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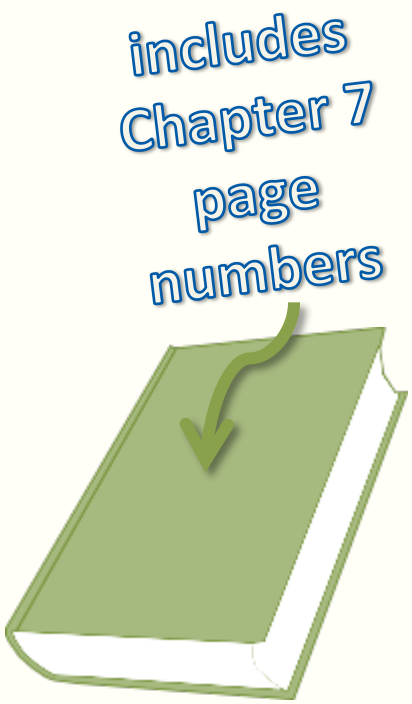
Health Informatics Standards & Health IT Interoperability



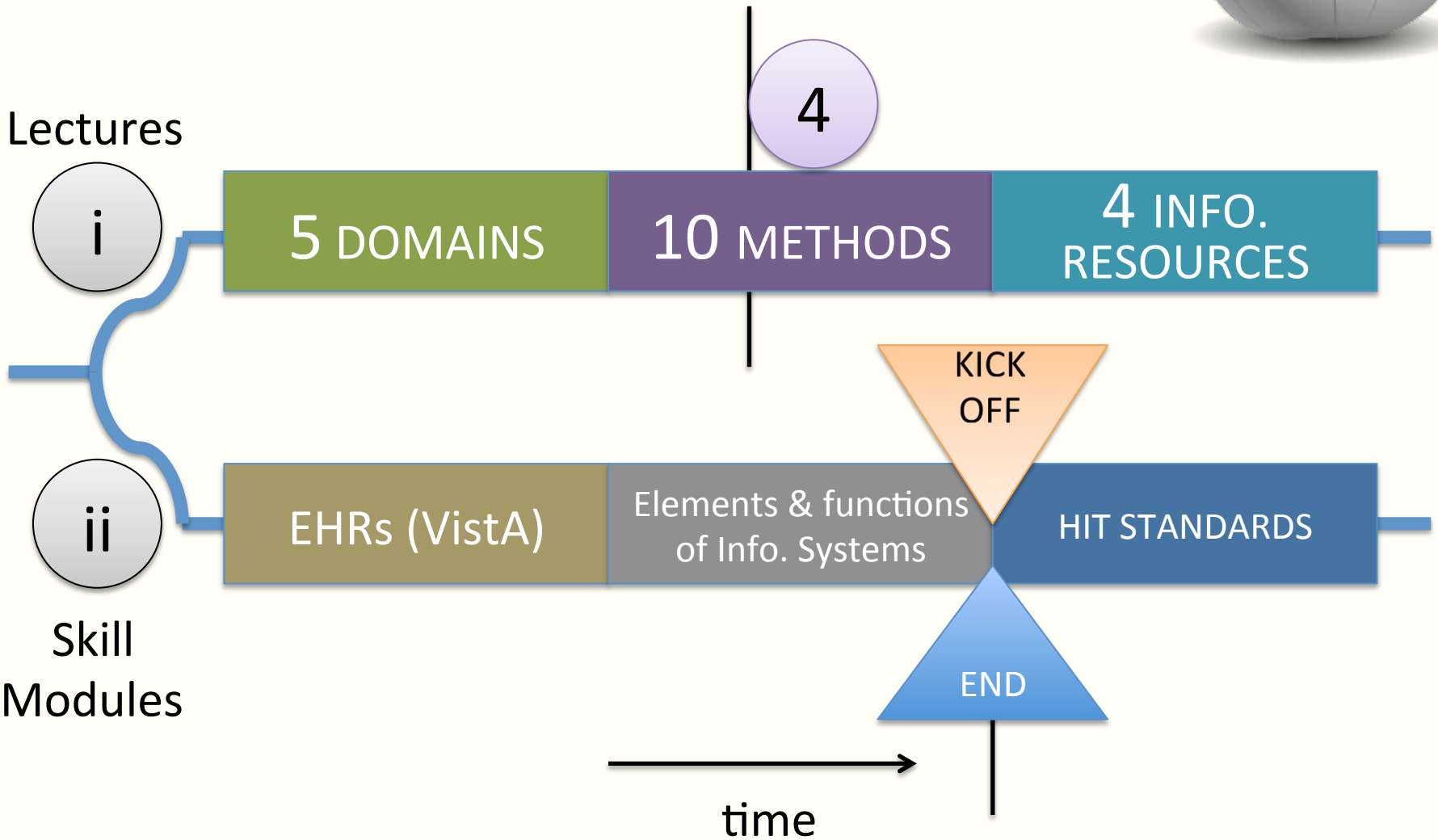
"Providing a framework"

Fall 2013

A. Flynn

University of Michigan
Introduction to Health Informatics Course

Course Map-Week 9



About Skill Module 3

START WITH THE STUDY GUIDE!

