

3rd HL7 Australia Conference, Sydney

HL7 Standards

- an Introduction -

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Session Overview

- Why standards in healthcare communications?
- What is HL7?
- HL7 in Australia
- A brief tour of HL7
- What is Version 3?
- What about XML?
- Q&A

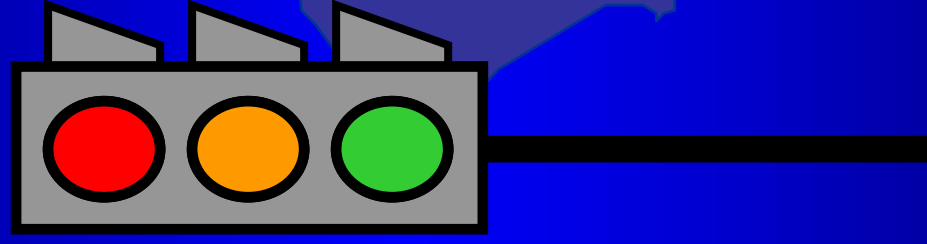


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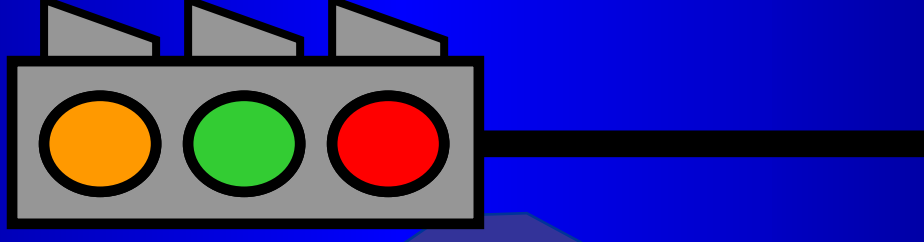
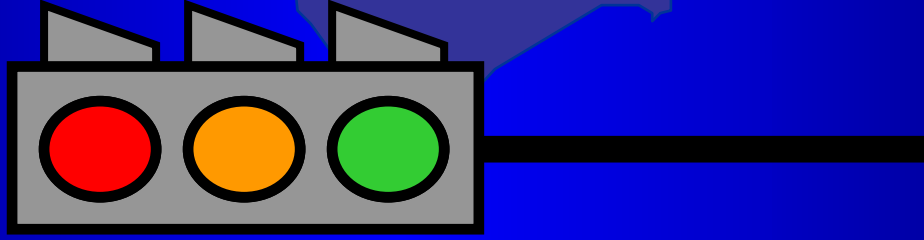
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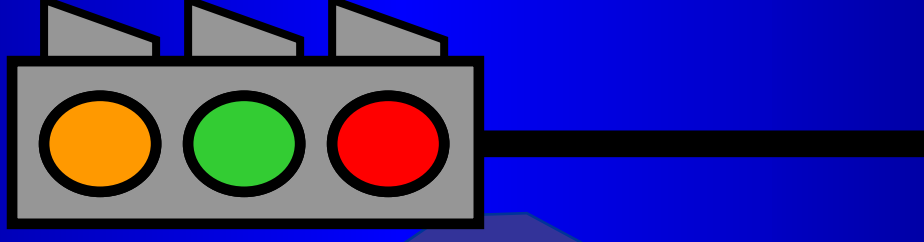
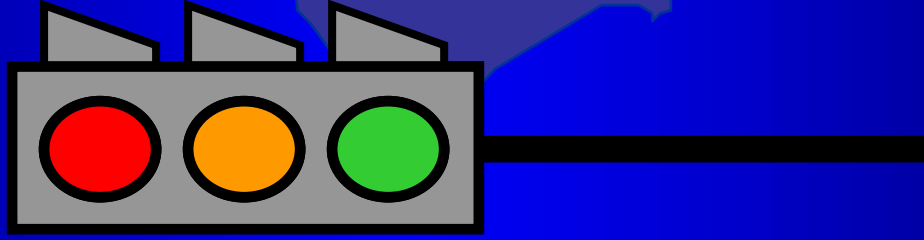
