

# Interoperability

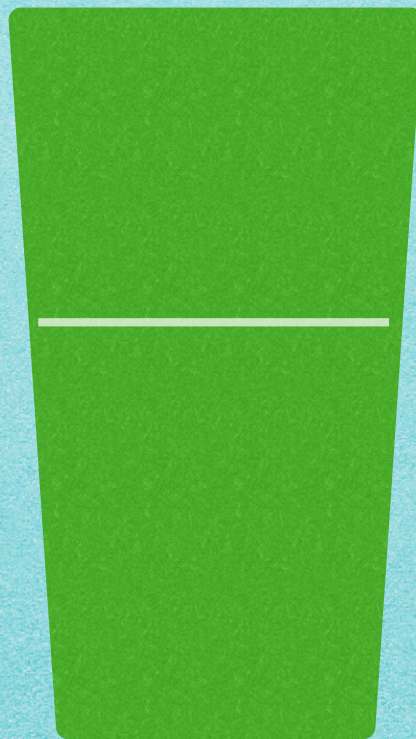
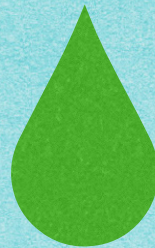
Brief Primer, Update and Demystification

*Joseph Bormel, MD, MPH*  
*Friday, April 20th, 2018*  
*jbormel@gmail.com*

Presented on Capital Hill at HealthTechNet

Reference: <http://healthtechnet.net/past-meetings>







# HIMSS 2018

*Over 60 educational sessions touching on interoperability  
(in service to something)*

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# Agenda

**1 Story of London Bridge**

**2 Interoperability, Types 1 and 2, Defined**

**3 Essential Elements of Sincere Interoperability**

**4 Thirty Billion Dollars later, necessary but not sufficient**

**5 Story of Hopkins and NCI**

**6 Operationalizing the Gaps in Interoperability**



# 1) Story of London Bridge



**Border Force**

**LANDING CARD** Please complete clearly in English and BLOCK CAPITALS  
Veuillez répondre en anglais et EN LETTRES MAJUSCULES  
Bitte in Englisch und DRUCKBUCHSTABEN ausfüllen

Immigration Act 1971

**Family name** Nom / Familienname

**First name(s)** Prénom / Vorname (n)

**Sex** Sexe / Geschlecht ☐ M ☐ F **Date of birth** Date de naissance / Geburtsdatum  
D D M M Y Y Y Y

**Town and country of birth** Ville et pays de naissance / Geburtsort und Land

**Nationality** Nationalité / Staatsangehörigkeit **Occupation** Profession / Beruf

**Contact address in the UK (in full)** Adresse (complète) au Royaume-Uni / Kontakt Adresse in das VK (in worten)

**Passport no.** Numéro de passeport / **Place of issue** Lieu de délivrance / Ausstellungsort  
Pass Nr.

**Length of stay in the UK** Durée du séjour au Royaume-Uni / Dauer des Aufenthalts in VK

**Port of last departure** Dernier lieu de départ / Letzter Abflugsort

**Arrival flight/train number/ship name** Numéro de vol / numéro de train / nom du navire d'arrivée  
Ankunfts Flugnummer / Zugnummer / Schiffsname

**Signature** Signature / Unterschrift

**IF YOU BREAK UK LAWS YOU COULD FACE IMPRISONMENT AND REMOVAL**  
Si vous enfreignez les lois Britanniques, vous vous exposez à une peine d'emprisonnement et la déportation  
Wenn Sie UK Gesetze brechen sie könnten zu Haftstrafen verurteilt und Umzugsbeihilfen

CAT  -16 CODE NAT  POL

For official use / A usage officiel / Nur für den Dienstgebrauch



- UNNECESSARY:** barriers to getting work done  
(e.g. authentication)



## 2) Interoperability, Types 1 and 2, Defined

*Experienced Interoperability is the product of Ability times Desire*

### **Type I: Ability - Standardized**

**Data definitions** (elements, sets, packaging)

**Displays** (common, usable)

**Practical ways for**

**doctors**                      **to get connected**

**patients/consumers** “ “ “

**Layer:** Paper/Plastic -> E-mail / Direct -> Portal(s) -> Structured -> APIs

**Fit** with workflows necessary for payment, quality, and processes; **implies CDS**

### **Type 2: Desire** - including Cost/Revenue, Quality, Coordination, Education, Implementation

**Barriers to market entry**

**Direct Competitors**

**Substitute Products**

**Payor interests**

**Patient Interests**



# Interoperability in Healthcare: Capitalism AND Socialism Pressures

## Truth #4: Multi-tiered



***With a single payer system doubtful anytime in the near future and reimbursement continuing to decline, the healthcare system will settle into three tiers of patients.***

■ **Changes in insurance coverage will create three tiers of patients:**

- **Tier 1: “Whatever it costs”** – those that can pay beyond traditional insurance
- **Tier 2: “Discerning concerned”** – those with some insurance, who will pay out of pocket for needed services
- **Tier 3: “Emergencies only”** – those that cannot pay or have little to no coverage

■ **For those in Tier 1, the patient will be at the center.**

- Service excellence will be one differentiator.
- Community hospitals will need to seek new ways to provide service to patients at competitive costs.

■ **As cost shifting increases, price will be a key differentiator for the “discerning concerned” tier.**

**Many Americans support equal access to care**

Statement	Agree	Disagree	N/A
“People who are unemployed and poor should be able to get the same amount of quality of medical services as people who have good jobs and are paying substantial taxes”	56%	18%	26%
“The government should do whatever is necessary, whatever it costs in taxes, to see that everyone gets the medical care they need”	53%	23%	24%

(Source: WSJ, July 19, 2006)

**Bottom Line**

***To be successful, provider organizations will need to excel at attracting the first tier of empowered patients who can pay beyond traditional insurance and efficiently treat all comers.***

*Capitalism: CFO's manage P&L to optimize department and service line profitability; minimal investment in efficiencies across entities*

*Socialism: Public Health oriented participants take a ‘vowels’ approach to operations, focusing on driving down **administrative** costs, **ineffective** services, maligned **incentives**, undesirable **outcomes**, and assuring coverage of the **uninsured***

*Whether Capitalism or Socialism, sustainability requires a positive operating margin; ROI on interoperability often is not there.*



