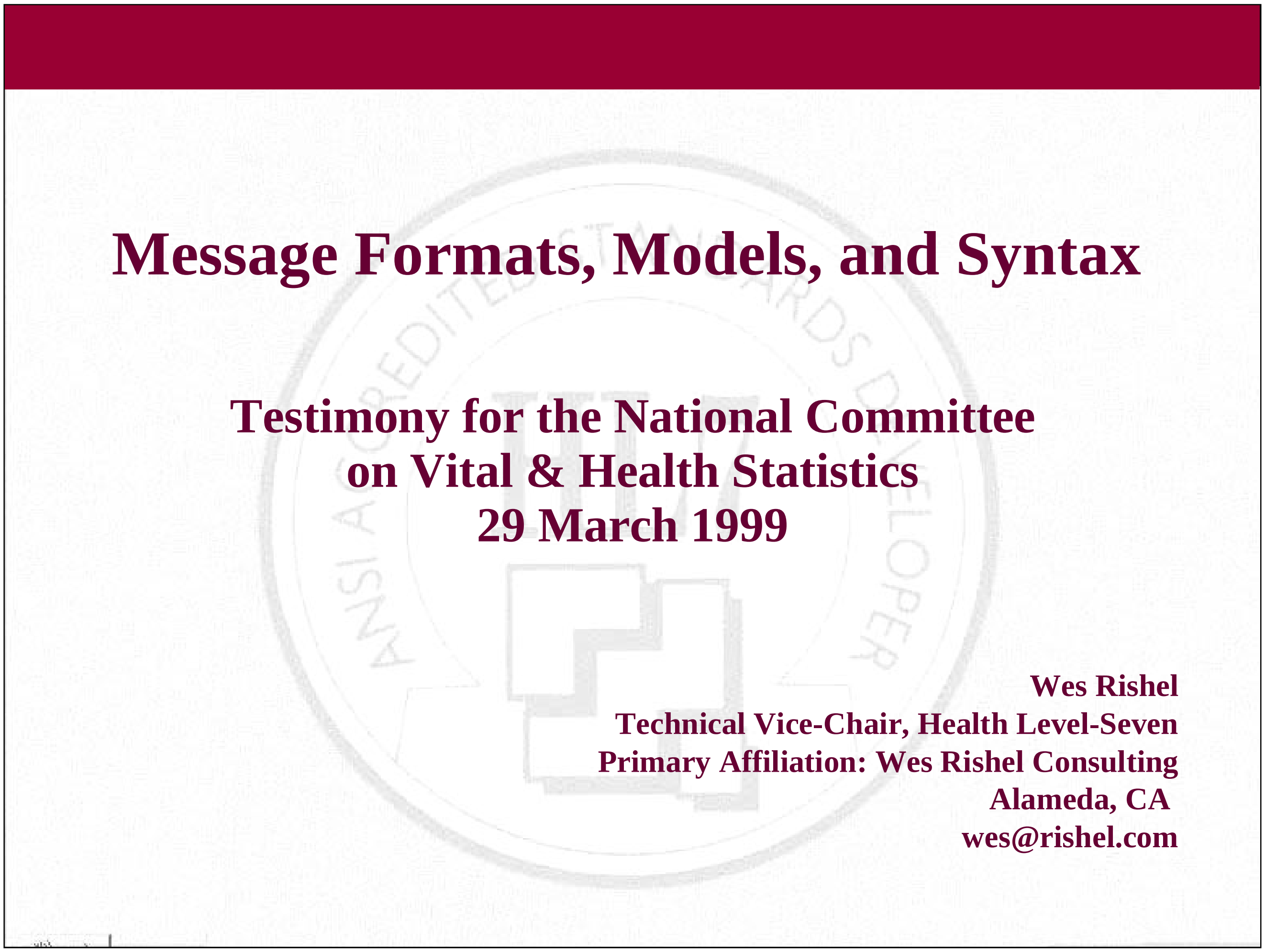

Message Formats, Models, and Syntax

Testimony for the National Committee on Vital & Health Statistics
29 March 1999

Wes Rishel
Technical Vice-Chair, Health Level-Seven
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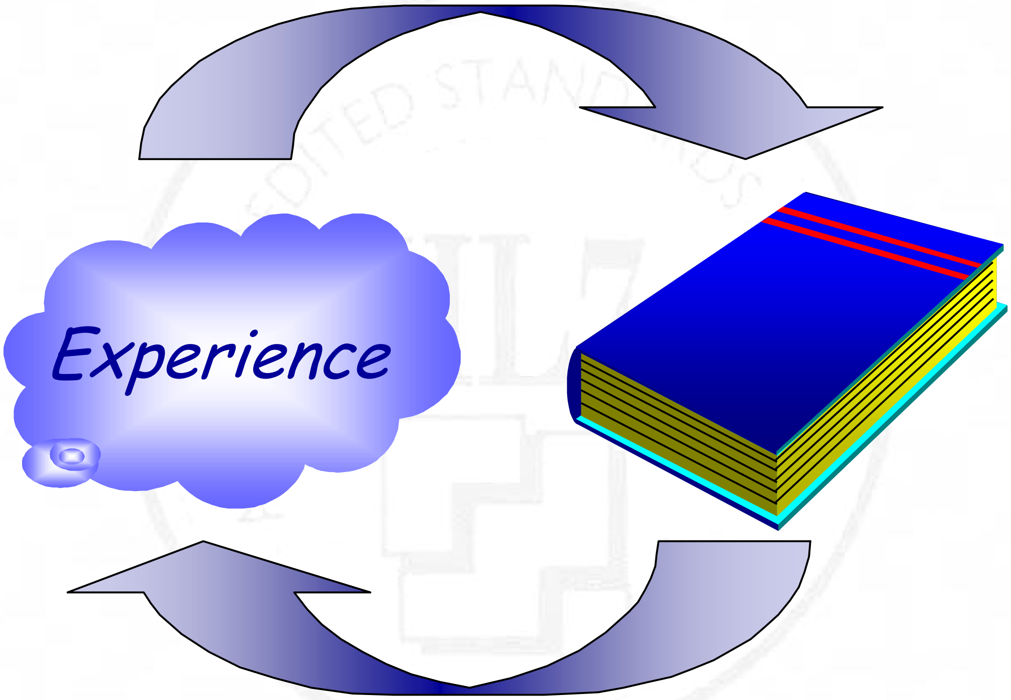
Standards/Experience Cycle


Experience

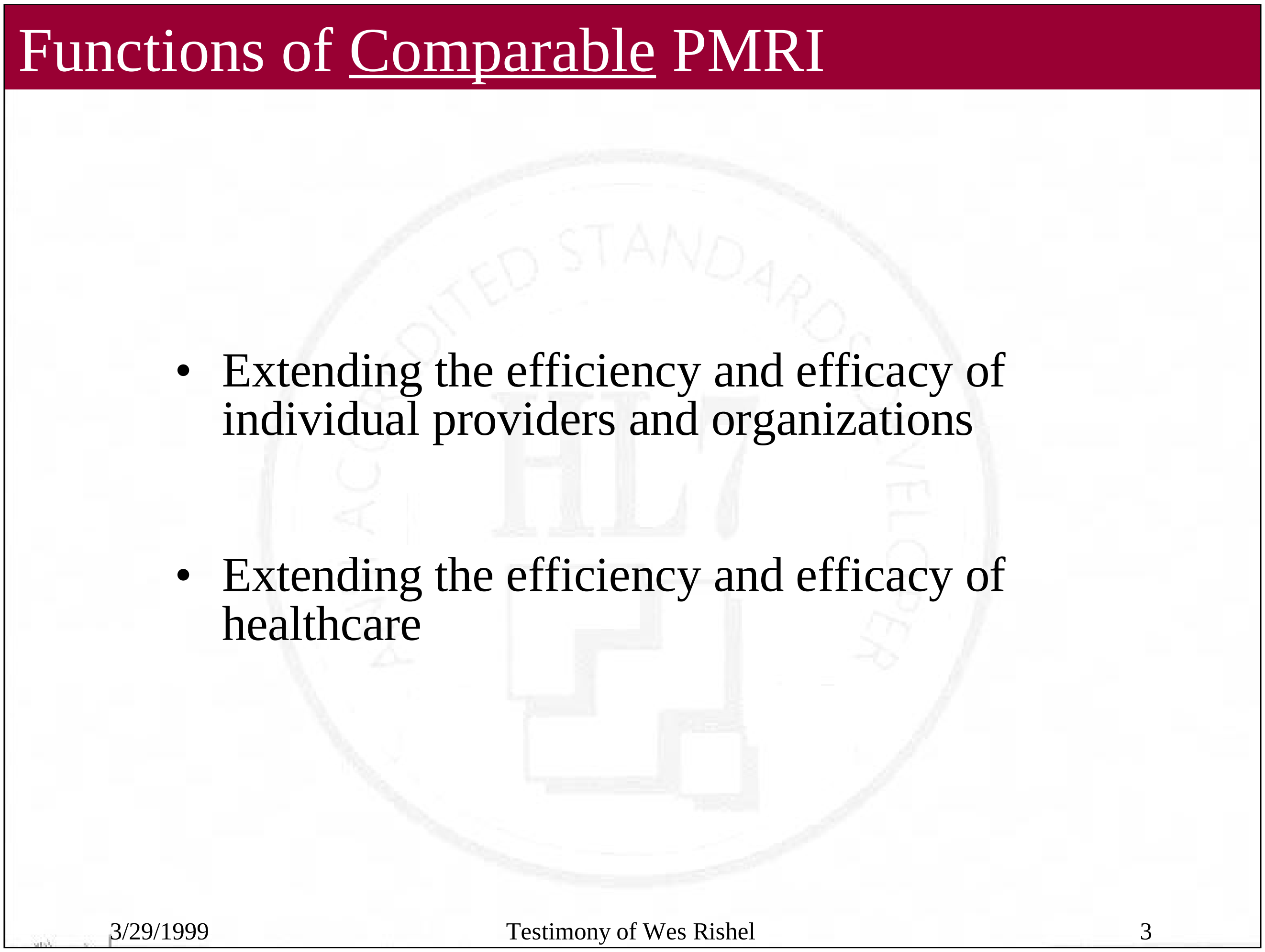
Versions 2.x

Strengths

- ✔ broad functional coverage
- ✔ highly adaptable
  - IS environments differ
  - system capabilities variations
- ✔ vocabulary independent
- ✔ *least common denominator* technological base