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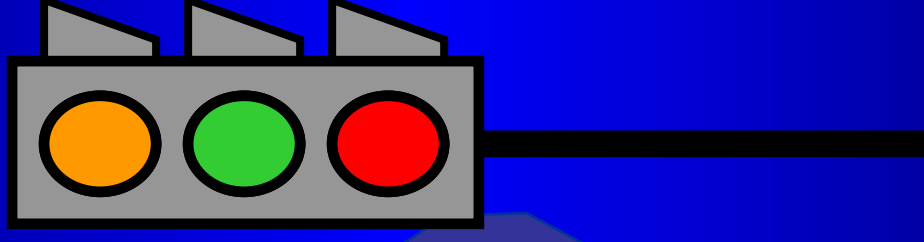
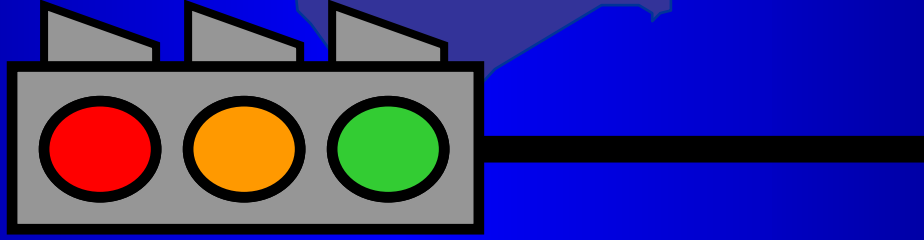
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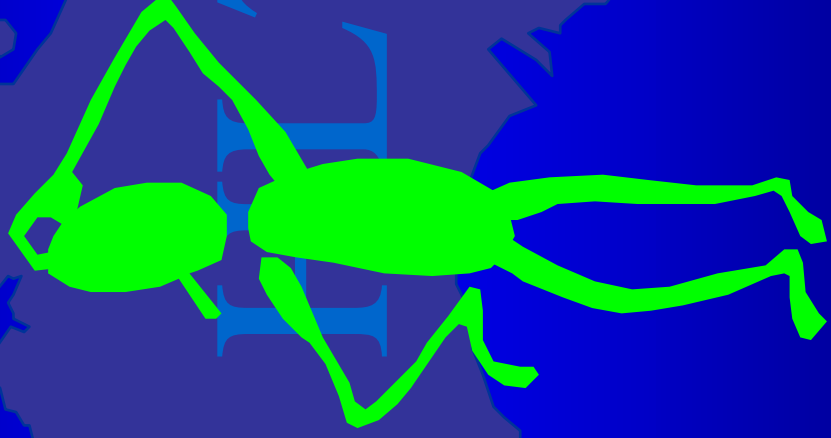
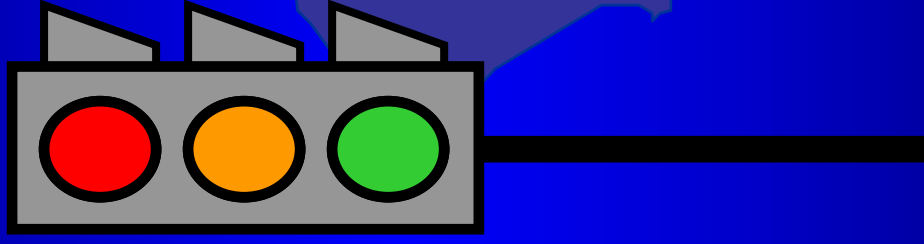
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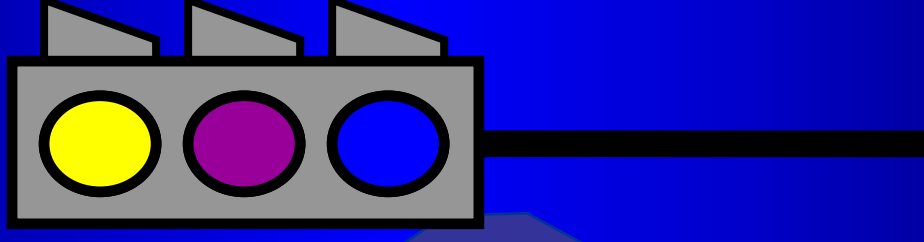
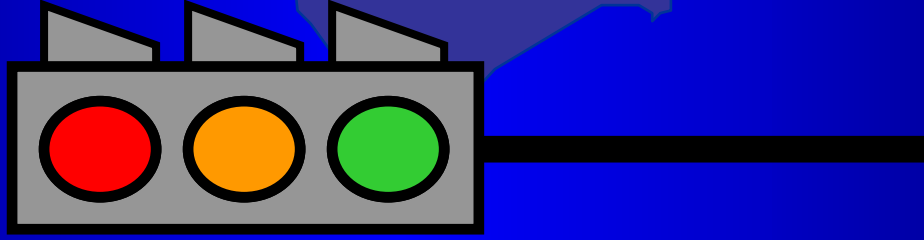
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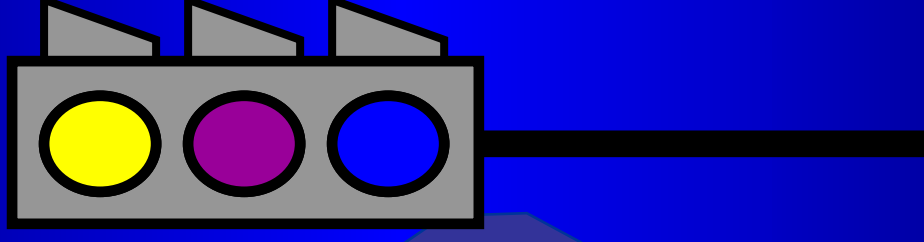
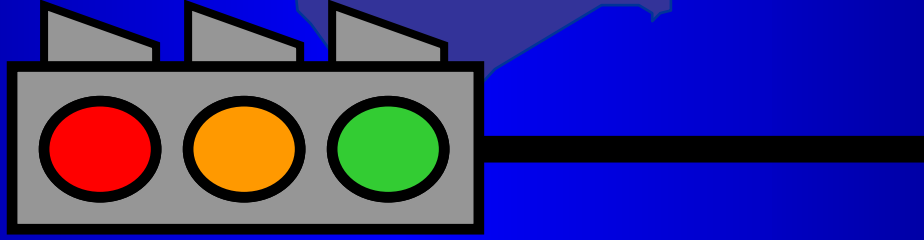
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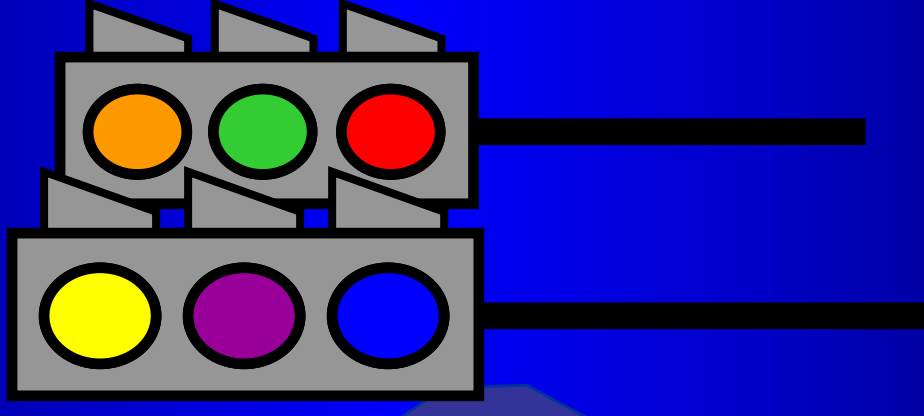
