

# Healthcare Information Integration Seminars

HL7, HL7 UK  
and  
Healthcare Messaging

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<http://www.hl7.org.uk>

# HL7 - History

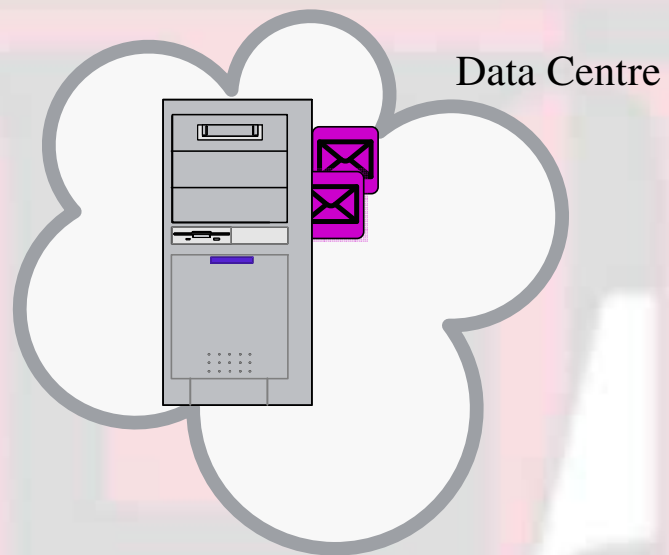
- HL7 - the world's most widely used standards for healthcare interoperability.
- 1987 Founded and Published v1.0
- 1988 Version 2.0
- 1994 ANSI Accredited
- 1999 Version 2.3
- 2001 Version 1.0 of the RIM (HL7 v3)
- 2007 Development of v2 & v3 ongoing.....

# Affiliates

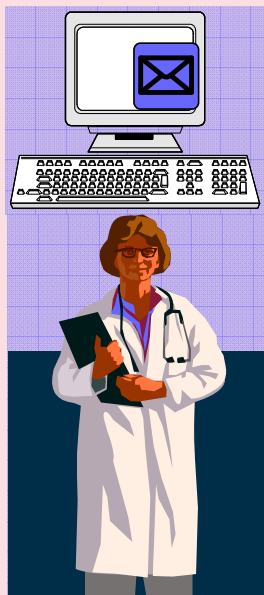
- 27 Affiliates – Argentina to Uruguay
- Contribute financially to HL7.org
- Provide a 'Realm' focus
- Feed realm requirements into the Standard
- National forum for localisation of the standard
  - NHS England - Connecting for Health
  - NHS Wales - Integrating Healthcare
  - NHS Scotland - ISD (CDA)

