



Healthcare Data: Secondary Use through Interoperability

Floyd Eisenberg MD MPH

July 18, 2007

NCVHS



Agenda

- Policies, Enablers, Restrictions
- Data Re-Use Landscape
- Sources of Data for Quality Measurement, Reporting, Improvement
- Data Re-Use Management
- Next Steps / Planned Activities

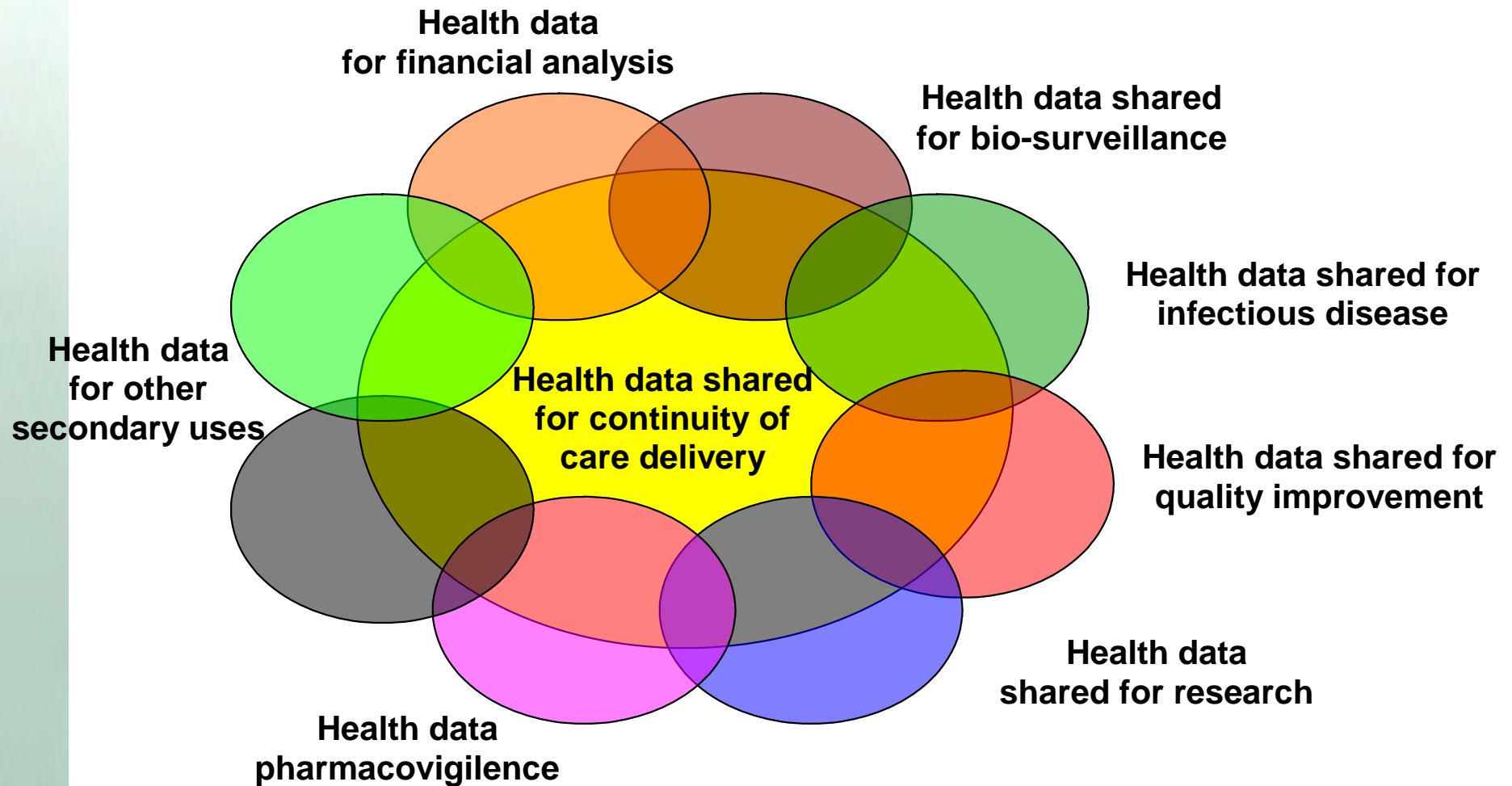
Policies, Enablers and Restrictions

“Promoting Quality and Efficient Health Care in Federal Government Administered or Sponsored Health Care Programs.”

