



The Use of Data in Integrated Care: A Model from Kaiser Permanente

Hal Wolf

Senior Vice President and Chief Operating Officer
Kaiser Permanente, The Permanente Federation



Innovation is in Our DNA



Dr. Garfield's hospital in the California desert (1933)

- Pre-payment
- Group practice
- Prevention / total health
- Population-based approach
- Clinical information technology
- Hospital design

Kaiser Permanente Stands for Total Health

Guided by a Mission and History:

To provide affordable, high-quality health care services to improve the health of our members and the communities we serve.

Kaiser Permanente: The oldest group model health maintenance organization, serving 8.8 million people in eight regions across the U.S.



Kaiser Permanente's capitated payment model places as much emphasis on keeping people healthy as it does on caring for members when they are ill.

Kaiser Permanente Programwide

- 8.8 million members
- 35 hospitals
- 454 medical office buildings
- 15,000+ physicians
- 164,000+ employees
- \$42.1 billion annual revenue*
- 65 years of providing care
- Focus on prevention of illness and disease
- Focus on community health helps our patients

KAISER PERMANENTE REGIONS



*2009 revenues

Common Global Health Challenges

“Organizations will need to negotiate successfully six major challenges.”

- U.S. Institute of Medicine

- 1. Best evidence process**
- 2. Effective information technology**
- 3. Knowledge and skills management**
- 4. Effective teams**
- 5. Measurement for continuous improvement and accountability**
- 6. Coordination of care across conditions, services, and settings**

Health Care Reform Changes Everything

The Patient Protection and Affordable Care Act of 2010 initiated the most significant changes in the U.S. health care system since the establishment of Medicare in 1965.

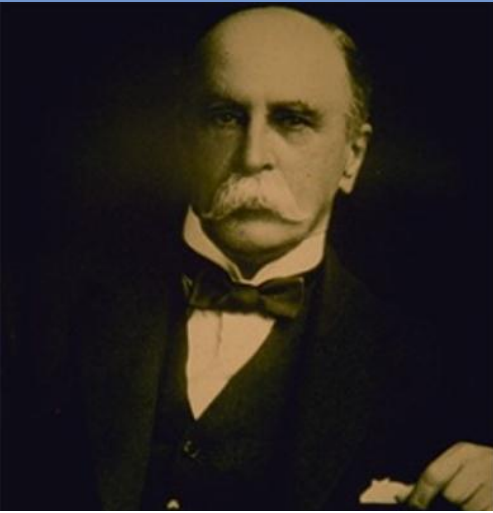
The new law has the potential to improve lives in some important ways

- **Approximately 32 million Americans, who today find themselves outside the U.S. health care system, will have access to vital preventive services and care**
- **Move toward accountable care – rewarding more coordinated, high-quality care through delivery system and payment system reforms**

Now we have a pathway for large scale data exchange

- **Programs under Medicare and Medicaid are to provide incentive payments to eligible professionals and hospitals as they adopt, implement, upgrade or demonstrate meaningful use of certified EHR technology***

The Physician Role Changes...



Traditional Model of Care

- One patient at a time
- Only know about patients who appear in your office
- No use of IT
- Limited use of “extenders”



New Model Elements

- Accountability for panel/population
- Transparency
- Use of EMR, registries, internet
- Team care (including patient)
- Moving care out of Dr. office