# Which processes need to be interoperable?

## Common Process Map

### Essential Processes:

1. Identify \*
2. Assess
3. Plan
4. Order \*
5. Schedule
6. Perform
7. Document
8. Account \*

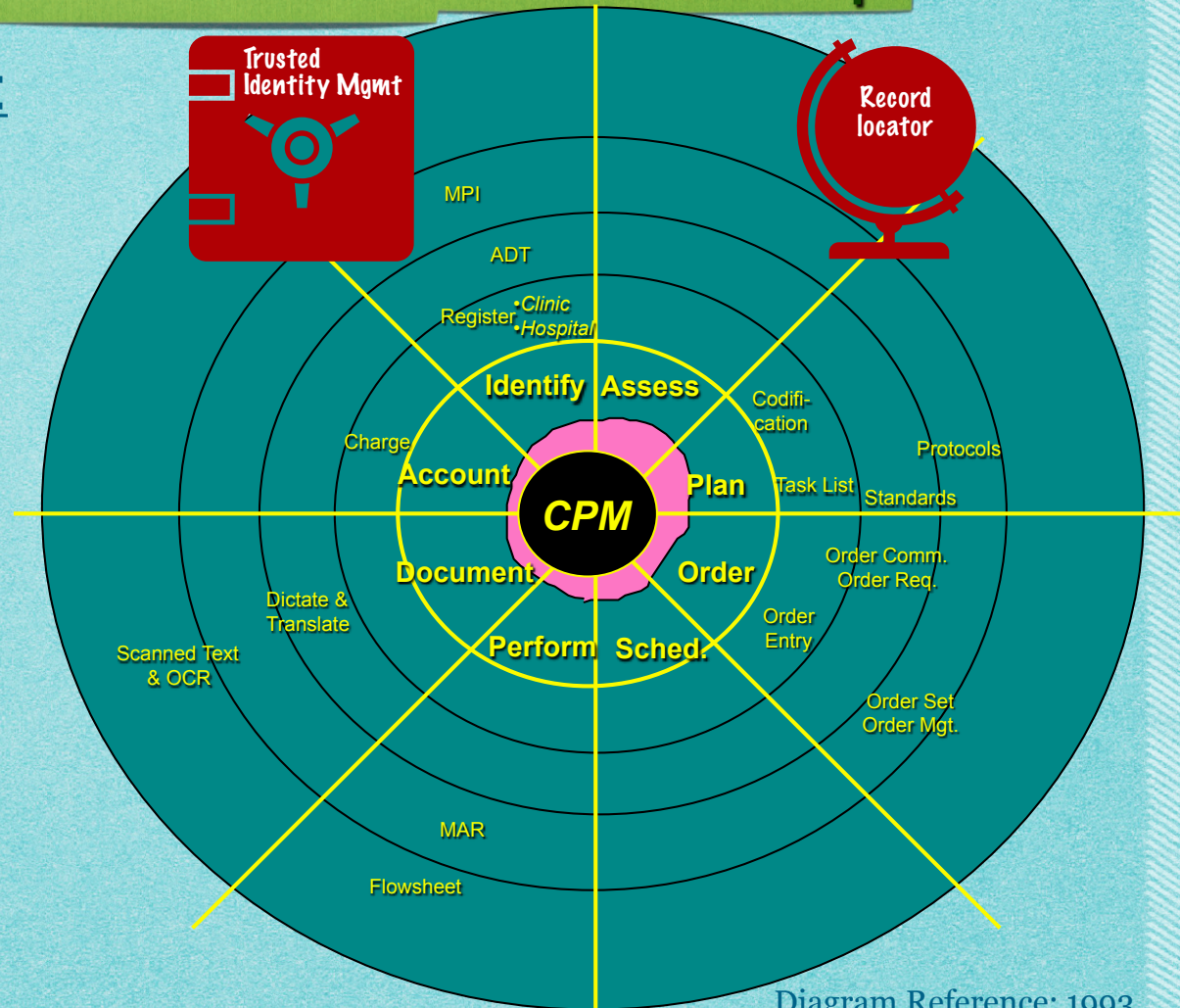
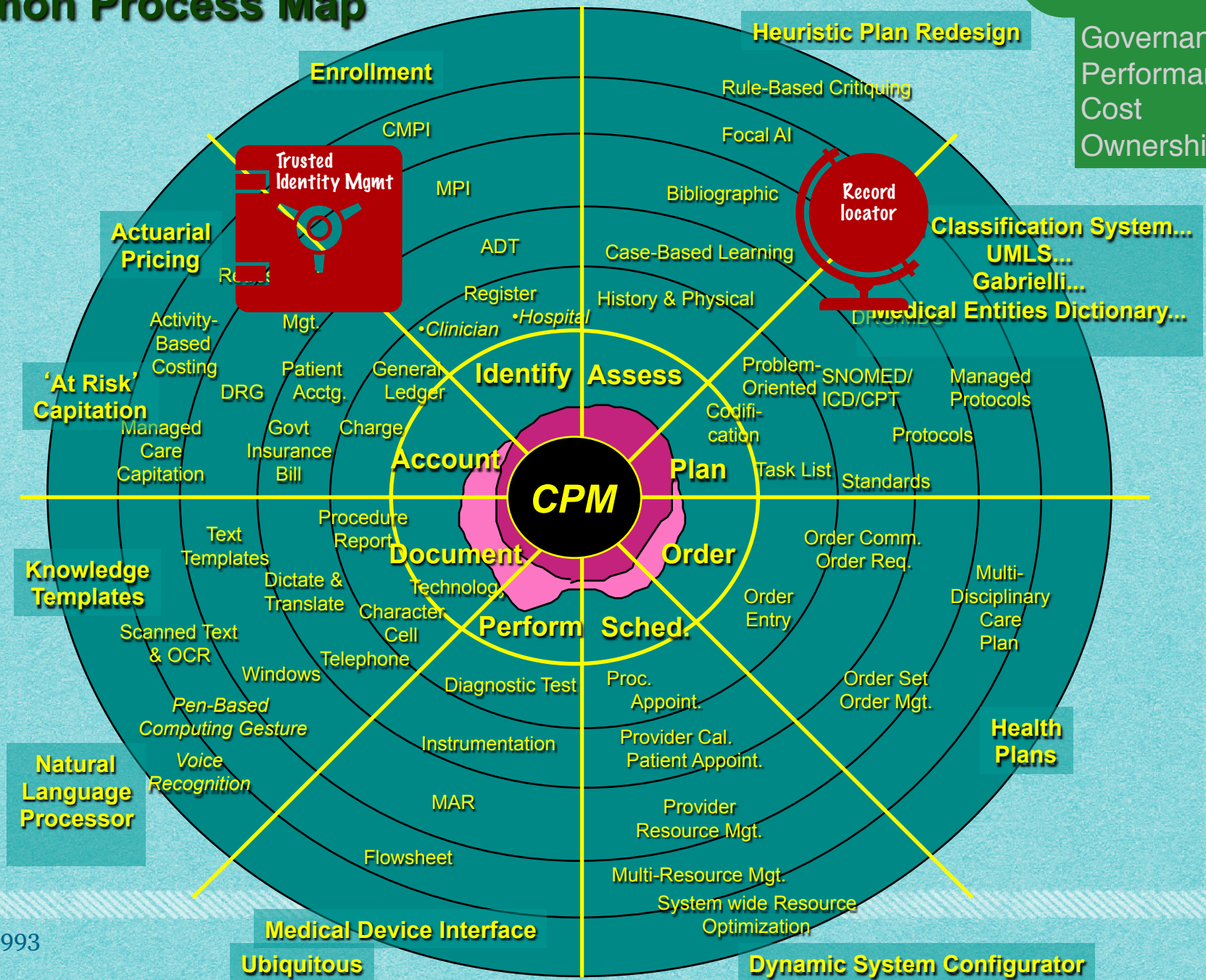


Diagram Reference: 1993  
David Margulies

\* These 3 processes are the first to be standardized within each institution. Identity management continues to be a challenge internationally. Order catalogues are variables are the resulting charge description masters. Accounting with ICD codes is also in evolution.