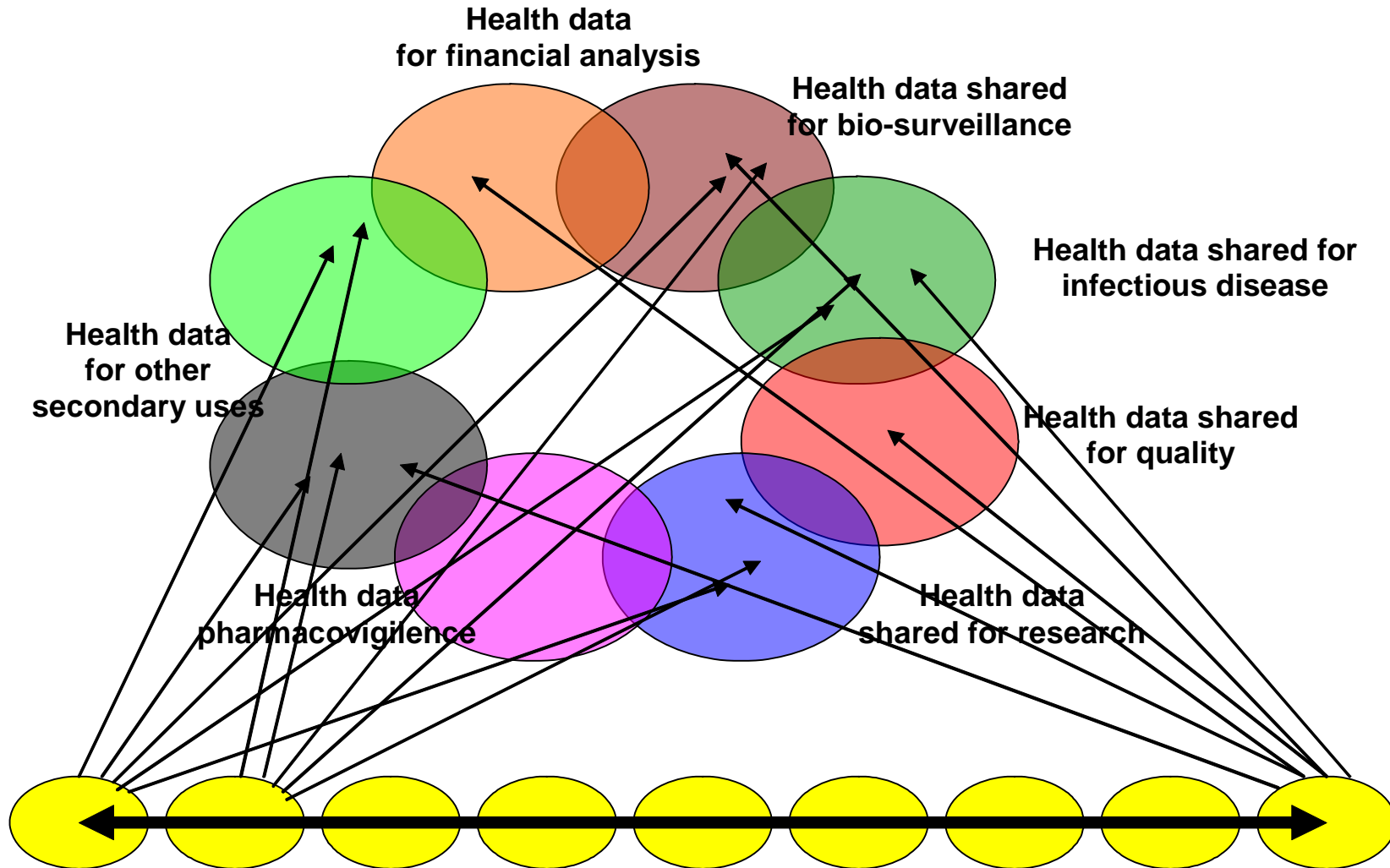
Interoperability: “The ability to communicate and exchange data accurately, effectively, securely, and consistently with different information technology systems, software applications and networks in various settings, and exchange data such that clinical or operational purpose and meaning of the data are preserved and unaltered.”

