Session Overview

- Why is Interoperability important to IIS?
- Interoperability topic deep dive
- Review resources for additional learning
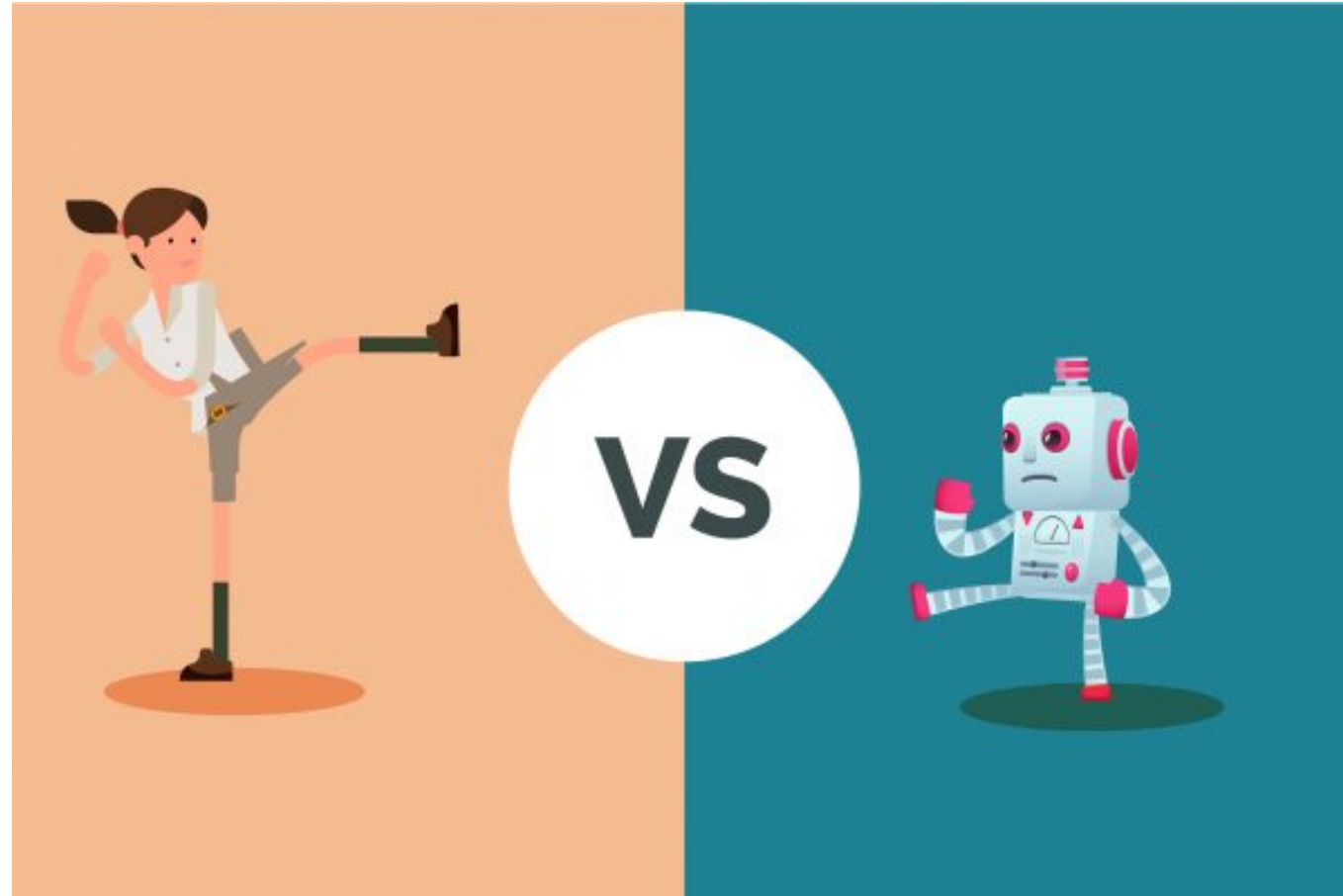- Q&A Interoperability topics

First a question...

Imagine you are talking with a friend about your work, and they ask you

"What can an IIS do?"

What would an IIS be if it could not...

- Receive immunizations
- Send immunization histories and forecasts

Communication vs Interoperability

Interoperability vs Communication

- Interoperability
  - the ability of computer systems or software to exchange and make use of information [Google Dictionary]
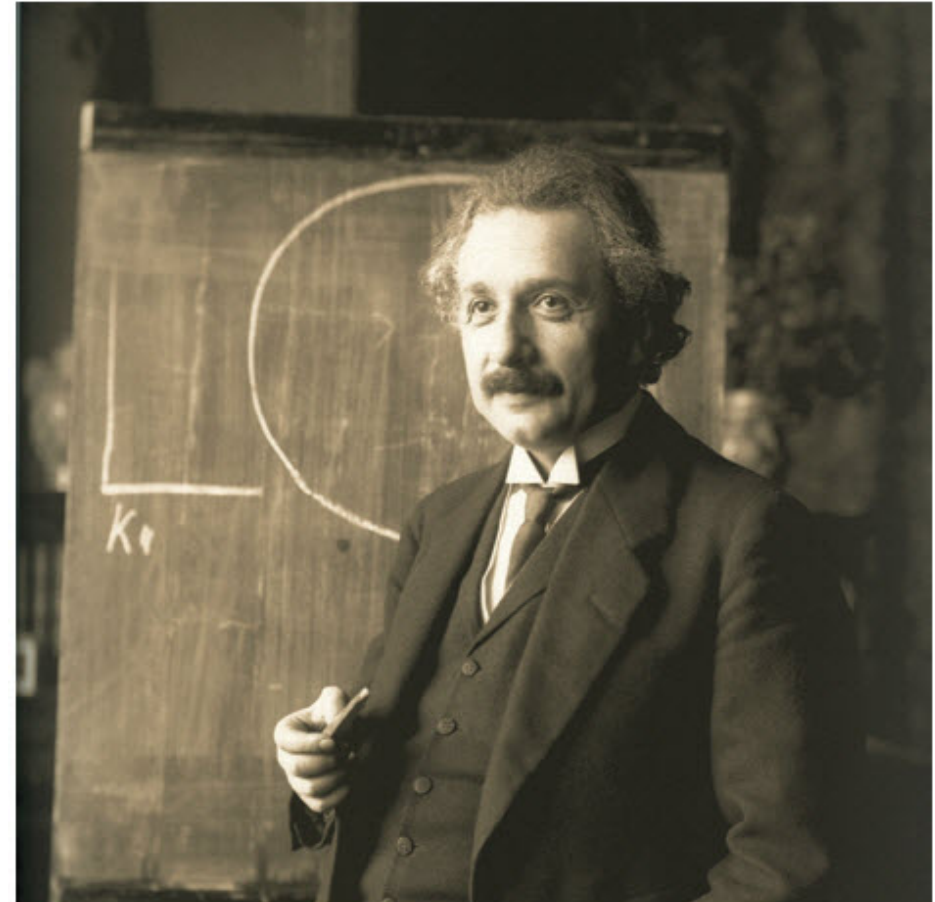- Communication
  - the imparting or exchanging of information or news [Google Dictionary]

Is Good Communication Important?

