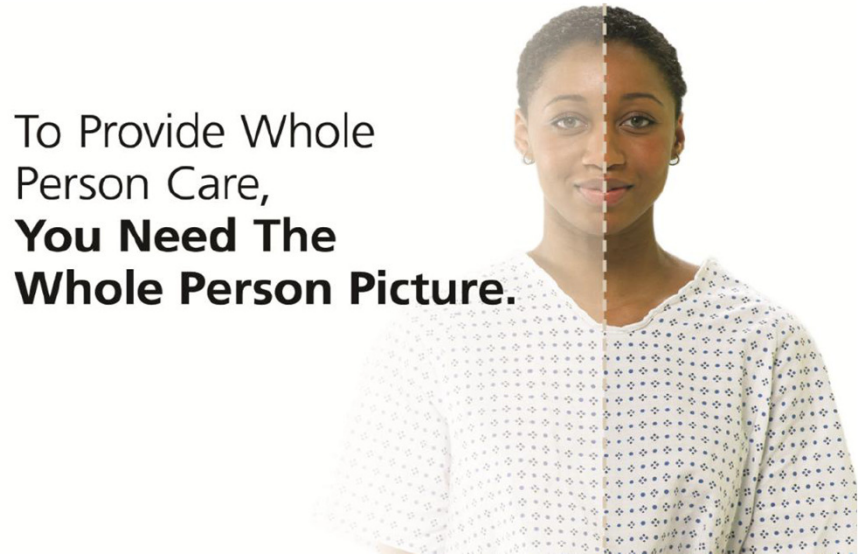


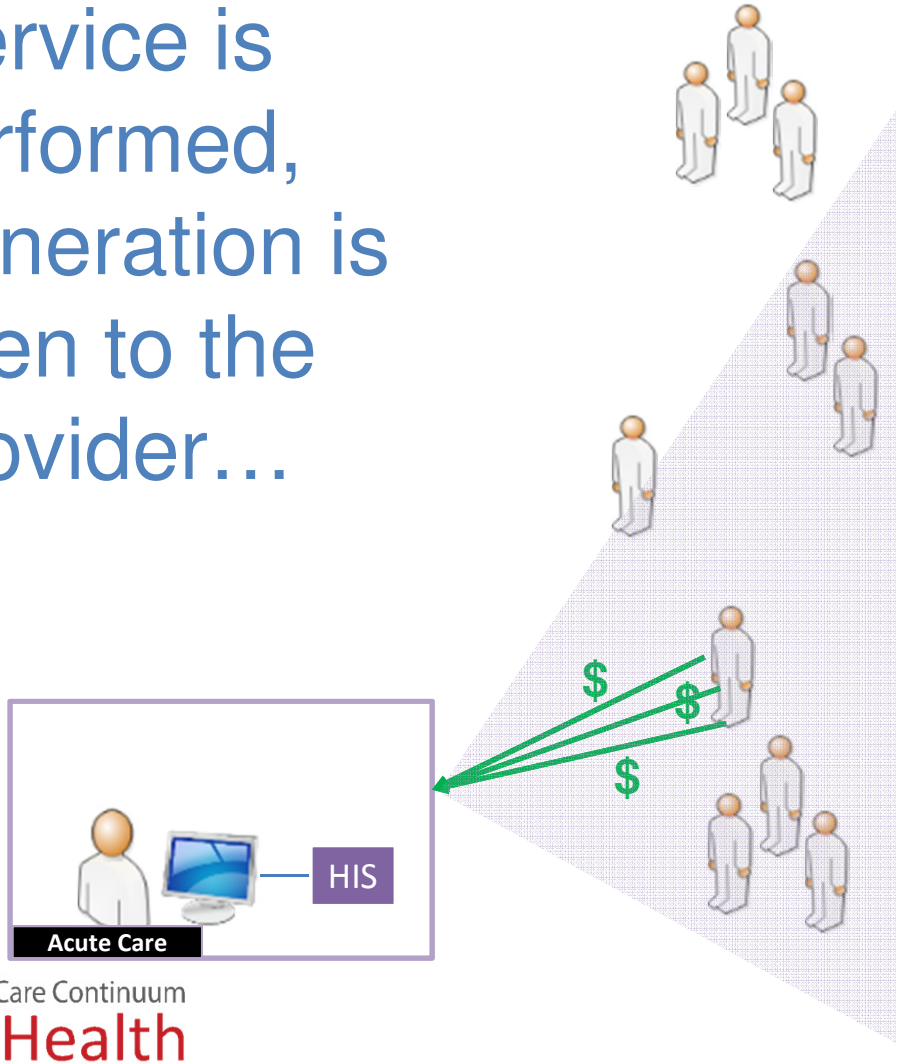
What Does "Analytics" Mean in Population Health Management & Collaborative Care

Realize Your Care Continuum
GSI Health

October 2014

Fee For Service Model

Every time a service is performed, remuneration is given to the provider…



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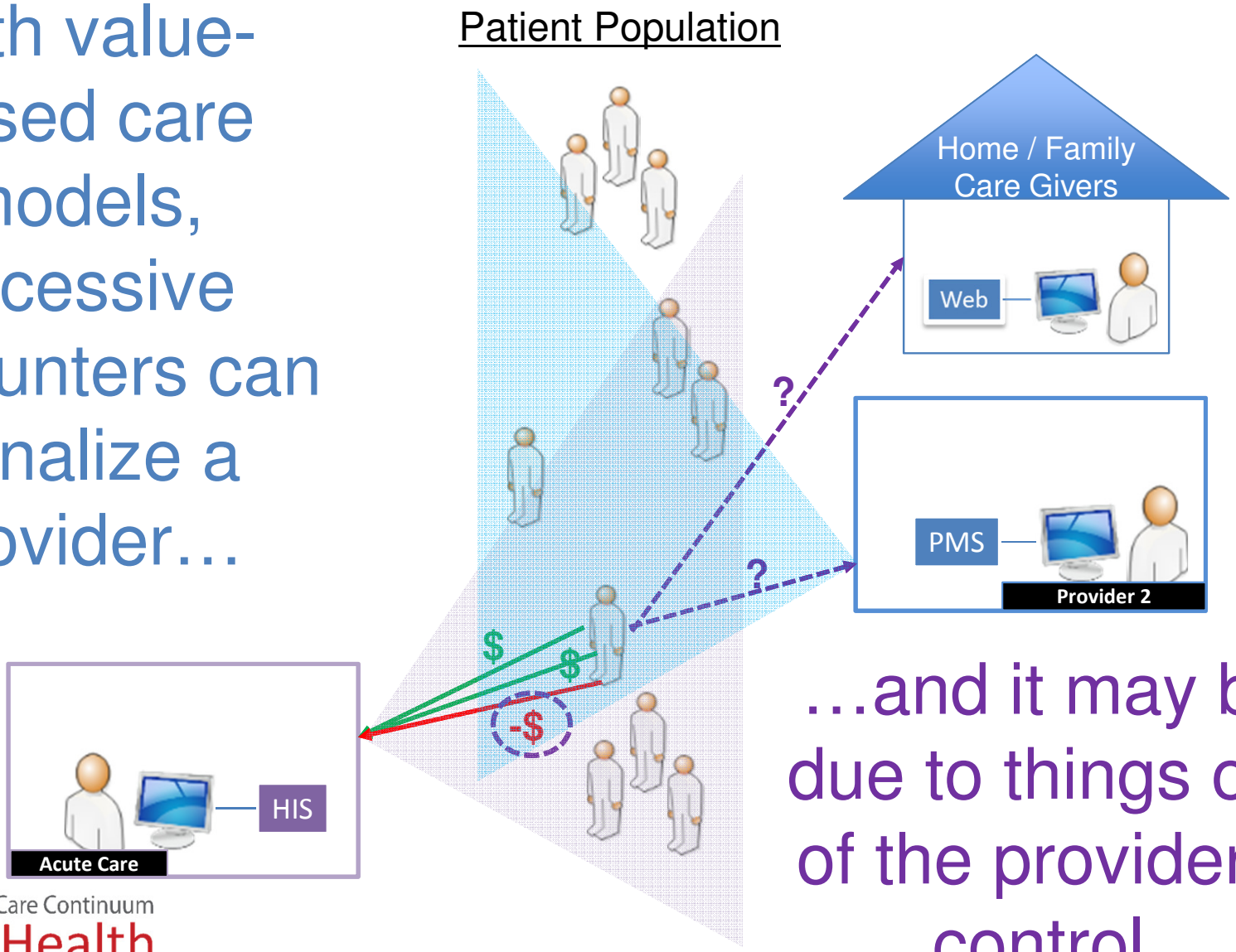
Payment Reform