Presidential Executive Order – August 2006

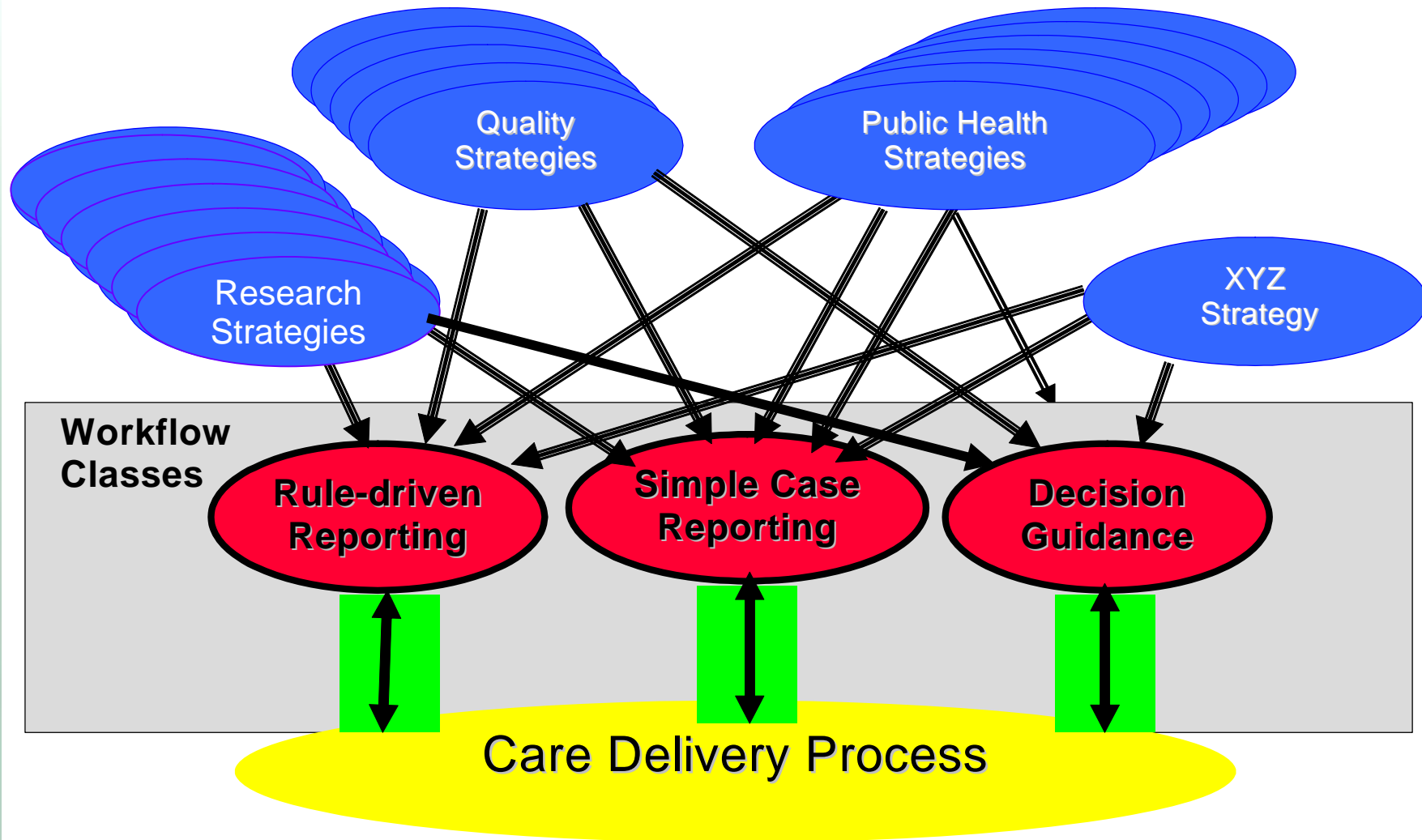
Data Re-Use Landscape



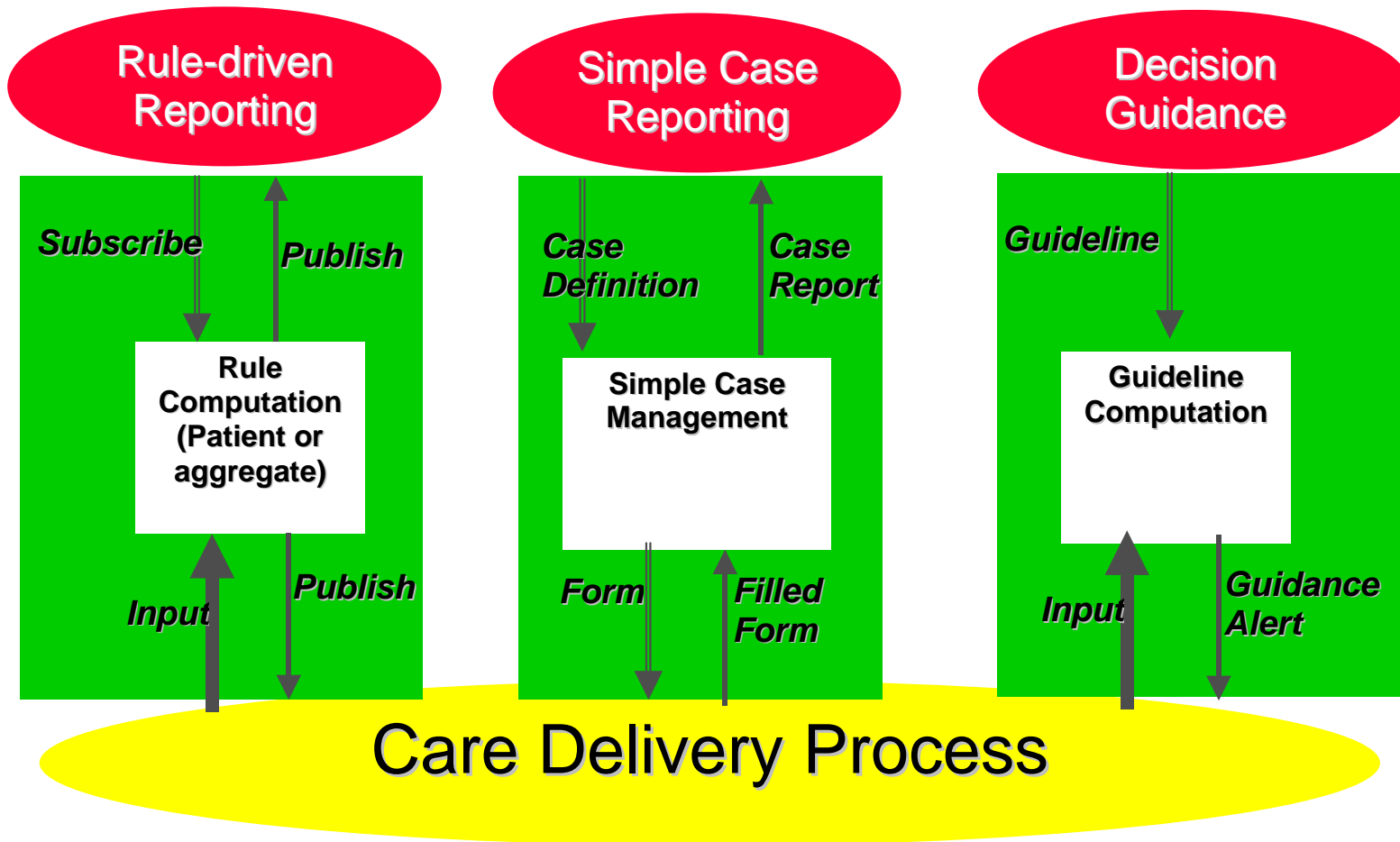
Data Re-Use Landscape



Data Re-Use Landscape



Data Re-Use Landscape



Sources of Data: Workflow

Integrating the Healthcare Enterprise (IHE) Patient Care Coordination Domain

Quality Strategies

Research Strategies

Public Health Strategies

- <Domain Name>
- <Domain Name> Stakeholders
- Express the criteria
- Select a Site / Location
- Identify a patient meeting certain criteria
 - Cohort (Based on Inclusion / Exclusion Criteria)
- Reporting data
- Data review/feedback
- Analysis/Evaluation
- Mapping
- Aggregation
- Communication

Sources of Data: Data Elements

**AHIC: Healthcare Information Technology Expert Panel
Identifying Core Data Elements For Electronic Healthcare Information Systems**

**Quality
Strategies**

**Research
Strategies**

**Public Health
Strategies**

Data Elements

- **Measure definition and method of expression**
- **Demographics (sources: ADT, Financial systems)**
- **Results (Laboratory, Imaging – Quantitative / Qualitative)**
- **Substance Administration (E.g., Medication, Oxygen, etc.)**
- **Procedures**
- **Location**
- **Events**
- **Clinical Observations / Findings**
- **Problems (Conditions, including but not limited to Allergies)**
- **Diagnoses**
- **History (patient or provider generated)**

Sources of Data: Data Element Detail (1 of 2)

Healthcare Information Technology Expert Panel

HITSP Population Health Technical Committee Analysis

- Procedures and diagnostic tests
 - Ordered
 - Performed
 - Diagnostic test results e.g. radiology findings, echo
 - Procedure Date/time (supports prior trigger event)
- Lab information
 - Result (value) E.g lipid measurement for diabetes
 - Lab order (e.g. Hemoglobin A1C)
- Symptom information
- Physical findings and observations
 - Vital signs
 - Physical exam
 - Medication allergies (hypersensitivity reactions)
 - True or anticipated Side Effects
- Diagnoses
 - Principal Diagnosis – retrospective measures
 - Admitting/presumptive – concurrent measures
 - Chronic conditions
 - Acute conditions
 - Problem list (interdisciplinary)

Sources of Data: Data Element Detail (2 of 2)

Healthcare Information Technology Expert Panel

HITSP Population Health Technical Committee Analysis

- Family history
- Patient past history
- Social History
- Allergies
- Medication existence
- Medication order
 - - Authorizing provider
 - - Drug
 - - Dose
 - - Strength
 - - Dispensed amount
 - - Refills (for continuous use measures)
 - - Derived attributes (e.g. continuous use measures)
 - - Managed / given by provider
 - - Route of entry
- Prior trigger event (E.g. antibiotic prophylaxis)
- Documentation of clinician-to-clinician communications / Patient Education