Communication Needs Three Things

- Interested in $E = mc^2$?
- Want to talk to Einstein?
- What is needed to communicate?

Place

Zurich Park Bench in 1905

Place

TARDIS

Zurich Park Bench in 1905

Language

- Sprechen Sie Duetsch?

3. *Zur Elektrodynamik bewegter Körper;*
von A. Einstein.

Daß die Elektrodynamik Maxwells — wie dieselbe gegenwärtig aufgefaßt zu werden pflegt — in ihrer Anwendung auf bewegte Körper zu Asymmetrien führt, welche den Phänomenen nicht anzuhaften scheinen, ist bekannt. Man denke z. B. an die elektrodynamische Wechselwirkung zwischen einem Magneten und einem Leiter. Das beobachtbare Phänomen hängt hier nur ab von der Relativbewegung von Leiter und Magnet, während nach der üblichen Auffassung die beiden Fälle, daß der eine oder der andere dieser Körper der bewegte sei, streng voneinander zu trennen sind. Bewegt sich nämlich der Magnet und ruht der Leiter, so entsteht in der Umgebung des Magneten ein elektrisches Feld von gewissem Energiewerte, welches an

Vocabulary

- Elektrodynamik Maxwells

- Körper

- Phänomen

- Wechselwirkung

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Vocabulary

- Elektrodynamik Maxwells
  - Maxwells Electrodynamics
- Körper
  - Body
- Phänomen
  - Phenomenon
- Wechselwirkung
  - Interaction

Einstein's 1905 Paper
On the Electrodynamics of Moving bodies

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Thought Experiment

- Transport
  - US Mail
- Standard
  - English
- Vocabulary
  - Vaccine Concepts

- How would you create a computerized immunization registry in the 1960s?
  - No internet
  - No computerized networks
  - Data in type-written reports
  - Sent by USPS
  - Stored in a computer
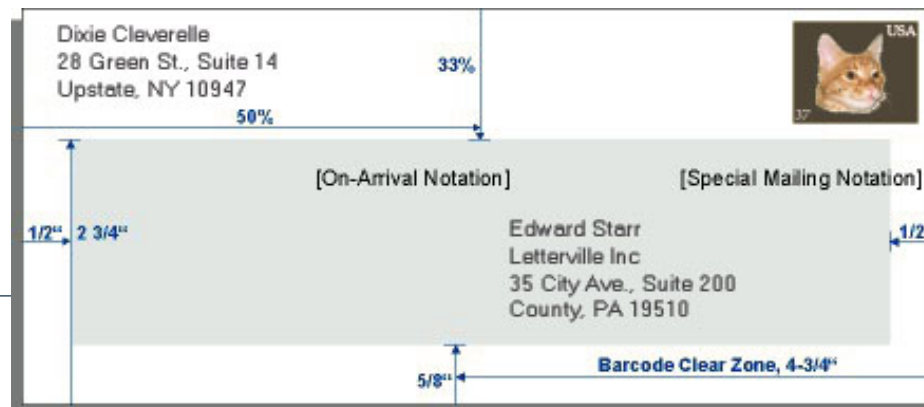
Thought Experiment

Date: October 16, 1967

To: Immunization Bureau, State Department of Health

From: Dr. Smith's Office

Subject: Immunization Administered

Please be advised that today Dr. Julien Smith administerd a smallpox
vaccination to Frank Hardy,born April 5, 1951.

https://uniqcode.com/typewriter/

Thought Experiment

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US Postal Standards

Letter writing conventions

Standard layouts and spacing

Dixie Cleverelle
28 Green St., Suite 14
Upstate, NY 10947

33%
50%

USA

[On-Arrival Notation]   [Special Mailing Notation]

1/2" 2 3/4"

Edward Starr
Letterville Inc
35 City Ave., Suite 200
County, PA 19510

1/2"

5/8"   Barcode Clear Zone, 4-3/4"

Thought Experiment

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English Language

Grammar   Spelling

Punctuation

Gregorian Calendar

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Organizations

Clinician   Patient

Vaccination

US Postal Standards

Letter writing conventions

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English Language

Grammar   Spelling

Punctuation

Gregorian Calendar

Thought Experiment

- Transport
  - ~~US Mail~~ CDC WSDL
- Standard
  - ~~English~~ HL7
- Vocabulary
  - ~~Vaccine Concepts~~ CDC Code Sets

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Convert to HL7

```
MSH|^~\&||Dr Julien Smith||Immunization Bureau|19671016
PID|||||Hardy^Frank||19510405
RXA||||19671016||75^Smallpox^CVX
```

Can you read this HL7 message?

```
MSH|^~\&||Dr Julien Smith||Immunization Bureau|19671016
PID|||||Hardy^Frank||19510405
RXA|||19671016||75^Smallpox^CVX
```

Interoperability Needs Three Things

- Transport (Place)
  - CDC WSDL
  - FTP
- Standard (Language)
  - HL7 v2.5.1
  - HL7 FHIR
- Vocabulary
  - CVX – Vaccinations
  - NDC – Vaccination Products
  - MVX – Manufacturers

Pick a topic!