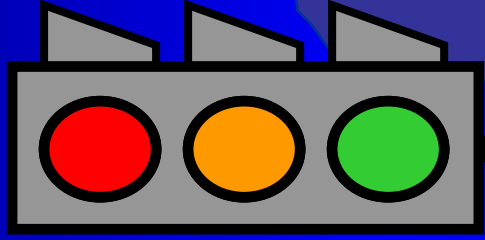
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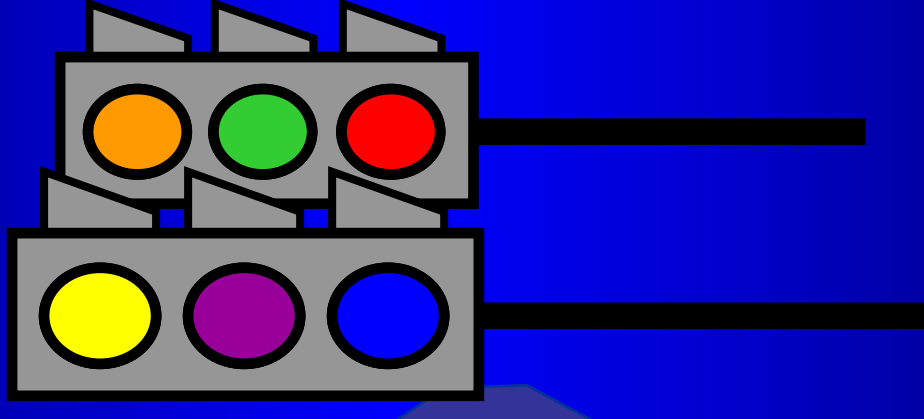
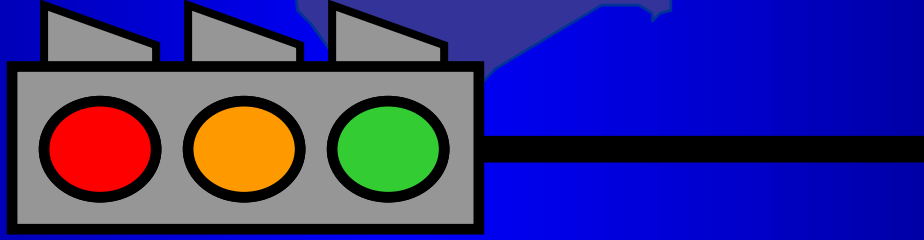
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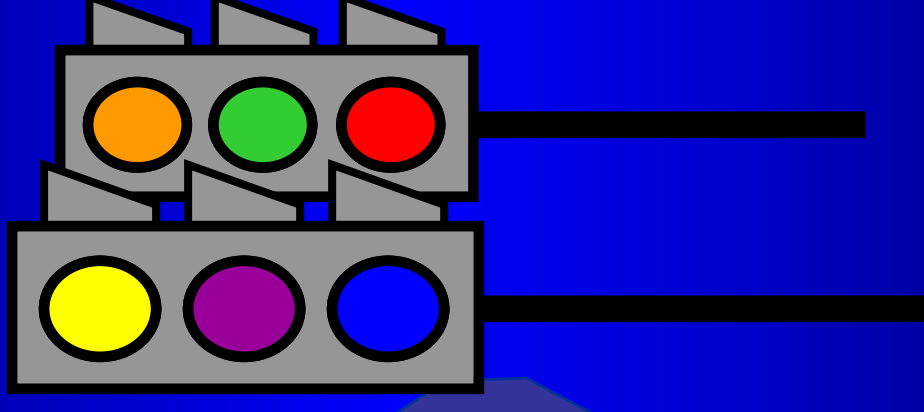
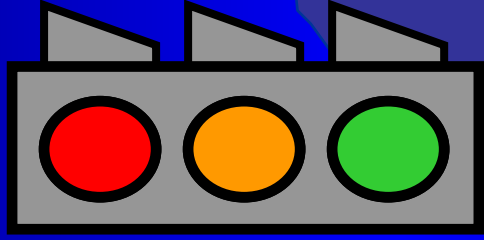
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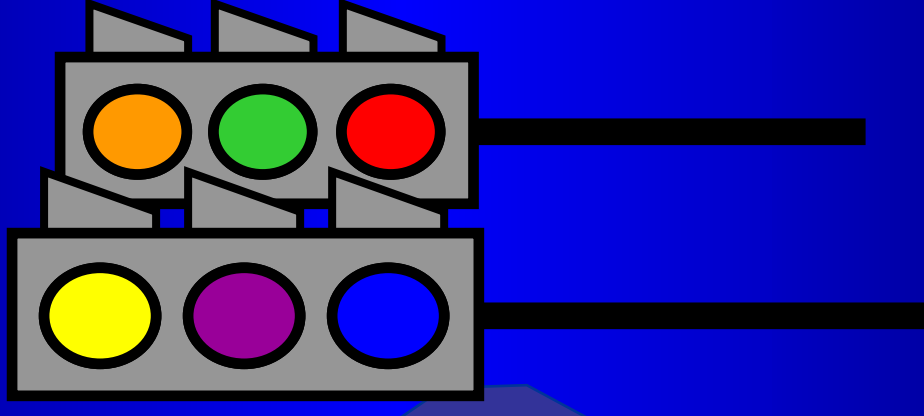
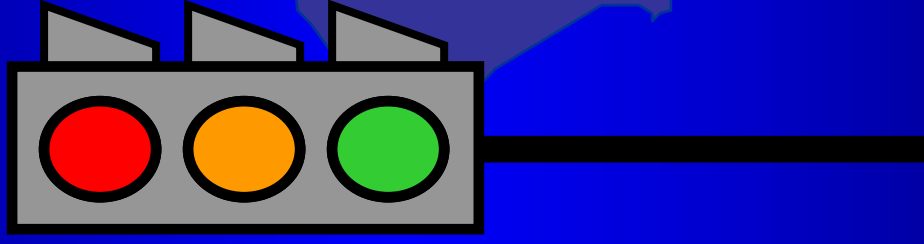
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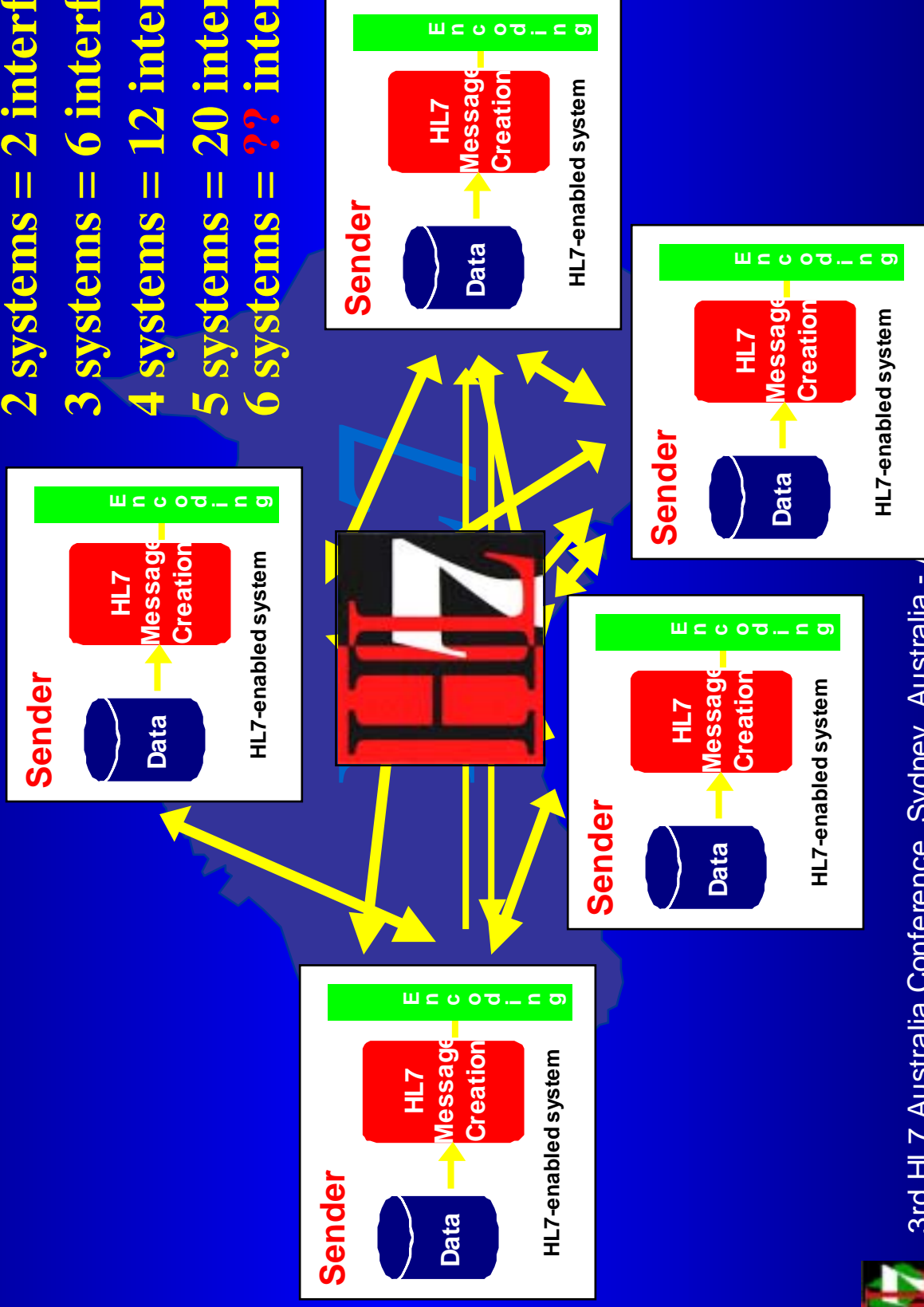
Other Examples of Standards