With value-based care models, excessive encounters can penalize a provider…



…and it may be due to things out of the provider's control.

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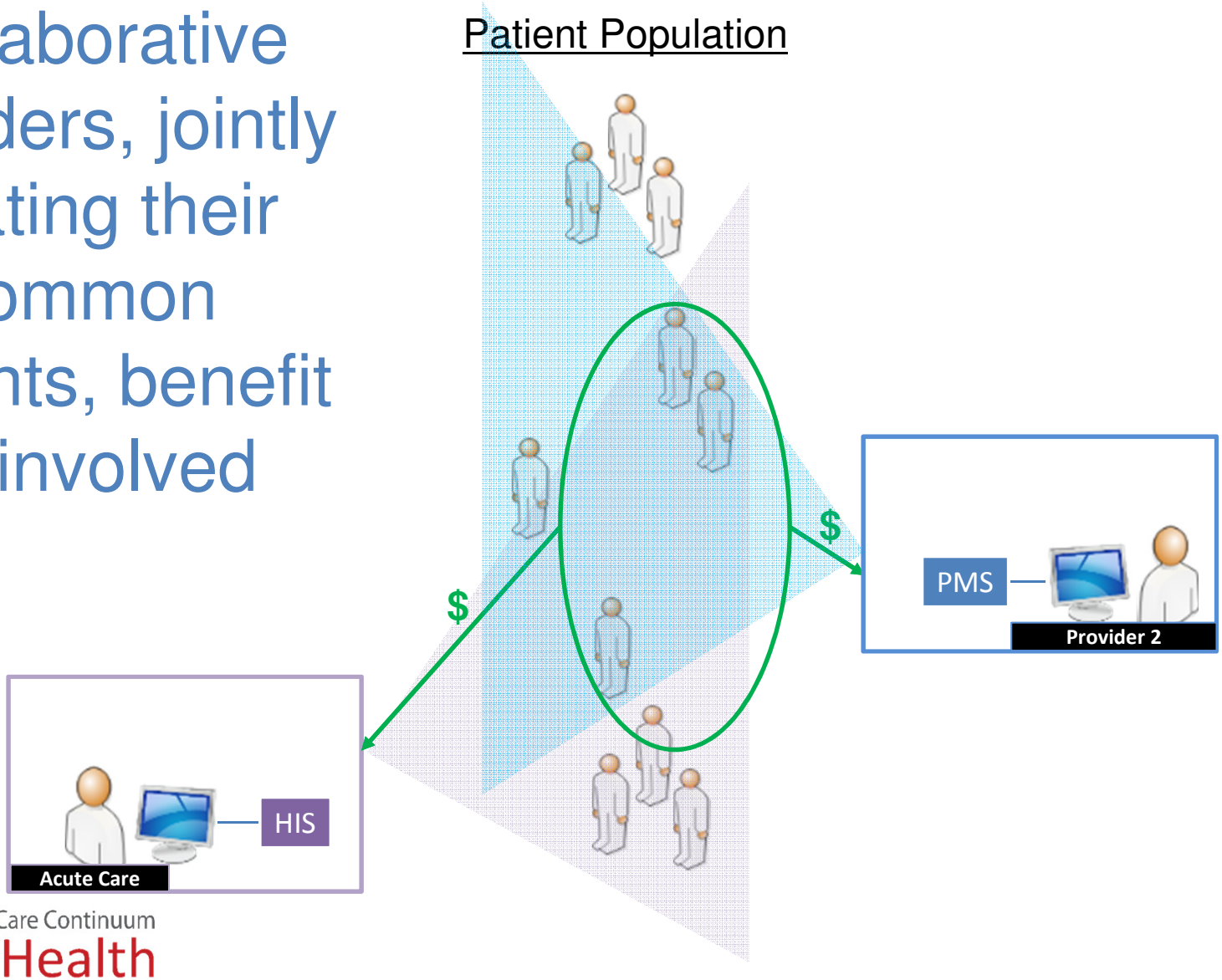
Collaborative Care Model

Collaborative providers, jointly treating their common patients, benefit all involved