Difficulties

- ✔ broad functional coverage
- ✔ highly adaptable
  - “Seen one? Seen one.”
  - vendor capability mismatch
- ✔ vocabulary independent
- ✔ *least common denominator* technological base



Functions of Comparable PMRI

- Extending the efficiency and efficacy of individual providers and organizations
- Extending the efficiency and efficacy of healthcare

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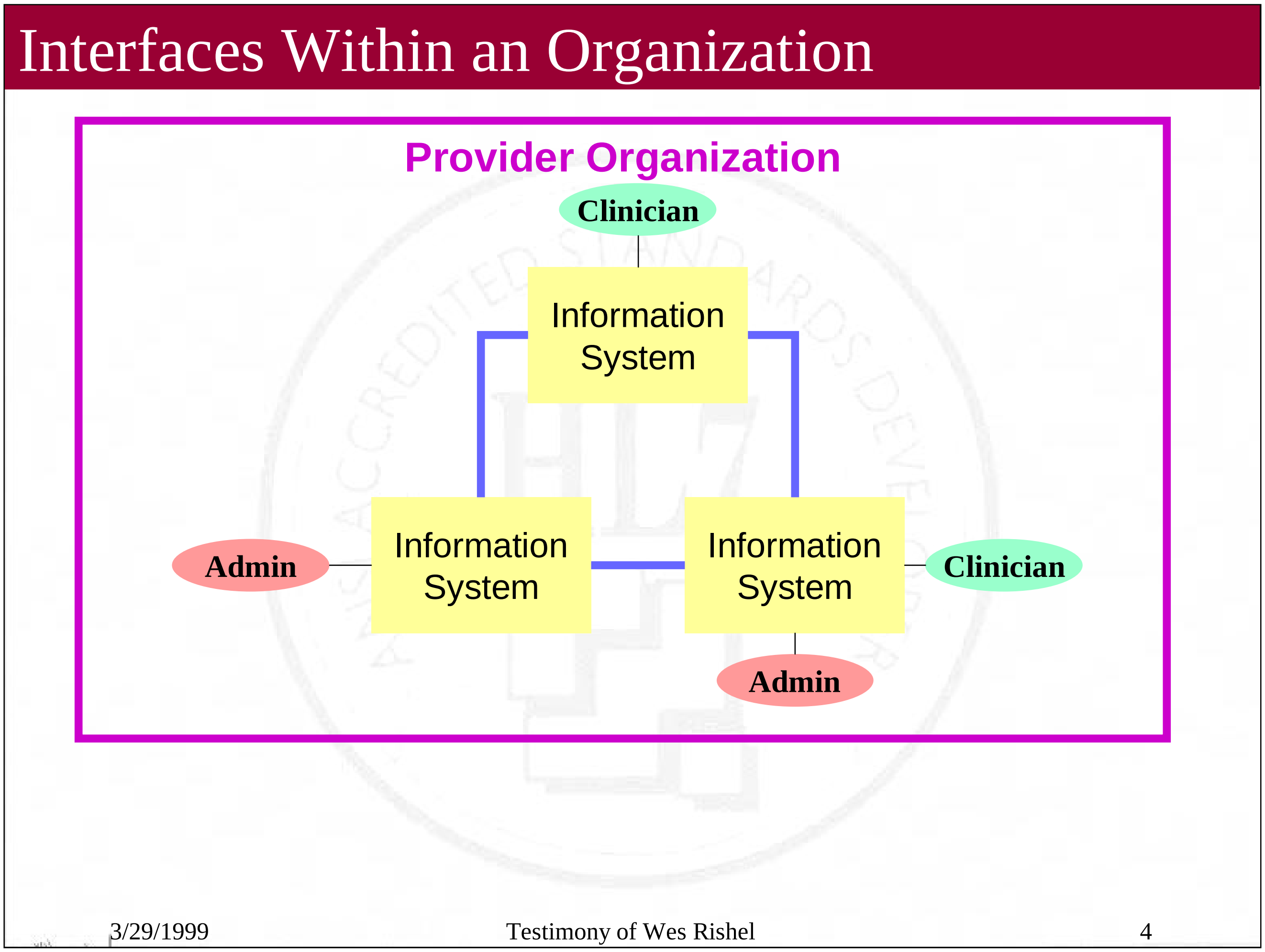
- Extending the efficiency and efficacy of individual providers and organizations
  - availability of current information at the point of care
    - across provider organizations
    - within rapidly changing provider organizations
  - decision support
  - support for standards of assessment and care
  - support for the somewhat bewildering array of administrative constraints on decision making and requirements for supporting data
- Extending the efficiency and efficacy of healthcare
  - evidence-based medicine
  - public health
  - public policy



Interfaces Within an Organization

Provider Organization

Clinician

Information System

Admin

Information System

Information System

Clinician

Admin

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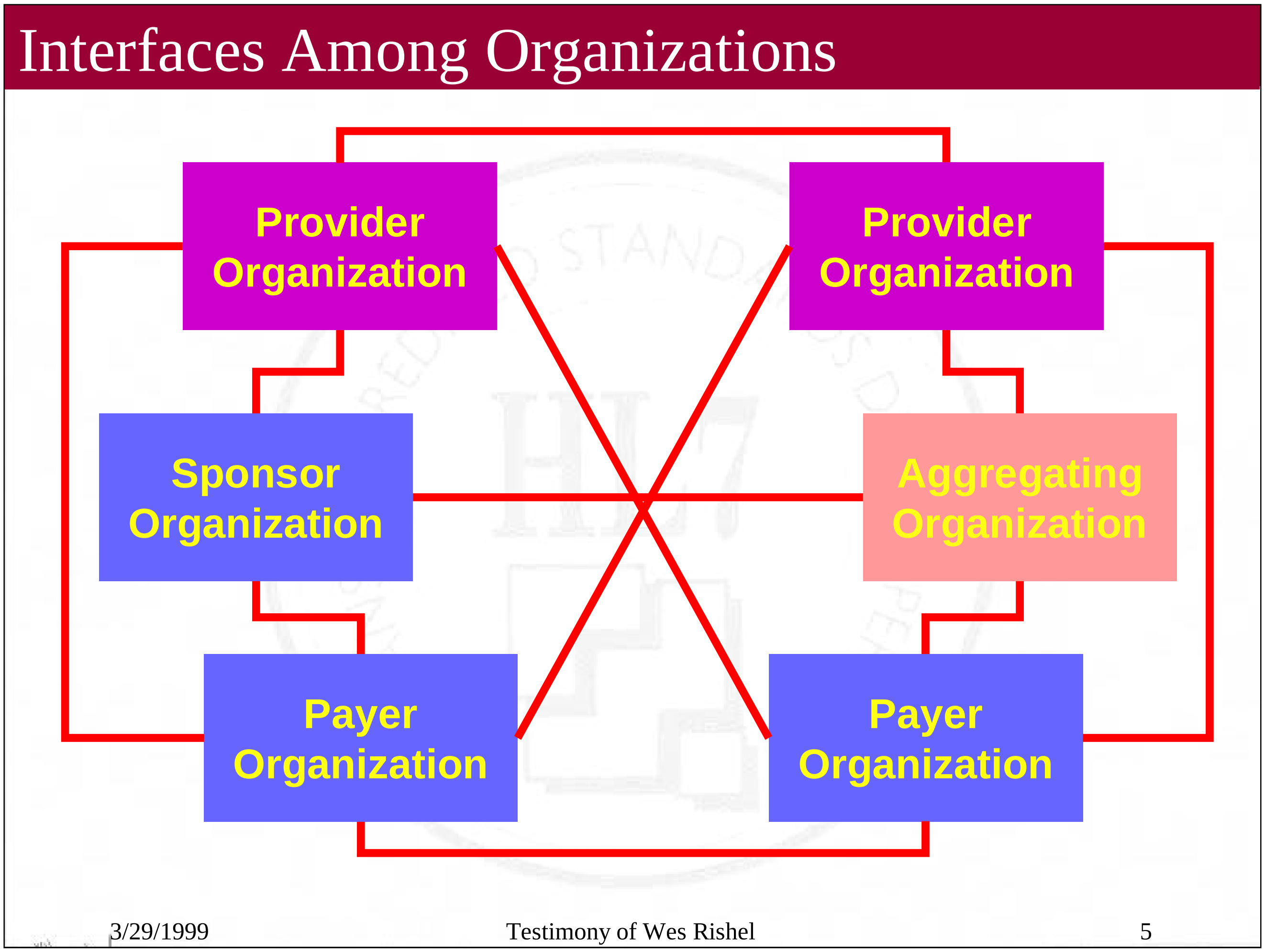
Governmental or societal interest less direct