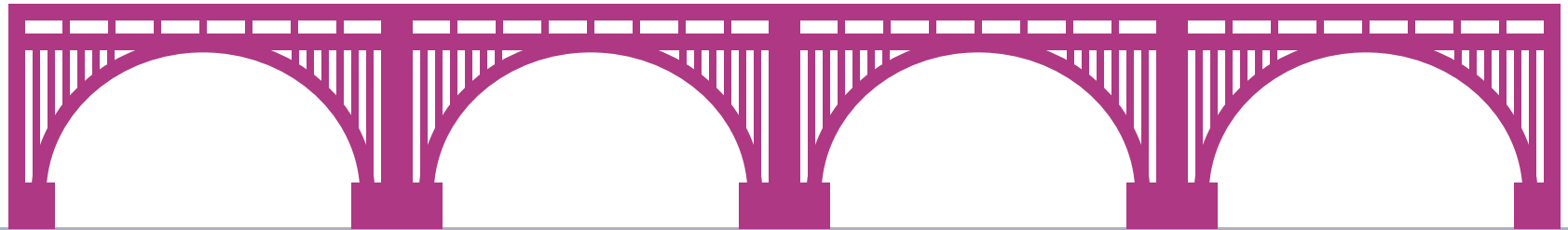
A Systematic Approach

**Primary
Prevention**

**Secondary
Prevention**

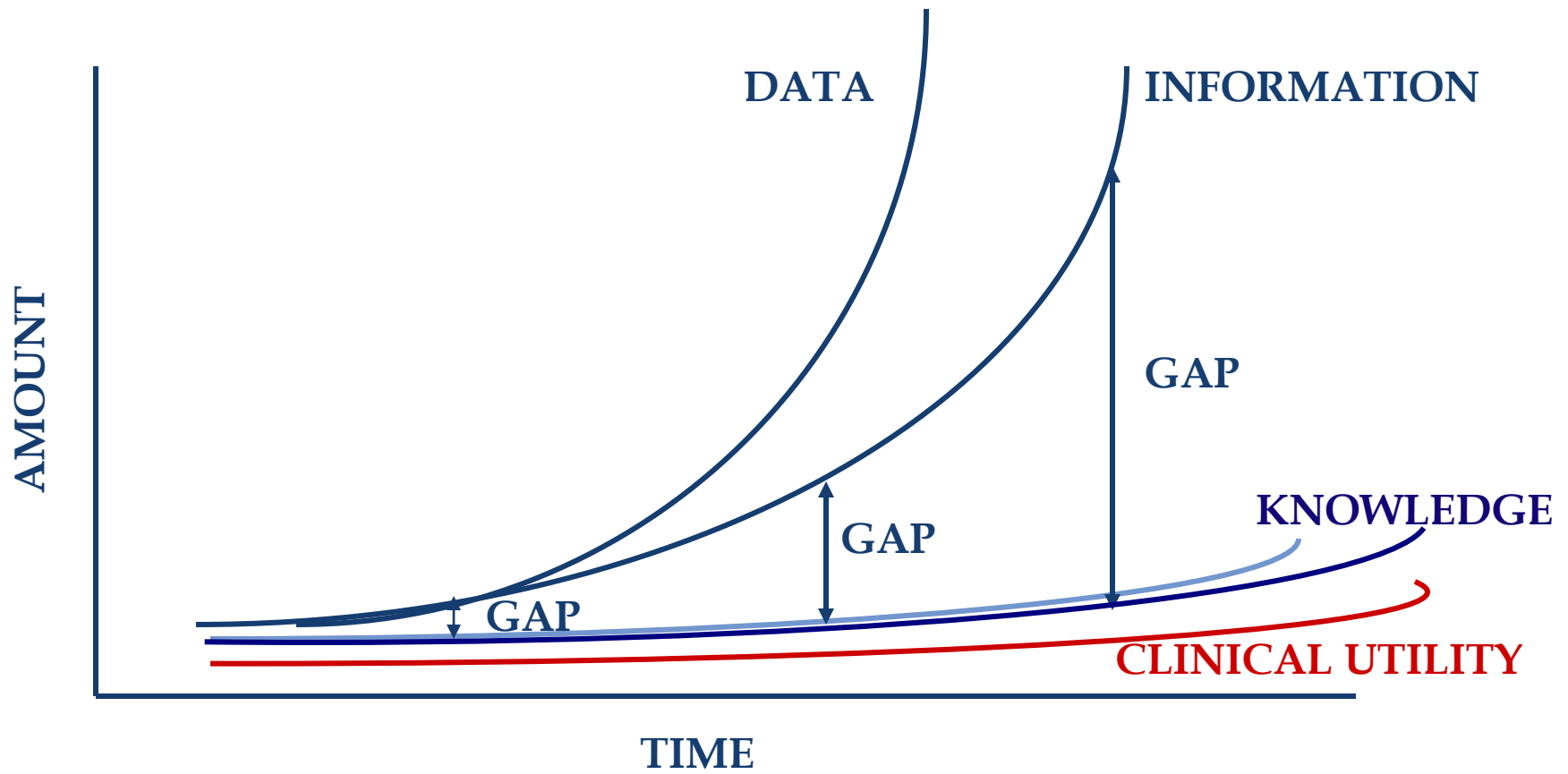
**Acute
Care**

**Chronic
Care**



...and accountability across the care continuum.

EHRs Offer Foundational Data

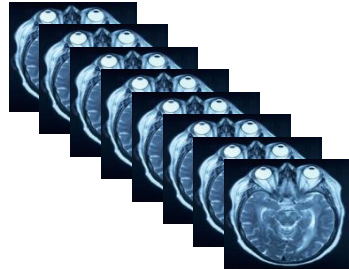


Source: Michael N. Liebman, PhD
Executive Director Windber Research Institute

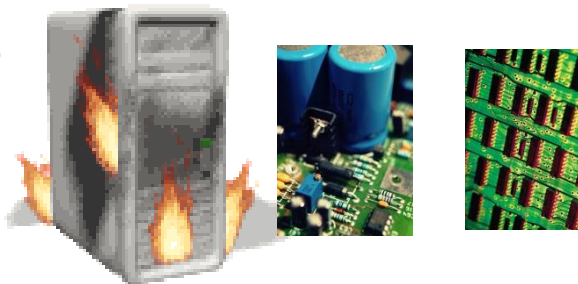
EHRs move vertically integrated care toward improved clinically integrated care