I. Readings – Three Types

(a) Textbook Chapter 7

(b) Detail Articles – *note the assigned pages*

(c) Reference Materials

II. SELF STUDY Exercises *in separate folder*

III. SKILL MODULE 3 MASTERY TEST

Health Information Exchange is…

(a) *Verb* "The **electronic sharing** of **health-related** information **among** organizations."

For a similar definition to (a) above of HIE see: p. 17

Health Information Exchange

- HIE is a **process that requires standards**
- HIE addresses health system **fragmentation**
- HIE helps **realize cost & quality gain** from HIT
- Several **pilot approaches** to HIE are being tried
- Many **barriers to HIE** remain **including work needing to be done to develop standards**

Key computing concepts…

- Free text vs. Coded data
- Syntax vs. Semantics
- Communication requires *shared* syntax and semantics

Communication Breakdown?

Why do we need data interchange standards in healthcare?

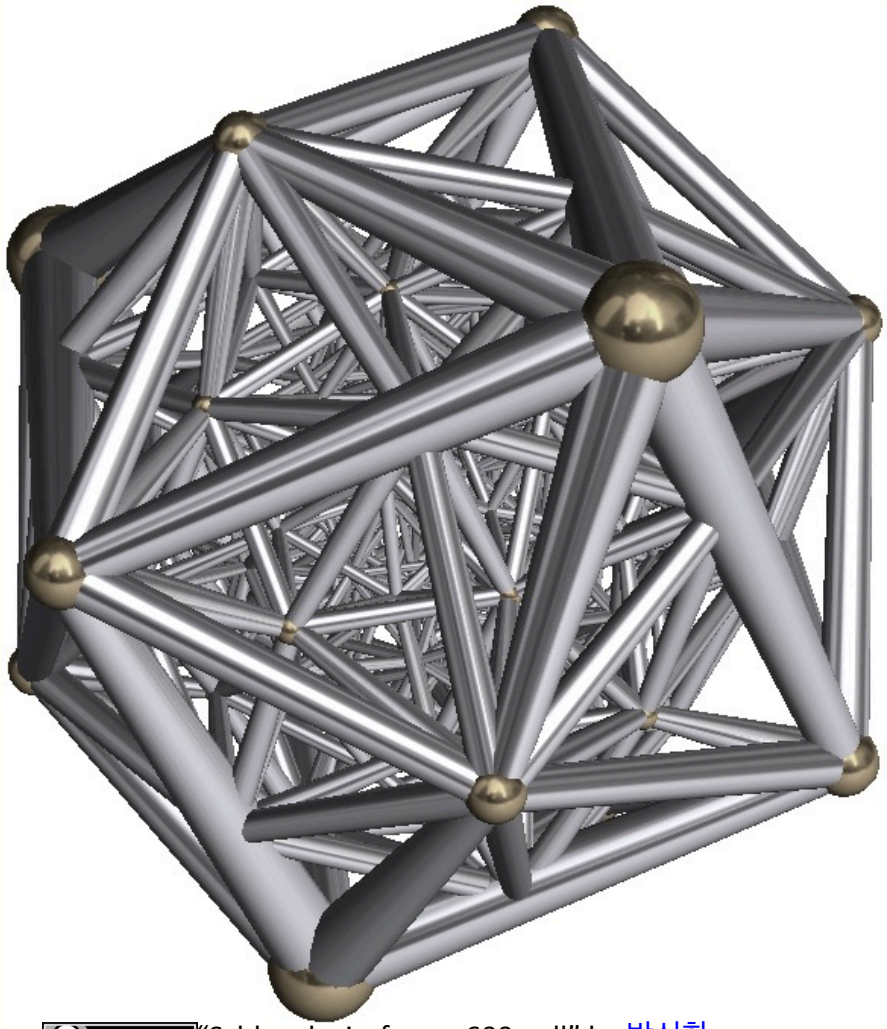
acetaminophen (Tylenol) 160mg/5mL, give 42mg every evening (5mL)

Standards can help to <u>diminish</u> ambiguity.

What you Need to Know

1. Definition/Characteristics of **Standards**
2. HIT Data Interchange Standard *Types*
3. Coded data vs. free text
4. Message vs. document standards
5. Semantic "content" vs. syntax
6. Position Dependent vs. Tagged Field syntaxes
7. Definition of **Interoperability**
8. What is a User Story in a Use Case?