SECURITY CONCEPTS

PRINCIPLES OF CONFORMANCE

Security vs Usability vs Cost

- How do you secure:
  - $1 bill
  - A house
  - $1,000 in cash
  - $800,000 gold bar
- You must balance
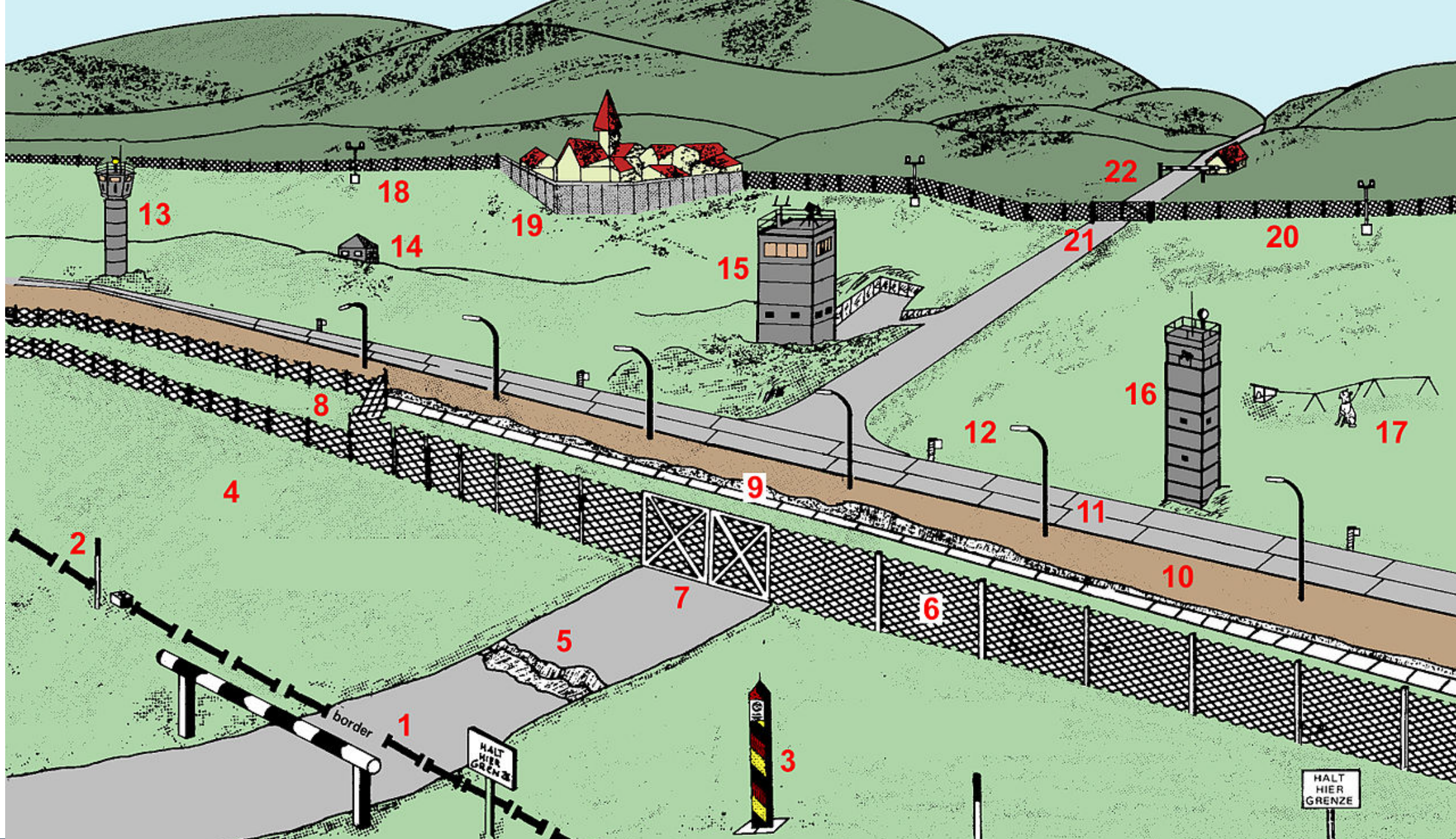 - Usability
  - Security
  - Cost
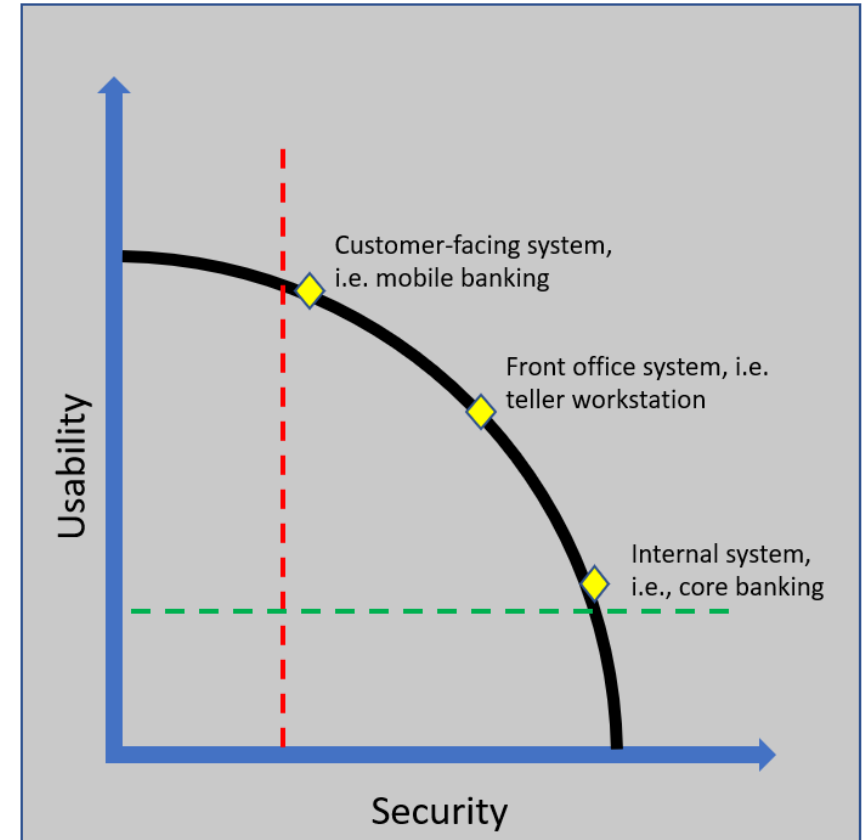
Perfect Security is Impossible

- Security threats can never be eliminated completely.

- Good security technology does not guarantee security.
  - Technology operates in a social context.

Over Focused on Snazzy Technology

- We often put too much faith in new technology.
- The English in Victorian England would pay high prices for "unpickable" locks.
  - Didn't prevent thieves from breaking boxes.
 - People eventually figured out how to pick them.

border

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HALT HIER GRENZE

HALT HIER GRENZE

What is the easiest solution?