- assurance of quality
- assurance of availability of information



Interfaces Among Organizations

Provider Organization

Provider Organization

Sponsor Organization

Aggregating Organization

Payer Organization

Payer Organization

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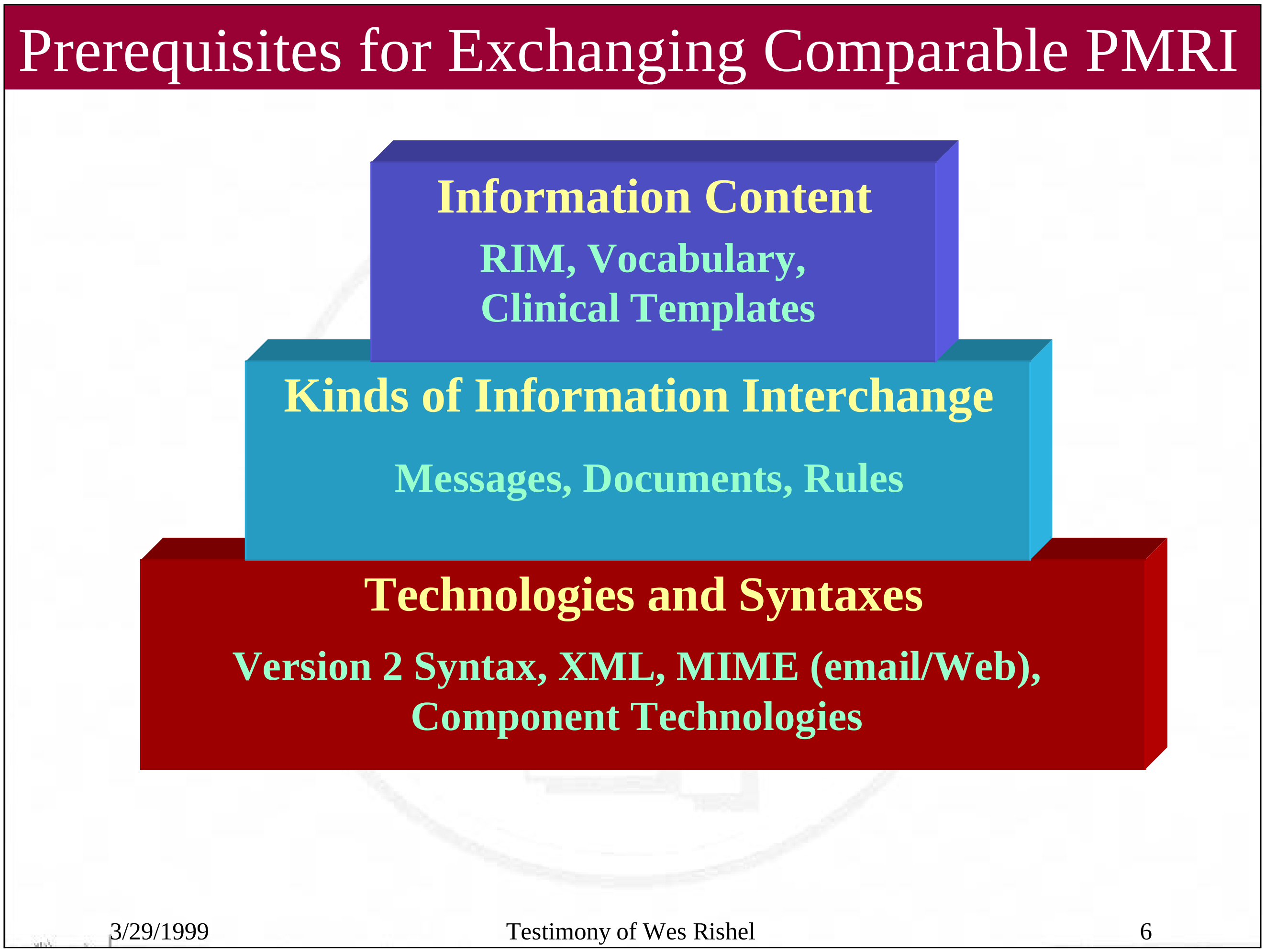
Governmental or societal interest is direct

- cost containment with quality
- assurance of availability of information
- barriers more difficult without government intervention



Prerequisites for Exchanging Comparable PMRI

Information Content

**RIM, Vocabulary,
Clinical Templates**

Kinds of Information Interchange

Messages, Documents, Rules

Technologies and Syntaxes

**Version 2 Syntax, XML, MIME (email/Web),
Component Technologies**

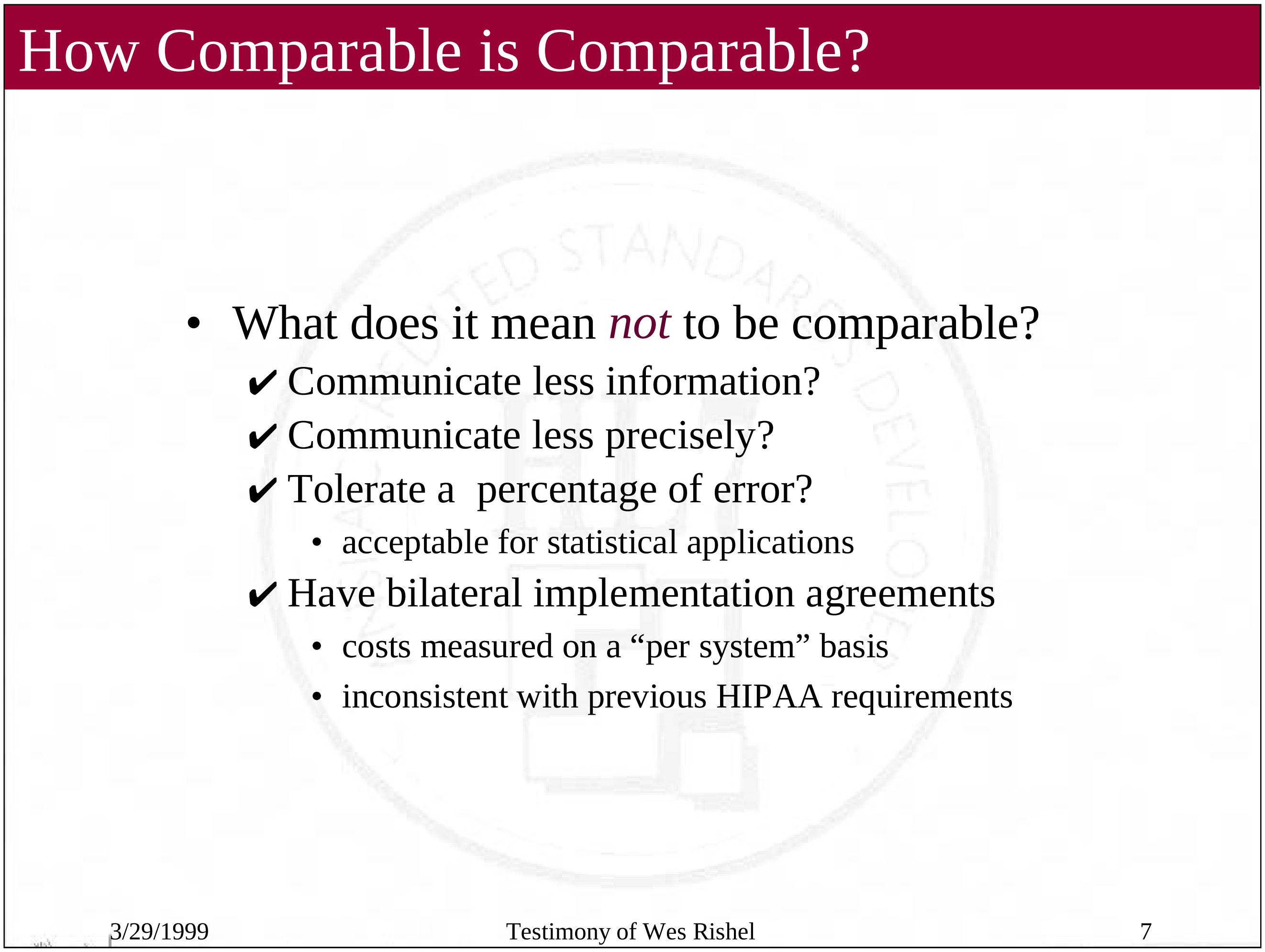
Technologies and syntaxes are important, but the primary challenges are in specifying information content.