Agenda



BY-SA "Schlegel wireframe 600-cell" by 박신환

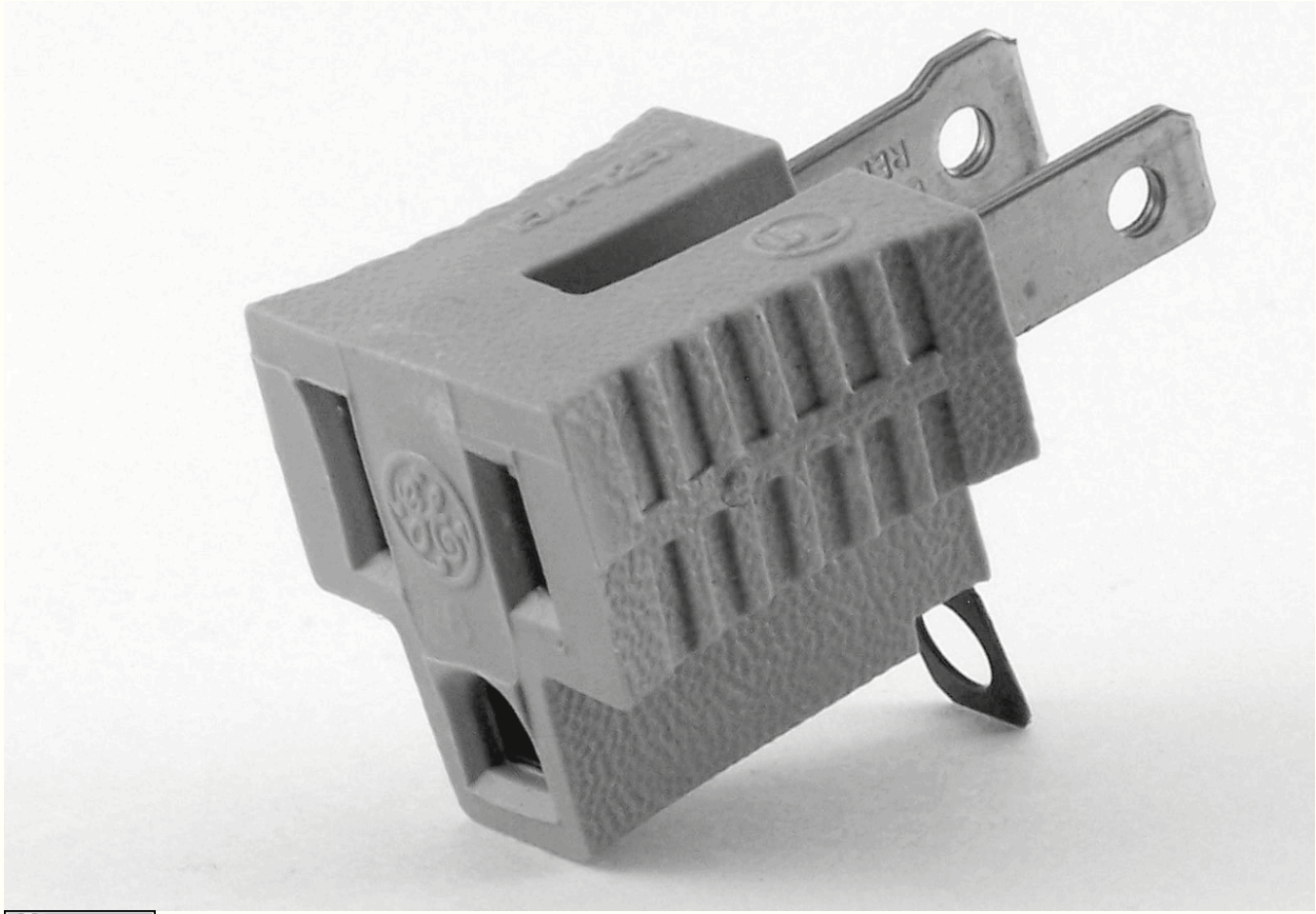
Giving a Framework

"a basic structure"

1. Standards, in general
2. Standards in HIT
3. Interoperability

STANDARDS, in general

What is a standard?



(cc) BY “Cheater plug edited” by PleaseStand

A standard is . . .

"a set of rules or definitions that specify how to carry out a process or produce a product"

– Hammond & Cimino, Ch. 7

"a specification approved by a recognized body and made available to the public"

– Intelligent Transport Systems, U.K.

"an acknowledged measure for comparison"

– The Free Dictionary

"a document, established by consensus that provides rules, guidelines or characteristics for activities or their results – Am. Natl. Standards Inst. (ANSI)

A standard is . . .

A *defined specification*
of *rules, guidelines, or characteristics* made
available to the public.

- Definition for this course

de facto or *de jure*?

de facto –unofficial but predominant, "in fact"

e.g., ½ inch spacing of rollers in a bicycle chain

Image Removed Due to Copyright

de jure – obligatory, required by regulation, "concerning law"

e.g., a building code requires newly installed residential, outdoor water spigots to have pressure relief valves to prevent pipe bursts

Drawing from http://patentpending.blogs.com/patent_pending_blog/2005/02/the_roller_chai.html , october 2013.

Why are PDFs difficult to edit?