Security vs Usability vs Cost

- Bad solutions
  - Focus on one aspect.
  - Ignore the other two.
- Good solutions
  - Consider all three aspects.
  - Arrive at reasonable solution for all three.
- Remember
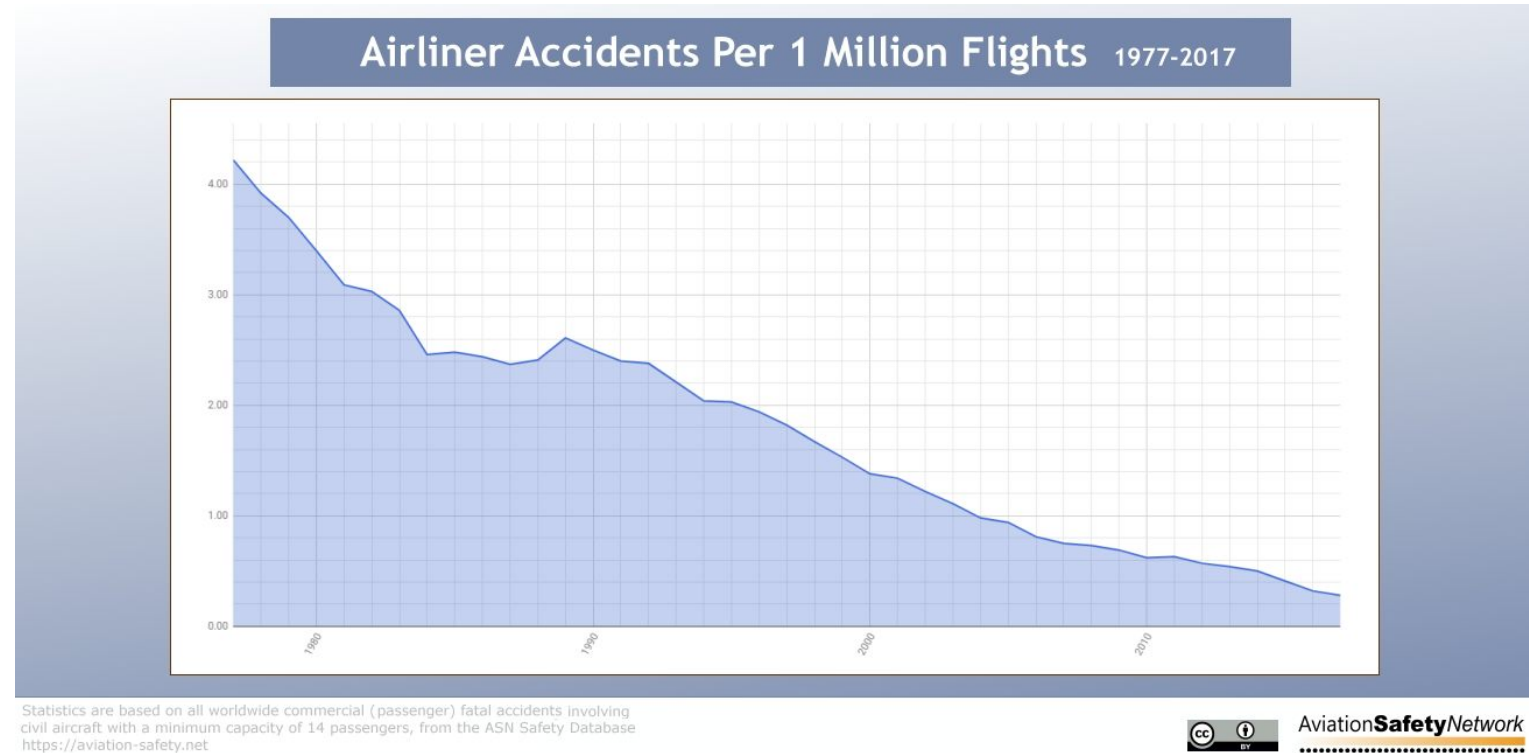 - Mitigation not elimination of security threat.

Two Factor Authentication

- Classic categories
  - Something you have
  - Something you are
  - Something you know
- Which are two factor?
  - Telling teller your account number and mother's maiden name
  - Showing the teller your driver's license
 - Showing the teller your bank account statement and electric bill

Bank Name

1234 5678 9876 5432
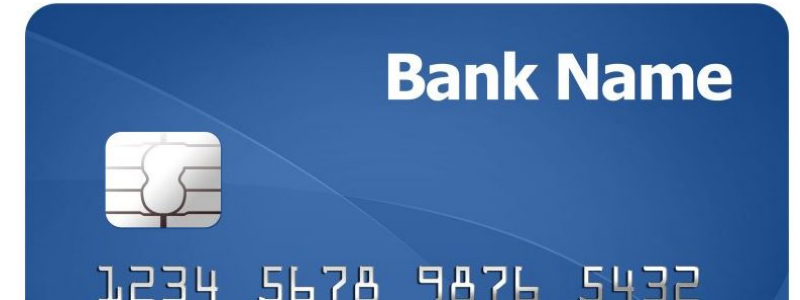
Reducing Plane Crashes

- Aviation is very safe today.

- Which factor was mitigated?
    - Pilot error
    - Mechanical failure
    - Bad weather

Airliner Accidents Per 1 Million Flights 1977-2017

Statistics are based on all worldwide commercial (passenger) fatal accidents involving civil aircraft with a minimum capacity of 14 passengers, from the ASN Safety Database
https://aviation-safety.net

AviationSafetyNetwork

Two Factor Authentication

- Why look at more than one factor?
  - Reduce risks by a larger factor
- Pick two:
  - Reduce level of oxygen in the air
  - Conduct prescribed burns
  - Monitor for hot spots
- Which is better?
  - Budget 100% for one factor
  - Split budget between two factors
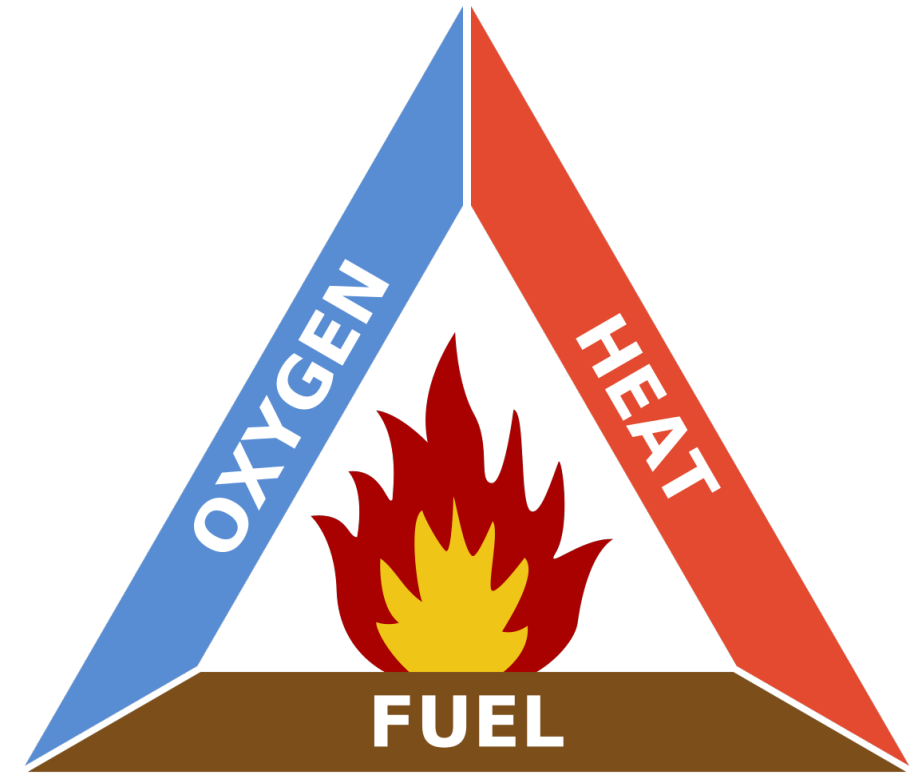
Two Factor Authentication

- How many factors?
  - CDC WSDL
    - Username, password, facility id
    - MSH-4, MSH-22
  - CDC WSDL + SSL Client Certificate
    - Username, password, facility id
    - SSL Client Certificate signed by State CA
  - CDC WSDL + Connecting from registered IP

Social Engineering

- Access to system required
  - Physical token
  - Username/Password for network
  - Username/Password for system
- How many factors?