Technology and syntax are interrelated

Appropriate combinations of technology and syntax reduce the cost and other barriers to acceptance within the industry

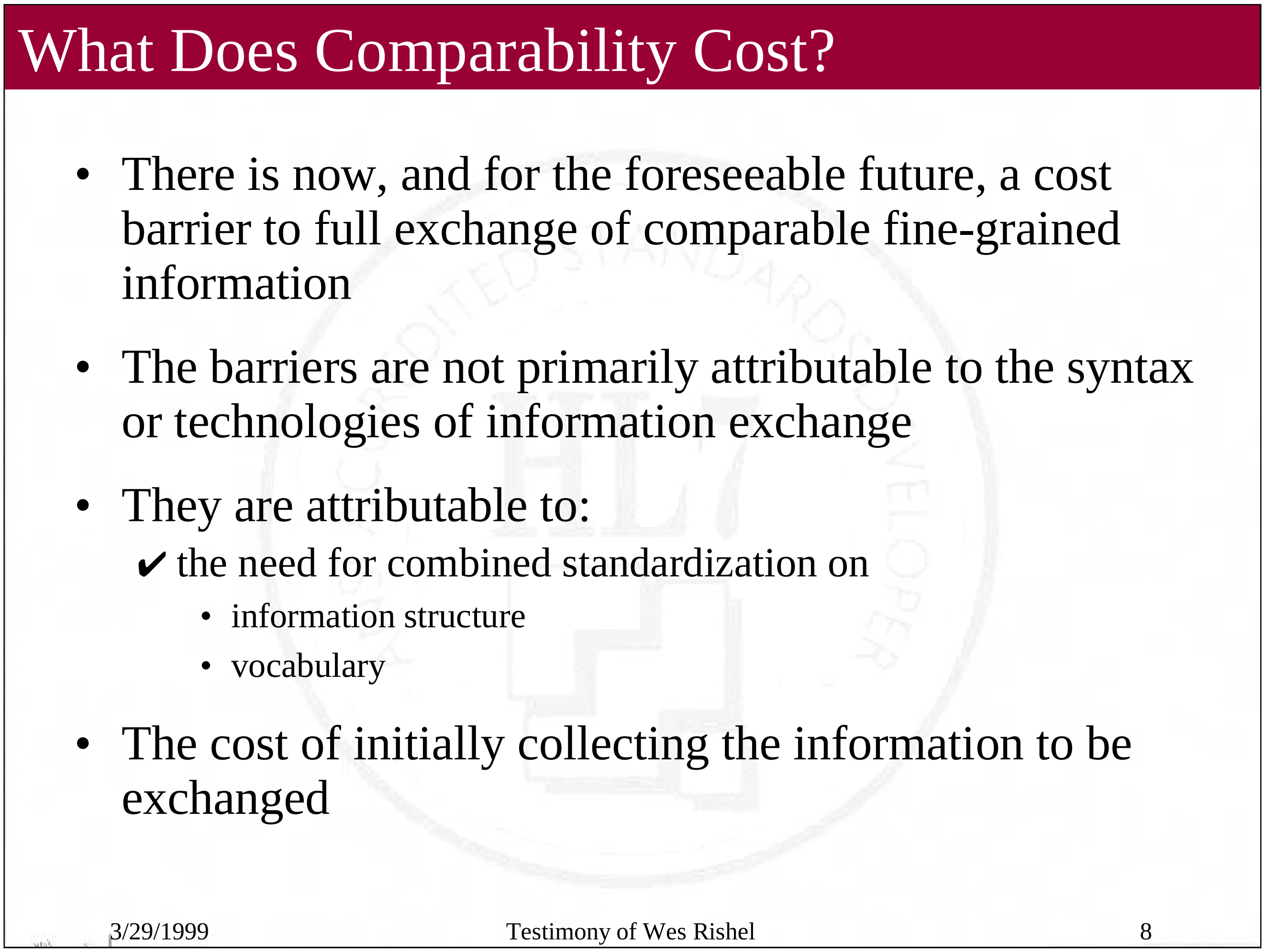
e.g.,

- reduced programming, debugging, and customization costs
- use if the Internet with suitable safeguards for interorganizational information transfer



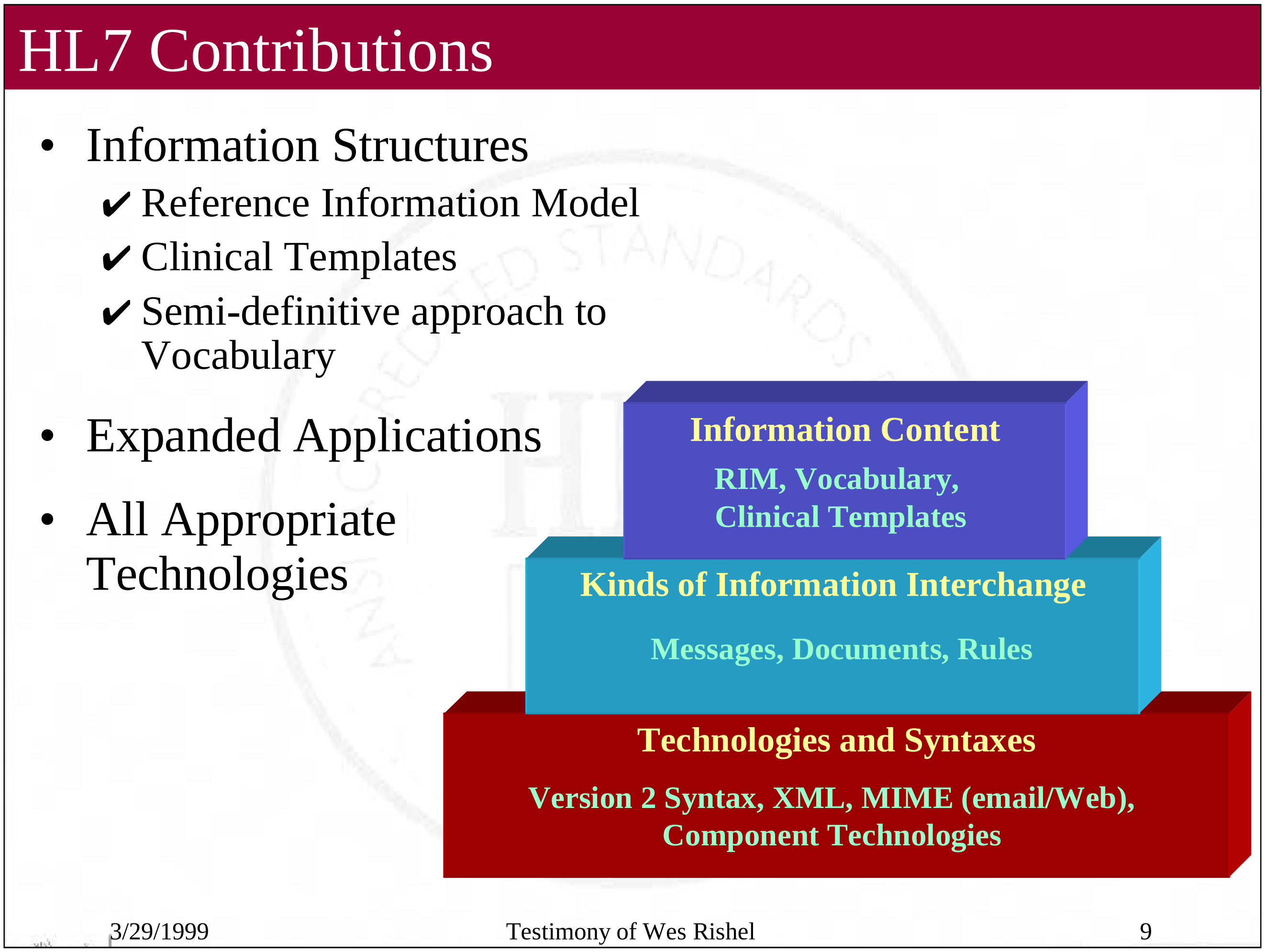
How Comparable is Comparable?

- What does it mean *not* to be comparable?
  - ✔ Communicate less information?
  - ✔ Communicate less precisely?
  - ✔ Tolerate a percentage of error?
    - acceptable for statistical applications
  - ✔ Have bilateral implementation agreements
    - costs measured on a “per system” basis
    - inconsistent with previous HIPAA requirements



What Does Comparability Cost?

- There is now, and for the foreseeable future, a cost barrier to full exchange of comparable fine-grained information
- The barriers are not primarily attributable to the syntax or technologies of information exchange
- They are attributable to:
  - ✔ the need for combined standardization on
    - information structure
    - vocabulary
- The cost of initially collecting the information to be exchanged



HL7 Contributions

- Information Structures
  - ✔ Reference Information Model
  - ✔ Clinical Templates
  - ✔ Semi-definitive approach to Vocabulary
- Expanded Applications
- All Appropriate Technologies