HL7 UK is the affiliate for Great Britain

# Interface Engine “Exchange of Data”



System A



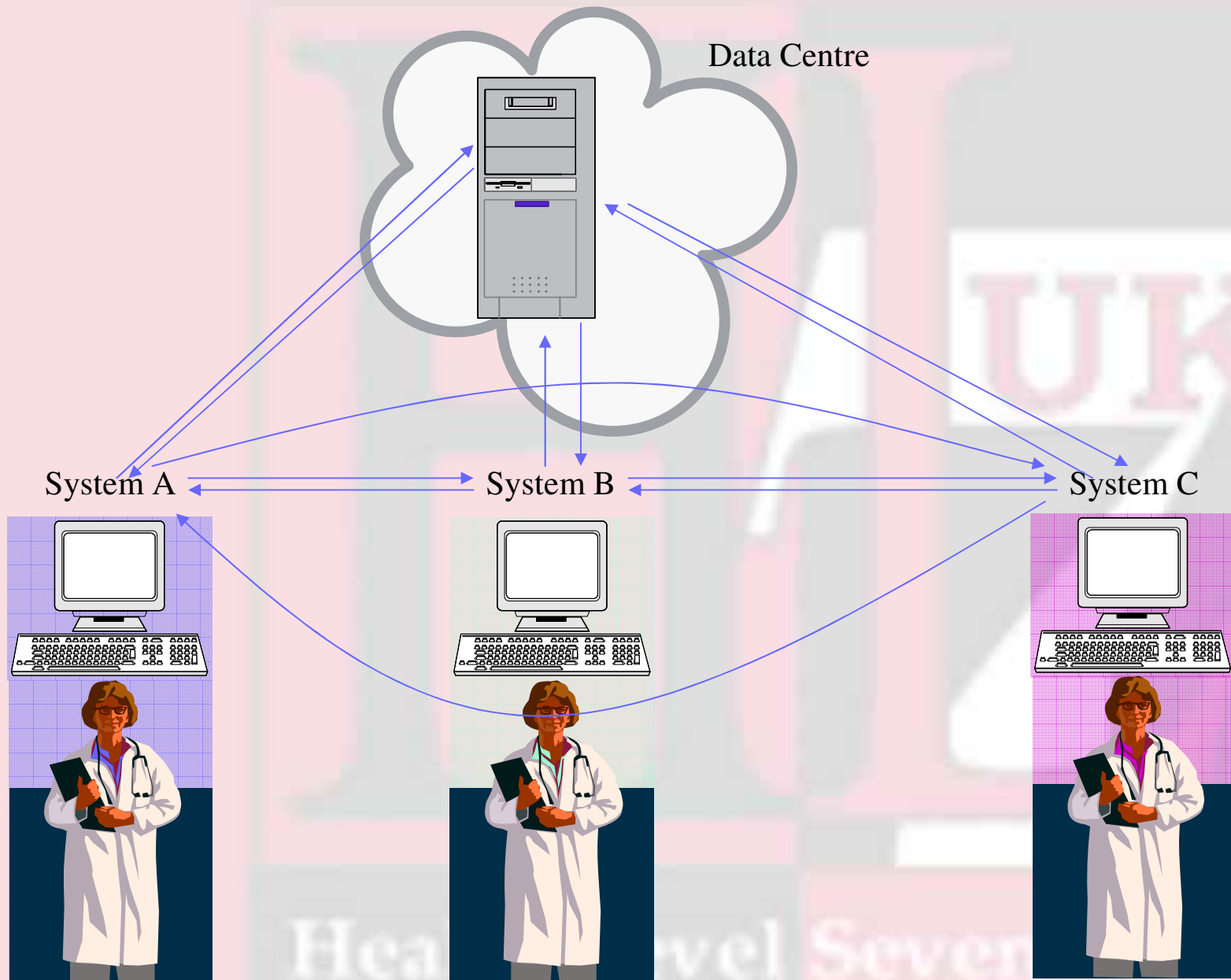
System B



System C



# Interface Engine “Exchange of Data”



# How many System to System interfaces do we need?

- 2 Systems = 1 Interface
- 3 Systems = 3 Interfaces (a-b, a-c, b-c)
- 4 Systems = 6 Interfaces (a-b, a-c, a-d, b-c, b-d, c-d)
- n Systems =  $n*(n-1)/2$  Interfaces
- 15 GP Pharmacy Systems = 105 Interfaces
- 250 Trusts = **31,125 Interfaces**

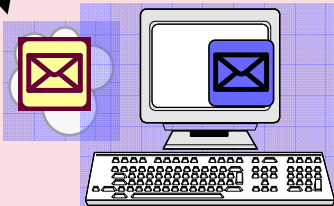
... Too Many!

.....And the ££££££££££

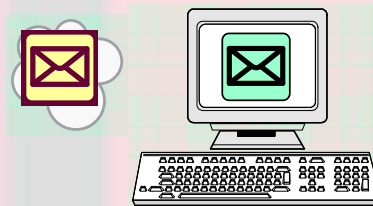
# HL7 “Exchange of Data”