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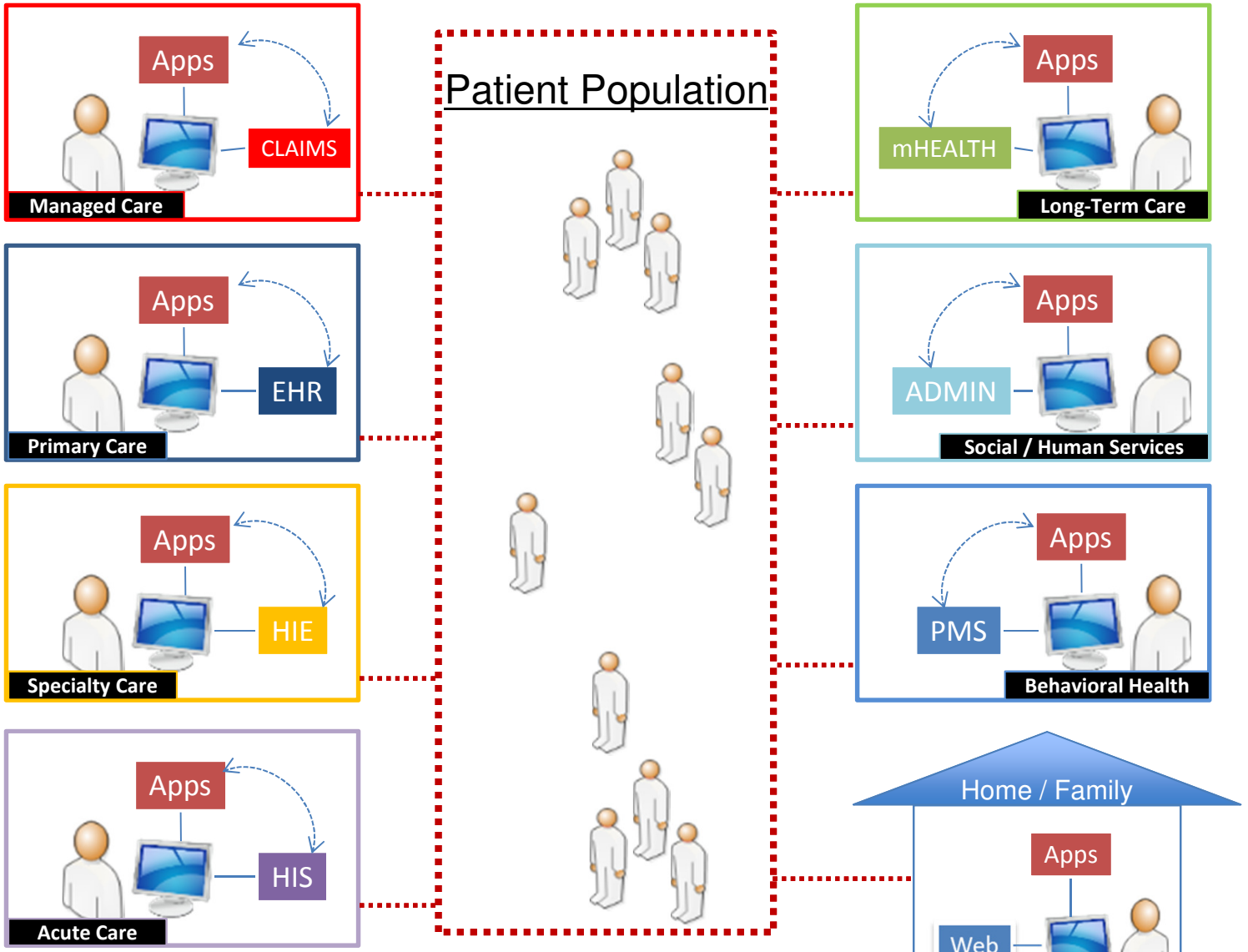
Whole Person Care



GSIHealthCoordinator

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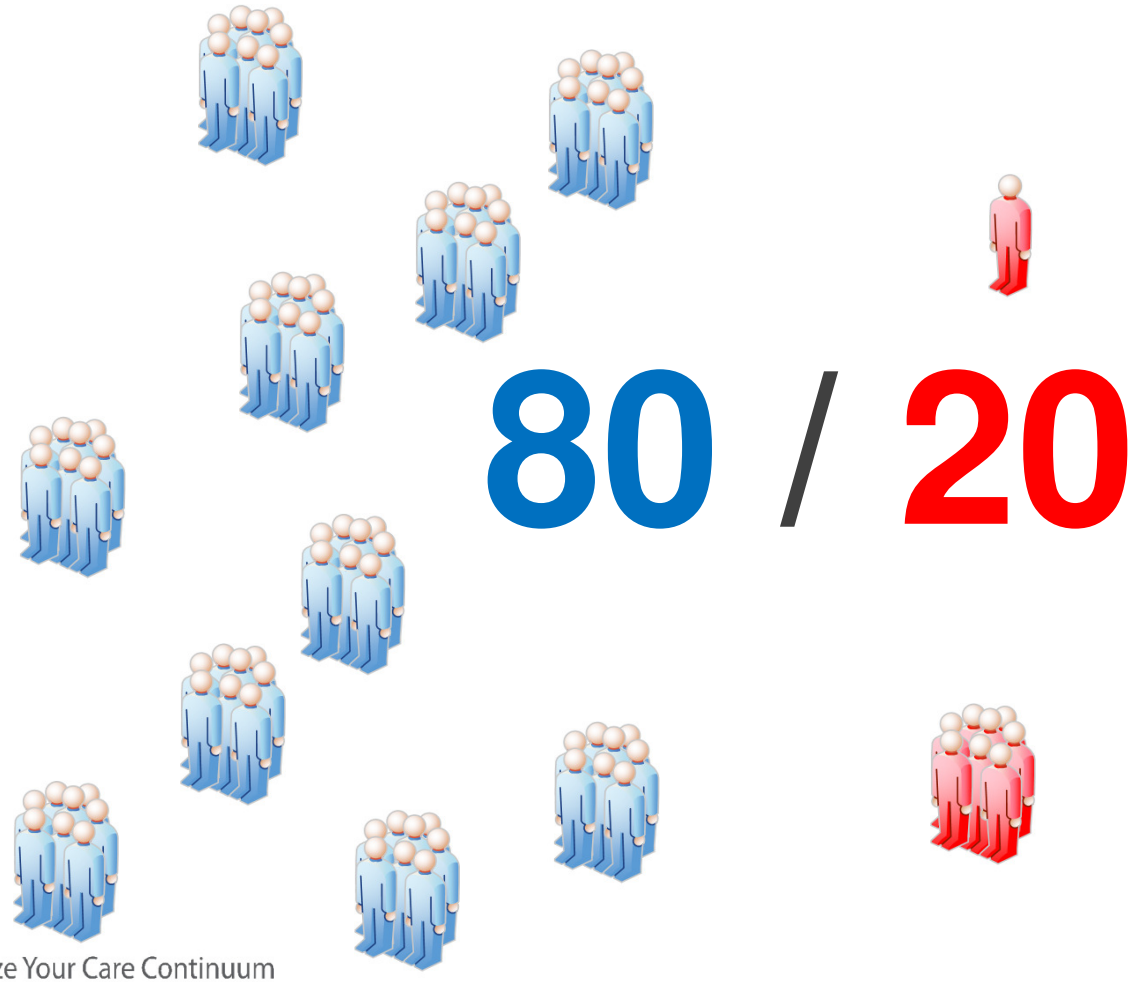
Which Patients To Manage?