Sources of Data: Data Element Example

Example: ACEI / ARB Measure

- ACEI / ARB
- Moderate / Severe Systolic Dysfunction
- Allergies (Exclusion)
- Medical Reasons (Exclusion)

Sources of Data: Data Element Example

Example: ACEI / ARB Measure

Inclusion Criteria: AMI ICD-9 Diagnosis Codes

ICD-9 Code	Description
410.01	Anterolateral wall, acute myocardial infarction-initial episode
410.11	Other anterior wall, acute myocardial infarction-initial episode
410.21	Inferolateral wall, acute myocardial infarction-initial episode
410.31	Inferoposterior wall, acute myocardial infarction-initial episode
410.41	Other inferior wall, acute myocardial infarction-initial episode
410.51	Other lateral wall, acute myocardial infarction-initial episode
410.61	True posterior wall, acute myocardial infarction-initial episode
410.71	Subendocardial, acute myocardial infarction initial episode
410.81	Other specified sites, acute myocardial infarction-initial episode
410.91	Unspecified site, acute myocardial infarction-initial episode

Echocardiogram (echo)	Cardiac Catheterization (cath) with Left Ventriculogram (LV gram)	Other Tests	Left Ventricular Systolic Function (LVSF)
--------------------------	---	----------------	---

Sources of Data: Data Element Example

Example: ACEI / ARB Measure

Inclusion / Exclusion: LVSD Explicitly Documented or Inferred IF:

Echocardiogram, appropriate nuclear medicine test, or a cardiac catheterization with a left ventriculogram done during hospital stay, or

Documentation one of the above diagnostic tests was performed anytime prior to arrival (e.g., “Echo done last March”), or

Documentation of LVSF, either as an ejection fraction or a narrative qualitative description (e.g., “Pt. admitted with severe LV dysfunction”).

- Explicit documentation of reasons by physician/APN/PA for not assessing LVSF (e.g., “ESRD, life expectancy < 1 month, will not measure EF.”) or clearly implied (e.g., “Patient refusing echo,” “Limited life expectancy, will not do any further evaluation,” “EF measurement not indicated”). If reasons are not mentioned in the context of LVSF assessments, do not make inferences (e.g., Do not assume that the physician/APN/PA is not assessing LVSF because the patient is already on ACEI therapy or is of advanced age). If the physician/APN/PA documents that he is deferring LVSF assessment to another physician/APN/PA, this should NOT count as a reason for not assessing LVSF during hospital stay (nor a reason for not planning an assessment after discharge) unless the reason/problem underlying the deferral is also noted (e.g., Select “No” if “Consulting cardiologist to evaluate pt. for echo” or “Pt. to follow up with physician/APN/PA re measuring EF as outpatient”).

In determining whether there is a plan to assess LVSF after discharge, the plan must be documented as definitive (e.g., “Will measure EF after discharge”). Documentation which indicates only that an LVSF assessment after discharge will be considered (e.g., “May do echo in 1 month”) is not sufficient.

Sources of Data: Data Element Example

Example: Heart failure patients with documentation that they or their caregivers were given written discharge instructions or other educational material addressing all of the following:

1. Activity level

- 419399001: verbalizes discharge instructions regarding activity plan

2. Diet

- 370847001: dietary needs education
- 11816003: diet education;
- 370808003: evaluation of response to nutritional instruction