# Common Process Map



## Persistent Storage

Governance  
Performance  
Cost  
Ownership



# Interoperability - Distorted and Politicized

- “It’s been five years and 23 billion taxpayer dollars and we absolutely don’t have interoperability. My doctor left his practice last year; I changed to another doctor in the same practice, spent \$50 to get my chart printed out to paper and the new doctor in the same practice has no good way to take this in. In contrast, I’ve been doing electronic funds transfer on my smart phone.”

– *Congressional Staffer, January 2015*

- “It’s been in excess of 30 years that health industry revenue cycle data has been digitized and moving from providers to payers. In the last five years, through government-coordinated standardization of codes, standardized exchange, and payment reform, we have more than 90% of EH and EP proven to be able to send and receive visit summary information electronically. That includes the current visit and not the complete chart. We have reached critical mass.”

– *Data-driven case, January 2015*

## Exchange of information between whom?

- Hospitals
- Physician offices
- Payers
- Public health departments
- LTC
- Imaging centers
- Pharmacies
- Labs
- PBMs
- School clinics
- NB: patients not on list, nor are registries, HIEs



# Two Minute Interoperability Drill

## Interoperability for Health and Care

2015 Update for Provider and Payer  
Collaborations

HIMSS Provider-Payer Community - January 29, 2015

Joe Bormel, MD, MPH

- Former Medical Director roles with Cerner, QuadraMed and the ONC
- Current Medical Management / Informatic roles with Healthline

1

- What's missing in the first story? Market Behavior !
  - The EP in the first story didn't offer the electronic visit summary electronically to the patient.
  - The EP didn't mention that the electronic chart could, with permission, be electronically provided to the next physician with zero need for transfer; just access rights since they were on the same system.
  - That's been available for over two years at the provider he referenced.
  - The bad experience they described is not driven by a lack of interoperability or lack of progress.
- What's missing in the first story? Denominators !
  - Three metrics matter and aren't known (per ONC October 2014 FACA Joint Task Force)
  - Multiple metrics that are available on certified products, capabilities and exchange.



# Interoperability is inter-dependent with workflow and workflows vary widely

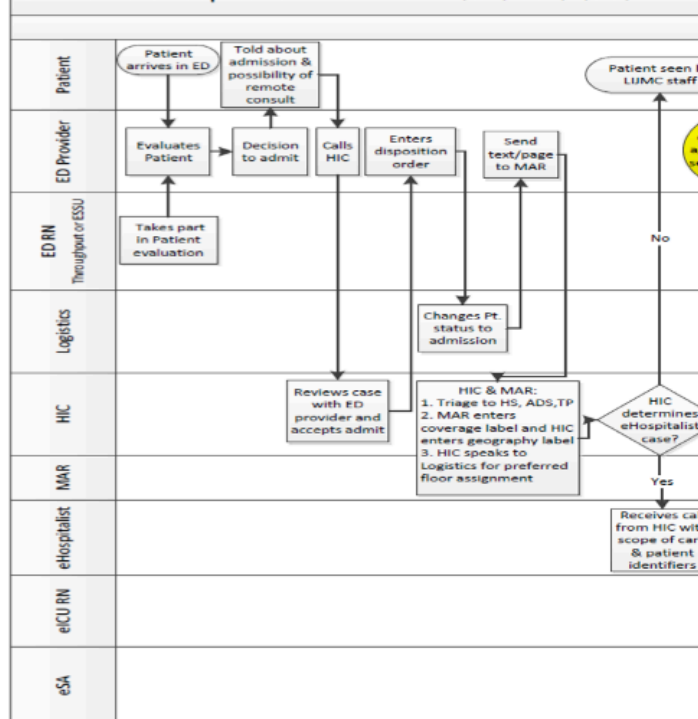
handout-195---designing-inside-out-taking-strategic-approach.htm.pdf (page 21 of 33)

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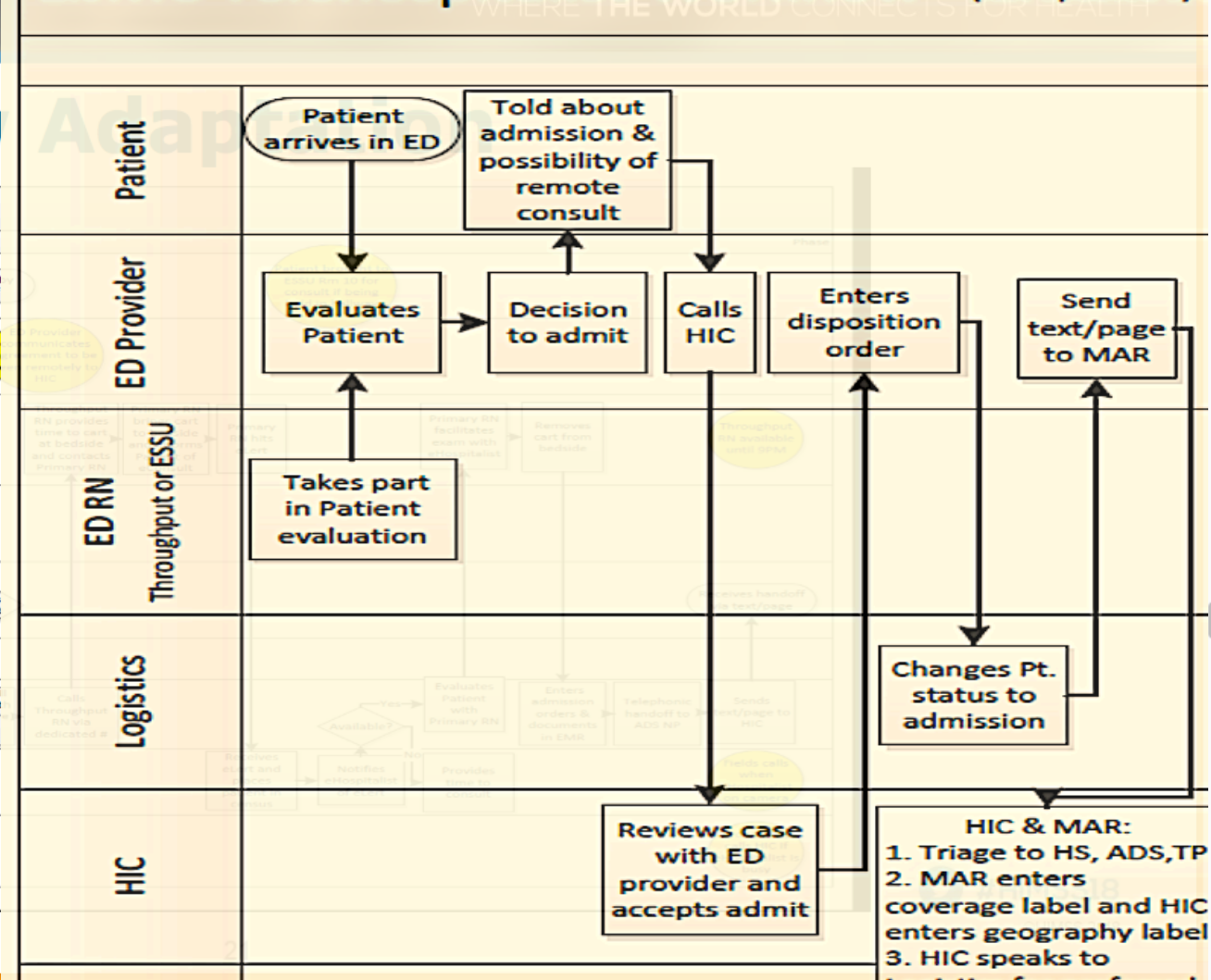
## Workflow