80 / 20

High Cost, Bad Outcomes

Chronic Diseases; High Acuity; High Utilization; Comorbid Conditions; and **Those Trending These Ways**

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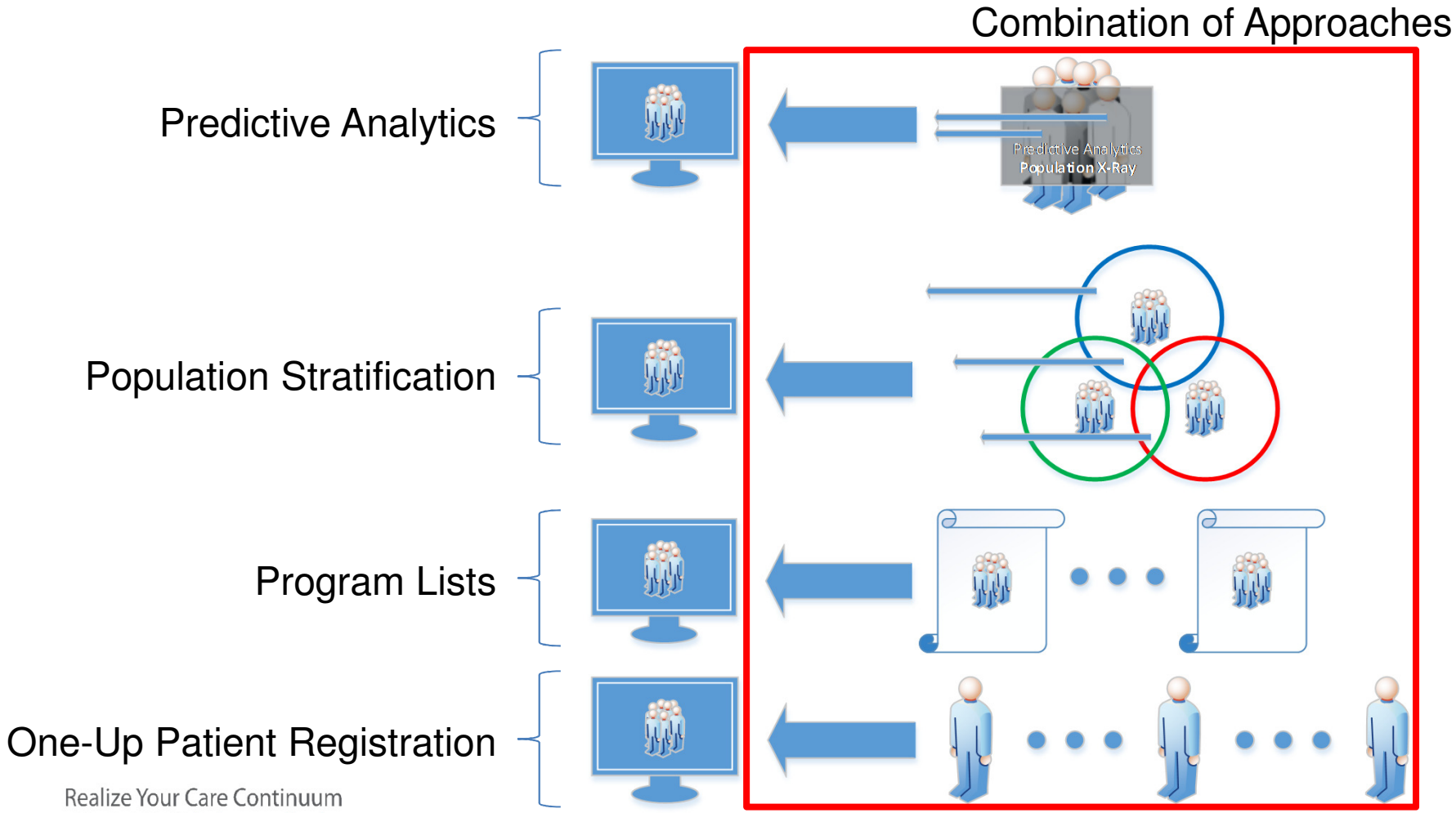
How To Build The Target Population?



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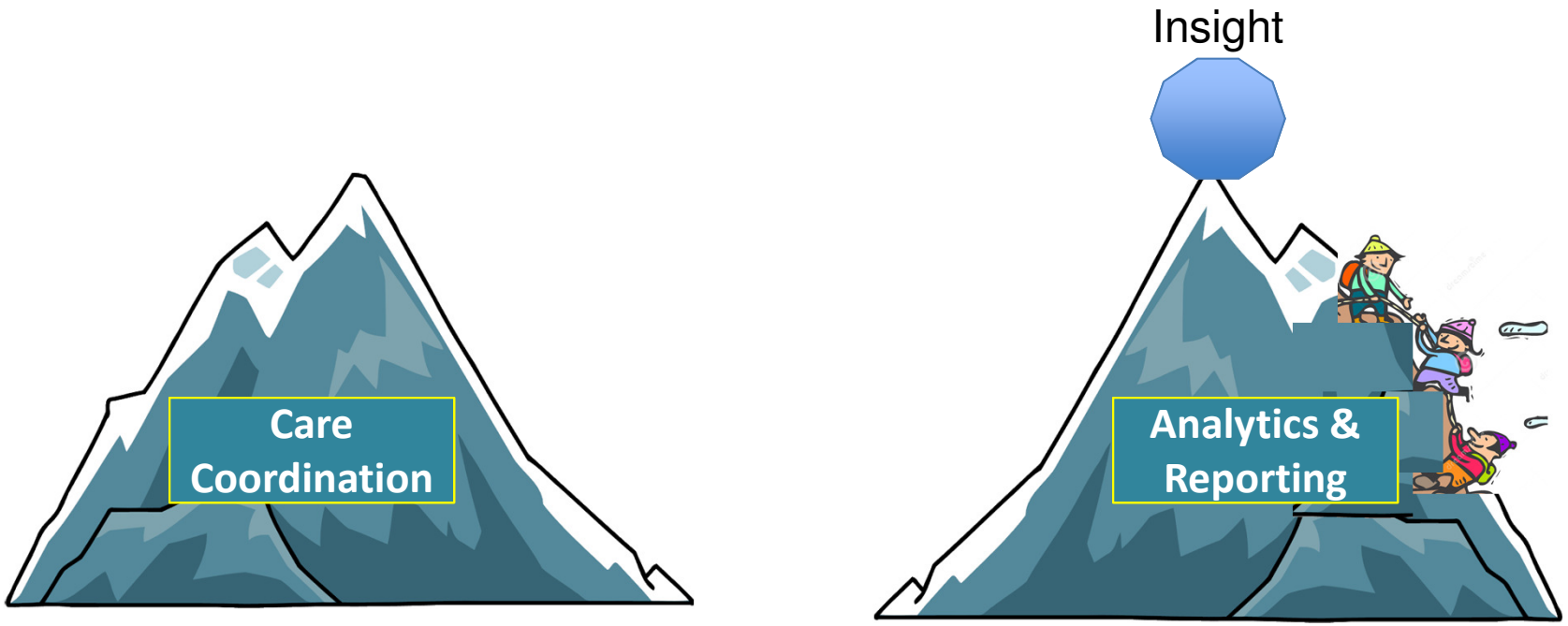
Some programs focus on analytics…