3. Discharge medications

- 386465007: prescribed medication education

4. Follow-up appointment

- 83362003: final inpatient visit with instructions at discharge

5. Weight monitoring

- 307818003: weight monitoring

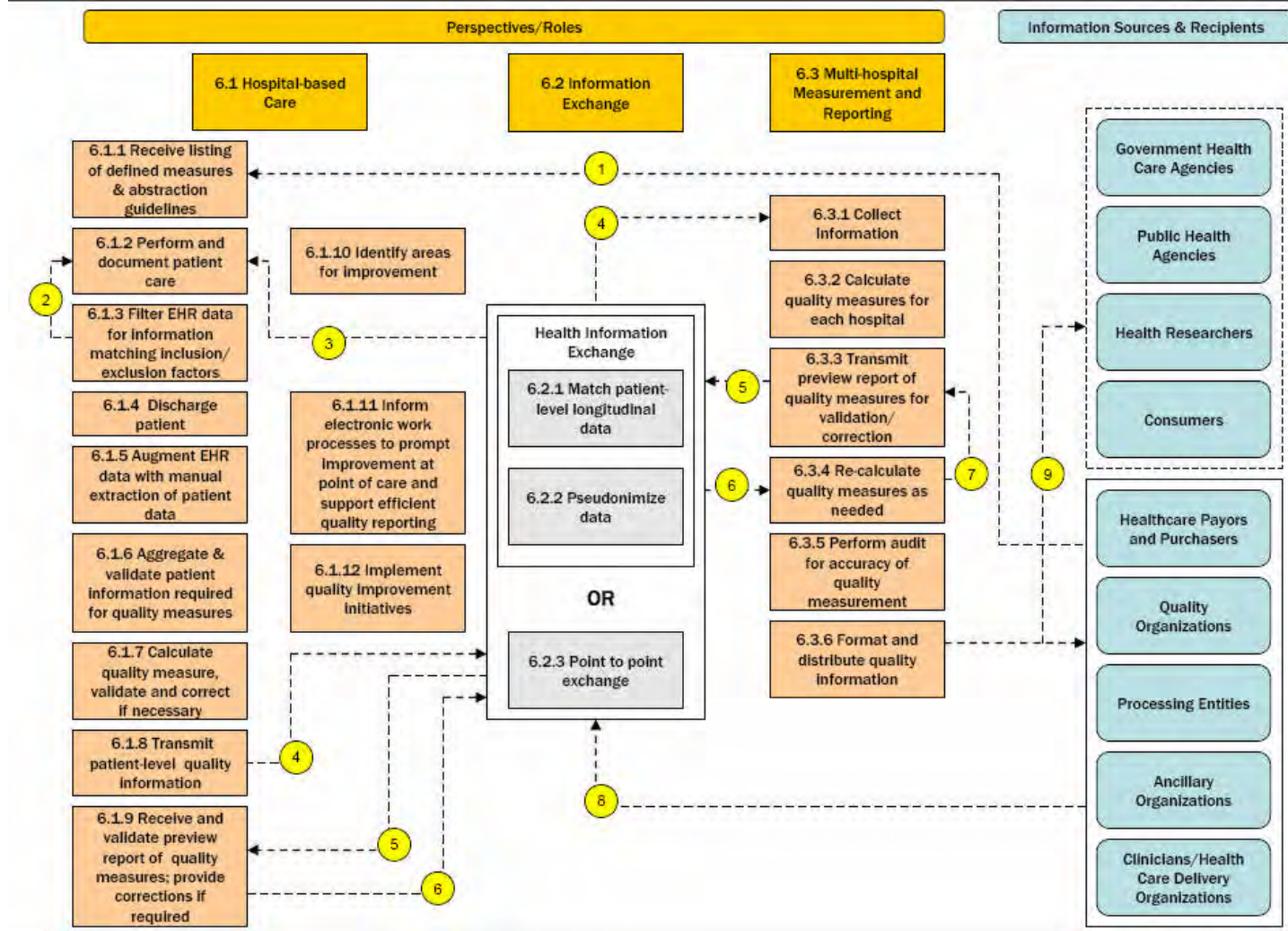
6. What to do if symptoms worsen

- 223413005: signs and symptoms education
- 223451005: advice to report signs and symptoms

Competing Terminologies / Semantic Interoperability

SNOMED CT has integrated several of the ANA recognized nursing terminologies (Omaha System, CCC, NIC, NANDA, NOC, PNDS). LOINC, ICNP (International Classification of Nursing Practice), ABC Codes and NMMDS (Nursing Management Minimum Data Set) have not yet been fully mapped to SNOMED. These additional mappings must occur. As content evolves within specific standard nursing terminologies, as long as nursing terminologies maintain the mapping relationships with SNOMED CT, they will be fully compatible with interoperability. **For purposes of interoperability with respect to the ONC Quality Use Case, mapping is required through SNOMED CT.** While there is established value for individual interface nursing terminologies (e.g. CCC and Omaha System, both in the public domain), for collection of data, interoperability within the scope of the Use Case is best managed with SNOMED CT. The need to enhance visibility of nursing and other disciplines can best be managed through specific use cases developed in the future for that purpose. Therefore, SNOMED CT is the identified terminology for use in the Quality Use Case.

Quality Use Case: Hospital-Based Care Quality Information Collection & Reporting Flow