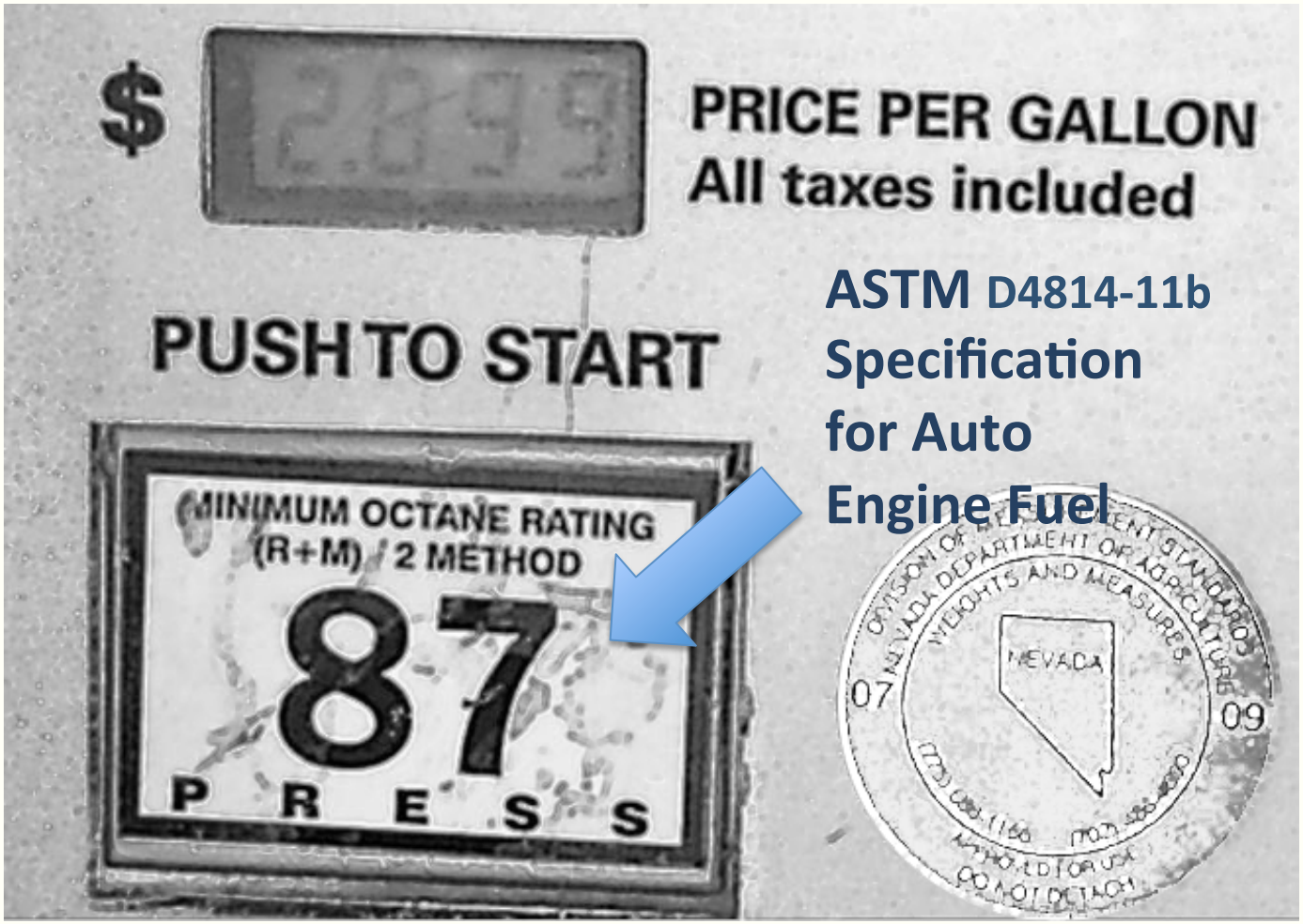
The **intent** of the PDF file standard is to facilitate exchanging and viewing - *but not editing*

The PDF standard includes specified security provisions for "conforming writers"