Social Engineering

- Access to system required
  - Physical token
  - Username/Password for network
  - Username/Password for system
- User forgets passwords
  - Calls help desk to reset password
  - They have the key fob

RSA SecurID® token displaying 359702

Social Engineering

- Social hacks are usually the weakest link.
- Too much confidence in a technology solution blinds people to gaps.
- People find ways around rigid security rules so they can get their jobs done.

Social Engineering

- Scene
  - 1980's military office with computer
  - Phone on the desk
  - Computer modem
- Actors
  - Computer consultant "hacking" demo
- Target
  - Highly secure military mainframe

Social Engineering

- Hotel with vending machines.
  - Men in work clothes arrive to take machines out for maintenance.
  - Front desk staff hold doors open for them.
- Owner of hotel comes in later.
  - Where did the vending machines go?

Social Engineering

- Focus on entire process, not on specific technologies.
- Pay close attention to usability at user level.
    - Don't force users to find ways to circumvent security measures.

Social Engineering

- Access to system required
  - Physical token
  - Username/Password for network
    - Changed every 90 days
  - Username/Password for system
    - Changed every 30 days
- How often did people need to reset passwords?
- What was the process for resetting the password?
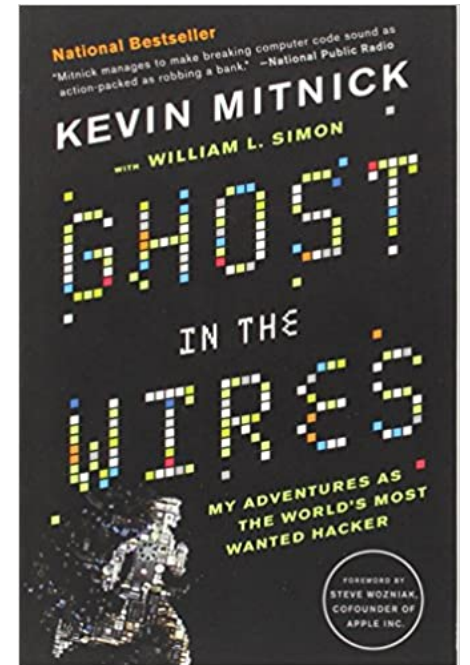
Recommendation

Quiz Time!

- Complete the quiz sheet with your table members
- First two teams with the most correct answers win prizes!