Information Content

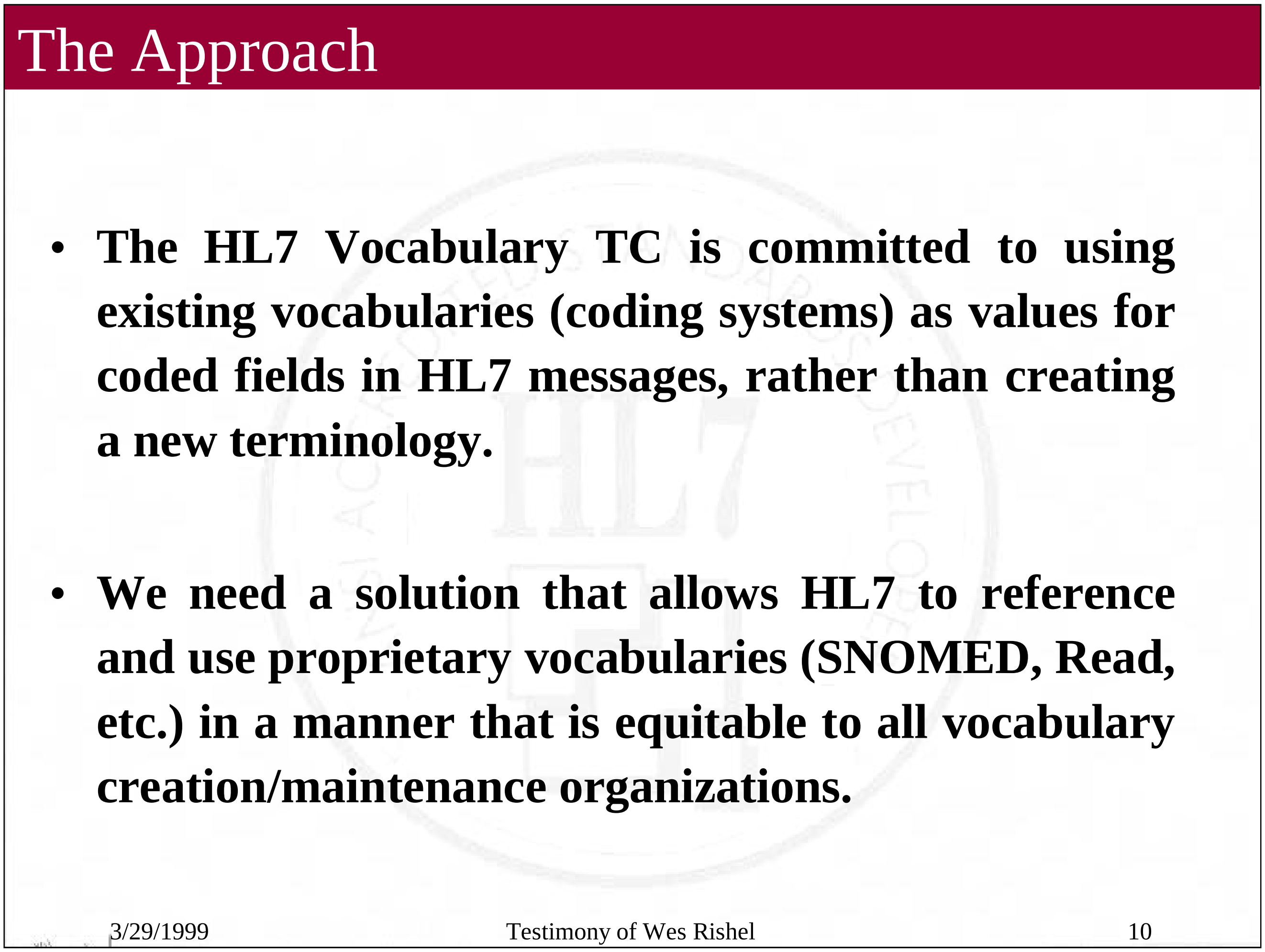
RIM, Vocabulary, Clinical Templates

Kinds of Information Interchange

Messages, Documents, Rules

Technologies and Syntaxes

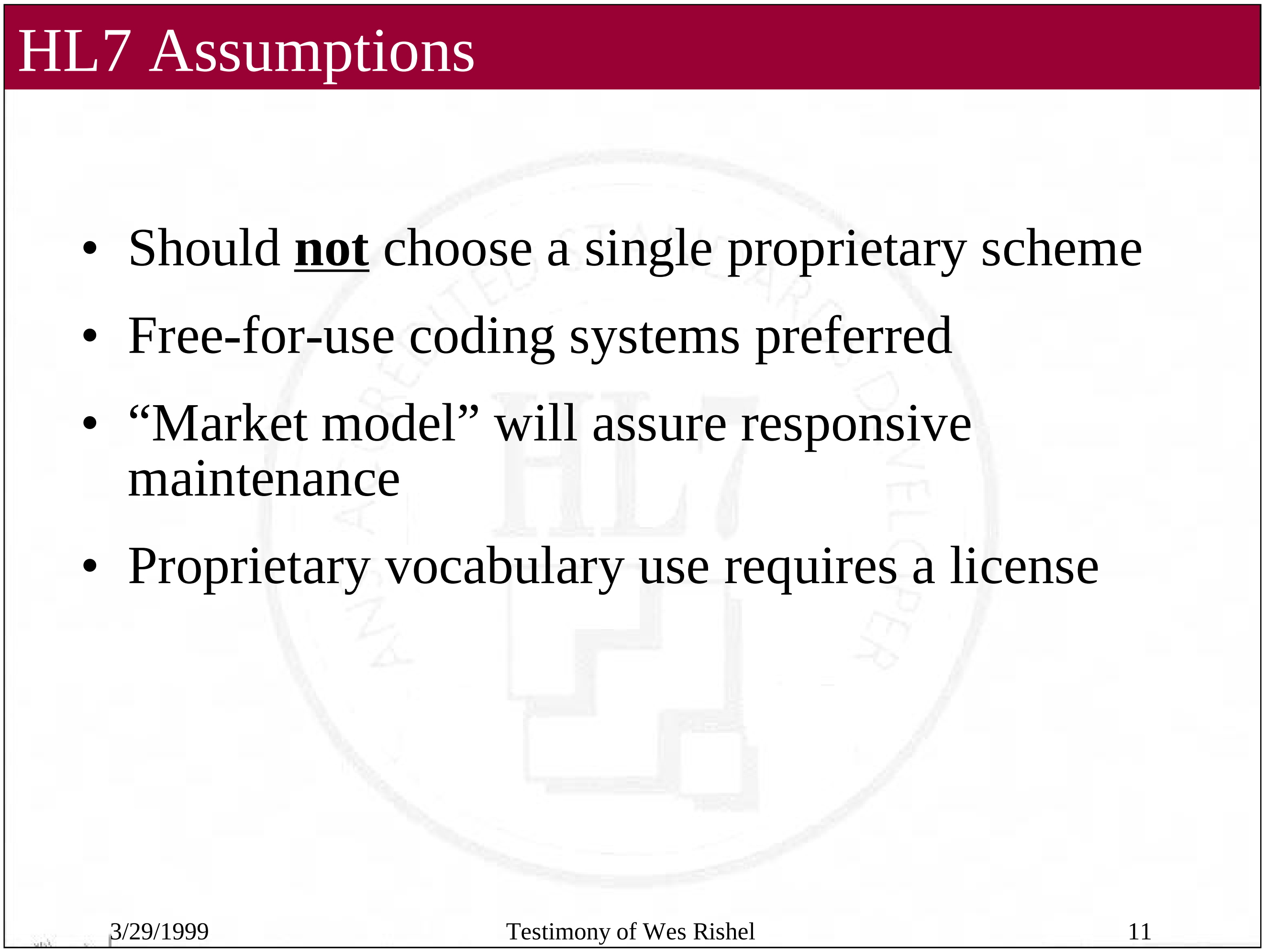
Version 2 Syntax, XML, MIME (email/Web), Component Technologies



The Approach

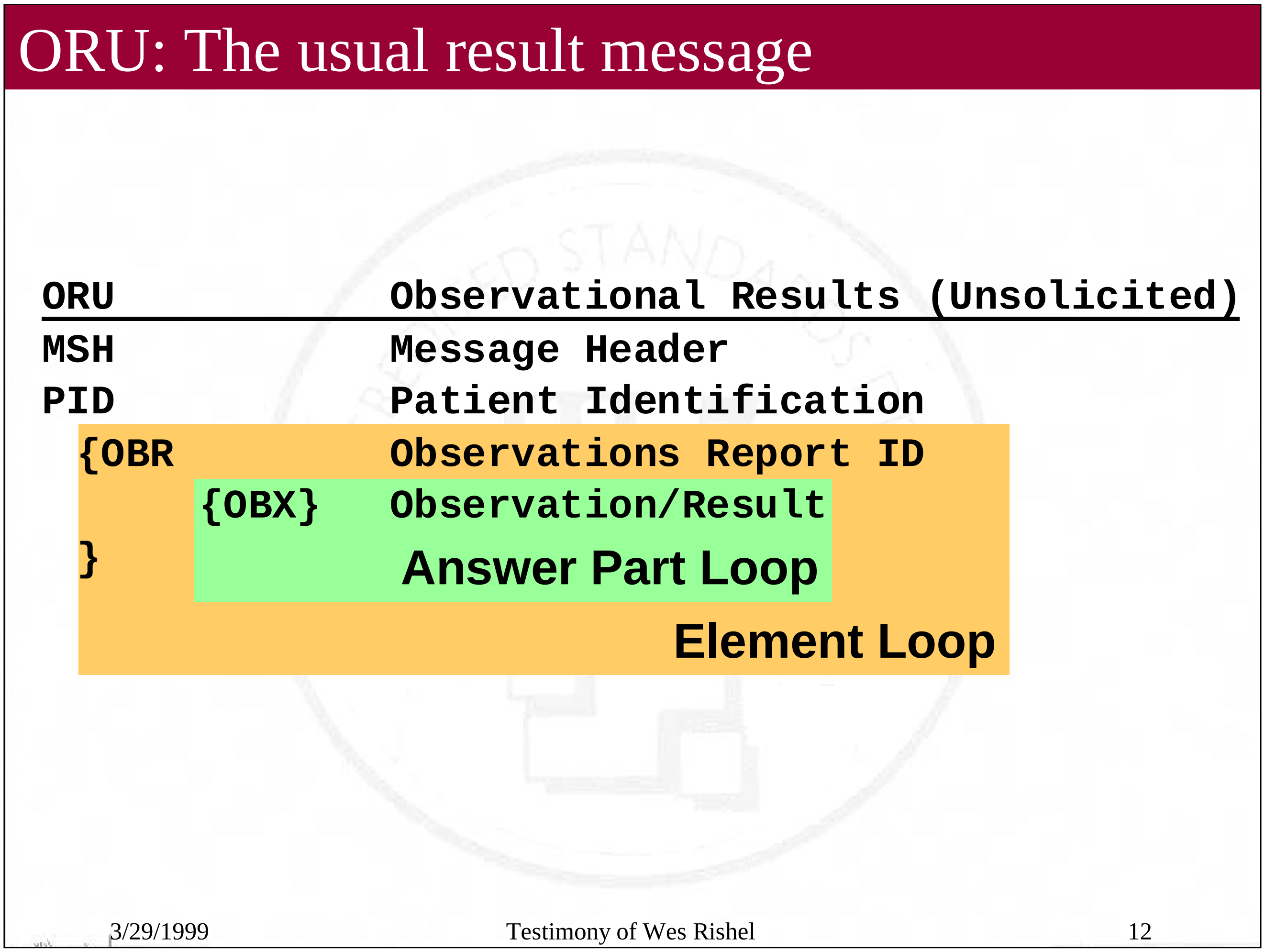
- **The HL7 Vocabulary TC is committed to using existing vocabularies (coding systems) as values for coded fields in HL7 messages, rather than creating a new terminology.**