Image Removed Due to Copyright

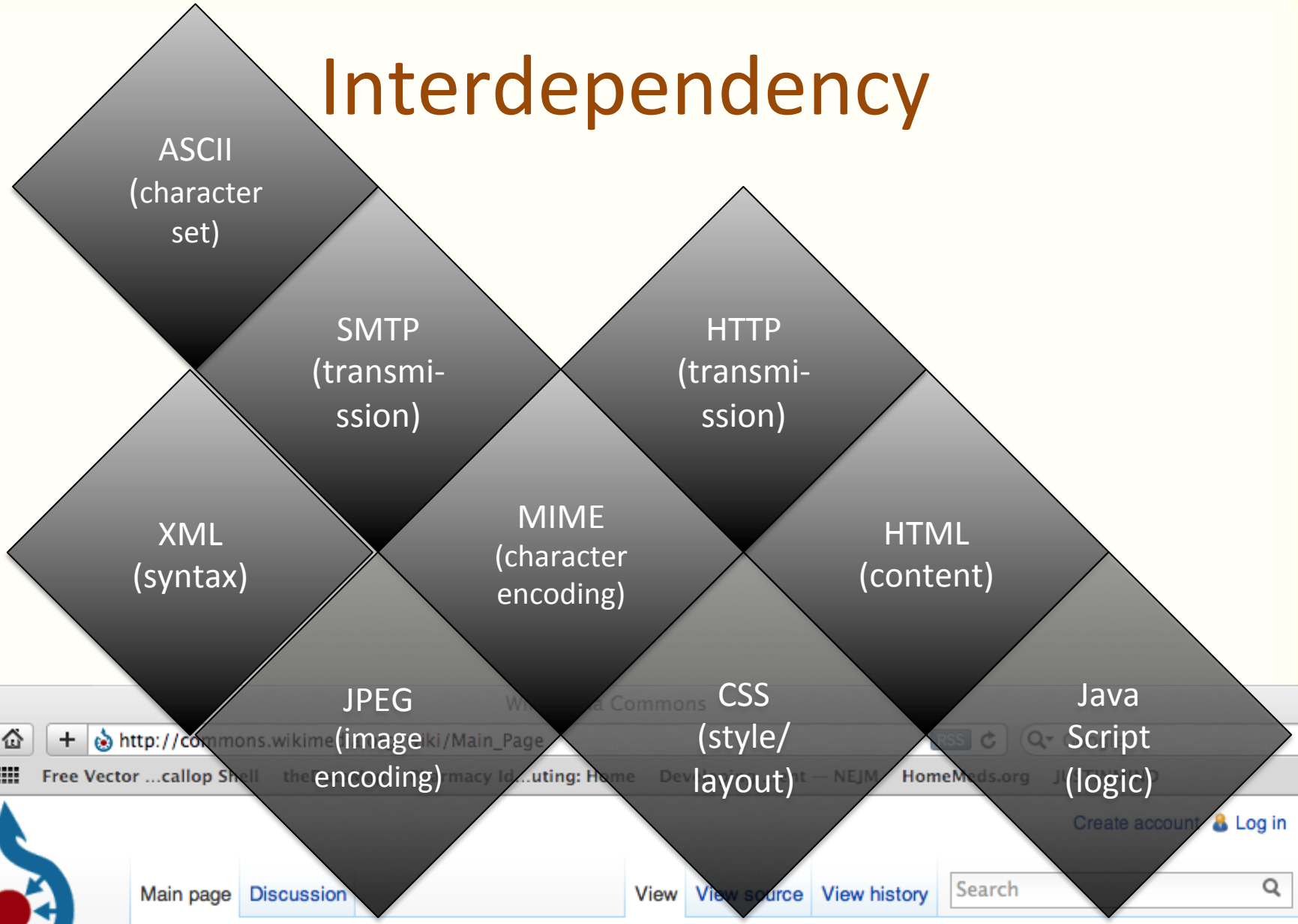
ISO 32000-1:2008 specifies a digital form for representing electronic documents to enable users to exchange and view electronic documents independent of the environment…

Compliance



ASTM D4814-11b Specification for Auto Engine Fuel

Interdependency



Incremental adoption

Corporate Average Fuel Economy (CAFE) Standards

US DOT & US EPA

↓ fuel consumption

↓ greenhouse gas emissions

'average fleet' of cars will have

54.5 mpg ***by 2025***

About Standards, generally

1. May be *de facto* or *de jure*
2. INTENT matters, and may constrain SCOPE OF USE
3. COMPLIANCE is not guaranteed, and so must be validated and/or CERTIFIED
4. Many INTERDEPENDENT standards are usually needed to achieve ultimate aims
5. INCREMENTAL ADOPTION of standards can facilitate their implementation and use

Health Care Informatics Standards

'Standards in Health IT'

Several Data-Interchange Standards used in Health Care

Security of data

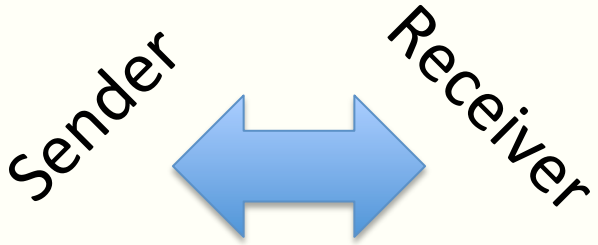
Transport of data from A → B

Syntaxes – 'format', sequence + structure

Terminologies and Code Sets

Data Interchange

TYPES of Data-Interchange Standards



From Hammond WE, Cimino JJ, Chapter 7

Terminologies and Code Sets

Nomenclature - names
Terminology - terms
(Standard) Vocabulary
Code set

*From Chapter 7, Biomedical Informatics – Computer Applications in Healthcare and Biomedicine

What is a formalism?

"a **rigorous definition** of a fuzzy or non-evidently sharp concept"

– Arkoudas K, Principles of Computation and Relative Computation, 1994

Known benefits of formalisms

1. Organize knowledge systematically
2. ↓ ambiguity (resolve borderline cases)
3. Facilitate the formulation of laws (rules)
4. Facilitate the **genesis of standards**

International Classification of Disease uses *formalisms*

Terminologies and Code Sets

<u>XI Diseases of the Digestive System K00-K93</u>

K35-K38 Diseases of appendix

Included:

K35 “Acute appendicitis”

K35.2 “Acute appendicitis with generalized peritonitis”