Application Lifecycle Management



Data Growth

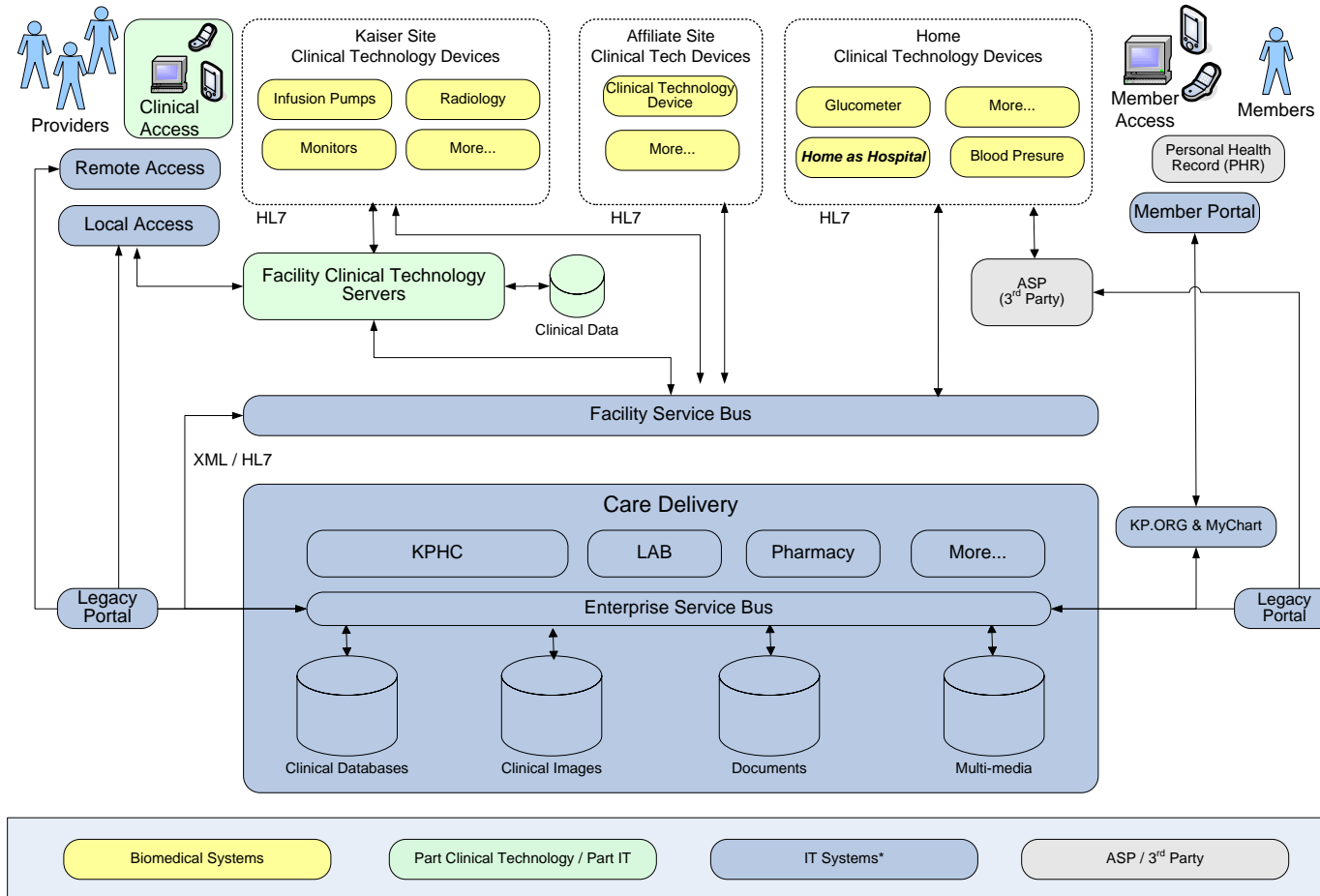


**Technology Lifecycle
< 5 years <<**

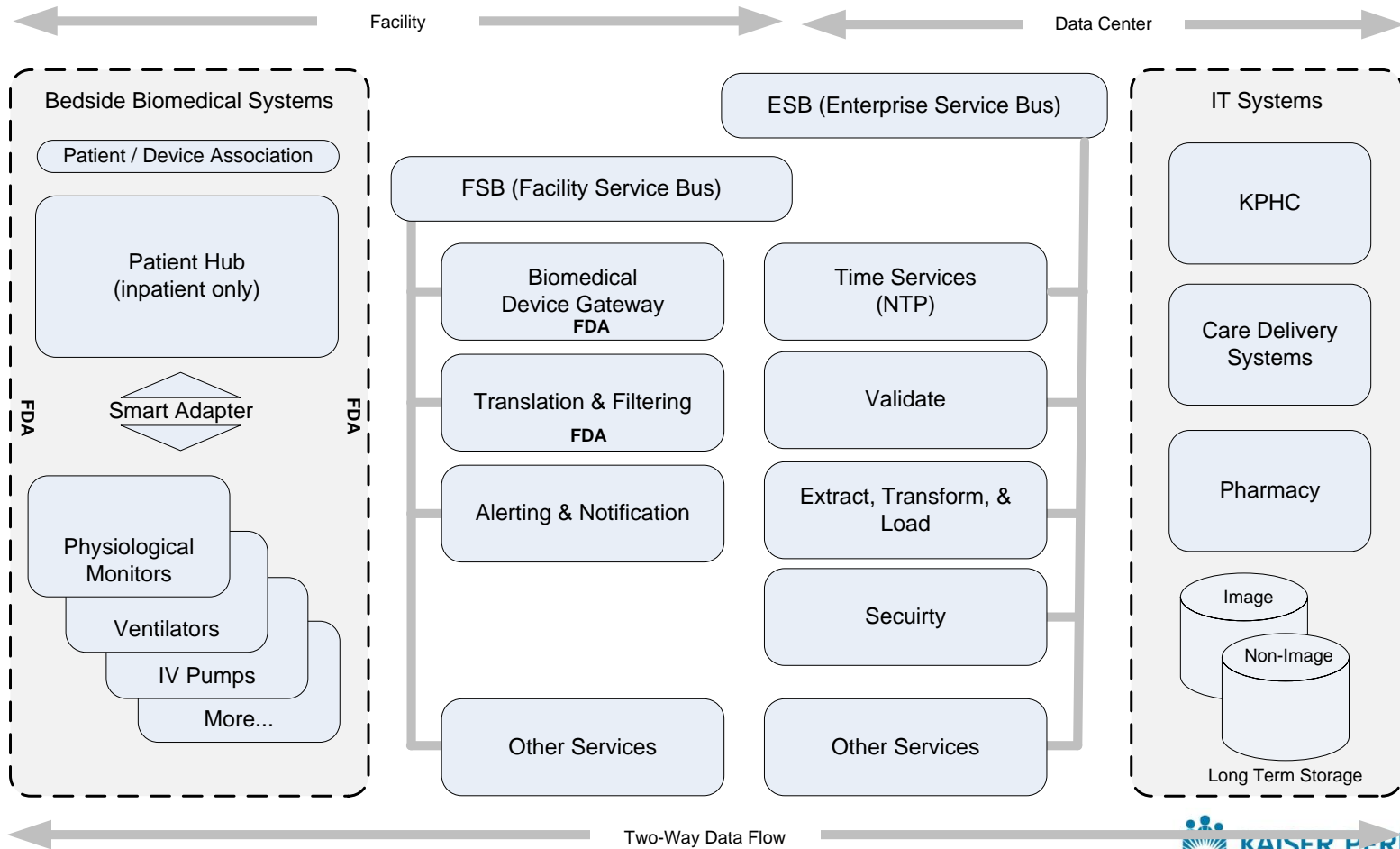


**Information Availability
10- 30 - 110 years!**