HL7 Interface

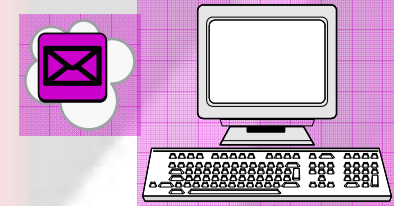
System A



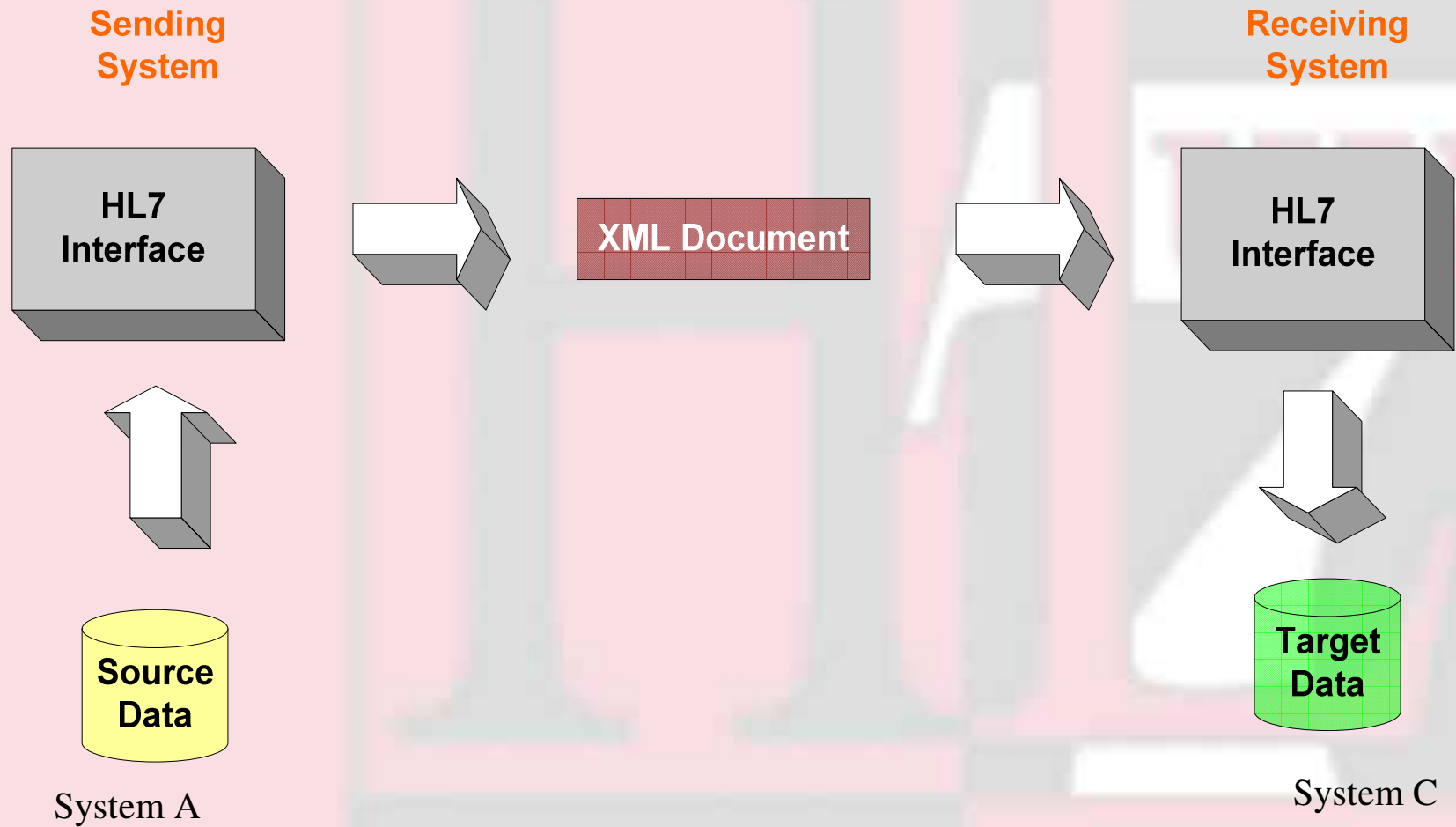
System B



System C



# Use of XML for HL7 Messaging



# How many HL7 Interfaces do we need?

- 2 Systems = 1 Interface
- 3 Systems = 3 Interfaces (a-HL7, b-HL7, c-HL7)
- 4 Systems = 4 Interfaces (a-HL7, b-HL7, c-HL7, d-HL7)
- n Systems = n Interfaces
  