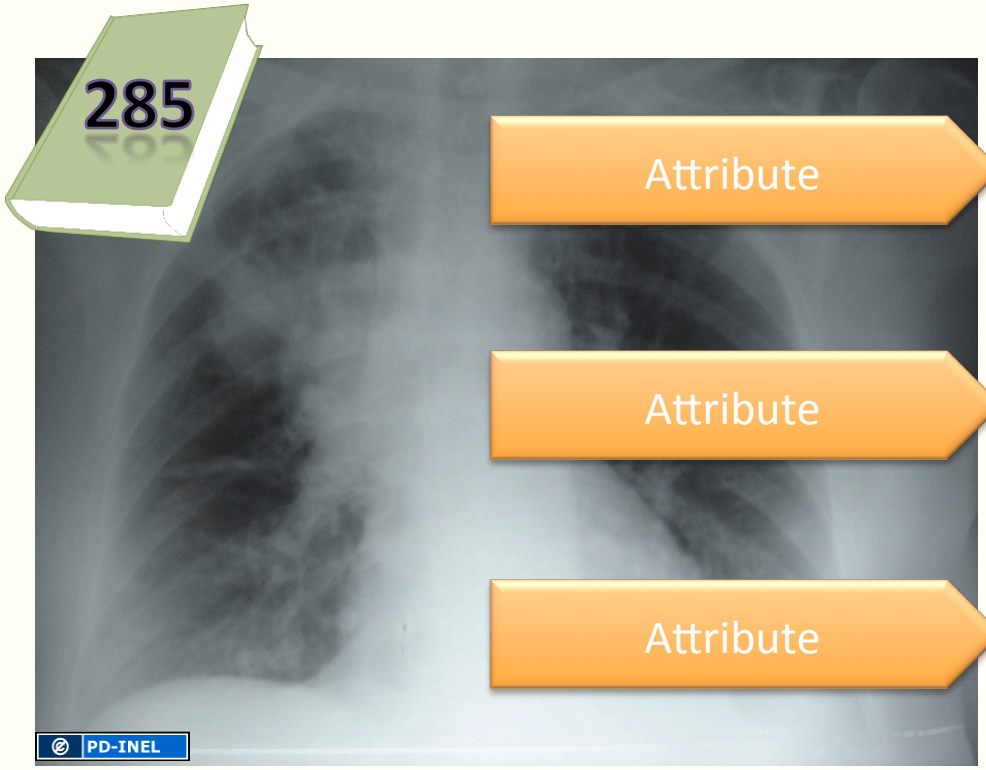
Excluded:

XI <u>excludes</u> *cancers* C00-D48

SNOMED uses *formalisms*

Terminologies and Code Sets

Systematized Nomenclature of Medicine



BACTERIAL PNEUMONIA

Is An

INFECTIOUS DISEASE OF THE LUNG

Causative Agent

BACTERIUM

Associated Morphology

INFLAMMATION

A standard is . . .

A *defined specification*
of *rules, guidelines, or characteristics*
made *available to the public*.
- Definition for this course

Several Data-Interchange Standards used in Health Care

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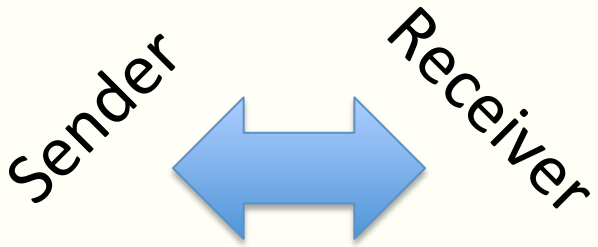
TYPES of Data-Interchange Standards



Syntaxes – 'format', sequence + structure

1. Position Dependent

1500|N|Elm|Ave|Jackson|MI|49202

2. Tagged Field

<address><st_num>1500</st_num>
<direction>N</direction><street>Elm
</street><st_type>Ave</st_type>
<city>Jackson</city><state2L>MI</state2L>
<zip5>49202</zip5></address>

from
FDA Structured Product
Label for Flovent Diskus®

Syntaxes – 'format', sequence + structure


```
<component><section>
<code code="34067-9" codeSystem="2.16.840.1.113883.6.1"
displayName="INDICATIONS &amp; USAGE SECTION"/>
<title>1 INDICATIONS AND USAGE</title> <text>
<paragraph>FLOVENT DISKUS is an inhaled corticosteroid indicated
for: </paragraph>
<list listType="unordered"><item><caption>•</
caption>Maintenance treatment of asthma as prophylactic therapy
in patients 4 years and older. (1)</item><item>
<caption>•</caption>Treatment of asthma for patients requiring
oral corticosteroid therapy. (1)</item></list>
<paragraph>FLOVENT DISKUS is NOT indicated for the relief of acute
bronchospasm. (1)</paragraph></text>
</section></component>
```