Biomedical Systems: Background



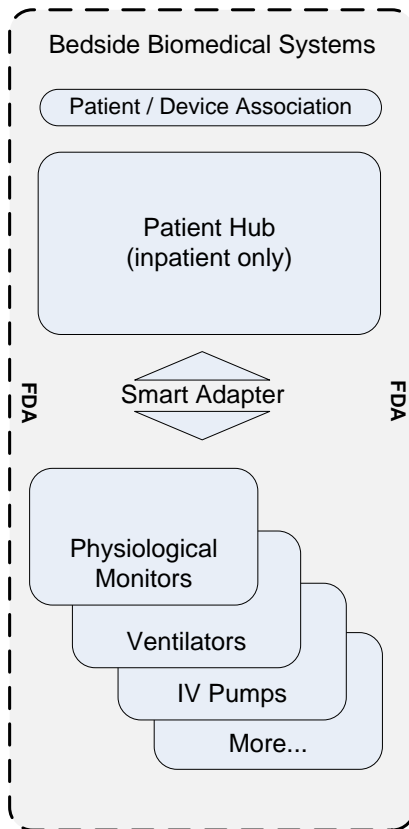
Architectural Vision



Inpatient Biomedical Systems

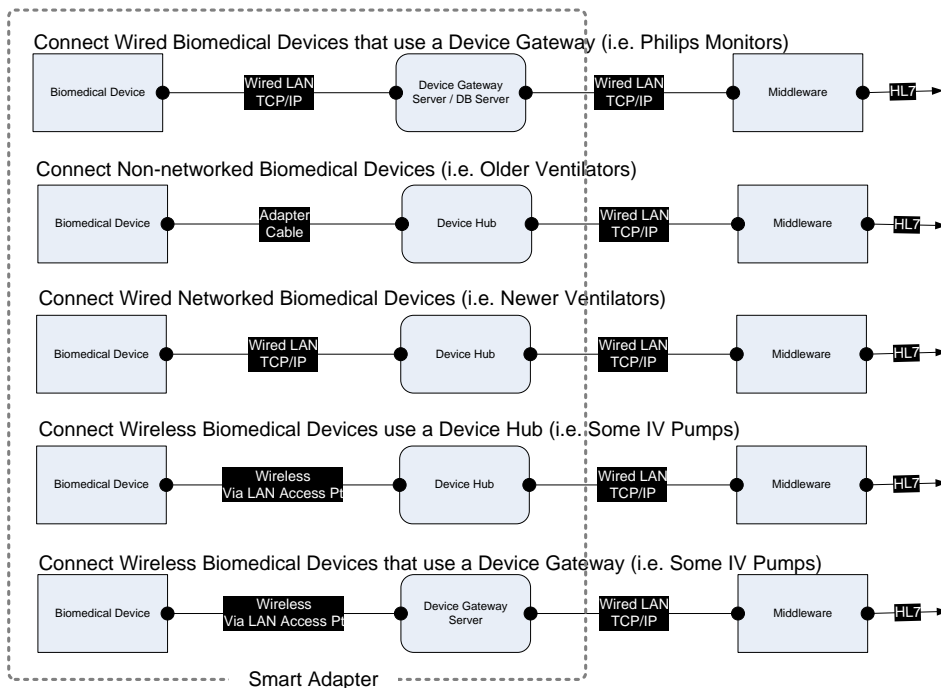
- Connected to wired and wireless networks that isolate biomedical devices from non-critical and business traffic to protect the systems and ensure connectivity
- Outpatient Biomedical Systems may connect through an isolated or shared network
- System dependencies
 - Ensures bandwidth
 - Security
 - Single data source