- 15 GP Pharmacy Systems = 15 Interfaces
- 250 Trusts = **250 Interfaces**

... Not trivial but easier!  
And less ££££

# HL7 Standards

- HL7 v2.\*
  - 2.1 to 2.6
    - overall interface structure including a generalized query
    - patient administration
    - order entry/resulting
    - patient accounting (billing) systems
    - reference files (master files)
    - medical information management
    - patient and resource scheduling
    - patient referral messages
    - patient care messages
    - clinical laboratory automation
    - application management
    - personnel management

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# Version 2

Field delimited - | ^ @ ~

## Strengths

Broad Coverage of  
healthcare

Highly adaptable

Vocabulary independent

Compact

## Weaknesses

Broad Coverage of  
healthcare

Highly adaptable

V2.\*

## Patient Registration

```
MSH|^~\&|REGADT|MCM|IFENG||199112311501||ADT^A04^ADT_A01|000  
001|P|2.5||  
EVN|A04|200301101500|200301101400|01||200301101410  
PID|||191919^^^GENHOS^MR~371-66-  
9256^^^USSA^SS|253763|MASSIE^JAMES^A||19560129|M|||171  
ZOBERLEIN^^ISHPEMING^MI^49849^""^||(900)485-5344|(900)485-  
5344||S|C|10199925^^^GENHOS^AN|371-66-9256||  
PV1||O|O/R|||0148^ADDISON,JAMES|0148^ADDISON,JAMES|0148^ADDI  
SON,JAMES|AMB|||||0148^ADDISON,JAMES|S|1400|A|||||||GEN  
HOS|||||199501101410|  
PV2|||||200301101400|||||||200301101400  
OBX||ST|1010.1^BODY WEIGHT||62|kg||||F  
OBX||ST|1010.1^HEIGHT||190|cm||||F  
DG1|1|19||BIOPSY||00|
```

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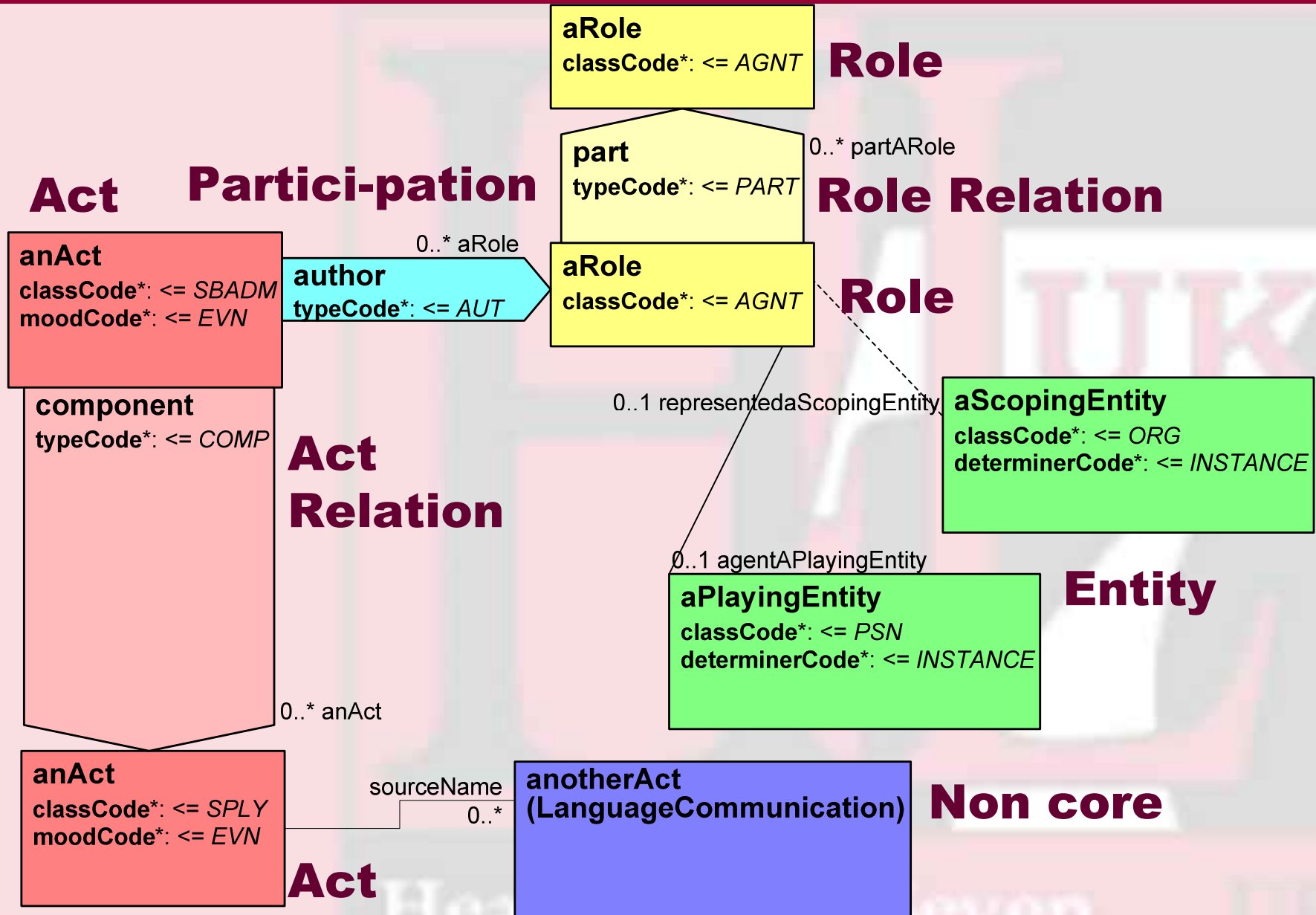
# HL7 V3