- Mobile Phones (“GSM”)
- CDs (“ISO”)
- ATMs
- “yes” and “no” in Bulgaria



Why Communication Standards?

- 2 systems = 2 interfaces
- 3 systems = 6 interfaces
- 4 systems = 12 interfaces
- 5 systems = 20 interfaces
- 6 systems = ?? interfaces



Why Standards?

- For Healthcare IT systems to exchange information, they can either:
 - communicate via custom interfaces *or*
 - share a common data format
- Custom interfaces are costly to design and difficult to maintain (~ \$100k each).

A common data format is cost-effective, but needs up-front agreement and commitment = “a Standard”.



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global

HL7 Mission



- To provide standards for the exchange, management and integration of data that supports clinical patient care and the management, delivery and evaluation of healthcare services.
- Specifically, to create flexible, cost effective approaches, standards, guidelines, methodologies, and enable healthcare information system interoperability and sharing of electronic health records.”



Interoperability

- Interoperability

“Ability of two or more systems or components to exchange information and to use the information that has been exchanged”

[IEEE Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries, IEEE, 1990]

Functional interoperability

Semantic interoperability



A Brief History of HL7 ...

- 1987: Interested users in the US start work on a standard - “Health Level Seven” .
- 1990: First standard (V2.1)
- 1993/94: First International Affiliates join.
- 1994: I
- 1997
HL7 as the healthcare messaging standard.
- 2000: HL7 V2.4 released.
- August 2001: 1st V3 Draft is released.

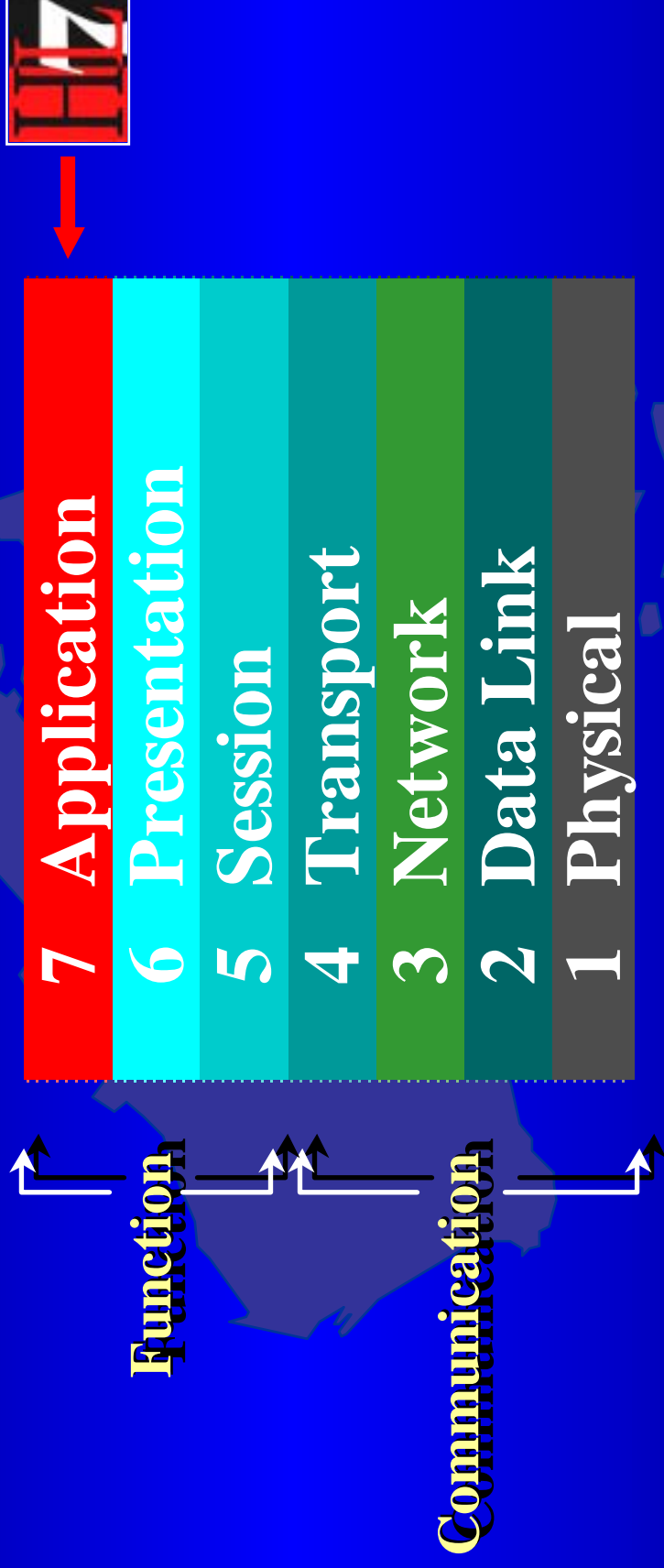
**More than 93% of all
organisations in the US with
Health IT systems use HL7!**



urses



Why Health Level “Seven”?



Who is HL7.org?

- ANSI-approved Standards Developing Organisation (SDO).
- Not-for-profit.
- >2200 members.
- >500 corporate members.
- 22 International Affiliates.
- Three 6-day Working Meetings per year.
- <http://www.HL7.org>



HL7: Messages and More ...

- Decision Support
 - Arden Syntax Standard (1999)
 - Guideline Interchange Format (GLIF)
- Visual Integration (“CCOW”)
- Clinical Document Architecture (CDA)
- Oct. 2001: Electronic Health Record (EHR)



HL7 is International!