Principles of Conformance

Tools to support interoperability

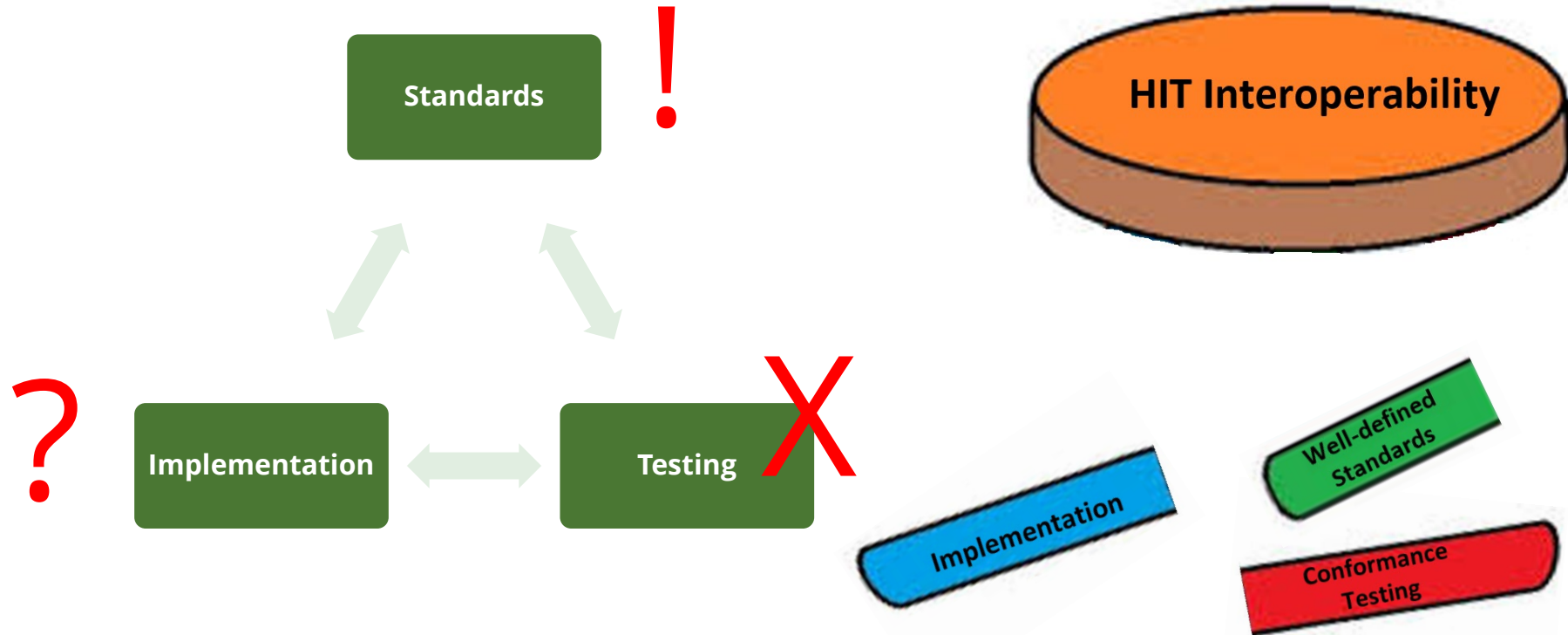# Conformance Introduction
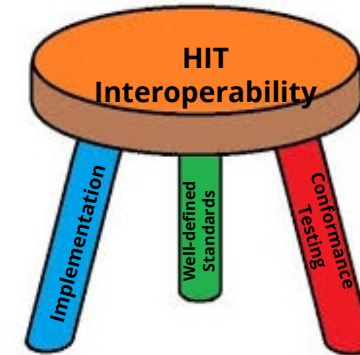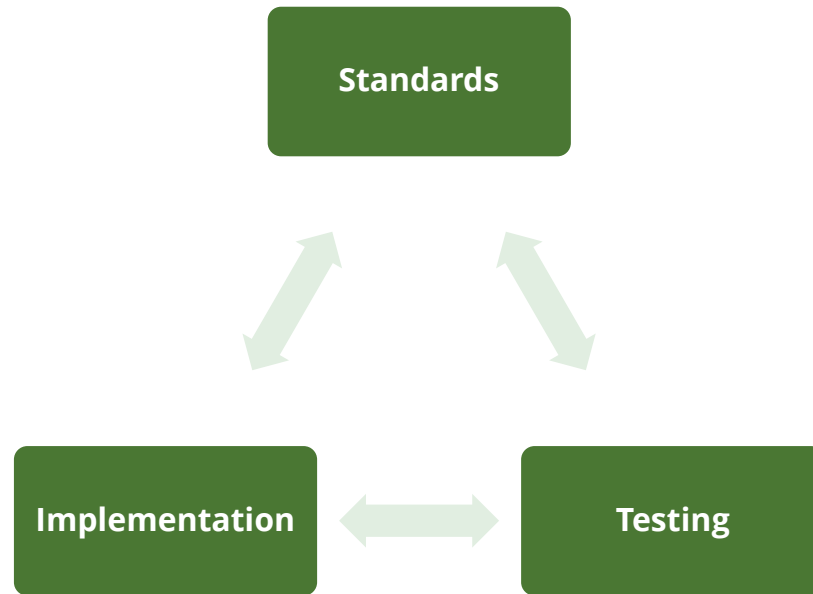
Immunization Community in early 2010s
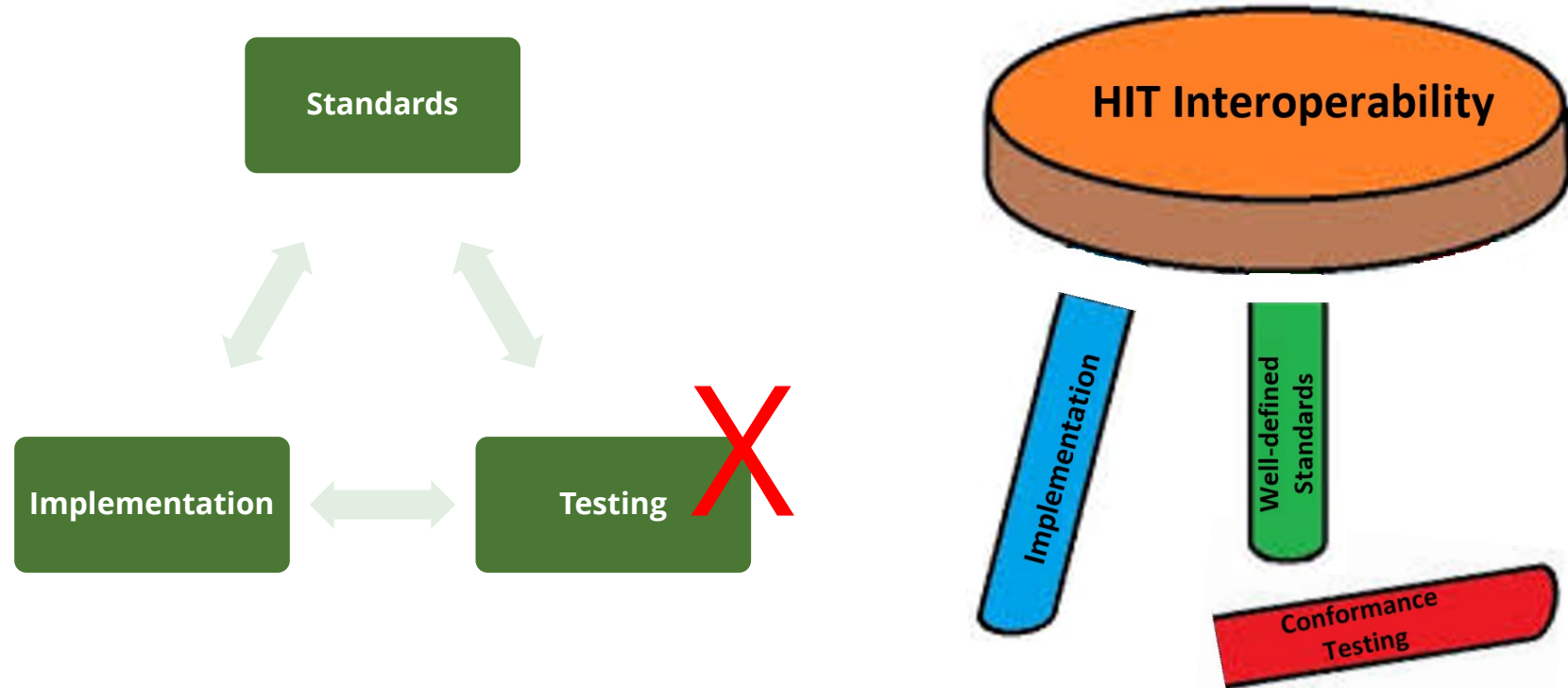
Problem: No testing available