LIJMC Telehospitalist Workflow (last updated 9/06/2017)



## LIJMC Telehospitalist Workflow

(last updated 9/06/2017)





# Interoperability for Registries

Note different goals and constraints with usual care

handout-297---clinical-data-registries-solving-interoperability.htm.pdf (page 28 of 37)

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## Key CDE Metadata

1. Clinical concept label e.g., human prompt for CRF, data entry screen
2. Database field label: all caps, no spaces, underscores only, limited chars ...
3. Clinical definition of the concept, synonyms thereof
4. Data type / format e.g., free text, constrained list, integer, ...
5. Allowed values aka permissible values; value set; VSAC
6. Allowed values definitions
7. Business rules e.g., range or edit checks, consistency, validation
8. SDO binding(s)
9. Published reference(s)

Question or prompt  
*May have associated controlled terminology*

Value, result or answer  
*May have associated controlled terminology*

**HCV status:**

Source: Tchong, James, MD, Duke Clinical Research Institute. Conference proceedings, 2017 HL7 Partners in Interoperability

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# 3) Essential Elements of Type 1 (Ability) Interoperability

## 1. Definition

- **Formally: The ability of a system or product to work with other systems/products without special effort on the part of the customer. Interoperability is made possible by the implementation of standards.**  
(Institute for Electrical and Electronics Engineering )
- In simple terms: All individuals, their families, and their health care providers have appropriate access to health information that facilitates informed decision-making, supports coordinated health management, allows patients to be active partners in their health and care, and improves the overall health of our population.

## 2. Latest HIMSS Visions, Views, and Victories

## 3. NCVHS - pre completed death records



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## Clinical Data Registries: Solving for Interoperability

Session 297, March 9, 2018

Seth Blumenthal, MBA

Director, Data & Innovation, PCPI

COMMITMENT

DISCLAIMER: The views and opinions expressed in this presentation are those of the author and do not necessarily

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### So what is the problem

- Emphasis on measuring health outcomes requires longitudinal, multispecialty data collection
- E.g.: looking at a complete picture of care in a chronic disease. find all the data one needs in a single registry
- **Data are not standardized across registries**
- Linking registries to create a unified view is hard
- Provider organizations are participating in multiple registries; integrating all dimensions – technical, legal, etc.) is a lot of work and must be done for each registry
- Much needed registry data are still entered manually due to the structure and standardization in EHRs
- The status quo is not sustainable...

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## 21<sup>st</sup> Century Cures Act

Division A - 21<sup>st</sup> Century Cures

Title I – Innovation Projects and State Responses to Opioid Use

Title II - Discovery (includes the Precision Medicine Initiative)

**Title III - Development (Medical Device Innovations)**

**Title IV - Delivery (Interoperability, Information blocking and telehealth)**

Title V - Savings





## What CIOs Should Know about Health System Strategy in 2018

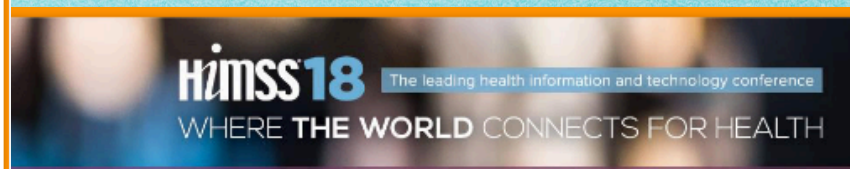
Session 131, March 7, 2018

Naomi Levinthal, MA, MS, CPHIMS, Practice Manager,  
The Advisory Board Company

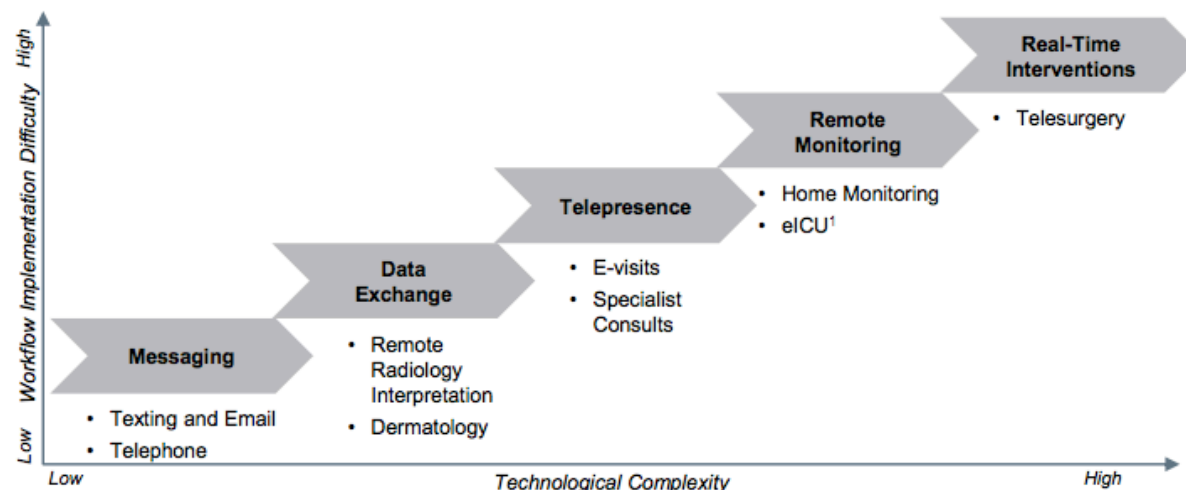


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## The Telemedicine Spectrum



Technical Feasibility



Implementation Timeline



Financial Rewards and Costs



Real Time vs. Asynchronous



Legal and Regulatory Constraints



Delivery and Communication Strategy

<sup>1</sup>) eICU = electronic intensive care unit.



# Where is the ROI for Interoperability?

Note: "Point Solutions" vs Enterprise (low cost & benefit vs high)

handout-131---what-cios-should-know-about-health-system-strategy-2018.htm.pdf (page 45 of 47)

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## Communicate and Focus on the "IT Value Equation"

Benefits

Costs (and Time)

(Breakeven or Value Point)

Automation, point solutions justified by ROI

Digitization, optimization, interoperability, focus on IT-powered strategy enablement and innovation at scale

Centralization, standardization to reduce IT spending growth rate

Enterprise apps and analytics, focus on operational excellence

Complexity created by multiple point solutions

"History has repeatedly shown that arguing against technology is a losing proposition."