• 23 International HL7 Affiliates:

- Argentina 
- Brazil 
- China 
- Czech Republic 
- Finland 
- Greece 
- Japan 
- Lithuania 
- Southern Africa 
- Taiwan 
- The Netherlands 
- Australia 
- Canada 
- Croatia 
- Denmark 
- Germany 
- India 
- Korea (Sth.) 
- New Zealand 
- Switzerland 
- Turkey 
- United Kingdom 
- USA 



Are there Alternatives to HL7?

- UN/EDIFACT
 - Originated from CEN in Europe.
 - Large number of messages: Transport, Customs, Supply Chain, etc.
 - Healthcare messages have found only limited proliferation.
 - CEN & HL7 Memorandum of Understanding
 - Close cooperation?
- XML???



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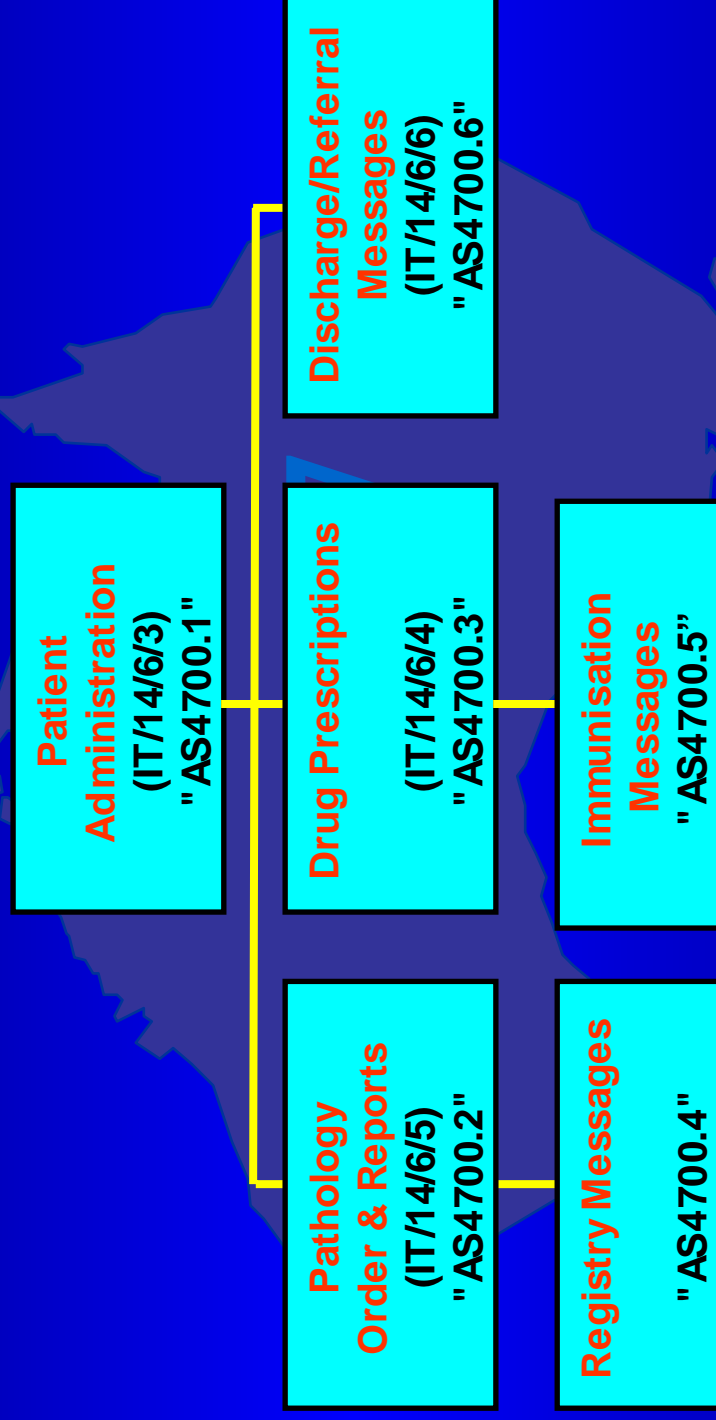


Background Information

- In Australia, standards are created by “STANDARDS AUSTRALIA” (SAI) - a government-supported organisation representing all stakeholders.
- The Australian Federal Govt supports HL7 as the healthcare messaging standard since 1997.
- HL7 has achieved widespread acceptance in Australia & New Zealand.



SAI HL7 Technical Committees



Structure of HL7 Standards in Australia



Australian HL7 Pathology Messages Standard
(V2.4 Implementation Standard - AS4700.2)

Australian HL7 Patient Administration Standard
(V2.4 Implementation Standard - AS4700.1)

HL7 International Standard V2.4
(as published by HL7)



Australian HL7 Standards

- AS4700.1: Patient Administration Standard
- AS4700.2: Pathology Orders and Results
 - Australian Pathology Implementation Guide HB262 (“Pathology Cookbook”)
- AS4700.3: Drug Prescriptions
- AS4700.4: Registry Messages
- AS4700.5: Immunisation Messages
- AS4700.6: Discharge/Referral Messages



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Content of the HL7 V2.4 Standard (1)

- General Introduction (Chapter 1)
- Message Infrastructure (Ch. 2)
 - General conventions
 - Data Types
 - Message Construction Rules
- Patient Administration (Ch. 3)
 - 62 Patient Administration transactions
 - 238 patient-related data items



Content of the HL7 V2.4 Standard (2)

- Orders & Observations (Ch. 4 & 7)
 - Diagnostic Services (Lab, Radiology, etc.)
 - Medications and Drugs
 - Treatments
 - Clinical trials
 - Dietary
 - Supply
- Queries (Ch. 5)
 - Queries & Responses



Content of the HL7 V2.4 Standard (3)

- Management of Master Files/Tables (Ch. 8)
 - Patients
 - Providers
 - Locations
- Clinical Document Management (Ch. 9)
- Scheduling of Medical Services (Ch. 10)
- Patient Referral/Discharge (Ch. 11)
- Patient Care (Ch. 12)