- **We need a solution that allows HL7 to reference and use proprietary vocabularies (SNOMED, Read, etc.) in a manner that is equitable to all vocabulary creation/maintenance organizations.**



HL7 Assumptions

- Should **not** choose a single proprietary scheme
- Free-for-use coding systems preferred
- “Market model” will assure responsive maintenance
- Proprietary vocabulary use requires a license



ORU: The usual result message

ORU	Observational Results (Unsolicited)
MSH	Message Header
PID	Patient Identification
{OBR	Observations Report ID
{OBX}	Observation/Result
}	

Answer Part Loop

Element Loop

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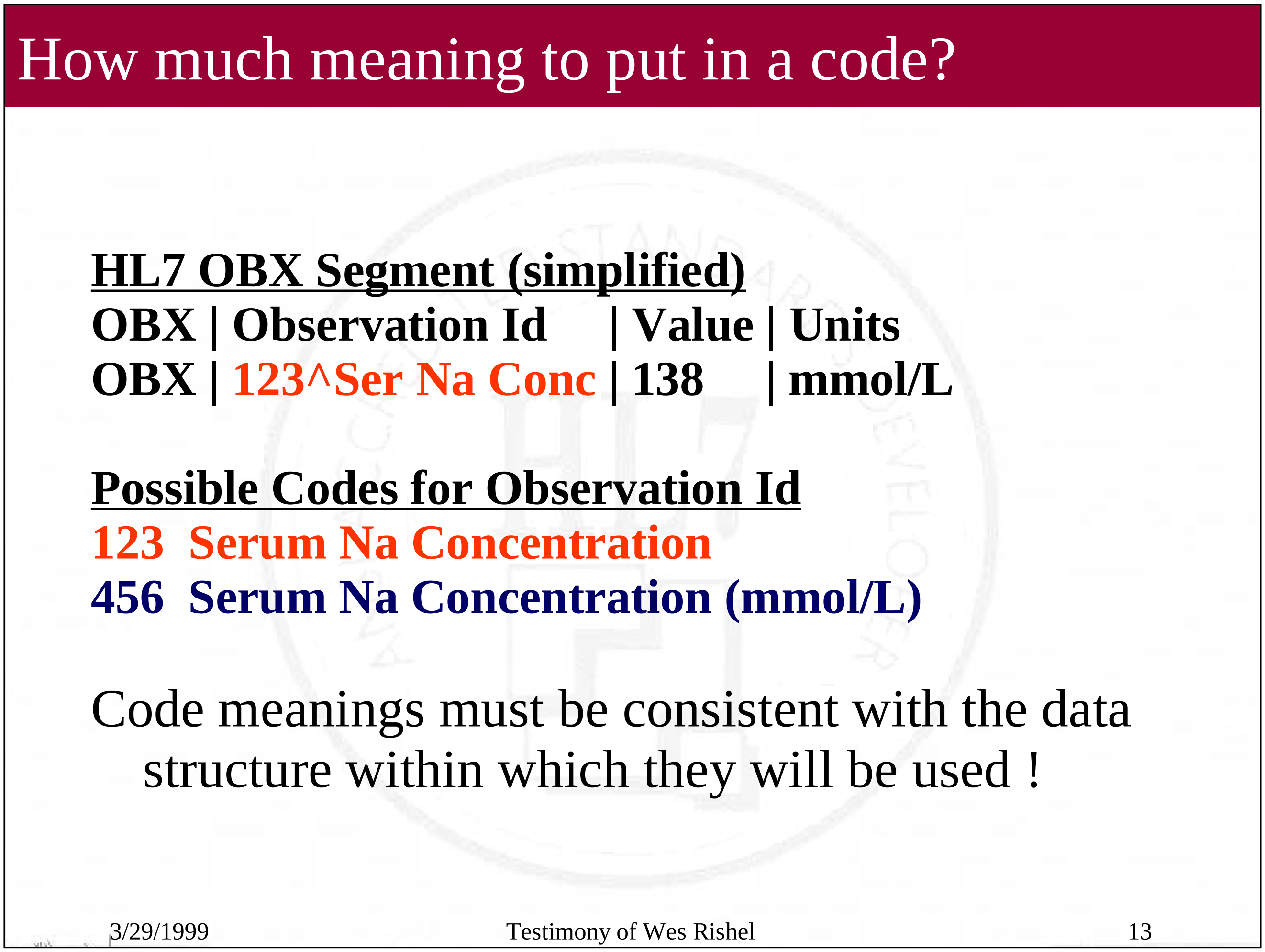


How much meaning to put in a code?

HL7 OBX Segment (simplified)
OBX | Observation Id | Value | Units
OBX | 123^Ser Na Conc | 138 | mmol/L

Possible Codes for Observation Id
123 Serum Na Concentration
456 Serum Na Concentration (mmol/L)

Code meanings must be consistent with the data structure within which they will be used !

The Missing Link: Clinical Templates

- Universal “trading partner agreements”
- More specific
- More costly

An instance of an ORU message

```
MSH, EVN, PID, PV1, ORC,
OBR||8974-9^BP Battery^LN|
OBX|1|CE|8357-6^METHOD^LN|M^Manual|
OBX|2|CE|8358-4^DEVICE^LN|1|AC^Adult Cuff|
OBX|3|CE|8359-2^SITE^LN|1|RBA^Rt Brachial Artery|
OBX|4|CE|8361-7^POSITION^LN|1|SIT^Sitting|
OBX|5|NM|8479-8^SBP^LN|1|138|mmHg|
OBX|6|NM|8462-4^DBP^LN|1|85|mmHg|
```

A BP Battery Template

Battery Level Constraint

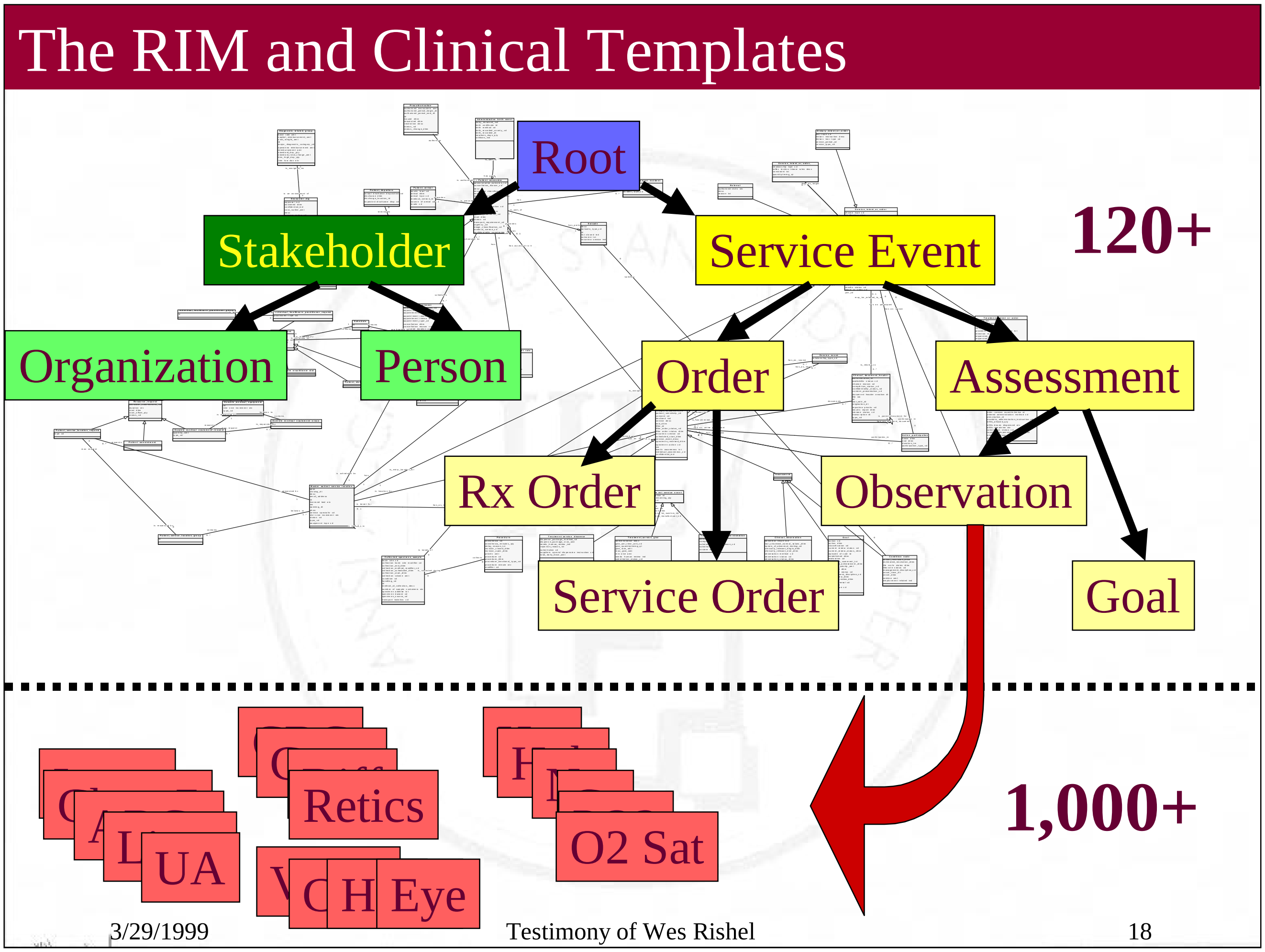
```
BPBattery ::= SET {
    obr {
      universalServiceID (8974-9^BP Battery) }
    obxs {
          MethodObs,
          DeviceObs,
          SiteObs,
          PositionObs,
          SystolicBPObs,
          DiastolicBPObs }
```