Dr. Michael Blum, Director, Center for Digital Health Innovation, UCSF

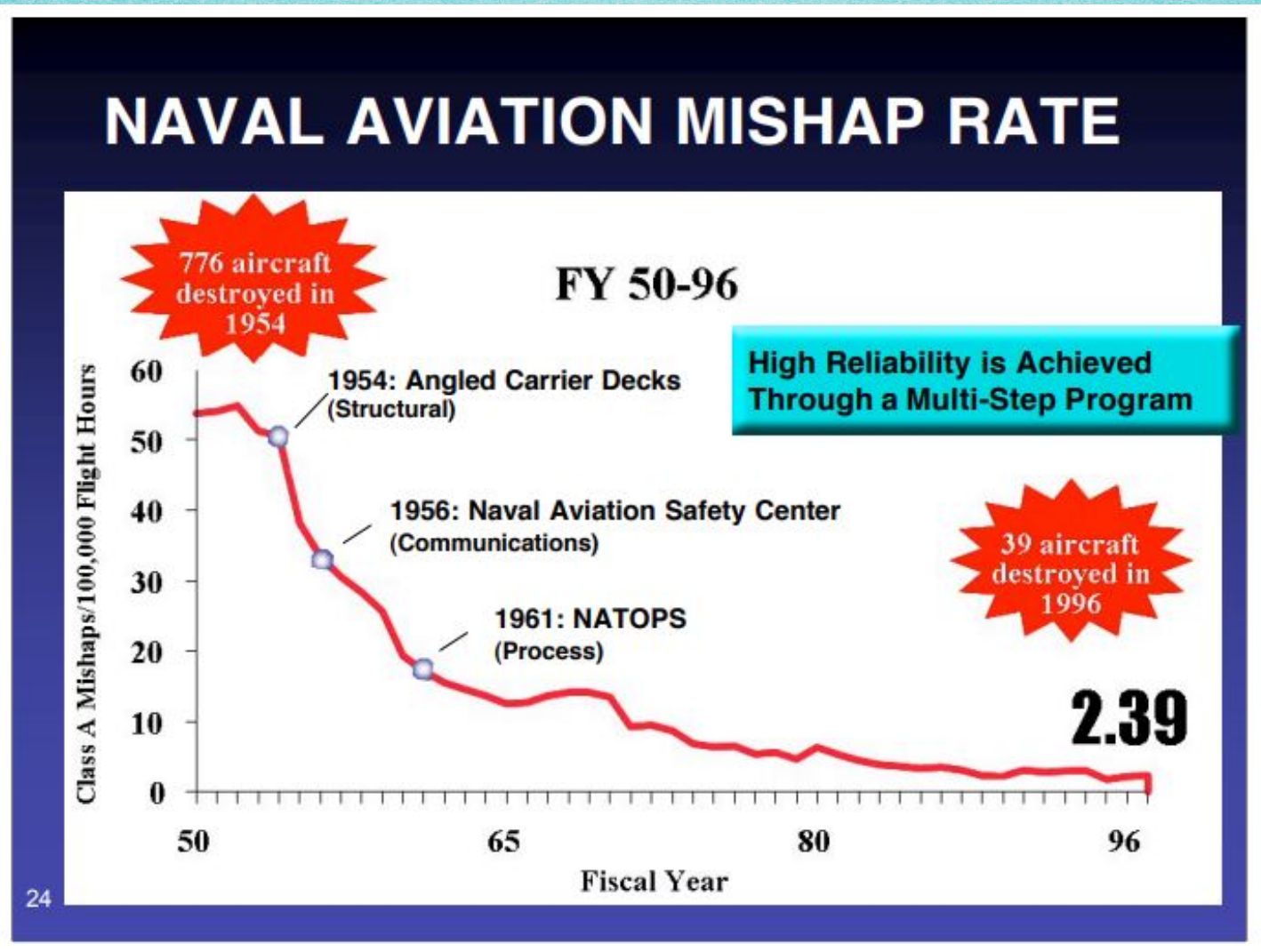
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Source: Health Care IT Advisor research and analysis.



# 4) Thirty Billion Dollars and Ten Years later, necessary but not sufficient How long should it take?

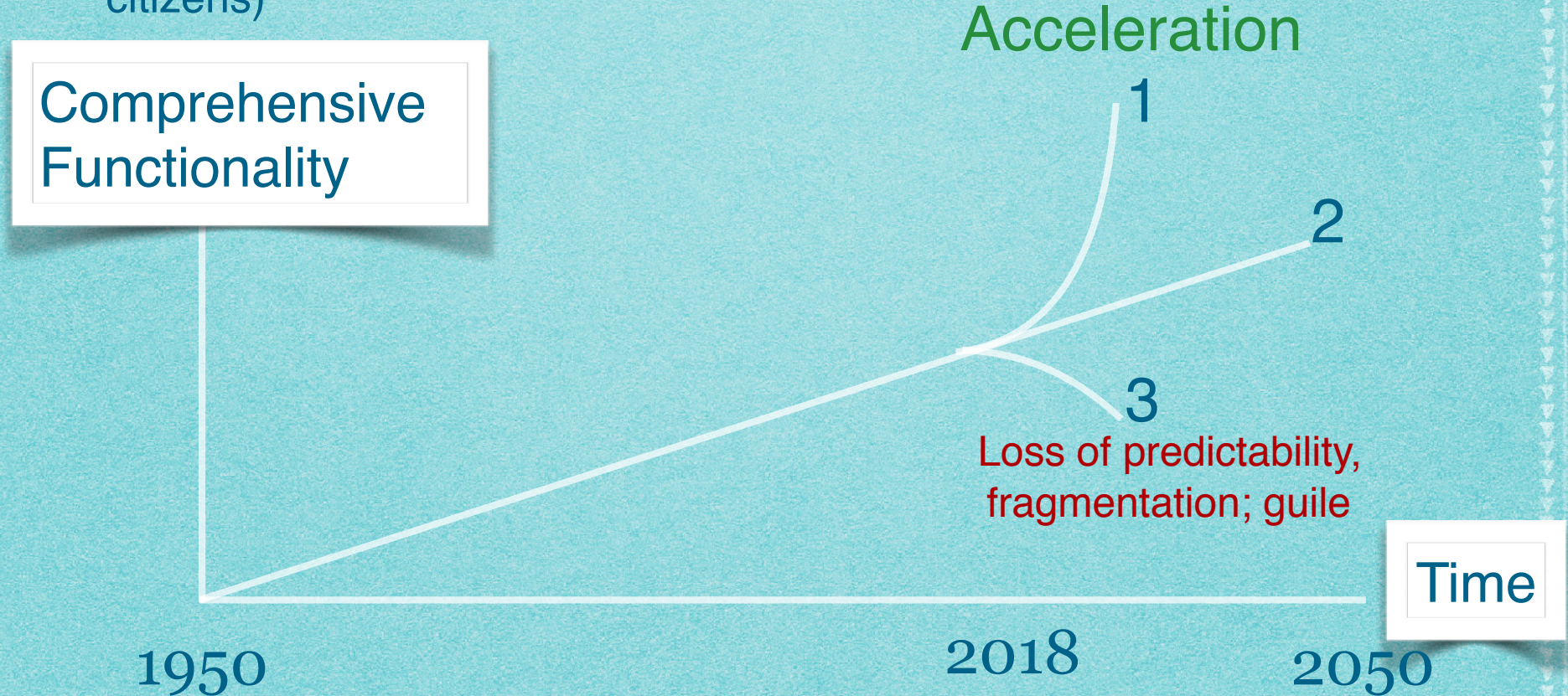




# Causes for Optimism

## When will we have 'Interoperability' ?

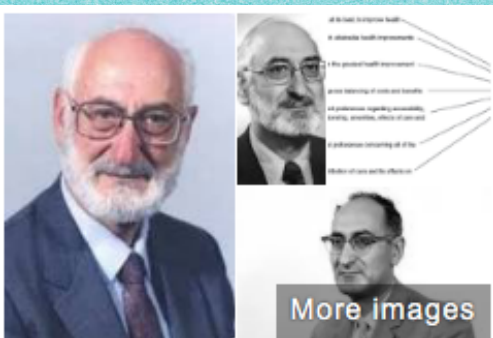
- ▶ Many countries have Interoperability now (flow of all information for all citizens)