From public SPL file f4408f95-d9c4-45b8-acd8-5db2d04766b3.xml

Several Data-Interchange Standards used in Health Care

Security of data

Transport of data from A → B

Syntaxes – 'format', sequence + structure

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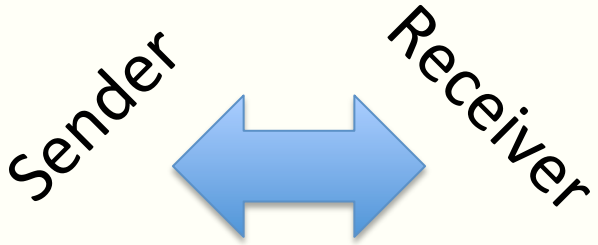
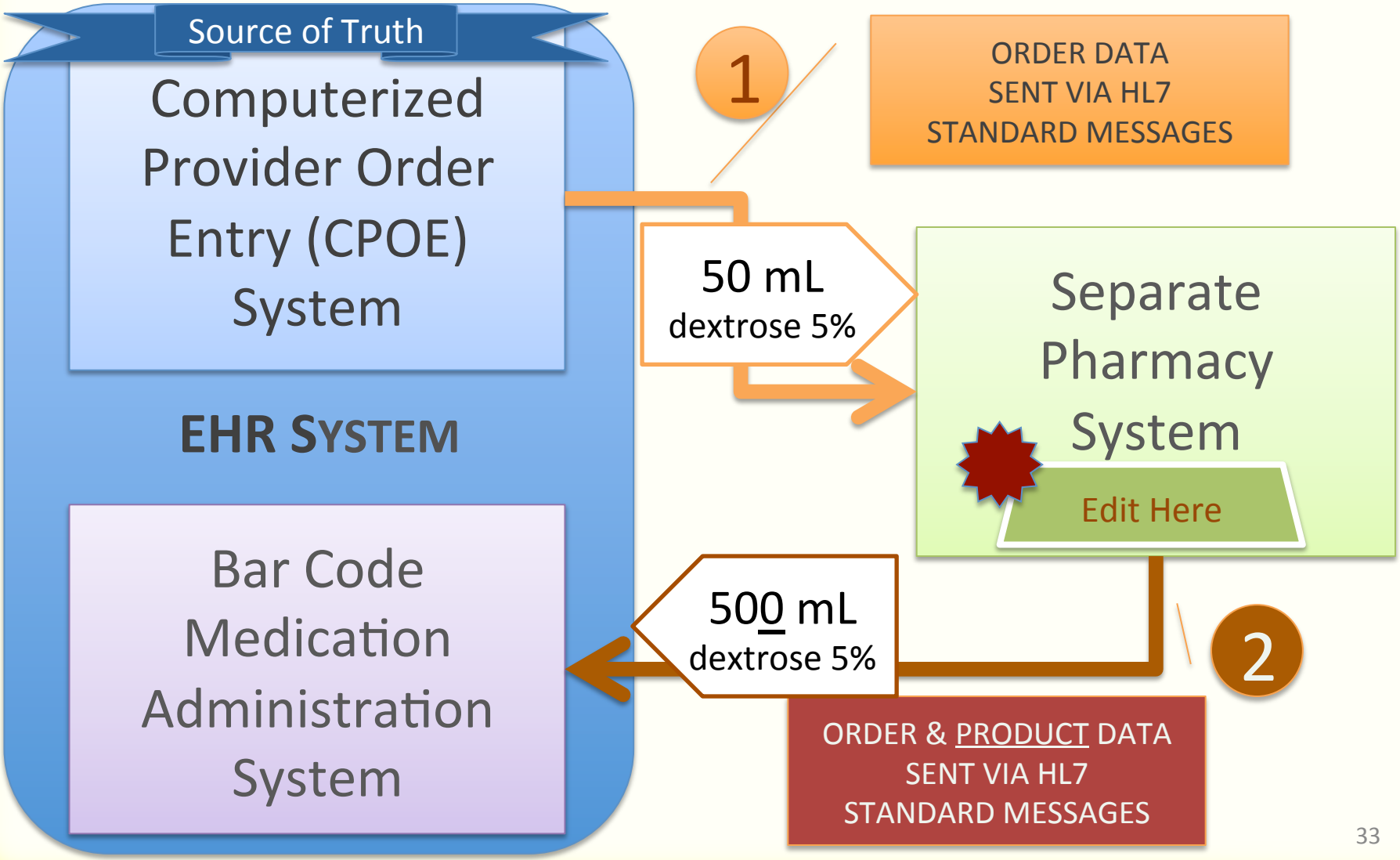
Data Interchange

TYPES of Data-Interchange Standards



Utilized standards. Still failed?