- HL7 v3
  - Administration Management
    - Patient Admin
    - Billing
    - Scheduling
  - Health & Clinical Management
    - Blood Bank
    - Care Provision
    - Clinical Decision Support
    - **Clinical Document Architecture**
    - Clinical Genomics
    - Diagnostic Imaging
    - Immunization
    - Laboratory
    - Medical Records
    - Medication
    - Orders and Observations
    - Pharmacy
    - Public Health
    - Regulated Products
    - Regulated Studies
    - Therapeutic Devices

- Top Down OO/UML based development
- Based on the RIM (Reference Information Model)
- XML based
  - XML is –
    - Easy
    - Fast
    - Readable
    - Everyone is doing it
    - Verbose!!!
- Not just Level 7 anymore
- Testable Conformance



# HL7 V3 Model Classes (6 core + 1)



# Example v3

## Patient Registration

```
<subject>
  <contextConductionInd value="true" />
  <registrationEvent>
    <id root="2.16.840.1.113883.19.3.2409" extension="1-976-245-000" displayable="true" />
    <statusCode code="active" />
    <effectiveTime>
      <low value="200208081400" inclusive="true" />
    </effectiveTime>
    <subject1>
      <IdentifiedPerson>
        <id root="2.16.840.1.113883.19.3.2409" extension="1-976-245" displayable="true" />
        <addr use="HP">
          <city>Ann Arbor</city>
          <state>MI</state>
          <postalCode>99999</postalCode>
          <country>USA</country>
        </addr>
        <telecom value="tel:+1(555)555-5001" use="H" />
        <statusCode code="active" />
        <effectiveTime>
          <low value="200208081400" inclusive="true" />
        </effectiveTime>
      </IdentifiedPerson>
      <!-- CMET 'COCT_MT150003' reference suppressed: <assigningOrganization/> for Good Health Organization -->
      <identifiedPerson>
        <id root="2.16.840.1.113883.19.4.1" extension="444-11-4567" displayable="true" />
        <name use="L">
          <prefix>Ms.</prefix>
          <given>Nancy</given>
          <given>D</given>
          <family>Nuclear</family>
        </name>
        <administrativeGenderCode code="F" codeSystem="2.16.840.1.113883.5.1" codeSystemName="AdministrativeGender" displayName="Female" />
        <birthTime value="19901205" />
        <deceasedInd value="false" />
        <multipleBirthInd value="false" />
        <maritalStatusCode code="S" codeSystem="2.16.840.1.113883.5.2" codeSystemName="MaritalStatus" displayName="Never Married" />
      </identifiedPerson>
    </subject1>
  </registrationEvent>
</subject>
```