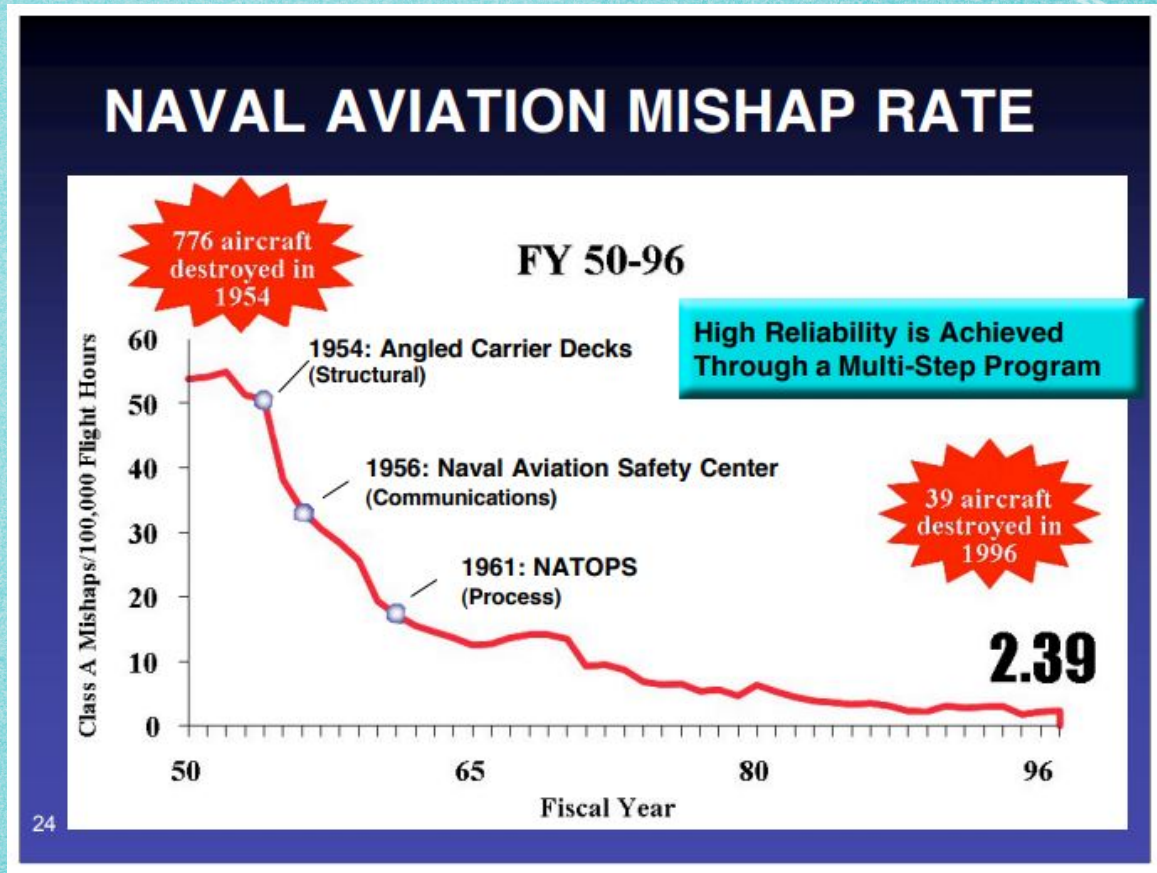


# Necessary Work for Acceleration

- 1) High Reliability Organization\*
  - a. Structural
  - b. Communications
  - c. Process
- 2) Legal and Regulatory Framework



Avedis Donabedian   
Physician

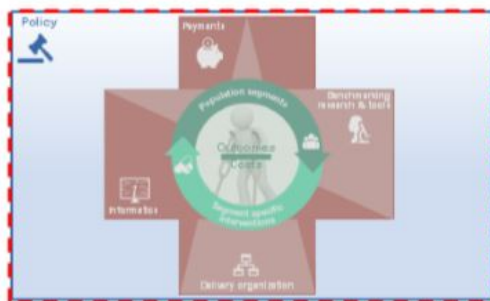




# Ability + Desire

Business Case includes Cost, Quality(regulatory), Access (consumer convenience)

## Exhibit 6. Public Policy Needs to Create an Appropriate Legal and Regulatory Framework for Value-Based Healthcare



A legal and regulatory framework that eliminates barriers and enables value-based care

- Policy affects both the patient-centric delivery model as well as the enablers of value-based care



Policy

- **Standardization of outcome measurement** and transparency across provider and supplier groups
- **Regulatory support** where stakeholder coordination is required (for instance, EHR interoperability)
- Incentives in place for **wellness and prevention** of disease and individual accountability within the population
- Legal framework protecting **patient integrity** yet supporting quality data access for patients and innovators

Measuring patient value	Population segments	Segment specific interventions	Informatics	Benchmarking, research, & tools	Payments	Delivery organization
Incentivize outcomes data collection and reporting	Collection and use of data on patient and population	Enable precision medicine by providing needed data access to outcomes data	Interoperability to support coordination across cycle of care	Reduce R&D cost and speed up patient access by registry based randomized trials	Legislation enabling provider and supplier risk sharing	Regulation to enable provider collaboration while preventing fraud and abuse



## 5) Story of Hopkins and NCI, Interoperability, Almost...





## 6) Operationalizing the Gaps in Interoperability

The way forward ... Stepping up to insurmountable complexity

Broad, relevant super use cases, POC and validation that addresses both type 1 and type 2 issues

Exemplary Pilot Work: Death Certificates



# *Insurmountable complexity*

Vasa set sail on her **maiden** voyage on August 10, 1628. At the time, she was the most powerfully armed warship in the world, with 64 bronze cannons. Twenty minutes into her journey, the ship was hit by two strong winds. It heeled to port, water gushed in, and the ship sank less than a mile into the journey. Feb 23, 2012





# *Vasa Lessons for Interoperability*

## *A checklist*

1. **Excessive schedule pressure:** The Vasa was completed under strong time constraints to meet a pressing need.
2. **Changing needs:** Many changes to operational characteristics were made during construction of the ship.
3. **Lack of technical specifications:** The (non-existent) specifications were not revised as the operational requirements changed.
4. **Lack of a documented project plan:** During a year-long transition in leadership it was difficult for the assistant to manage the project. This resulted in poor supervision of the various groups working on the ship (i.e., the shipwright, the ship builder, and the numerous subcontractors). There is no evidence that the new project manager (the former assistant) prepared any plans after the original shipwright died.
5. **Excessive innovation:** No one in Sweden, including the shipwright, had ever built a ship having two gun decks.
6. **Secondary innovations:** Many secondary innovations were added during construction of the Vasa to accommodate the increased length, the additional gun deck, and other changes.
7. **Requirements creep:** It seems that no one was aware of the degree to which the Vasa had evolved during the 2 ½ years of construction.
8. **Lack of scientific methods:** There were no known methods for calculating center of gravity, stiffness, and the resulting stability relationships of the Vasa.
9. **Ignoring the obvious:** The Vasa was launched after failing a stability test.
10. **Possible mendacity:** Results of the stability test were known to some but were not communicated to others.