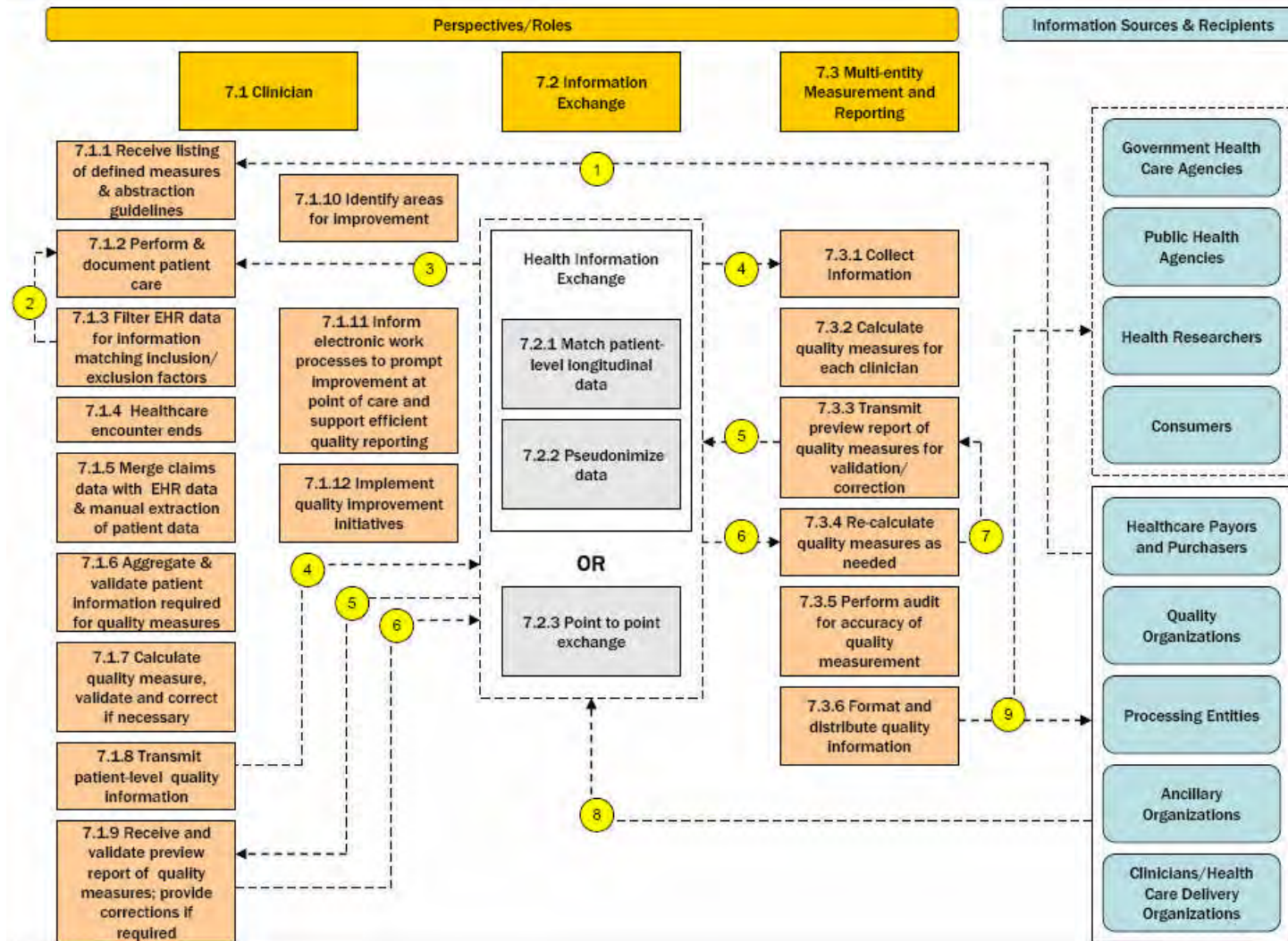
Quality Use Case: Hospital-Based Care

Quality Information Collection & Reporting Flow

Scenario Flows

- ① Defined quality measurement specifications to be reported are sent to hospitals.
- ② Notice is given to clinicians to support clinical decisions and augment recorded data.
- ③ Longitudinal health information held in associated repositories is forwarded by the HIE (patient-level – identifiable).
- ④ Hospital quality data is sent either via an intermediate entity or point-to-point for onward transmission to the Multi-Hospital Measurement and Reporting entity (patient-level – identifiable).
- ⑤ Preview report is sent directly for validation and/or correction (aggregated hospital-level data).
- ⑥ Corrected quality information is sent directly to the Multi-hospital Feedback and Reporting Entity (patient-level – identifiable).
- ⑦ Corrected reports are sent for validation and/or correction (aggregate hospital-level data).
- ⑧ Claims data is collected from Payors (patient-level – identifiable).
- ⑨ Distributed data is available to users (aggregate hospital-level data).