Interoperability

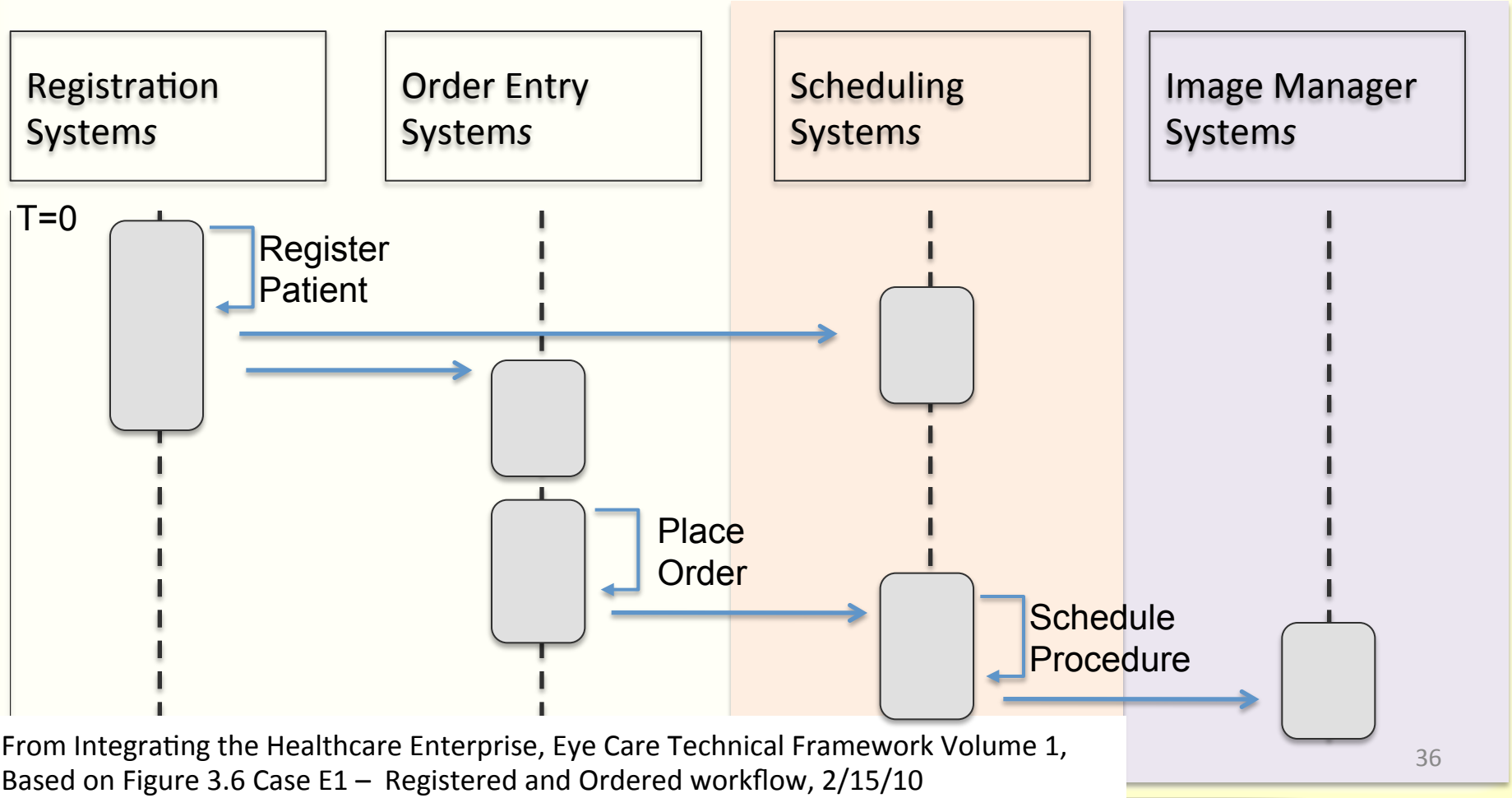
Interoperability is* . . .

"Interoperability means the ability of health **information systems to work together** within and across organizational boundaries in order to advance the effective delivery of health care for individuals and communities."

- Health Information Management Systems Society Integration and Interoperability Steering Committee, 2005

*Definitions of interoperability vary. This definition will be the 'course' definition.

"Work Together" (Interoperability): >1 organization & >1 type of system, multi-person **workflow sequence**



From Integrating the Healthcare Enterprise, Eye Care Technical Framework Volume 1, Based on Figure 3.6 Case E1 – Registered and Ordered workflow, 2/15/10

Use Case Snippet Example

"Close Loop Referral"

Primary Care Physician's Office (assess)

EHR-1 *sends referral message to* EHR-2

Specialist's Office (assess/treat)

EHR-2 *sends consult message back to* EHR-1

Primary Care Physician's Office (evaluate)

EHR-1 *sends annotated message to* PHR-1

Patient's Home (consider/undergo/do)

Paraphrase of "Draft_Close_Loop_Referral_Use_Case_SI_TOC_3.14.11.docx accessed at http://wiki.siframework.org/ToC+-+User+Stories+SWG on 9.12.12

User Story Example

"Close Loop Referral"

	EVENT in the Story	System(s) Used	Trigger for Intended Outcome of Closed Loop Referral
1	AJ, a 30 year old female, goes to see her doctor for a mole on her toe	Registration system Office EHR-1	
2	Mehdi, AJ's doctor refers AJ to a dermatologist	Office EHR-1 Office EHR-2	EHR-1 triggered to send EHR-2 an e-referral
3	Diana, the dermatologist removes the mole and sends consult note and treatment update	Office EHR-2 Office EHR-1	EHR-2 triggered to send "referral completed" message to EHR-1
4	Mehdi reads the consult note and update, and notifies AJ he has read them by secure e-mail	Office HER-1 AJ's eMAIL client	

Paraphrase of "Draft_Close_Loop_Referral_Use_Case_SI_TOC_3.14.11.docx accessed at http://wiki.siframework.org/ToC+-+User+Stories+SWG on 9.12.12

What we did and did not cover today

1. Definition/Characteristics of **Standards**
2. HIT Data Interchange Standard *Types*
3. Coded data vs. free text
4. Message vs. document standards
5. Semantic "content" vs. syntax
6. Position Dependent vs. Tagged Field syntaxes
7. Definition of **Interoperability**
8. What is a User Story in a Use Case?

Conclusion – HIT Standards

"Most of the standards are not complete . . . "

"Standards do **NOT** exist to support **FULLY** the requirements of health professional workstations."

– Hammond WE, Cimino JJ, Chapter 7, p. 308-9

END

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