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DECEASED-NAME FIRST MIDDLE LAST <b>1. JOHN WAYNE GACY</b>		SEX <b>2. MALE</b>		DATE OF DEATH (MONTH, DAY, YEAR) <b>3. MAY 10, 1994</b>			
COUNTY OF DEATH <b>4. WILL</b>		AGE-LAST BIRTHDAY (Y/M/D) <b>5a. 52</b>		UNDER 1 YEAR UNDER 1 DAY <b>5b. 52</b>		DATE OF BIRTH (MONTH, DAY, YEAR) <b>5d. MARCH 17, 1942</b>	
CITY, TOWN, TWP. OR ROAD DISTRICT NUMBER <b>6a. LOCKPORT TOWNSHIP</b>		HOSPITAL OR OTHER INSTITUTION-NAME (IF NOT IN EITHER GIVE STREET AND NUMBER) <b>6b. STATEVILLE CORRECTIONAL CENTER</b>		I HOSP. OR INST. INDICATED O.A. OR EMER. RM. INPATIENT (SPECIFY) <b>6c. -----</b>			
BIRTHPLACE, CITY AND STATE OR FOREIGN COUNTRY <b>7. CHICAGO, ILLINOIS</b>		MARRIED, NEVER MARRIED, WIDOWED, DIVORCED (SPECIFY) <b>8a. DIVORCED</b>		NAME OF SURVIVING SPOUSE (MAIDEN NAME, IF WIFE) <b>8b. -----</b>		WAS DECEASED EVER IN U.S. ARMED FORCES? (YES/NO) <b>9. NO</b>	
SOCIAL SECURITY NUMBER <b>10. 344-34-3840</b>		USUAL OCCUPATION <b>11a. CONTRACTOR</b>		KIND OF BUSINESS OR INDUSTRY <b>11b. OWN BUSINESS</b>		EDUCATION (SPECIFY ONE, Y HIGHEST GRADE COMPLETED) <b>12. 12</b>	
RESIDENCE (STREET AND NUMBER) <b>13a. KASKASKIA STREET</b>		CITY, TOWN, OR ROAD DISTRICT NO. <b>13b. MENARD</b>		INSIDE CITY (YES/NO) <b>13c. YES</b>		COUNTY <b>13d. RANDOLPH</b>	
STATE <b>13e. ILLINOIS</b>		ZIP CODE <b>13f. 62259</b>		RACE (WHITE, BLACK, AMERICAN INDIAN, etc.) (SPECIFY) <b>14a. WHITE</b>		OF HISPANIC ORIGIN? (SPECIFY NO OR YES-IF YES, SPECIFY CUBAN, MEXICAN, PUERTO RICAN, etc.) <b>14b. X NO</b>	
FATHER-NAME FIRST MIDDLE LAST <b>15. JOHN STANLEY GACY</b>		MOTHER-NAME FIRST MIDDLE LAST <b>16. MARION ROBERTSON SCOW</b>					
INFORMANT'S NAME (TYPE OR PRINT) <b>17a. JOHN GREENLEES</b>		RELATIONSHIP <b>17b. LAWYER</b>		MAILING ADDRESS (STREET AND NO. OR R.F.D., CITY OR TOWN, STATE, ZIP) <b>17c. 3039 W. IRVING PK. RD. CHICAGO, IL.</b>			
18. PART I: Enter the diseases, injuries, or complications that caused the death. Do not enter the mode of dying, such as cardiac or respiratory arrest, shock, or heart failure. List only one cause on each line.							
Immediate Cause (Final disease or condition resulting in death) <b>(a) ACUTE CONGESTIVE HEART FAILURE</b>							
DUE TO, OR AS A CONSEQUENCE OF <b>(b) LETHAL LEVELS OF POTASSIUM CHLORIDE</b>							
CONDITIONS, IF ANY WHICH GIVE RISE TO IMMEDIATE CAUSE (a) STATING THE UNDERLYING CAUSE LAST. <b>(c) LETHAL INJECTION</b>							
PART II: Other significant conditions contributing to death but not resulting in the underlying cause given in PART I.							
NATURAL, ACCIDENT, HOMICIDE, SUICIDE, UNDETERMINED, (SPECIFY) <b>20a. HOMICIDE</b>		DATE OF INJURY (MONTH, DAY, YEAR) <b>20b. MAY 10, 1994</b>		HOUR <b>20c. 12:17</b>		HOW INJURY OCCURRED (ENTER NATURE OF INJURY MENTIONED IN PART I OR PART II, ITEM 18) <b>20d. Victim injected with lethal drugs per judicial order</b>	
INJURY AT WORK (YES/NO) <b>20e. NO</b>		PLACE OF INJURY (AT HOME, FARM, STREET, FACTORY, OFFICE BUILDING, ETC.) (SPECIFY) <b>20f. STATE PRISON</b>		LOCATION (CITY, VIL. OR TOWN, OR TWP. OR RD. DIST. NO., COUNTY, STATE) <b>20g. LOCKPORT TWP., WILL COUNTY, ILLINOIS</b>		IF FEMALE, WAS THERE A PREGNANCY (PAST THREE MONTHS) <b>20h. YES <input type="checkbox"/> NO <input checked="" type="checkbox"/></b>	
I CERTIFY THAT IN MY OPINION BASED UPON MY INVESTIGATION AND/OR THE INQUIRY, THIS DEATH OCCURRED ON THE DATE, AT THE PLACE AND DUE TO THE CAUSE(S) STATED, AND THAT <b>21a. PATRICK K. O'NEIL</b>		THE DECEDENT WAS PRONOUNCED DEAD ON <b>21b. MAY 10, 1994</b>		AT <b>21c. 12:58 A. M.</b>			
CORONER'S - MEDICAL EXAMINER'S SIGNATURE <b>22a. PATRICK K. O'NEIL</b>		DATE SIGNED (MONTH, DAY, YEAR) <b>22b. JUNE 17, 1994</b>					
CORONER'S PHYSICIAN'S SIGNATURE <b>23a. [Signature]</b>		DATE SIGNED (MONTH, DAY, YEAR) <b>23b. [Signature]</b>					
BURIAL, CREMATION, REMOVAL (SPECIFY) <b>24a. CREMATION</b>		CEMETERY OR CREMATORY-NAME <b>24b. RIVER HILLS CREMATORY</b>		LOCATION CITY OR TOWN STATE <b>24c. BATAVIA, ILLINOIS</b>		DATE (MONTH, DAY, YEAR) <b>24d. MAY 14, 1994</b>	
FUNERAL HOME <b>25a. McKOWN-DUNN FUNERAL HOME, LTD.</b>		STREET AND NUMBER OR R.F.D. <b>210 MADISON STREET</b>		CITY OR TOWN STATE ZIP <b>OSWEGO, ILLINOIS 60543</b>			
FUNERAL DIRECTOR'S SIGNATURE <b>25b. [Signature]</b>		NAME <b>WILLIAM F. DUNN</b>		FUNERAL DIRECTOR'S ALL ILL. LICENSE NUMBER <b>25c. 034-010714</b>			
LOCAL REGISTRAR'S SIGNATURE <b>26a. [Signature]</b>		DATE FILED BY LOCAL REGISTRAR (MONTH, DAY, YEAR) <b>26b. JUN 24 1994</b>					

## CERTIFICATION

STATE OF ILLINOIS  
COUNTY OF WILLDATE December 12, 1994

I, JAN GOULD, COUNTY CLERK, DO HEREBY CERTIFY THAT THIS DOCUMENT IS A TRUE AND CORRECT COPY OF THE ORIGINAL RECORD ON FILE IN THE WILL COUNTY CLERK'S OFFICE, JOLIET, ILLINOIS.