Biomedical Systems: A Patient-Centric Focal Point



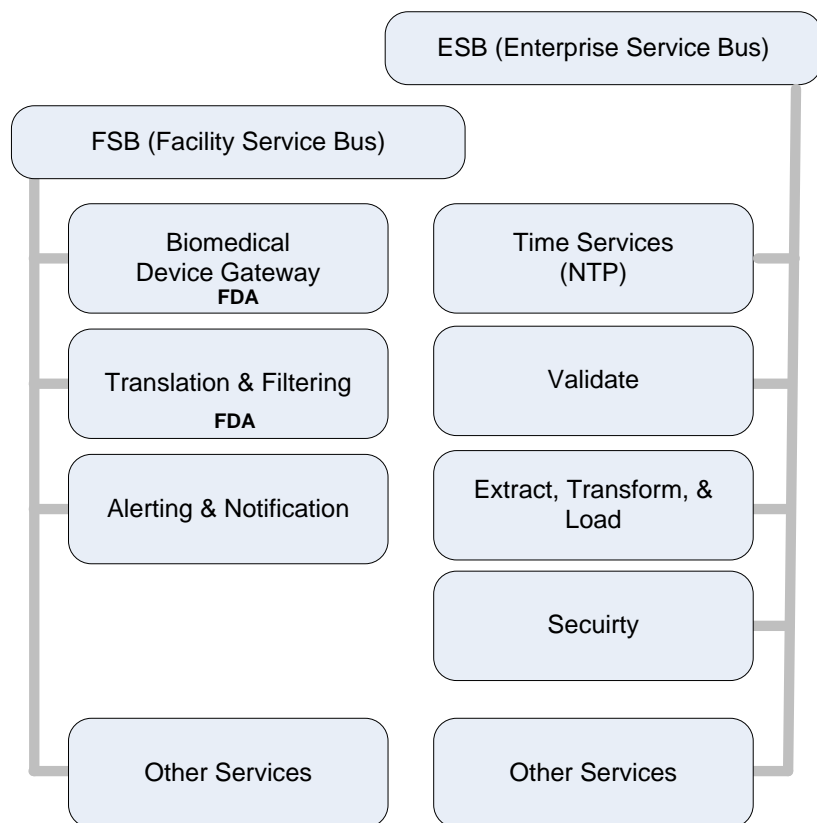
- Provides real-time comprehensive data to support patient safety and workflow improvements
- Patient hubs allow data collected from different sources - will be FDA certified devices that move with patients through the care environment
- Outpatient areas will connect Biomedical Systems to middleware services through smart adapters.