Observation Template

Observation level constraint

```
PositionObs ::= SET{
    observationId (8361^POSITION^LN),
    value (PositionDomain) }

SystolicBPObs ::= SET{
    observationId (8479-8^SBP^LN),
    value (Numeric, “DDD”) },
    units (mmHg) }
```



The RIM and Clinical Templates

Root
Stakeholder
Service Event
120+
Organization
Person
Order
Assessment
Rx Order
Observation
Service Order
Goal
Retics
UA
O2 Sat
Eye
1,000+

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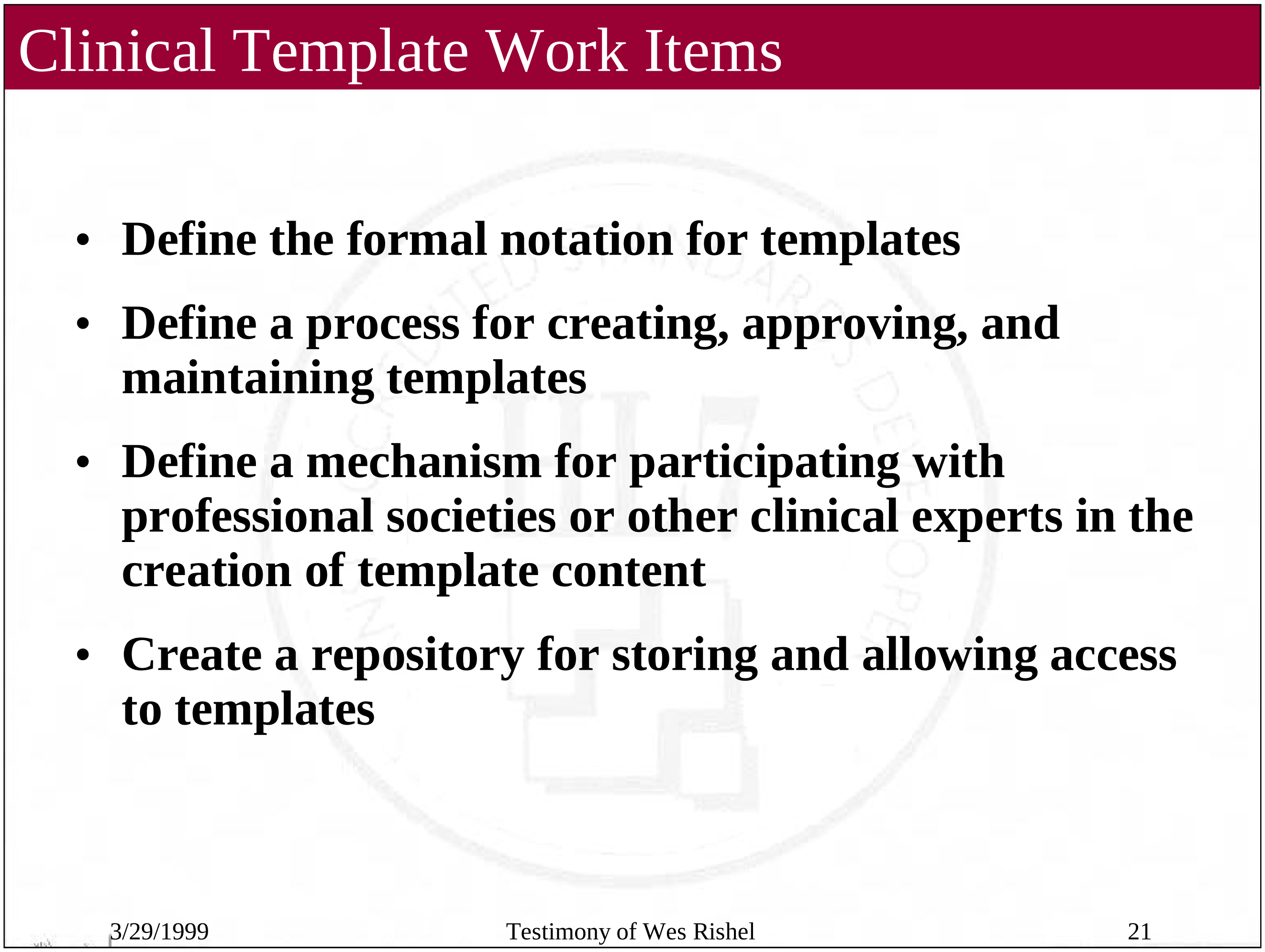
What are clinical templates?

- *“Constraint of an existing information model”*
  - ✔Reference Information Model (RIM)
- Constraint of specific RIM classes:
  - ✔clinical assessment
  - ✔clinical observation
  - ✔service event
  - ✔service order
  - ✔others
- Can be applied to Version 2.X or version 3.0

What Kinds of Data Will Templates Describe?

- **Clinical laboratory batteries**
- **Physical exam findings**
- **Microbiology culture results**
- **Immunization queries and results**
- **Claims attachments**
- **Medical Records Documents (transcription)**
- **And hundreds more ….**

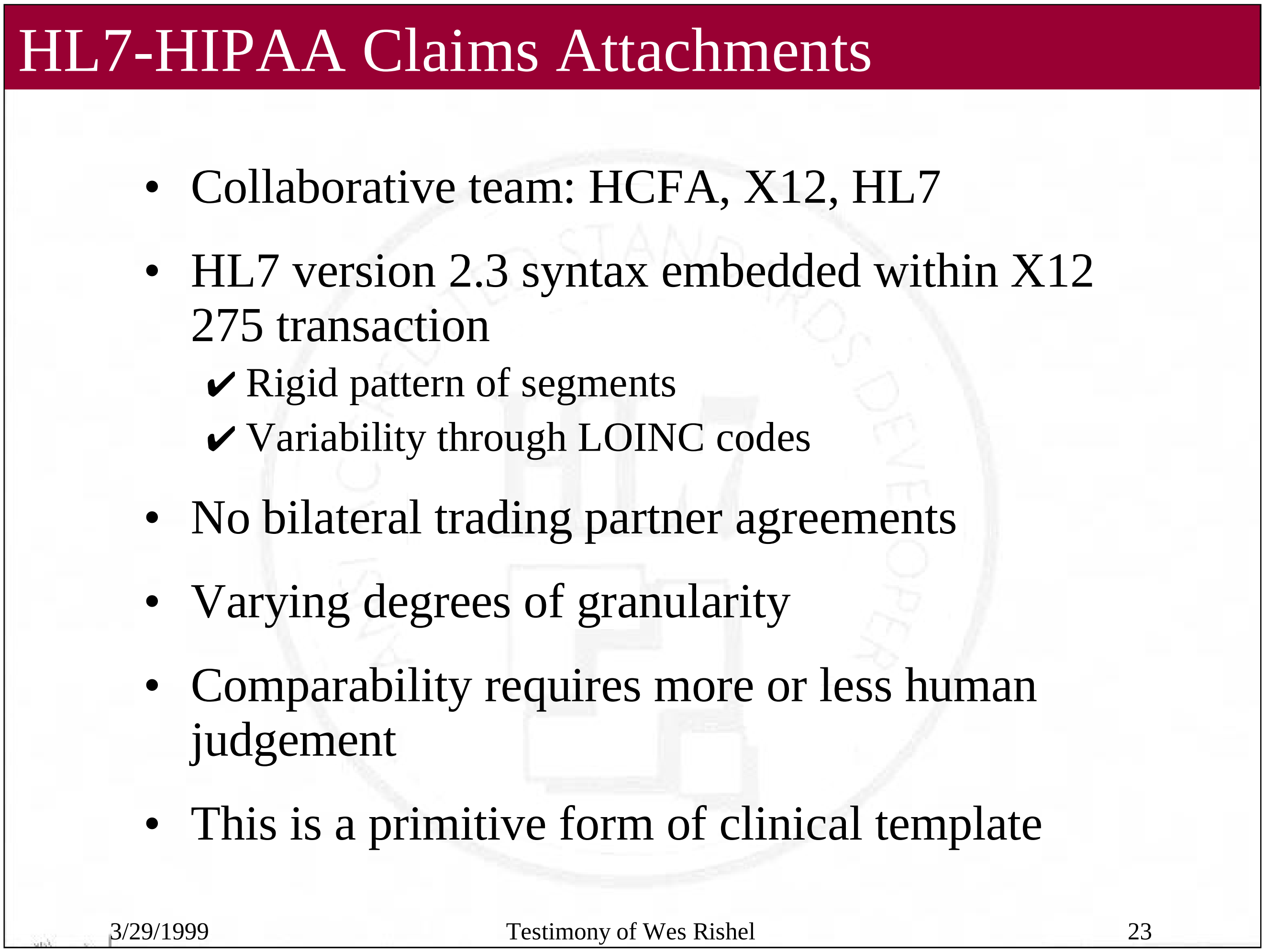


Clinical Template Work Items

- Define the formal notation for templates
- Define a process for creating, approving, and maintaining templates
- Define a mechanism for participating with professional societies or other clinical experts in the creation of template content
- Create a repository for storing and allowing access to templates

Where Will Clinical Templates be Used?