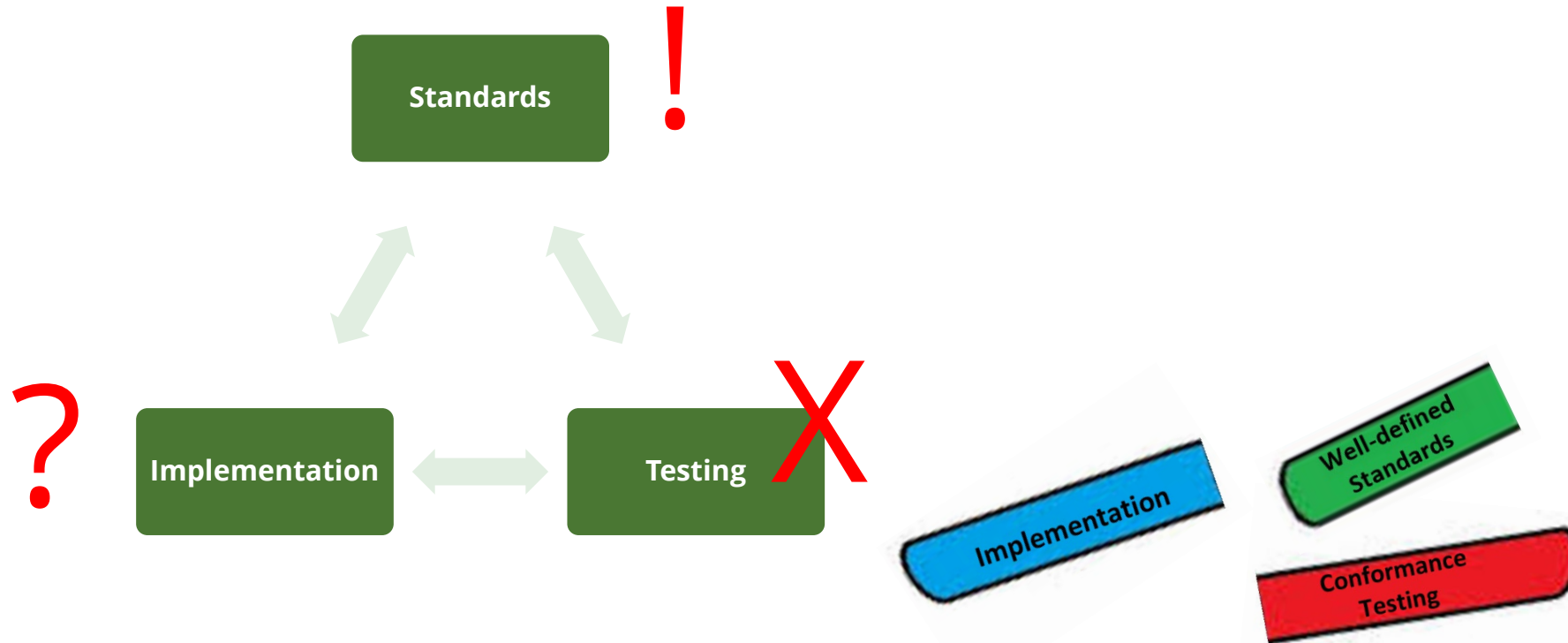# Immunization Community in early 2010s

Standards

!

Implementation

Testing

X

HIT Interoperability

Implementation

Well-defined Standards

Conformance Testing
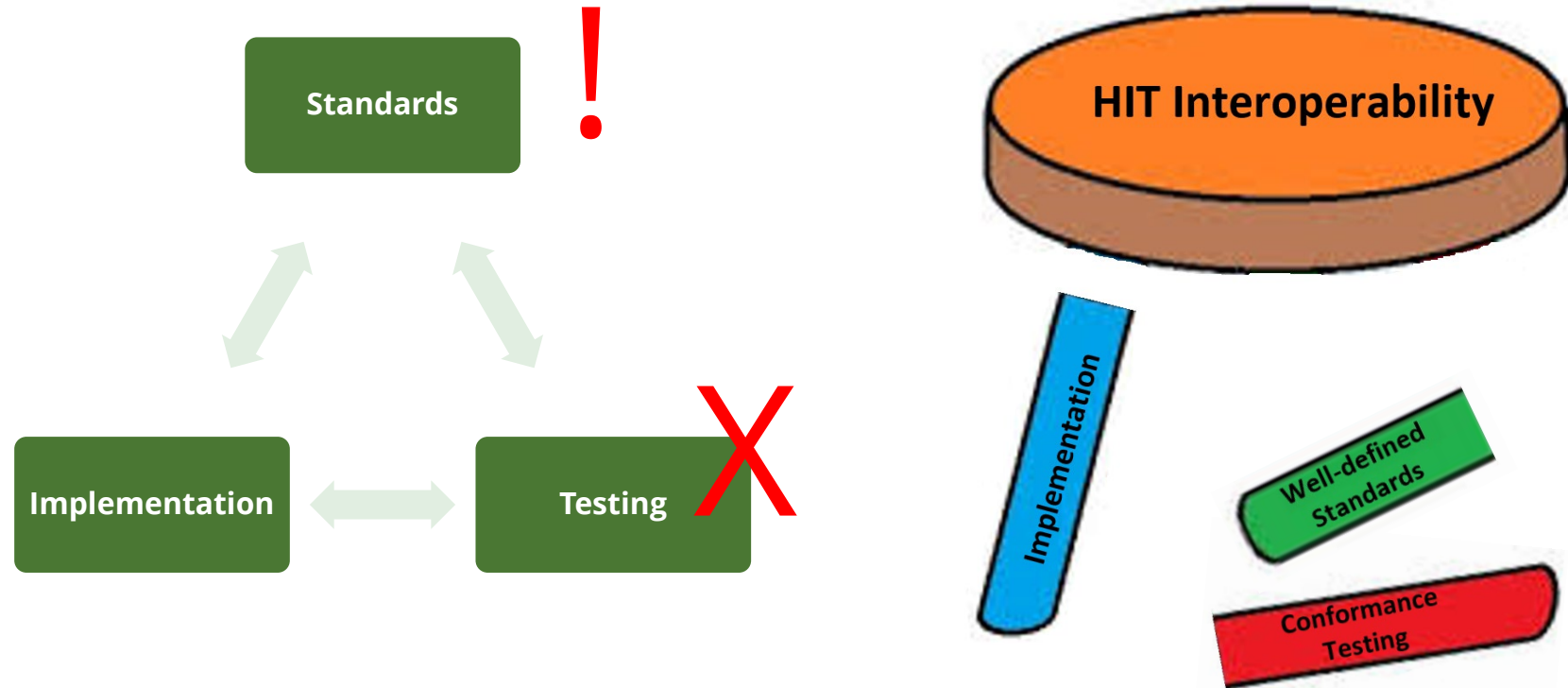
Problem: Standards unclear

Immunization Community in early 2010s

Problem: Software varied

Immunization Community in early 2010s

Major Interoperability Problems!