Smart Adapters



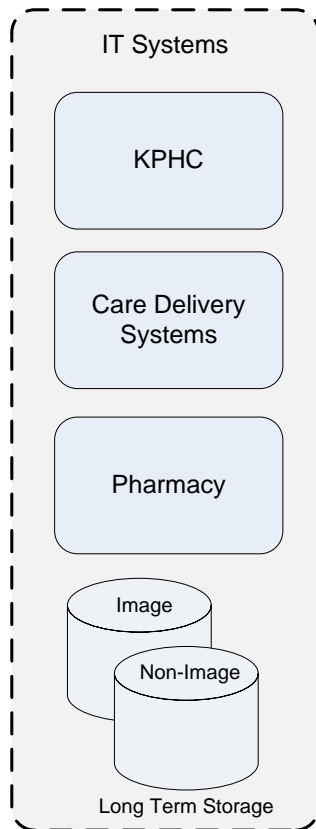
- Will be part of the foreseeable future where many Biomedical Systems can't natively be integrated
- May be used to connect devices that were not originally designed to be connected to the network
- May be a combination of software and hardware

Standardized Messages & Services Will Connect Systems



- Biomedical Device Gateways will manage groups of systems
- Translation/Filtering Middleware will be used to send and receive data that have not yet fully embraced standards or long-lived systems that have not been retired
- Will use enterprise services including time services and directory services

IT Systems



- Translation, verification, and storage services receive and send data between Biomedical Systems and Care Delivery Systems
- Data is received in known formats and verified that the data appears to be correct and for the right patient
- Data is stored and indexed in appropriate Care Delivery Systems
- Translation services also perform ETL (extract, transform, and load) operation to send data to Biomedical Systems in a standard HI 7 format such as patient demographics

Clinical Area Considerations

Area	Examples	Considerations	Potential Variation
Ambulatory – outpatient	Primary Care – thermometers, non-invasive blood pressure, weight scales	Point-in-time data collection. Minimal filtering required. Large number of systems. Cost is a significant driver.	Some architectural components not required; No Patient Hub. Product selection is likely to be different than inpatient to reduce cost. Greater use of centralized data center infrastructure with reduced requirement for the facility to operate in a major disaster.
Bedside - inpatient ¹¹	ICU, CCU, Telemetry Unit – physiological monitors, ventilators, Smart Pumps, Smart Beds	Biomedical Systems collect data continuously. Protocol translation may be required to convert proprietary formats to HL7. Filtering is required to reduce total volume of data stored to only clinically relevant data. Need for a wide variety of available bedside device drivers.	All architectural components required. Product selection driven by the need to support critical clinical procedures and ensure patient safety. Configuration redundancy. Local infrastructure to support essential care services.
LAB	Regional Lab -	Lab regulatory requirements. Specialized test equipment. LIS (Lab Information System) usually includes lab test equipment integration.	Specialized system. Tight integration between LAB test equipment and the LIS. Interface to other Care Delivery Systems are through the LIS. Kaiser currently uses Cerner for the LIS.
LAB Point-of-Care-Testing	Various Depts. – iStat, glucometer, etc.	Lab regulatory requirements apply to POCT (Point-of-care-testing) devices. Mini-LIS capability required. Need a wide variety of POCT drivers.	Tight integration with Mini-LIS. Interface to other Care Delivery Systems are through the Mini-LIS. Kaiser currently uses LDS AegisPOC.
Telehealth	Home	Data collected by patients. There is an increased chance for error where the device may be used by another family member. Data sent in batches a couple times a day. High volume likely to be in the millions.	Components shown in Facility portion of the Architectural Overview (Figure 3) are replaced by 'Black Box to Kaiser' consumer devices which are likely to be Continua certified. Central data aggregation before processing which may be at an ASP.
Visible Light	Various Depts. – photos, video clips	Data collected by visible light devices are images.	Imaging . Covered in image integration. Images may be wrapped in DICOM and stored in PACS and Medical Image Data Stores.