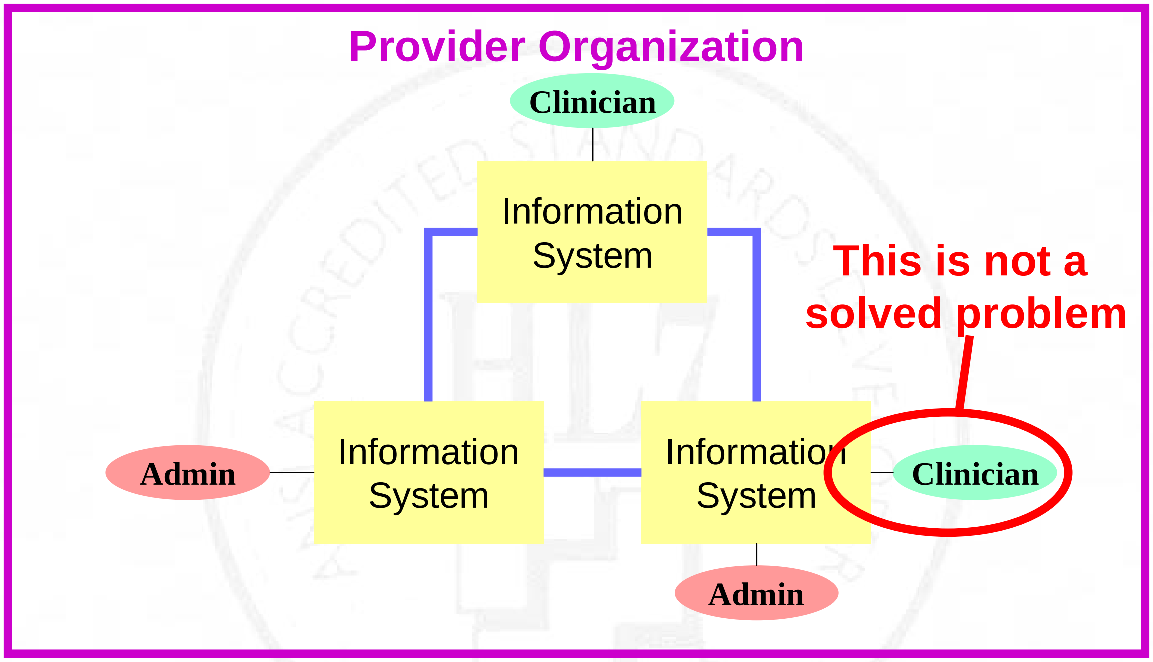
- **Messages with fine-grained, comparable, clinical data**
- **Documents**
- **Rules**



HL7-HIPAA Claims Attachments

- Collaborative team: HCFA, X12, HL7
- HL7 version 2.3 syntax embedded within X12 275 transaction
  - ✔ Rigid pattern of segments
  - ✔ Variability through LOINC codes
- No bilateral trading partner agreements
- Varying degrees of granularity
- Comparability requires more or less human judgement
- This is a primitive form of clinical template

The Other Cost of Fine-Grained Information



Provider Organization

Clinician

Information System

Information System

Information System

Admin

Clinician

Admin

This is not a solved problem

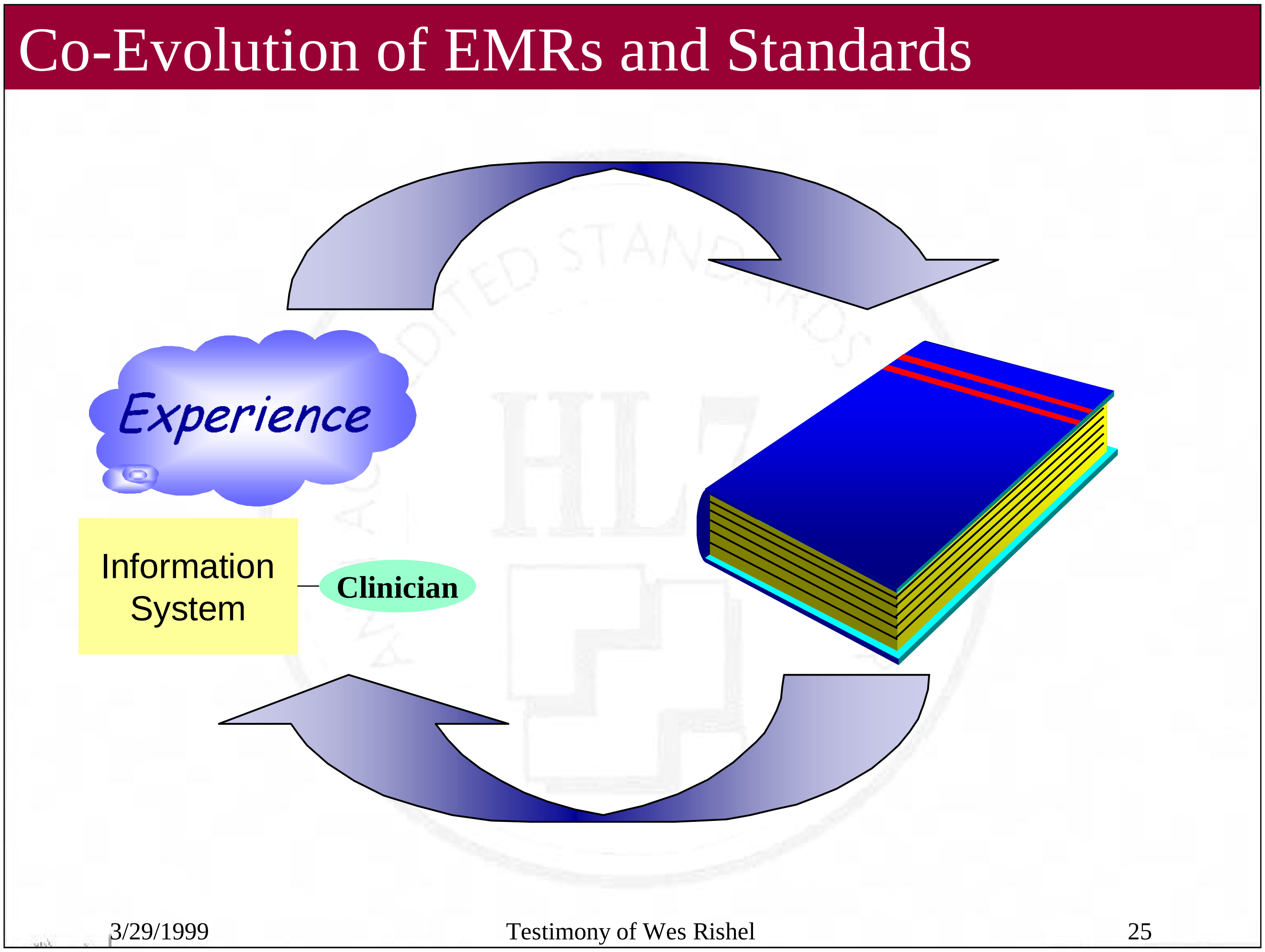
Much of the most valuable information comes from providers making care decisions

Capturing information requires provider interaction with the computer at or near the time of making the decisions

The time of the provider is itself a major cost

We rely on medical record designs to co-optimize physician time and information quality

This is not a solved problem



Co-Evolution of EMRs and Standards

Experience
Information System
Clinician

The issues are not wholly separable

The latency time for improvements is substantial

- standards development
- system engineering cycles
- provider implementation cycles

The situation has similarities to automobile mileage and pollution regulation

What Can the Government Do?

- Establish Time-Based Goals With Teeth
- Require no trading partner agreements for aggregation requirements
- Don’t let the perfect be the enemy of the good
  - ✔ early on: emphasize selective achievements consistent with current systems and extant standards
- Don’t let the good be the enemy of the better
  - ✔ long term: *raise the bar* to promote finer-grained standards in time frames consistent with industry product cycles

Specific Governmental Actions

- Support the creation of clinical templates
  - ✔Methodology
  - ✔Outreach to clinical specialty groups
- Strongly influence in the business of providing vocabularies
  - ✔Select, sponsor, negotiate public rates for *a few* important vocabularies
    - Drugs
    - Signs, symptoms, diagnoses, history, physical exam
    - Laboratory findings
    - Observation identification