…but can't infuse their insight into the care model

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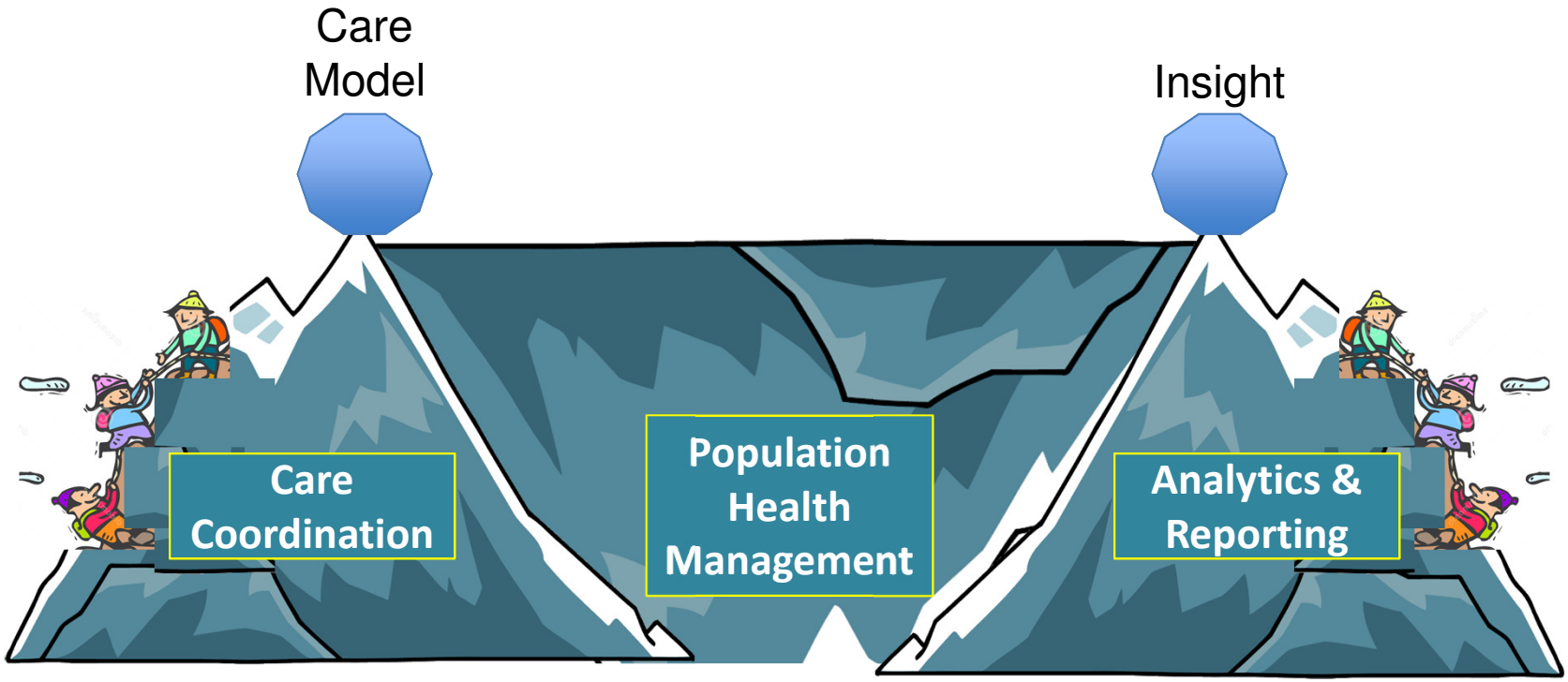
Some programs focus on care management…

…but can't measure its efficacy or calibrate it based on insights

Good use of analytics bridges the chasm…



…and enables cohesive population health management

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What It's All About…

Data

&

Methodology

Path to Data Utilization & Analytics

Care Delivery, Operations

What We Collect	What We Store	What We Report	How We Present
Clinical Data	Raw Data	Data By Source	Static Reports
Administrative Data	Derived Data	Aggregated Data	Ad-Hoc Reports
Care Coordination Data	Meta Data	Dynamic Computations	Dashboards
		Structured Data Groups	In-Application Utilization
		Quality Measures	Alerting
		Outcome Measures	Logs
		Combinations	Exports / Transmissions
			Meta Reporting

Care Coordination

Considerations For Measure Reporting

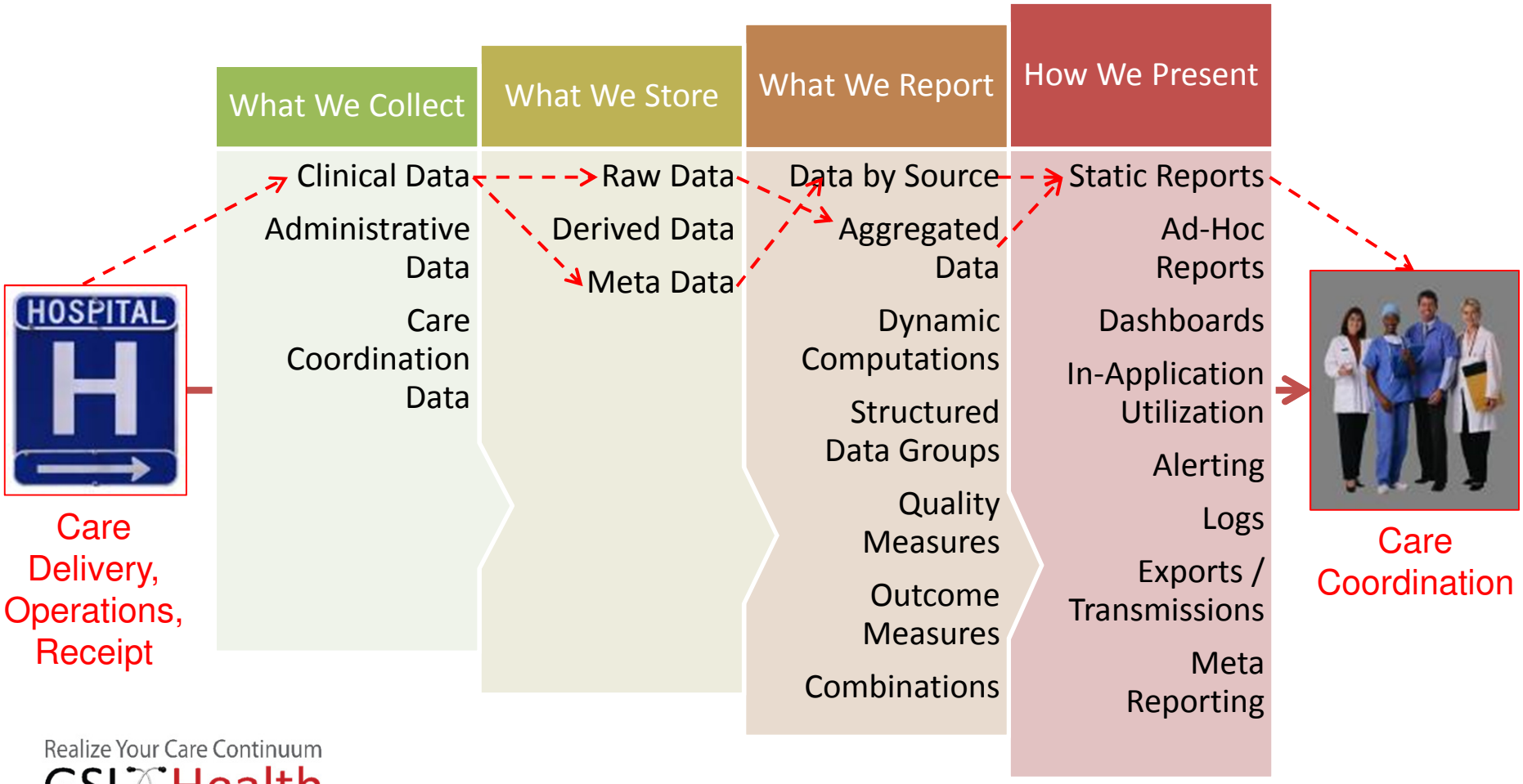
- Source of Truth
- Normalization
- Duplication
- Data Relationships
- Data Cleansing
- Deletion / Replacement
- Data Window & History
- Archival and Retention