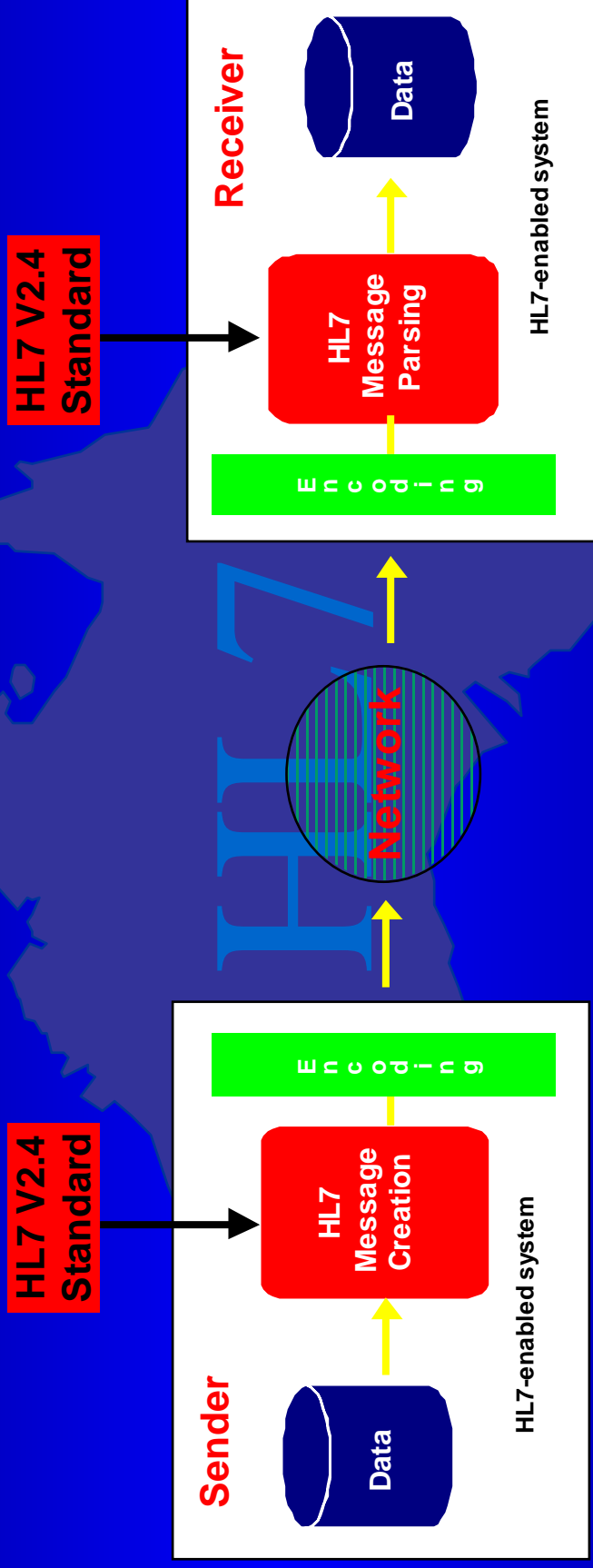


Content of the HL7 V2.4 Standard (4)

- Laboratory Automation (Ch. 13)
- Financial Management (Ch. 6)
 - basic service billing messages
 - e-claims → HL7 Canada messages
- Application Management (Ch. 14)
- Personnel Management (Ch. 15)
- ... Appendices ...



How does HL7 Messaging work?



What does HL7 look like?

```
MSH|^~\&|PATH||GP123||20000826||ORU|101|P|2.4|34567||AL|NE|AU||en<cr>
PID|||KNEE123||Knees^Nobby^J^^Mr||19331215|M|||23 Shady Lane^LIGHTNING
    RIDGE^NSW^2392|||||219171803<cr>
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OBX|1|NM|1751-7^S Albumin^LN||38|g/L|35-45||||F<cr>
OBX|2|NM|1779-8^S Alkaline Phosphatase^LN||52|U/L|30-120||||F<cr>
```



Segments ...

```
MSH|^~\&|PATH||GP123||20000826||ORU|101|P|2.4|34567||AL|NE|AU||en<cr>
PID||KNEE123||Knees^Nobby^J^Mr||19331215|M||23 Shady Lane^LIGHTNING
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OBX|1|NM|1751-7^S Albumin^LN||38|g/L|35-45||||F<cr>
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Repeated Segments ...

```
MSH|^~\&|PATH||GP123||20000826||ORU|101|P|2.4|34567||AL|NE|AU||en<cr>
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OBX|1|NM|1751-7^S Albumin^LN||38|g/L|35-45||||F<cr>
OBX|2|NM|1779-8^S Alkaline Phosphatase^LN||52|U/L|30-120||||F<cr>
```



Let's look at a "Segment" ...

