntax compliant coded data

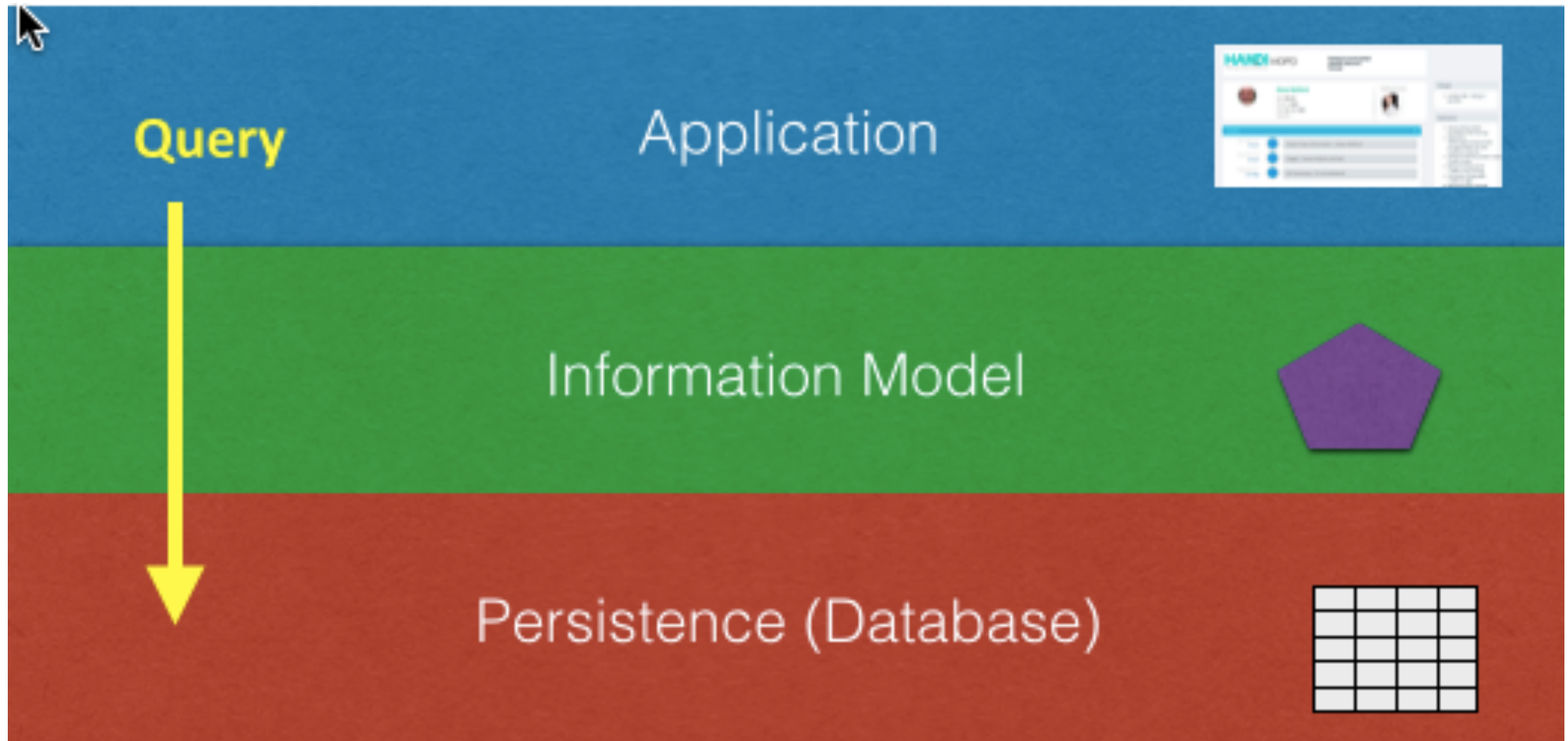
...can be determined by a computer as equivalent to:

Dose:

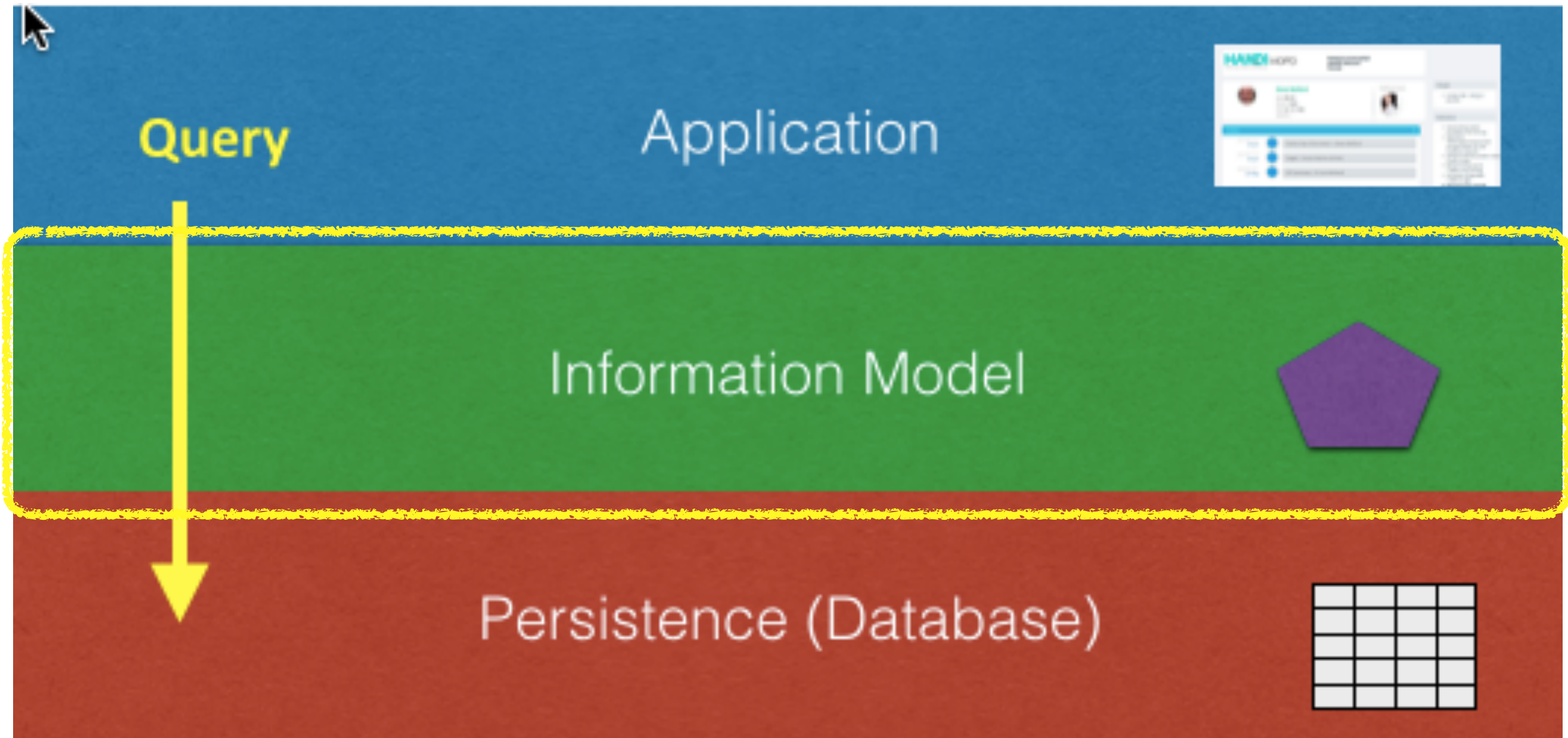
paracetamol – oral – tablets – DOSE 1000 mg – four times a day
VTM from Drug Dictionary Dose Syntax compliant coded data



Information model is critical

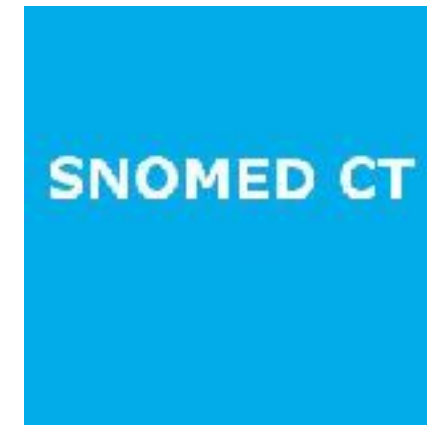


Information model is critical



Health terminologies

- Needed to represent biological and scientific concepts
 - 500,000+ SNOMED CT concepts
 - even more relationships which support 'inferencing'
 - e.g. Diabetes Mellitus Type 1 is_a metabolic disease AND is_a disease of the pancreas



dictionary of
medicines + devices



A mixed economy

- In reality we need
 - **‘Clinical content’ models**
 - underpin persistence
 - underpin API / messaging
 - **+ Terminologies**
 - label/ classify biological concepts
 - power inferencing
 - **Blended approach**
 - no ‘one true way’

```
"diagnoses": [  
  {  
    "problem_diagnosis": [  
      {  
        "date_of_onset": [  
          "2015-02-17T13:30:37.553+01:00"  
        ],  
        "diagnosis": [  
          {  
            "|code": "301485011",  
            "|terminology": "SNOMED-CT",  
            "|value": "asthma"  
          }  
        ]  
      }  
    ]  
  }  
],
```



Over to Ian ...



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