- Data Access
- Logical Naming
- Report Refresh
- Sharing (internal & external)
- Drilling (across & down)
- Format

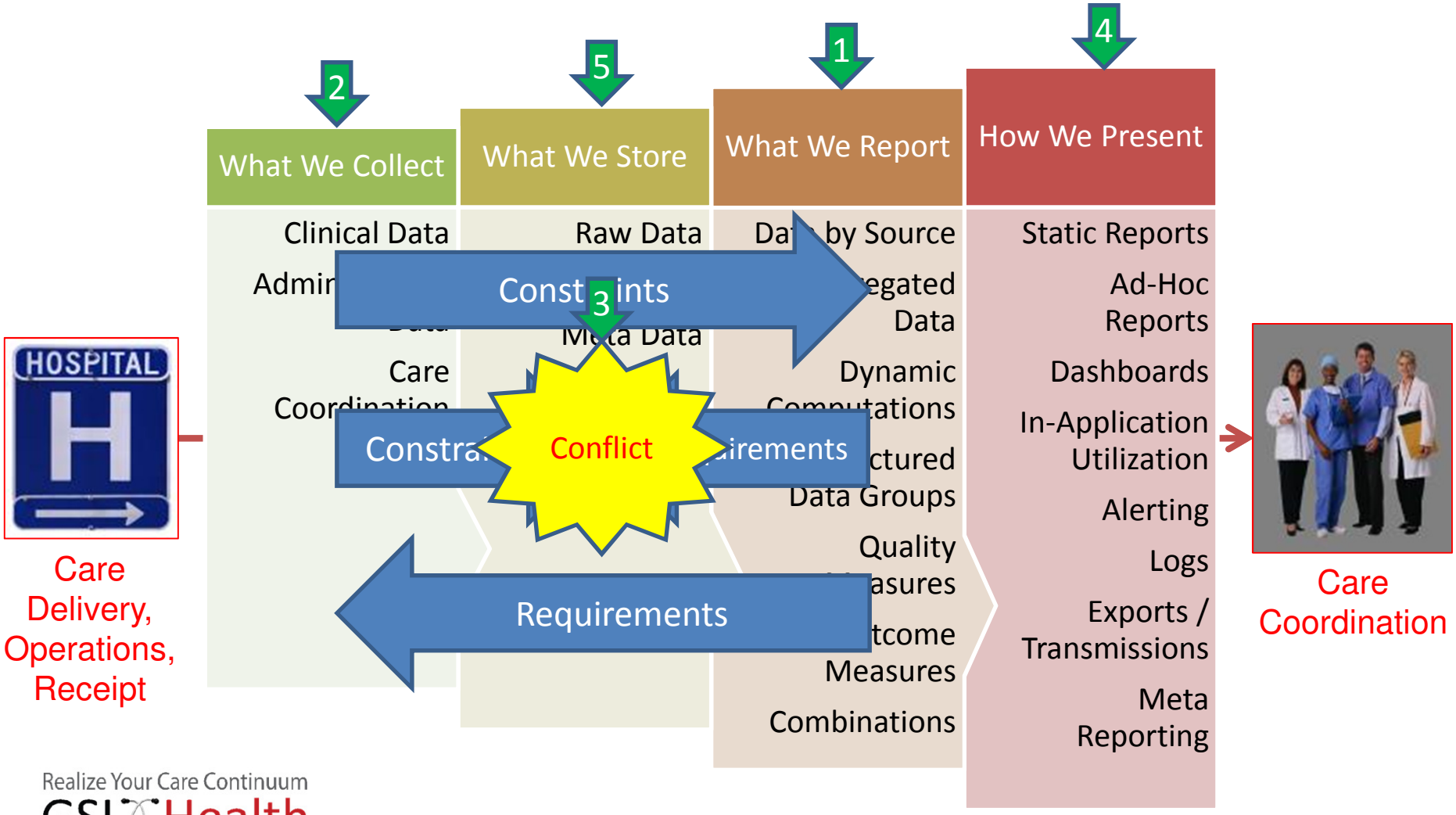
- Source
- Schedule
- Encoding
- Format
- Collection Method
- Completeness
- Coverage (e.g. – transaction vs. warehouse)

- Contractual Requirements
- Clinical Improvement
- Coordination Improvement
- Report Definition
- Data Inclusion / Exclusion
- Data Grouping Definition (e.g. – diagnosis grouping)

What Is The Task?



Where Do We Start?