```
MSH|^~\&|PATH||GP123||20000826||ORU|101|P|2.4|34567||AL|NE|AU||en<cr>
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LIGHTNING RIDGE^NSW^2392|||||||219171803<cr>
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OB |1|NM|17|1-^S Albumin^LN||38|g|35-45||||<cr>
OB |2|NM|17|9-^S Alkaline Phosphatase^LN||5|U||30-120||||F<cr>
```

ID

Name

DOB

Sex

Street Address

Town/Suburb



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Limitations of HL7 V2.x

- Too much optionality...
- No explicit information model ...
- Events and profiles not unambiguous ...
- Terminology/Vocabularies/Code sets not tightly defined ...
- Not object-oriented ...



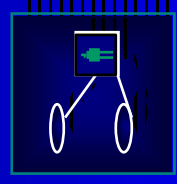
The Promise of HL7 V3

- HL7 V3 is based on a formal Data Model.
- Improved adaptability of the spec to change.
- Allow easier internationalization.
- *May even achieve “plug & play”!*



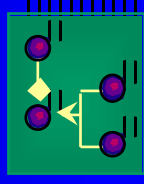
The HL7 V3 Approach

HL7 Message Development Framework (MDF)



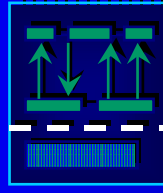
Use Cases

Capture real-life healthcare requirements



Information Model

Specifies data, its semantics, state transitions, etc.



Interaction Model

Defines roles and information flows between entities



Message Specification

Defines message contents and optionalities

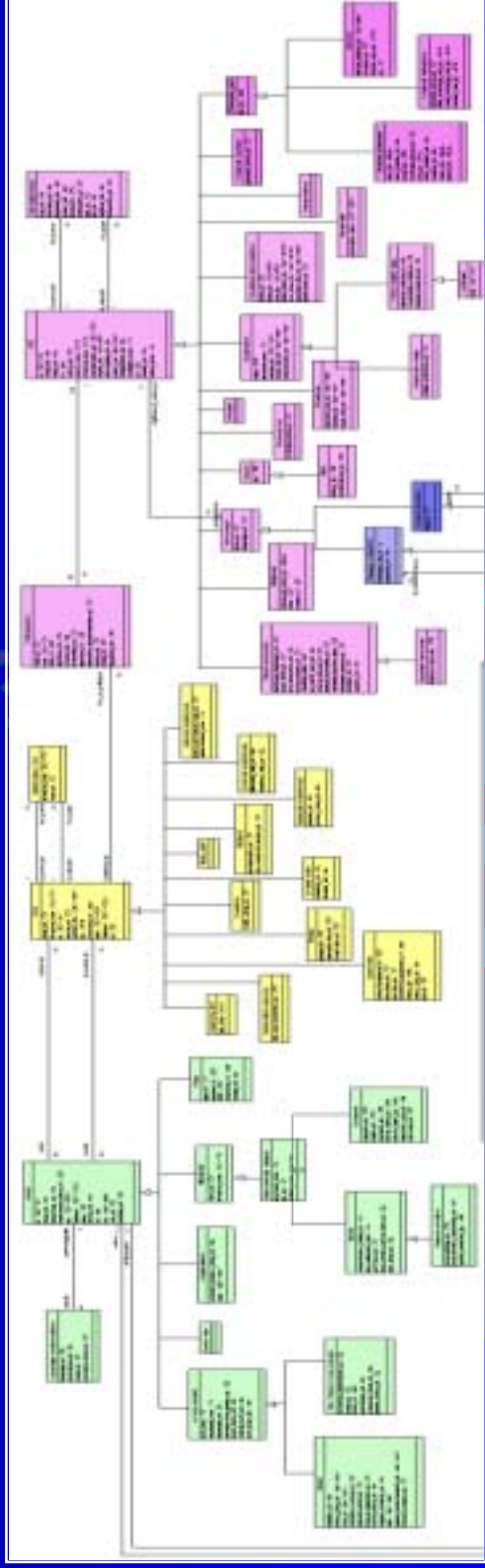


The Reference Information Model (RIM)

- Detailed and precise definitions of the information on which the data content of IT systems can be based.
- Uses object-oriented modeling and diagramming techniques (UML, etc.) .
- Provides an abstract way of expressing data definitions independent of message structure or EHR design.
- Provides a shared view of information used across HL7 messages and EHRs.



The RIM V1.25 - 2003



- 5 Subject Areas
- ~192 Attributes
- ~39 Generalisations
- ~44 Classes
- ~56 Relationships
- ~7 Associations



The Components of the RIM (1)

- Every happening is an **Act**, an intentional action in the business domain of HL7
 - Examples: Procedures, observations, medications, supply, registration, etc.
- Acts are related through an **Act_relationship**
 - Examples: composition, preconditions, revisions, support, etc.
- **Participation** defines the context for an Act
 - Examples: author, performer, subject, location, etc.

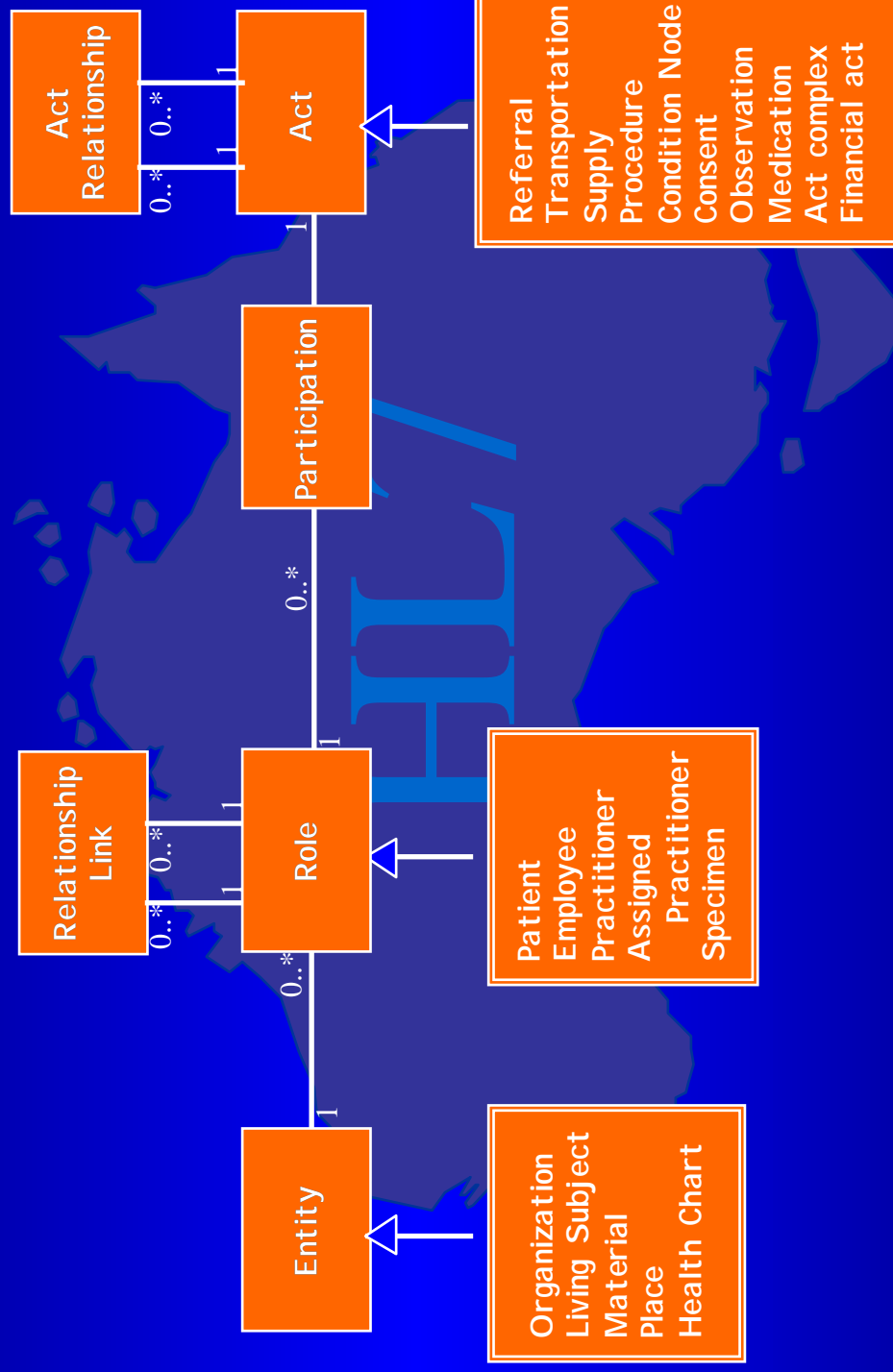