# Balloting & Publishing

- All HL7 standards are balloted
  - Committee
  - Member
- Published through HL7.org
- UK Localization (V3GB) - Ballot process through HL7.org
- Full Ballot resolution – Feedback into .org

Harmonization with other standards  
(CEN/ISO/ASTM etc)

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## Clinical Document Architecture

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# CDA – Clinical Document Architecture

## What is a clinical document?

- Intuitively, clinical documents:
  - Are the historical form of human readable healthcare records
  - Mix discrete data and free-flowing narrative
  - Are always (at least theoretically) attested (i.e. signed)

## What is a CDA-compliant document?

- An XML document consisting of a header and a body
- The header identifies the patient, provider, document type, etc.
- The body has a mandatory human-readable part + an optional encoded part.
  - The human-readable part is attested and contains the complete content.
    - Either XML or any MIME encoded BLOB e.g. \*.doc, \*.pdf, \*.tif
  - The encoded portion, if present, can always be safely ignored by recipients unable to process it.

# CDA – Clinical Document Architecture

## CDA can:-

- provide a usable communication for all systems levels
- progress the level of coding
- meet the business need for coded information
- provide a framework for the incremental growth in the amount and precision of structured, vocabulary-bound clinical information exchanged.
  - Low barrier to entry; simple things are easy to do.
  - Promotes longevity of information.
  - Supports the finest level of granularity of standards-based encoding of clinical information for applications that can support it.
- assist in moving from v2 to v3?

# CDA – Clinical Document Architecture

- CDA documents are **“human readable”**
- CDA documents are also **“machine processable”** to the degree that markup has been added
  - The CDA header is required markup
  - Additional markup can augment machine processing

A CDA Document could be a:-

- Discharge Summary
- Referral
- Clinical Summary Report
- History & Physical examination
- Diagnostic Reports (DI, lab...)
- Medication Prescription Rx
- Public health report

*... any content that potentially carries a signature.*

# CDA Example

Wrightington, Wigan and Leigh  
NHS Trust **NHS**

## Discharge Letter

### DEPARTMENT OF PAEDIATRICS

Direct Line 01942 2644170  
Fax Number 01942 2644176

02/06/2003

DR FOSTER  
THE GP PRACTICE  
999 WIGAN LANE  
WIGAN, WN1 1XX

Dear: Doctor

RE: **TEST1 GEORGE W**  
**DOB 11/11/2000 NHS No 999 999 9999, PAS No 889900**  
THE HOUSE,  
STREET ST,  
WETHERFIELD,  
WIGAN  
WN1 2XX.

**Admission Details:** 2/7 ago he was admitted with croup  
He came back with fever, coryzeal symptoms  
and congested tonsils  
He was started on penicilline

**Admission Date/Time:** 24/09/2003 from UPPER JOHNSON WARD, RAEI

**Discharge Date:** 25/09/2003 from UPPER JOHNSON WARD, RAEI

**Discharging Consultant:** DR RG LEVY

**Primary Diagnosis:** Acute upper respiratory infection

**Secondary Diagnosis:**

**Patient Weight (Kg):** 17.9 kg

**Discharge Medication**  
PHENOXYMETHYLPENICILLIN 125mg/5mL SOLUTION 7 day(s) supply 125m

**Other Medication**

**Follow Up:**  
No Follow Up

**Planned Investigation(s)**

Yours sincerely,

Vassiliki Mitsiadi  
SHO

## Header

- Document Type
- Sender
- Receiver
- Patient

## Body

### Section(s)

- Admission Details
- Primary/Secondary Diagnosis
- Observations
- Medications
- Follow-up