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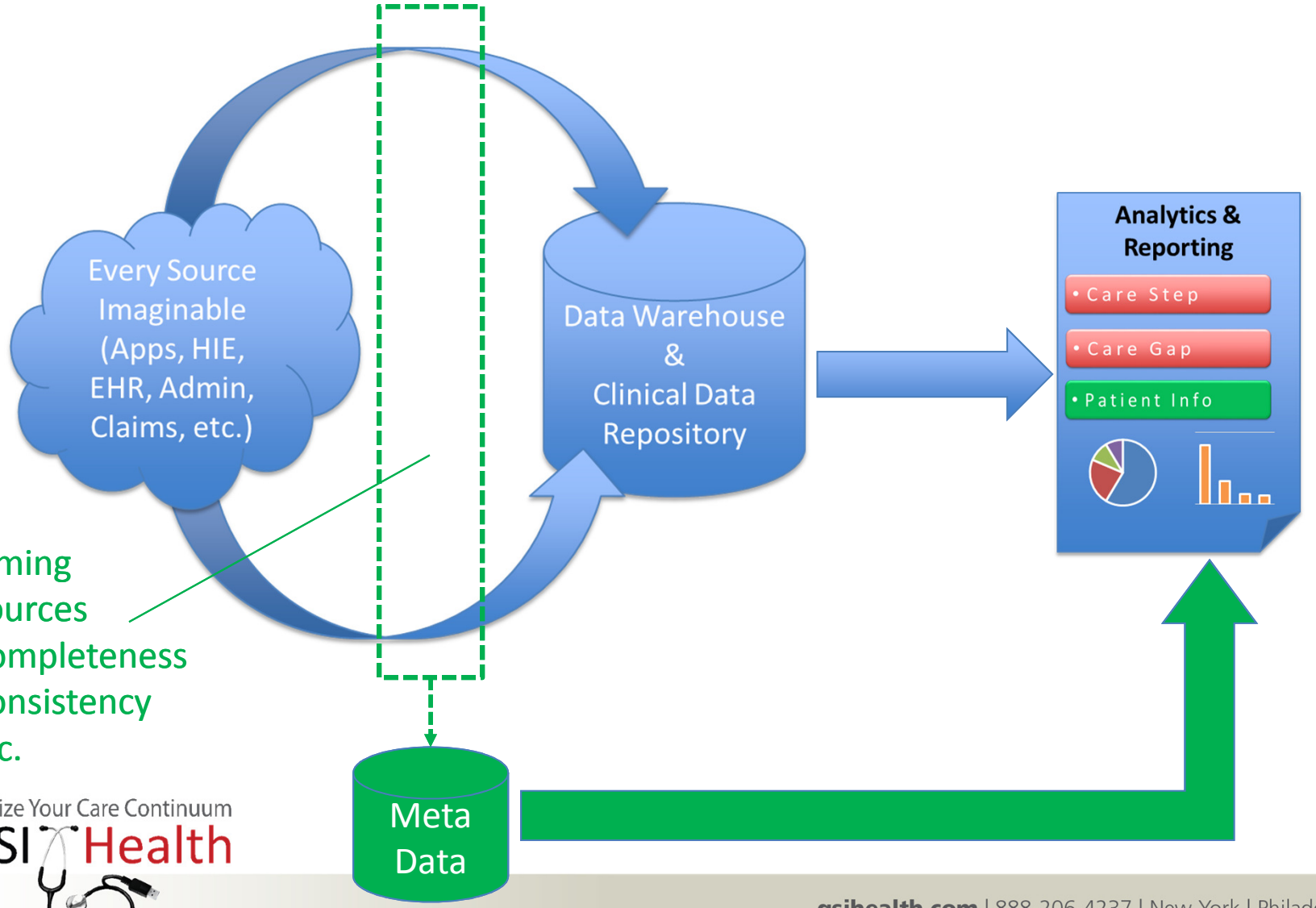
Key Concept: Meta-Data as Coordination Data



- Timing
- Sources
- Completeness
- Consistency
- Etc.

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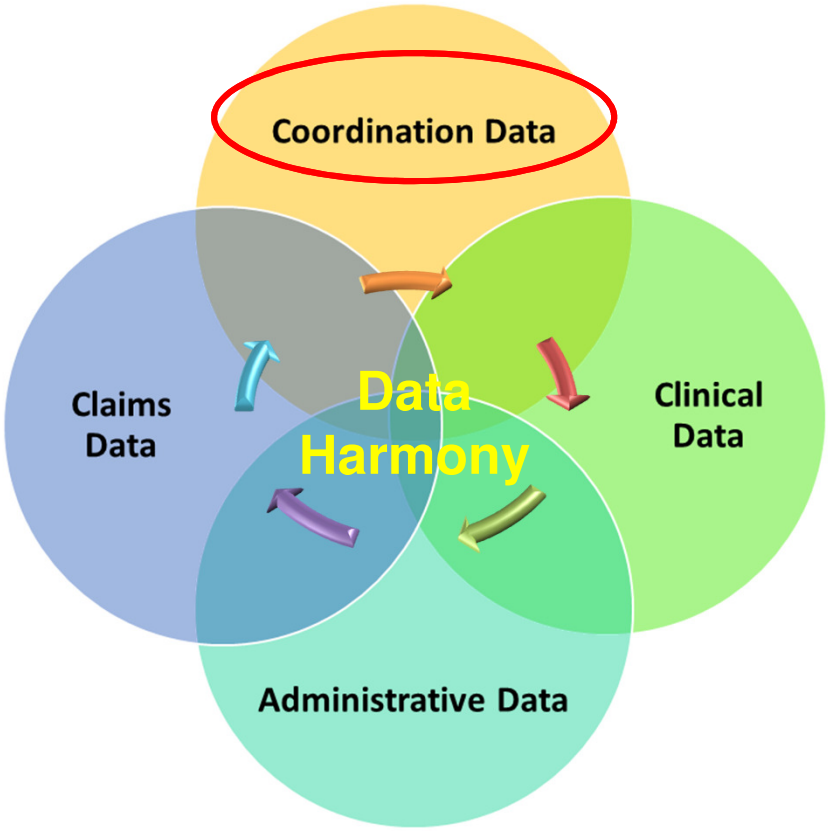
Traditional Sources of Data

- Clinical & Administration
  - Typically from EHRs, HISs, and HIEs
  - HL7 2.x, HL7 CCD, & HL7 CDA more generally largely define the data content and representation
  - Labs, meds, diagnoses, procedures, vitals, etc. usually comprise the core
  - Cost information from provider administration systems
- Claims
  - Largely file-based extracts
  - Typically restrictions from data custodians (i.e. – Payers) on use
  - Comprehensive for encounters, labs, meds, etc., spanning providers

Data Harmony & Coordination Data



- Enjoin Coordination data as a recognized category akin to clinical & claims data
  - Logistical Interventions
  - Outreach
  - Operations
- All data sources must be appropriately melded

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Over Simplified Predictive Analytics

$$\beta_1(var_1)+\beta_2(var_2)+\ldots+\beta_n(var_3)$$

Relative contribution of each variable

Variables (e.g., diags, demographics, etc.)

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Over Simplified - Example

$$\text{Risk Score} = (.35)(\text{ICD-9}) + (.4)(\text{zipcode}) + \ldots + (.25)(\text{age})$$

Relative Contribution may be determined by degree of correlation, published guidelines, etc.

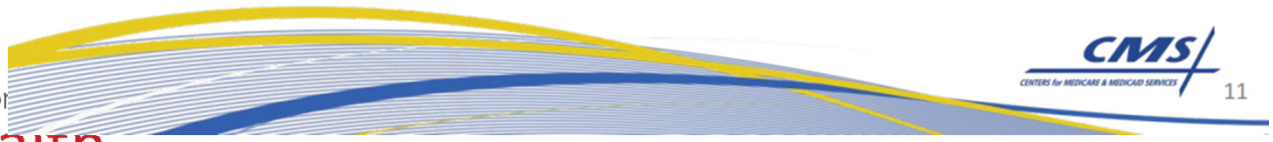
Could be hundreds of variables

Represents contribution of various values for the variable. Continuous variables broken into bands.