Lesson Learned

- Standard must include the following...
  - Written specification
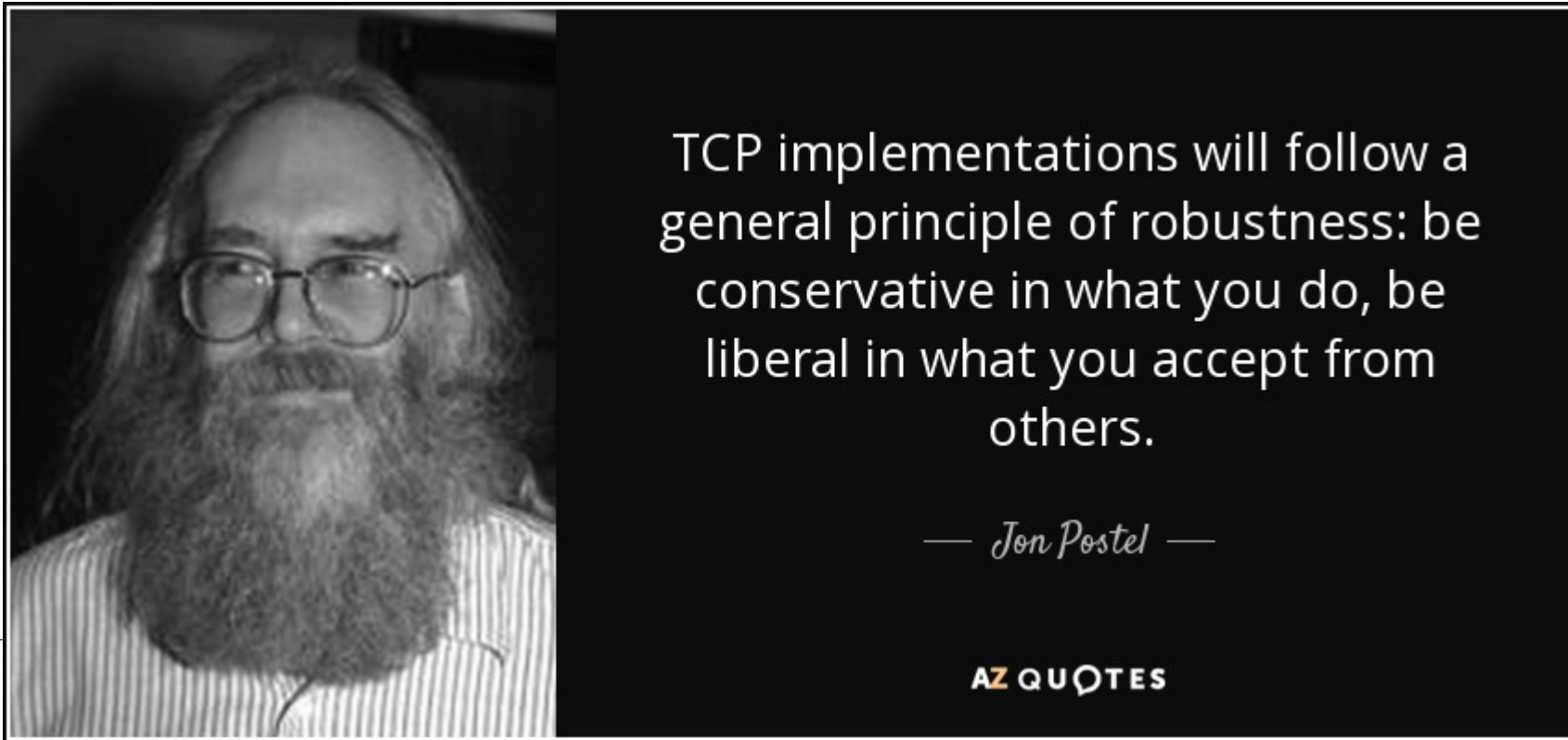 - Testing process
  - Software demonstrating standard

Perfect Works

Principle #1: Focus on Interoperability

Never forget that the final goal is for systems to exchange useful information, everything else serves that goal.

Example from Other Standards

Non-conformity should not prevent the exchange and processing of useful information

TCP implementations will follow a general principle of robustness: be conservative in what you do, be liberal in what you accept from others.

— Jon Postel —

AZ QUOTES

Examples from HL7

- EHR supports HL7 v2.3.1 but not HL7 2.5.1
  - IIS would like to accept this data
  - Can the IIS accept this data?
- EHR support HL7 v2.5.1 but not correctly
  - Data is good, but some minor problems with message format
  - Can IIS accept this data?
- HIE has administered vaccination data
  - But some of it is missing lot numbers
  - Should the HIE still send it?
  - Can the IIS accept it?

Principle #2: Tell the Truth

Scenario:
- It's 7:35 in the morning
- You are at the bus stop
- Same people as every day
- You ask the guy next to you: What time is it?

Principle #2: Tell the Truth

- Option A
  - "It's 7:35"
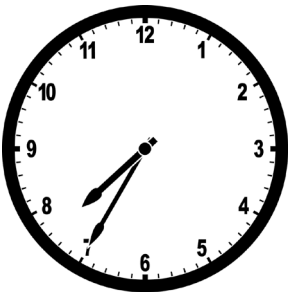 - Optimal answer

Principle #2: Tell the Truth

- Option B
  - "It's 7:40"
  - Not ideal
  - Might cause you problems
  - Perhaps someone chimes in:
    - "Did you know your watch is off by 5 minutes?"
    - "It's really 7:35"

Principle #2: Tell the Truth

- Option C
  - "Does anybody hear that voice?"
 - Awkward silence, stare at your phone, look away

Voice only Harold can hear: "Little did he know that this simple, seemingly, innocuous act would result in his imminent death."

What?? Hey?? Hello!?? Why??, Why my death? Hello! Excuse me? When??? How imminent!??

Principle #2: Tell the Truth

- Option D
  - "It's 11:25"
  - "Are you sure?"
  - "Definitely"
  - "But I can see that you just wrote that on your wrist, it's not the right time"
  - "Yes, it's the right time"
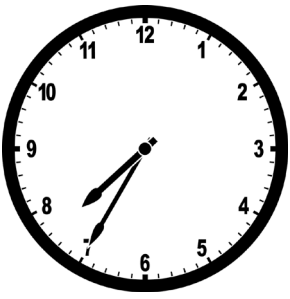
Principle #2: Tell the Truth

- Option E
  - "I don't know"
  - Thanks anyways

Your only choice is to listen to people as if what they are saying is true.

shutterstock.com · 1252923883

Principle #2: Tell the Truth

- Key principle in communication
  - Functional requirement
  - Not just for ethics
  - Implicit contract between speaker/listener
  - Listeners must assume what speaker is saying is true (at least from speaker's perspective)

Quiz Time!

- Complete the quiz sheet with your table members
- First two teams with the most correct answers win prizes!

VXU Quicksheet

Interop Resources Quicksheet

Interoperability Resource List

AIRA

- **Resource Repository**: https://repository.immregistries.org/
  - Searchable repository of guidance documents, presentations, webinar recordings on a variety of topics.
- **Standards & Interoperability Steering Committee:** https://www.immregistries.org/standards-interoperability-steering-committee
  - IIS community-based technical support and guidance development.
- **Training Videos**: https://www.immregistries.org/training-videos
  - Technical assistance videos that explain basic concepts about transport and interoperability.
- **Aggregate Analysis Reporting Tool (AART):** https://app.immregistries.org/aart/home
  - Test IIS interoperability against community-driven measures and test related to the IIS Functional Standards.
- **Technical Assistance**: https://www.immregistries.org/request-technical-assistance

AIRA Interoperability Course Objectives

- Effectively onboard providers
- Troubleshoot connectivity and submission issues
- Improve quality of data submitted

AIRA Interoperability Course – Beta

- Conducted in Spring 2021
- 13-week long course with 26 classes
- 36 participants attended over 80% of classes

Next Interop Course Edition

- Fall 2021!
- Email adiallo@immregistries.org if you are interested

What questions do you have on Interoperability?

AIRA 2021
NATIONAL MEETING
AUG. 3-5, 2021 | PORTLAND, OREGON

Thank You!

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adiallo@immregistries.org