Indirect vs. Direct Association

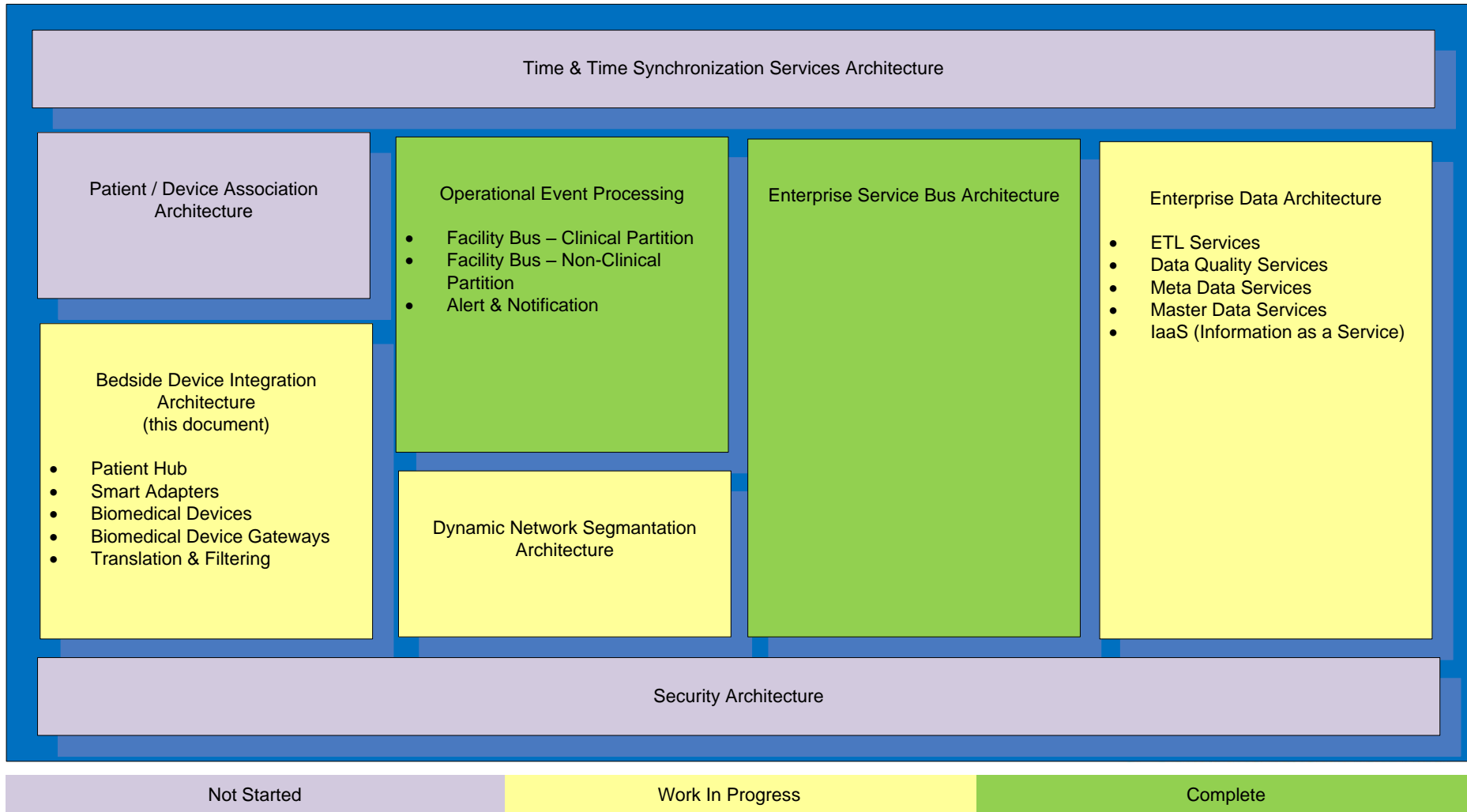
Indirect association:

- Dependent on accurate admission, transfer, and discharge processes
- Data passed from Biomedical Systems to Care Delivery Systems should contain placeholders for Patient ID

Direct association:

- Where patients are associated with the Biomedical System at the bedside, mobile and Biomedical Systems will direct the need for direct patient association

Building on Other Architectures





Thank you

Hal Wolf

**Sr. Vice President & Chief Operating Officer
Kaiser Permanente, The Permanente Federation
Hal.Wolf@kp.org**