(COUNTY SEAL)

 COUNTY CLERK, WILL COUNTY, ILLINOIS  
 DEPUTY


## John Wayne Gacy

American serial killer

John Wayne Gacy Jr. was an American serial killer and rapist. He sexually assaulted, tortured and murdered at least 33 teenage boys and young men between 1972 and 1978 in Cook County, Illinois.

[Wikipedia](#)

Born: March 17, 1942, Chicago, IL

Died: May 10, 1994, Stateville Correctional Center, Lockport Township, IL

Artworks: Goodbye Pogo, Sex Skull, Lou Jacobs, MORE

Victims: 33-34

Cause of death: Lethal injection

Children: Christine Gacy, Michael Gacy



# FHIR-based Death Certificate Tool

2017-05-23dl Mark Braunstein, Paula Brown et al - orig 1a99f8d0ad60563468a8c1eb0d15e46063fb.pdf (page 34 of 66) ▾

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SMART-on-FHIR Public Health App: "Death Worm"

**Solution: Powerful & Flexible Tool to Help Physicians Determine Chain of Events that Led to Death**

- + **Integrate Into Physicians' Workflow:** Certify Deaths in the EHR & Send Electronically to State
- + **Save Time:** Provide Medical History & Pre-Populate Demographic/Basic Health Information
- + **Improve Accuracy:** Use Advanced Computing to Help Determine Cause-of-Death Sequence
- + **Advance Medical Research & Improve Care:** Send Coded Data Back to EHR

33

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ref:

2018: [Paula-Braun-Briefing-on-FHIR-to-NCVHS-2018-Jan-9-508](#)

2017: Mark Braunstein, Paula Brown et al - orig [1a99f8d0ad60563468a8c1eb0d15e46063fb.pdf](#)



# *FHIR-based Death Certificate Tool*

The screenshot displays a web application for generating death certificates. It features a patient profile for Jonathan James Johnston, a timeline of health conditions, and a cause-of-death section. Callouts highlight key features: automatic EHR data extraction, patient history, a scaled timeline, a familiar interface for documentation, bundling results in FHIR format, and recommending possible sequences.

**Automatically extract patient data from EHR**

**Patient history information**

**Scaled timeline of health conditions**

**Recommend possible sequences**

**Familiar interface for cause-of-death documentation**

**Bundle results in FHIR format**

**Cause of Death:**

- Rupture of heart
- Acute myocardial infarction
- Diffuse disease of coronary artery
- Diabetes mellitus

**Onset to Death:**

- 13 minutes
- 3 days
- 16 years
- 29 years

**Other Significant Conditions**

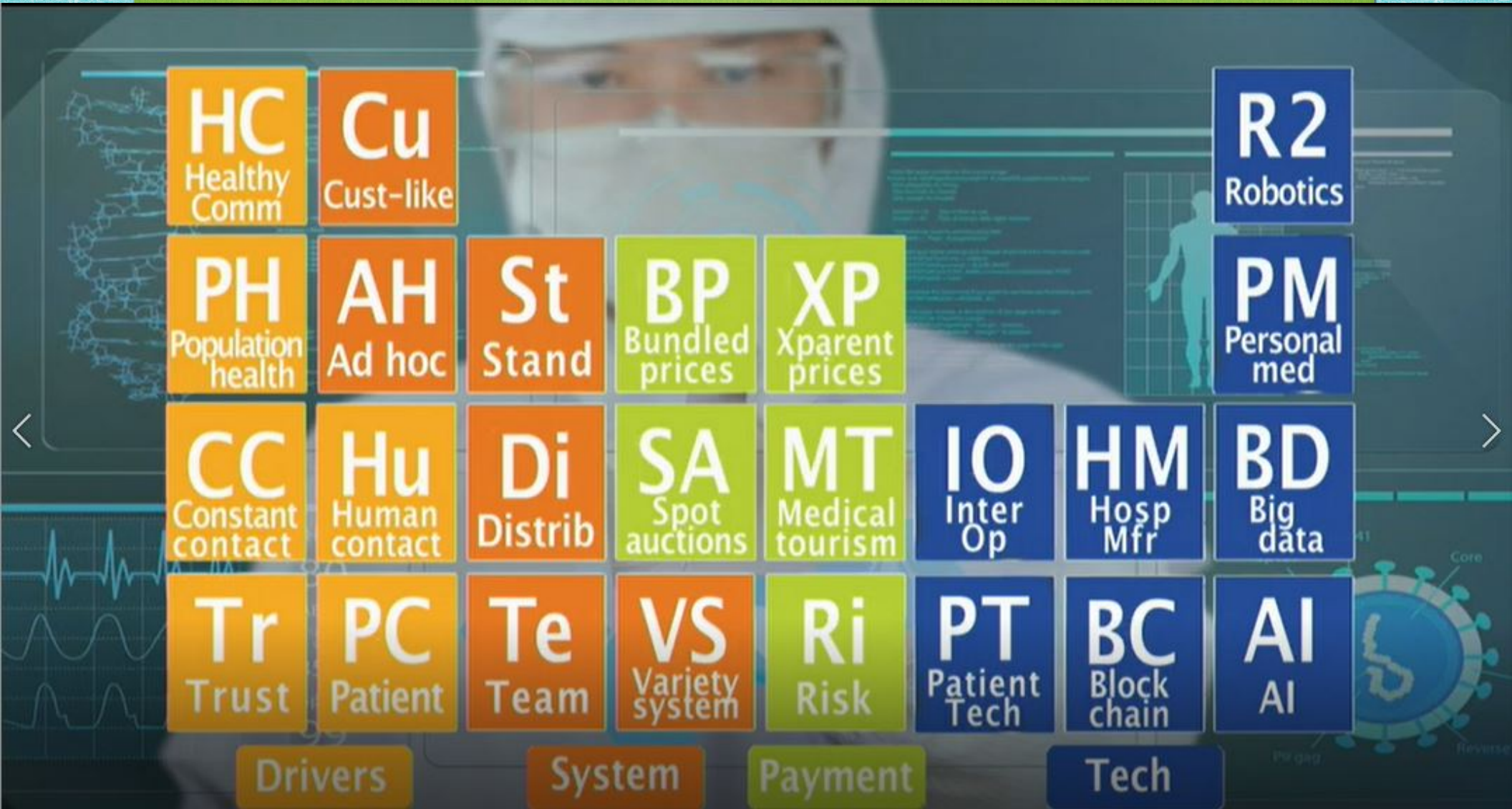
Enter text here.

Logged in as: unknown

Ref: *ibid*; 60 second demo here showing integration:  
<https://www.youtube.com/watch?v=PIBoRspEzbA>



# Summary: Interoperability is about drivers, system, payment and technology



Reference: 2016 Joe Flower - <https://www.imaginewhatif.com/>