Quality Use Case: Clinician Quality Information Collection & Reporting Flow

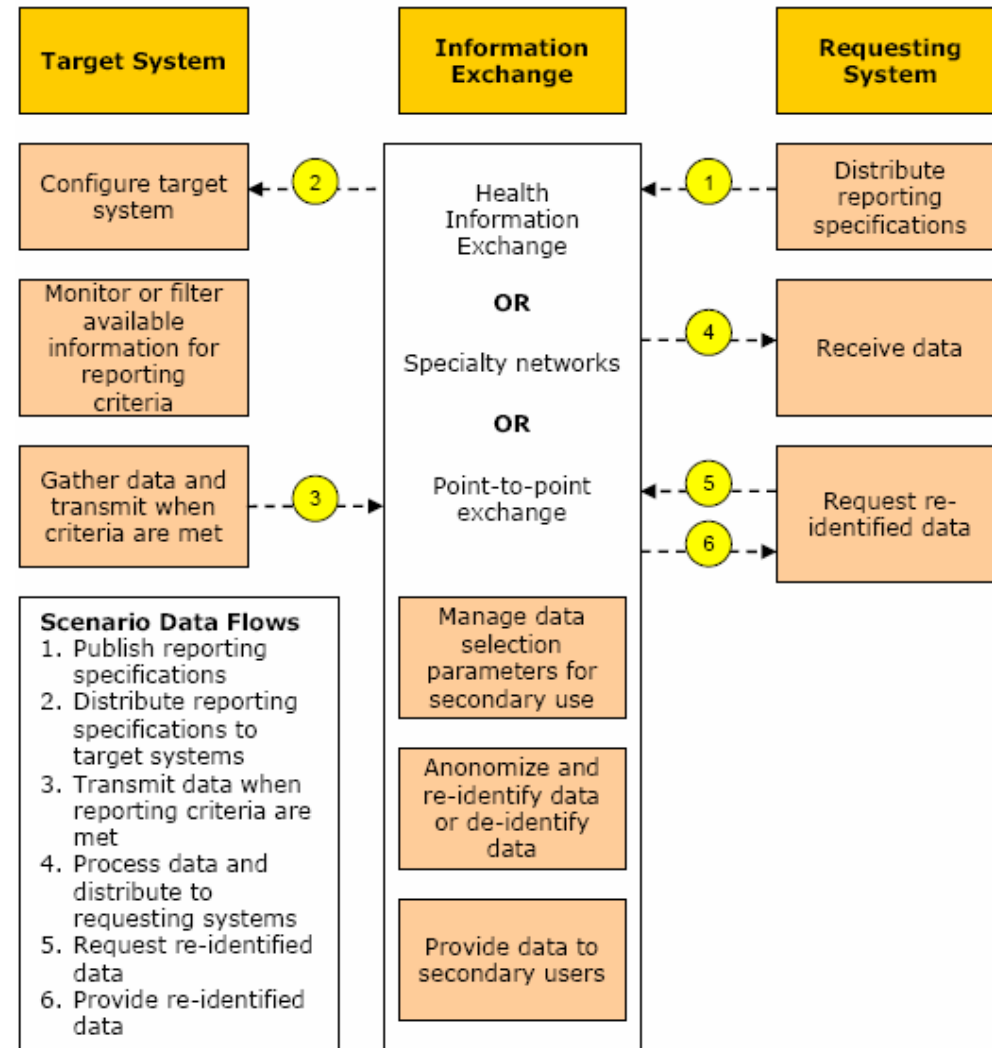


Quality Use Case: Clinician Quality Information Collection & Reporting Flow

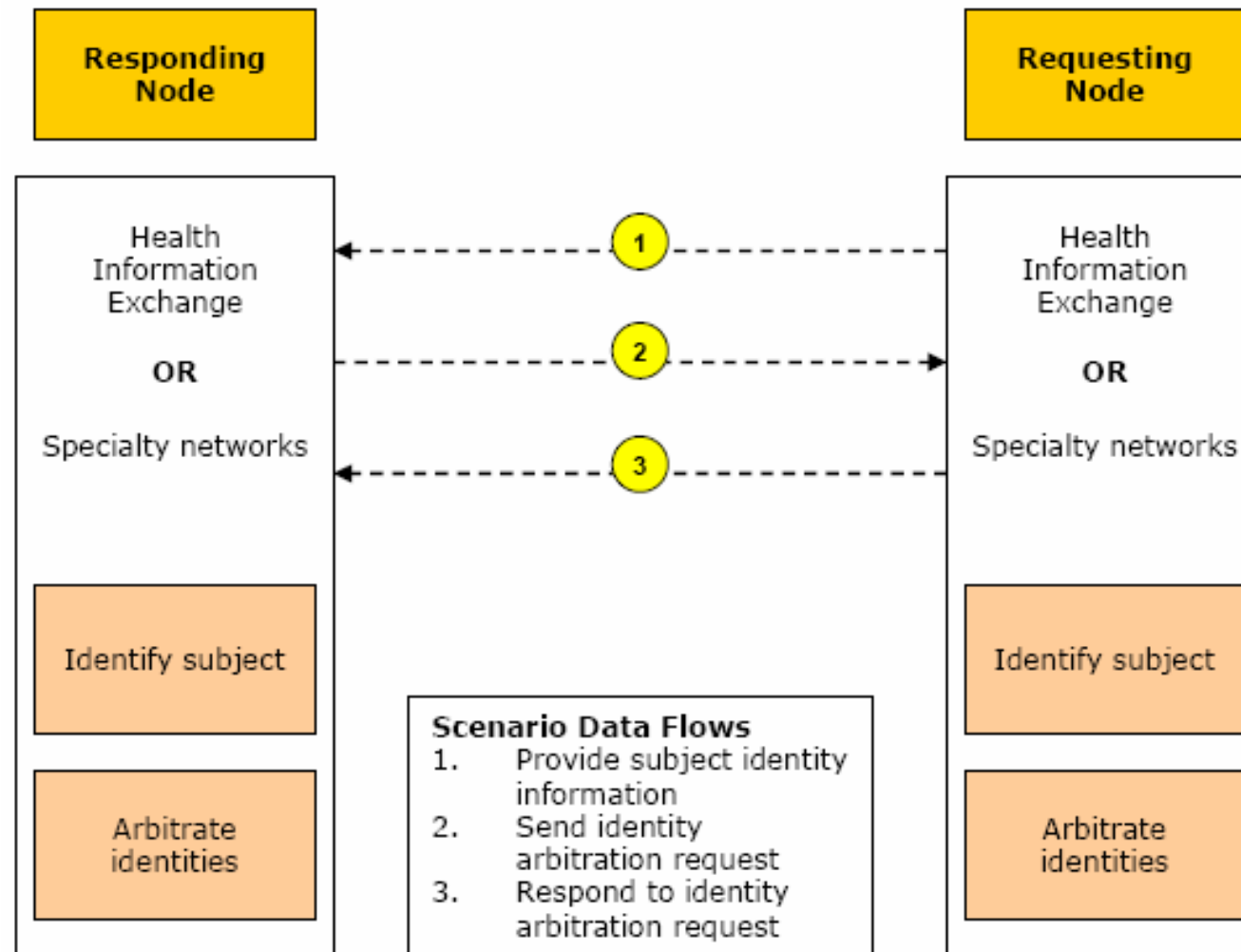
Scenario Flows

- ① Defined quality measurement specifications to be reported are sent to clinicians.
- ② Notice is given to clinicians to support clinical decisions and augment recorded data.
- ③ Longitudinal health information held in associated repositories is forwarded by the HIE (patient-level – identifiable).
- ④ Clinician quality data is sent either via an intermediate entity or point-to-point for onward transmission to the Multi-entity Feedback and Reporting entity (patient-level – identifiable).
- ⑤ Preview report is sent directly for validation and/or correction (aggregated clinician-level data).
- ⑥ Corrected quality information is sent directly to the Multi-entity Feedback and Reporting Entity (patient-level – identifiable).
- ⑦ Corrected reports are sent for validation and/or correction (aggregate clinician-level data).
- ⑧ Claims data is collected from Payors (patient-level – identifiable).
- ⑨ Distributed data is available to users (aggregate clinician-level data).

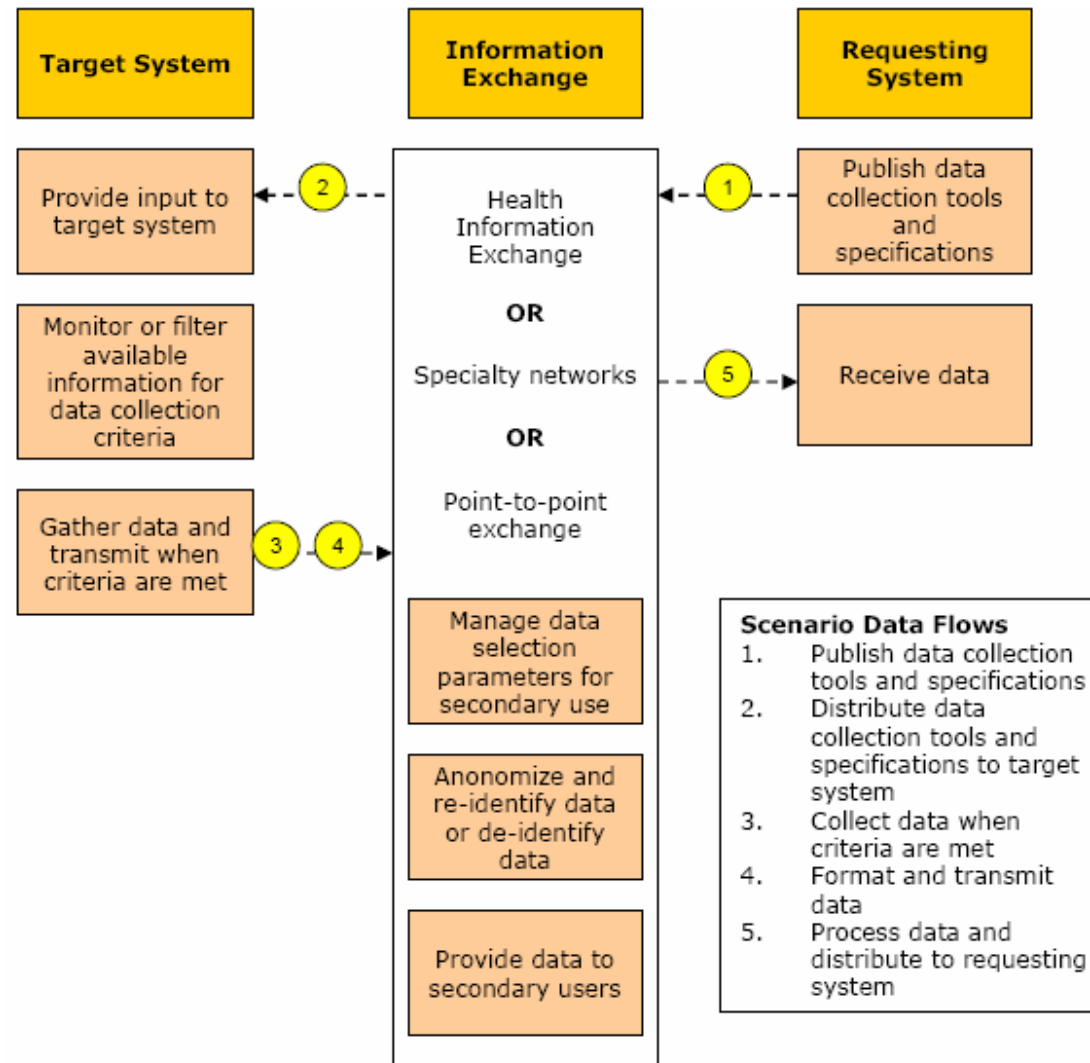
Quality Use Case: Provisioning Data for Secondary Use