## Entries

- Admission Details
- Primary/Secondary Diagnosis
- Observations
- Medications

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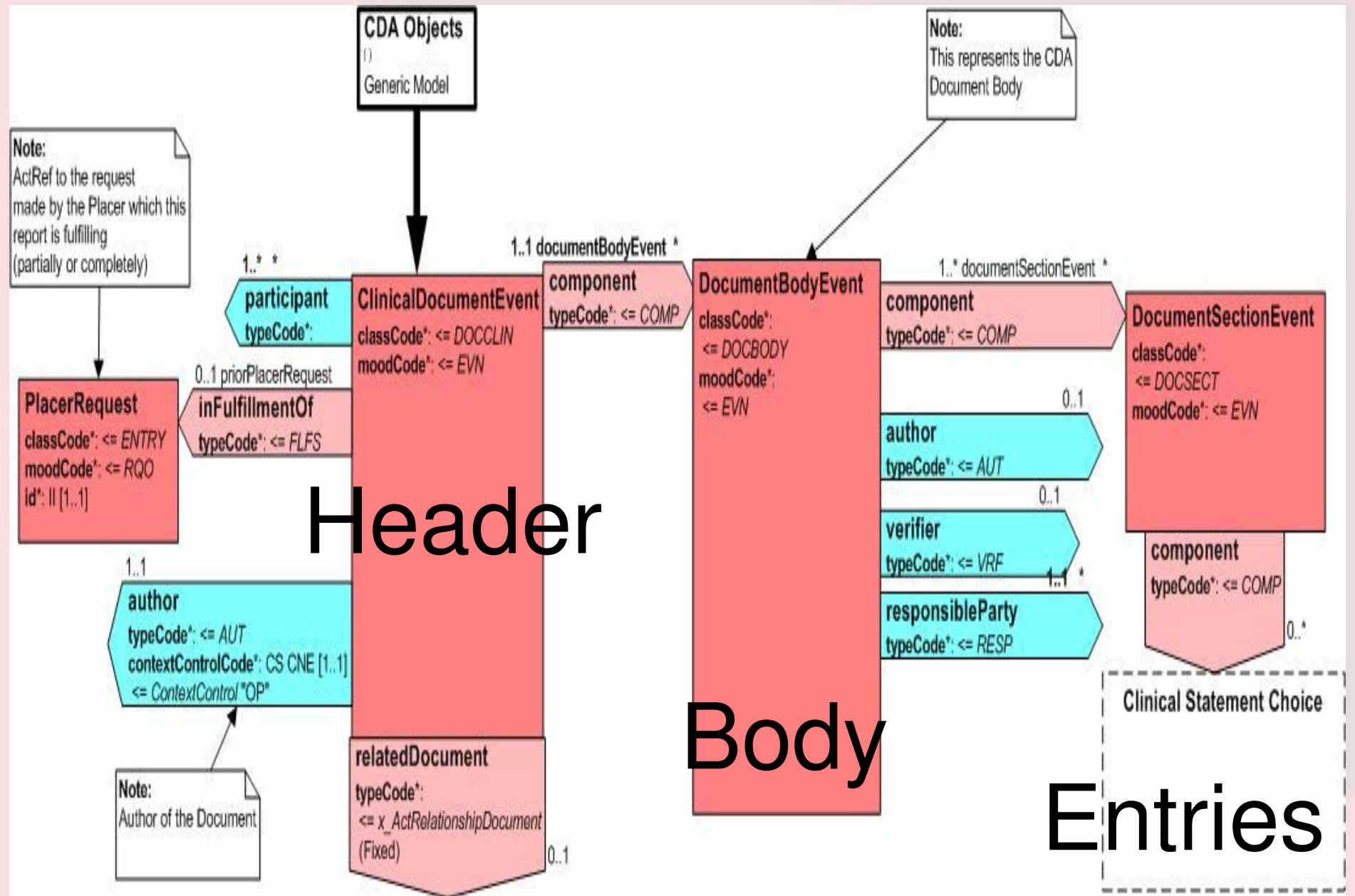
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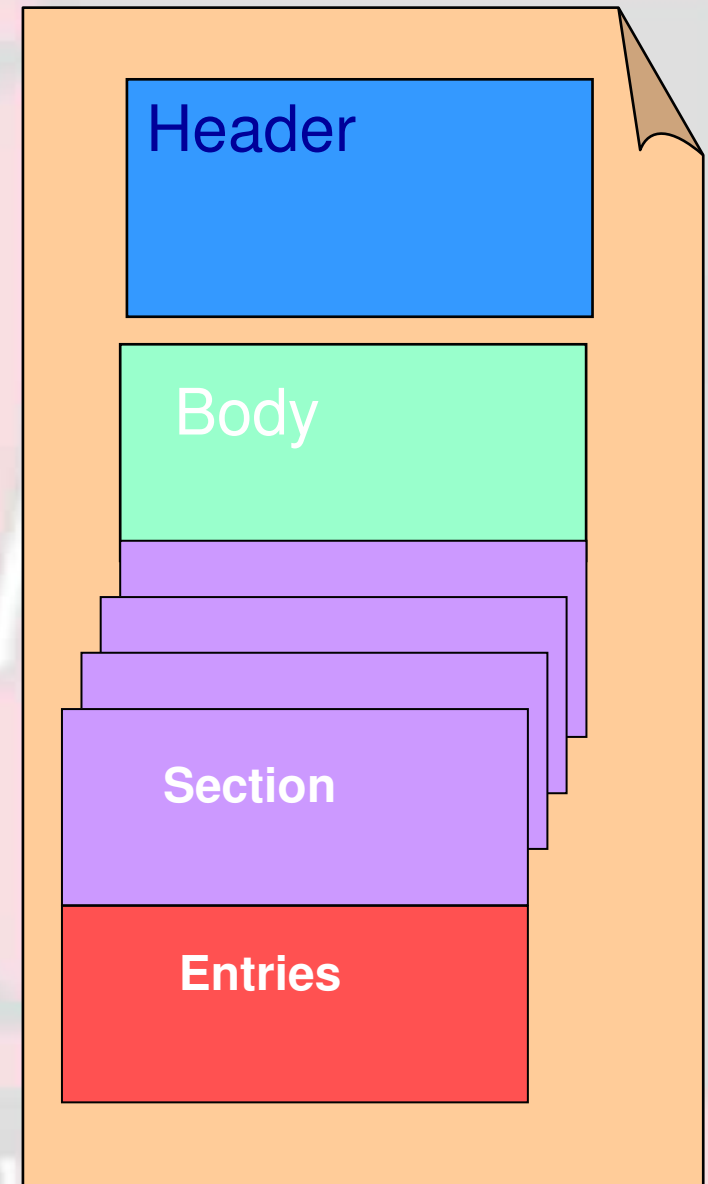
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# CDA Generic Message Model