The Components of the RIM (2)

- **Entities**, a physical thing or organization and grouping of physical things
 - Examples: persons, organizations, material, places, devices, etc
- The participants are in **Roles**, which define the competency of an Entity.
 - Examples: patient, provider, practitioner, specimen, specimen, etc.



RIM Core Classes



V3 Status

- Version 3 is maturing (RIM V1.25)
- 1st technical review (“ballot”) August 2001.
- 5th technical review August 2003.
- Publication: 2004?
- Some early adoption projects are in progress (USA, Germany, UK, Japan, The Netherlands, etc.)
- Challenge: Implementation documentation



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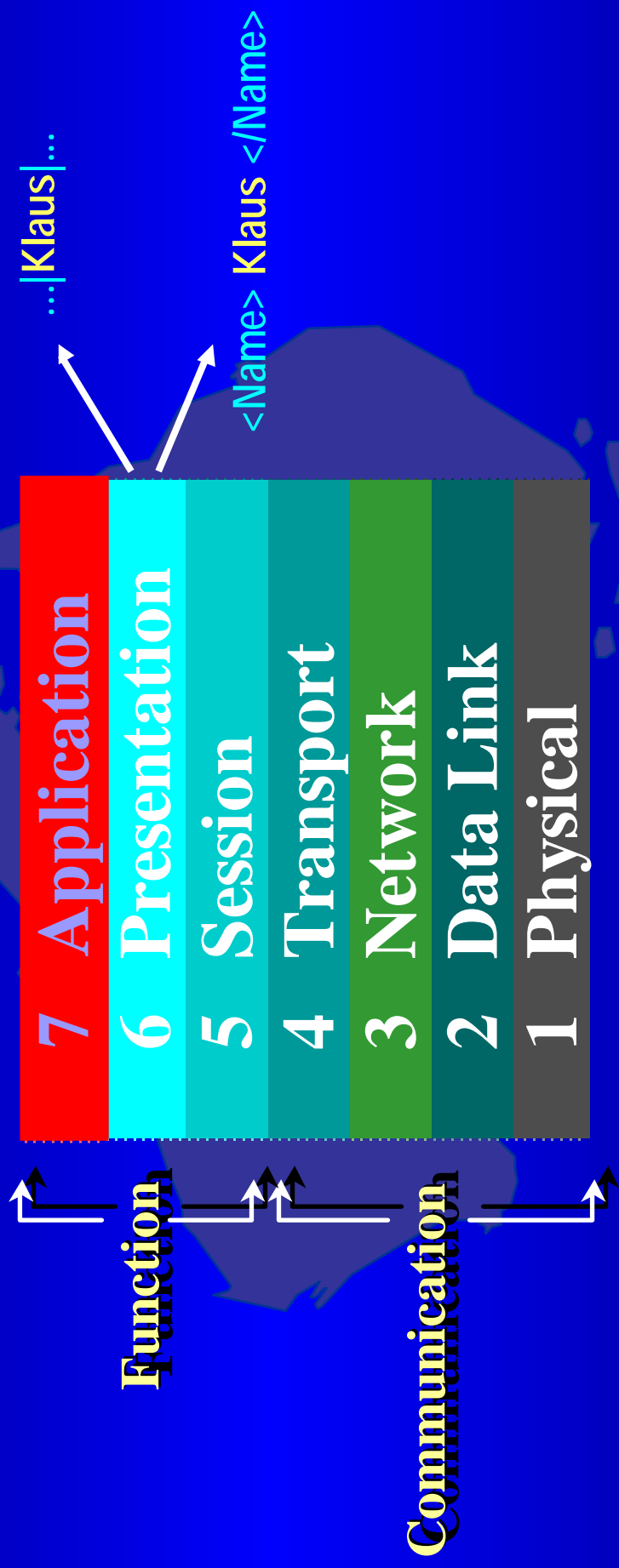


What about XML?

- eXtensible Markup Language
- A “sibling” of HTML, derived from SGML - ISO Standard 8879:1986(E).
- Structure: Name/Value pairs, eg.:
`<Name> Klaus </Name>`



Where does XML fit in?



HL7 and XML

- HL7 V2.x can be encoded in XML!
 - V2.3, V2.3.1 and V2.4 have XML encoding specifications!
 - Easier to read, but voluminous (~7x)!
 - Cool!?
- HL7 V3 is committed to XML encoding.



XML Example

Example: **Klaus D. Veil**

V2.x encoding:

...|**Veil^Klaus^D**|...

XML encoding:

<PatientName>

<Surname> **Veil** </Surname>

<FirstName> **Klaus** </FirstName>

<MiddleName> **D** </MiddleName>

</PatientName>



International HL7 Calendar

- March 5 - 6, 2003: HL7 Australia Meeting, Brisbane, Australia
- April 27 - May 2, 2003: HL7 Working Meeting, Cleveland, USA
- May 4 - 7, 2003: MIE 2003, St Malo, France
- **Aug. 13 - 14, 2003; 3rd HL7 Conference, Sydney, Australia**
- Aug. 21 - 22, 2003: 2nd Cross-Strait HL7 Mtg, Taipei, Taiwan
- Sept. 7 - 12, 2003: HL7 Plenary Meeting, Memphis, USA
- Oct. 16 - 17, 2003: 4th Int. Affiliates Meeting, Daego, Sth. Korea
- Jan. 18 - 23, 2004: HL7 Working Meeting, San Diego, USA
- May 2 - 7, 2004: HL7 Working Meeting, San Antonio, USA
- Sept. 26 - Oct. 1, 2004: HL7 Plenary Meeting, Atlanta, USA
- May 2005: HL7 Working Meeting, Europe

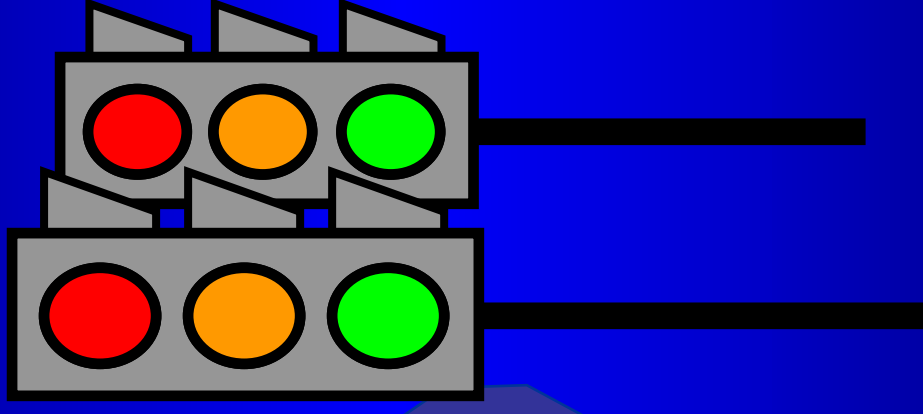
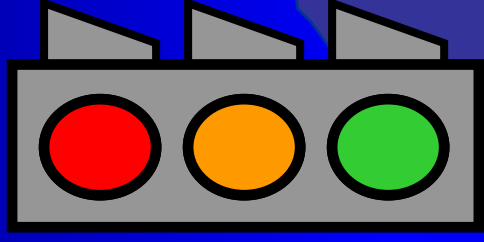
HL7 Events Calendar: www.HL7.org.au/Events



We need to use Standards!

[HL7 Australia: http://www.HL7.org.au](http://www.HL7.org.au)

[HL7 Global: http://www.HL7.org](http://www.HL7.org)



Klaus.Veil@HL7.com.au