Quality Use Case: Arbitrating Identities



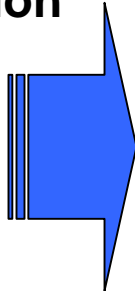
Quality Use Case: Augmenting Clinical Information



Data Re-Use Management

Source Data

Demographics
Results
Substance Administration
Procedures
Location
Events
Clinical Obs / Findings
Problems
Diagnoses
History



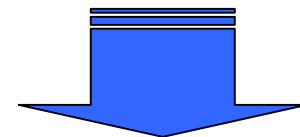
Source Data Qualities

Quantitative
Qualitative
Freeform Text
Codified
Unavailable



Re-Use Requirements

Text Parsing
Terminology Mapping
Hybrid Methodology
– Abstracting
– Augmentation



Anonymization / Pseudonymization Issues

Anonymization

Benefits:

- Privacy protection

Limitations:

- Restricted data set
- Basic population characteristics
 - Public health trends
 - Situational awareness
 - Syndromic surveillance

Pseudonymization

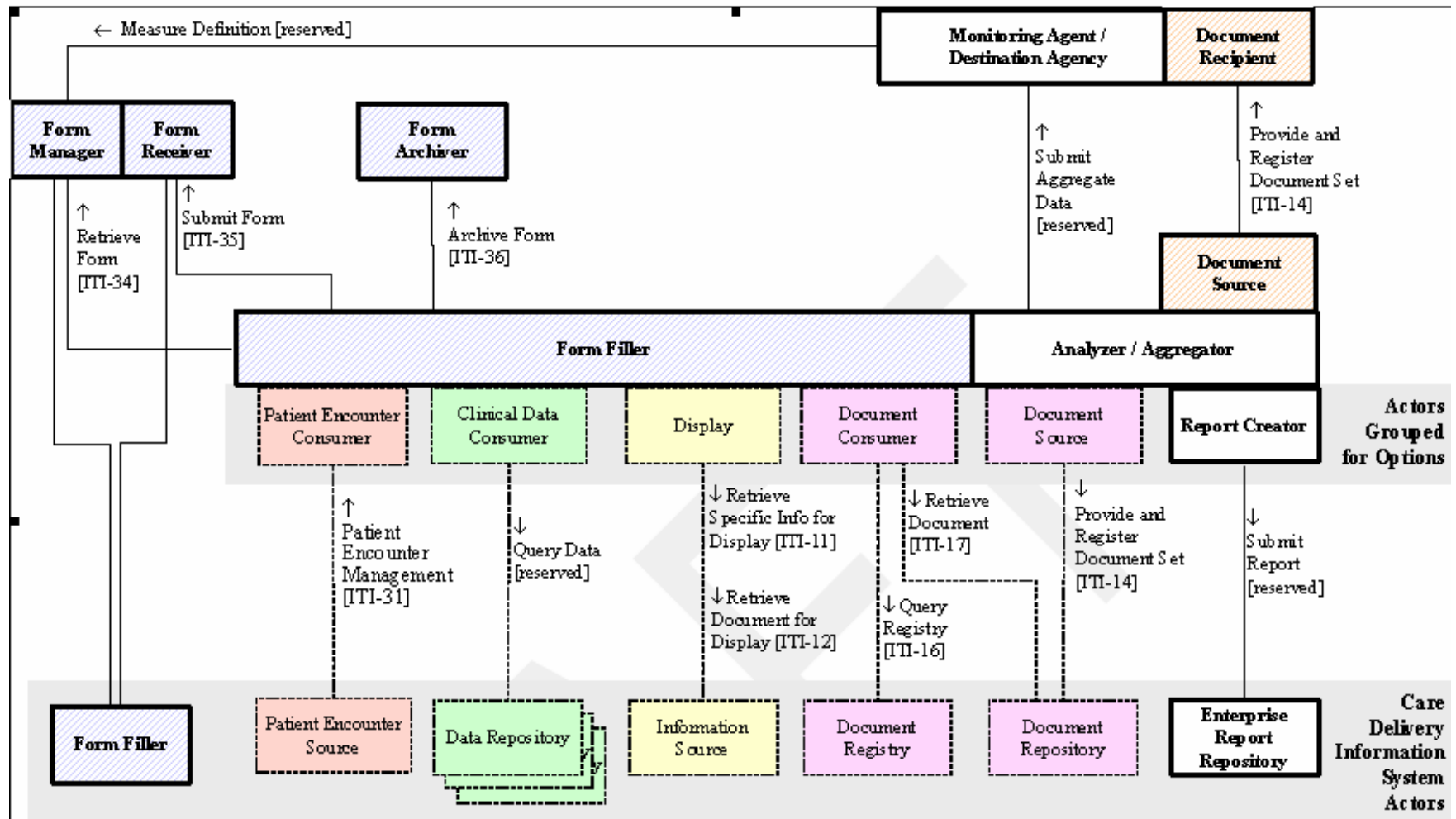
Benefits:

- Privacy protection (partial)

Limitations:

- Increased burden / cost for pseudonym / re-identification during data validation / augmentation process
- Greater complexity for case management
 - Patients
 - Clinicians

Document-Based Business-Sequence Diagram (Quality)



Next Steps

- Near term HITSP Population Health constructs for extraction of patient-level data elements for quality measurement
 - Leverage IHE Patient-Level-Quality-Data Profile
 - Leverage IHE Query for Existing Data Profile
- Identify standard export model
 - Efforts of Collaborative for Performance Measure Integration with EHR Systems – XML schema expression of quality measures
 - Patient-level data reporting
 - Aggregate reporting
- Identify standard import model
 - Leverage HL7 Structured Reports (in progress)
 - Leverage CDC / HL7 CDA expression for reportable diseases.

Expected HITSP Population Health Constructs

cd Class Model