# CDA Levels

- Level 1
  - CDA Header is Described
  - Document Type(s)
- Level 2
  - Assumes XML Body Content
  - Prescribes:
    - the Sections,
    - their Order
    - and Section Identifier Codes
- Level 3
  - CDA Entries
  - Vocabulary [Codes]
  - Relationships
  - Semantics



# CDA Projects

- PICNIC (European Union)
- SCIPHOX (Germany)
- HYGEIAnet/WebOnColl (Greece)
- NHS South Staffordshire (United Kingdom)
- Aluetietojärjestelmä (Finland)
- Health Information Summaries (New Zealand)
- Referrals (Australia)
- MERIT-9 (Japan)
- e-Claims Supporting Document Architecture (Canada)
- Mayo Clinic (USA)
- Buenos Aires HMO project (Argentina)
- Dalhousie U, QEII Health Sci Ctr (Canada)
- Connecting for Health (NHS England)
- CCD Approved standard (USA – HL7/ASTM)

Plus projects in Italy, Russia, Ireland, Mexico, ...

# HL7 UK

Is HL7 UK for you??

- Broad spectrum of members
- Input into the International and Realm content
- Education and Support
- Discussion forum
- Technical expertise
- Access to HL7 standards and supporting documents.
- Influence the way in which UK-specific versions are developed. Members include:
  - NHS central and policy organisations (NPfIT), (ISB)
  - NHS Trusts and PCGs
  - Royal Colleges
  - Most of the largest suppliers of primary and secondary healthcare IT systems
  - Middleware suppliers
  - Companies - from single-handers to huge multinationals.

## Some Current Activities

- Integration Roadshows (you're here)
- Technical Meetings – Next is 2<sup>nd</sup> October
- HL7UK V3GB Implementation guide (ongoing)
- November Conference – 21<sup>st</sup> & 22<sup>nd</sup>  
"Making Interoperability Work"
- E-zine publication – Contributions welcome

<http://www.hl7.org.uk>

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