Example Proposed Risk Score Method (CMS)

Risk Scores

- Individual risk scores
  - Each enrollee risk score is based on the individual's demographic and health status information
  - A risk score is calculated as the sum of these demographic and health factors weighted by their estimated marginal contributions to total risk
- Calculated relative to average expenditures:
- For example:
  - Average = $1,000
  - Female, 57 = $500 = .5 risk factor
  - Condition A = $700 = .7 risk factor
  - Risk Score = 0.5 + 0.7 = 1.2



Red Flags with Predictive Analytics in a Far-Flung Collaborative-Care Model

$$\beta_1(var_1)+\beta_2(var_2)+\ldots+\beta_n(var_3) = RISK\ SCORE$$

The more sources and differences in data capture, consistency, timing, coverage, etc., the more unstable the data and the more error-prone is the relative contribution (requiring recalibration)

Need to identify all outcomes up front rather than allow them to emerge as program matures and analysts experiment

A "score" conveys a level of precision that belies the volatility of the underlying data, especially in the early period of the program

The independent variables you really want are care coordination variables and meta data about the process you are using to improve care

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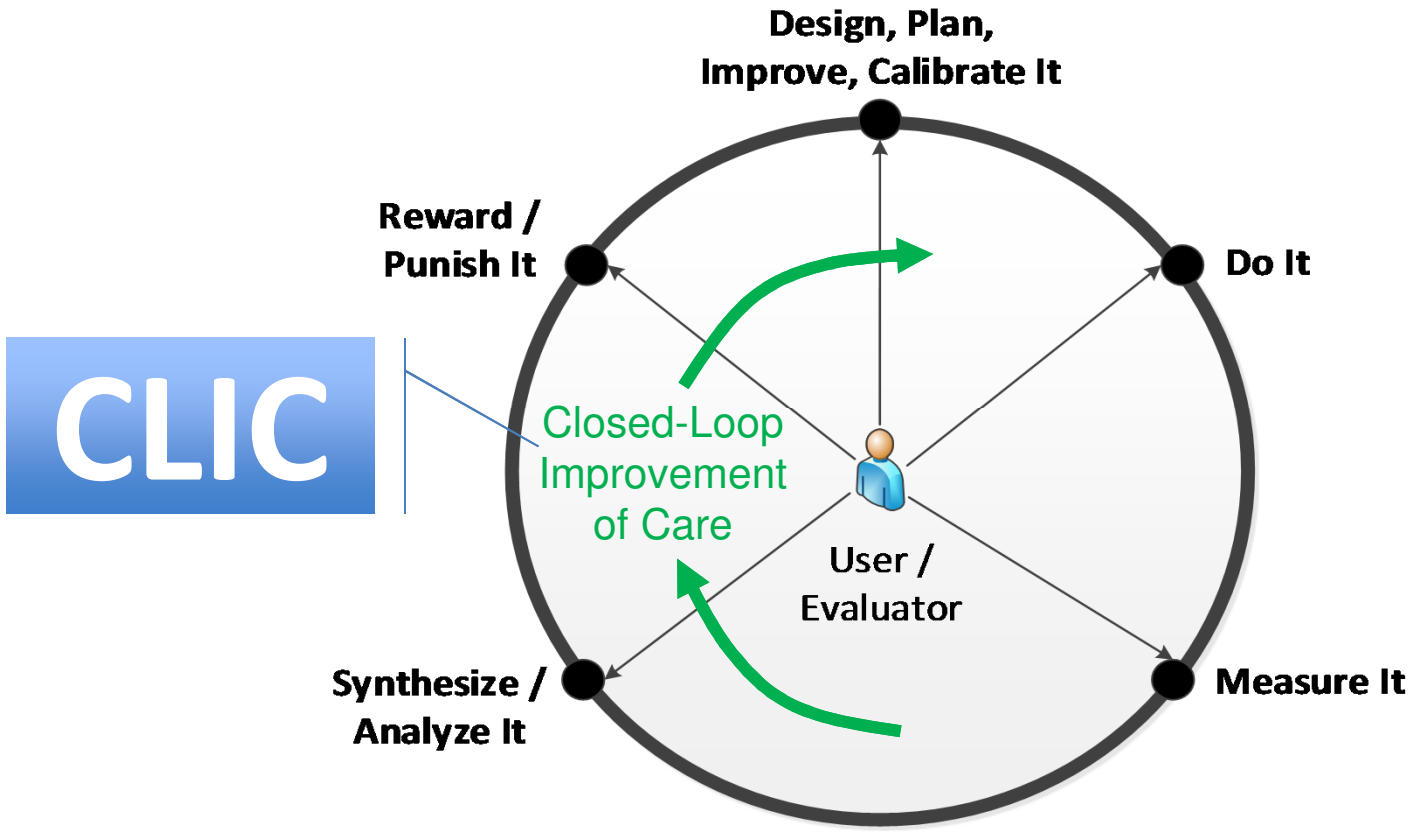
Corollary to Coordinated-Care Variables Used in Predictive Model

- We want all levels of analytic results to help calibrate the operational model for programs on a go-forward basis

- Therefore, analytics should be tightly coupled with the operational activities to allow for closed-loop improvement of care – CLIC -- (i.e., symbiosis between care delivery and measurement)
  - The expression of analytics and operational activities should leverage the same concepts so their relationships can be determined and exploited

CLIC Makes Analytics Useful



Insight is Actionable

Some Working Definitions

- **What are analytics**? – methods to perform data analysis, typically in a quantitative way
  - Characterization: Segmenting by attributes (e.g. – using a query) – a.k.a. "descriptive" analytics
  - Association: Determining the contributing variables that are correlated to the dependent (e.g., outcome) variable – a.k.a. "prescriptive" analytics
  - Predictive: a classification system that allows estimation of future values of patient care variables based on patterns seen in the population
    - Learn by Example: developing an analytic model based on previous data examples used to "train" the model (e.g., regression analysis)
    - Learn by Observation: developing an analytic model based on data on hand, using the emergent patterns to shape it

Some Working Definitions (cont'd)

- **What is population stratification**? – dividing up the population by some set of criteria that categorizes the members of the population
- **What is risk stratification**? – population stratification where the criteria used to segment is indicative of the population members' risk of having a given outcome

Predictive Analytics Characteristics

- We want four things in predictive analytics
  - Want to know what variables are positively correlated with outcome, and to what degree, which gets to the risk the outcome will happen given the attributes (independent variables) of the patient
  - Want to predict (extrapolate) dependent variable value (e.g. – costs) given the anticipated dependent variables (and likelihood)
  - Want to know how much of the predicted value is excess or deficit compared to the typical or desired state (risk adjusted)
  - Want to know which of the opportunities are actually actionable (ie, which of the high risk things can I discard, and which should I pursue based upon the impact I can have?)
- By comparison and/or assigning of thresholds, the population may be partitioned by the results of the above analyses

Considerations on Type of "Risk"

Risk-Factor Stratification

- Risk factors can come from organic sources (e.g., a program's internal assessment of risk factors for an outcome), or authoritative sources (e.g., medical evidence)
- There may be a "score" or "scale" associated with risk factors that allow for classification
- May afford more flexibility in dynamic analysis (e.g., when outcomes-of-interest are not fixed, or there are various intermediate outcomes to consider)
- When authoritative sources used, the math has already been done for you (e.g., PAM, LACE)

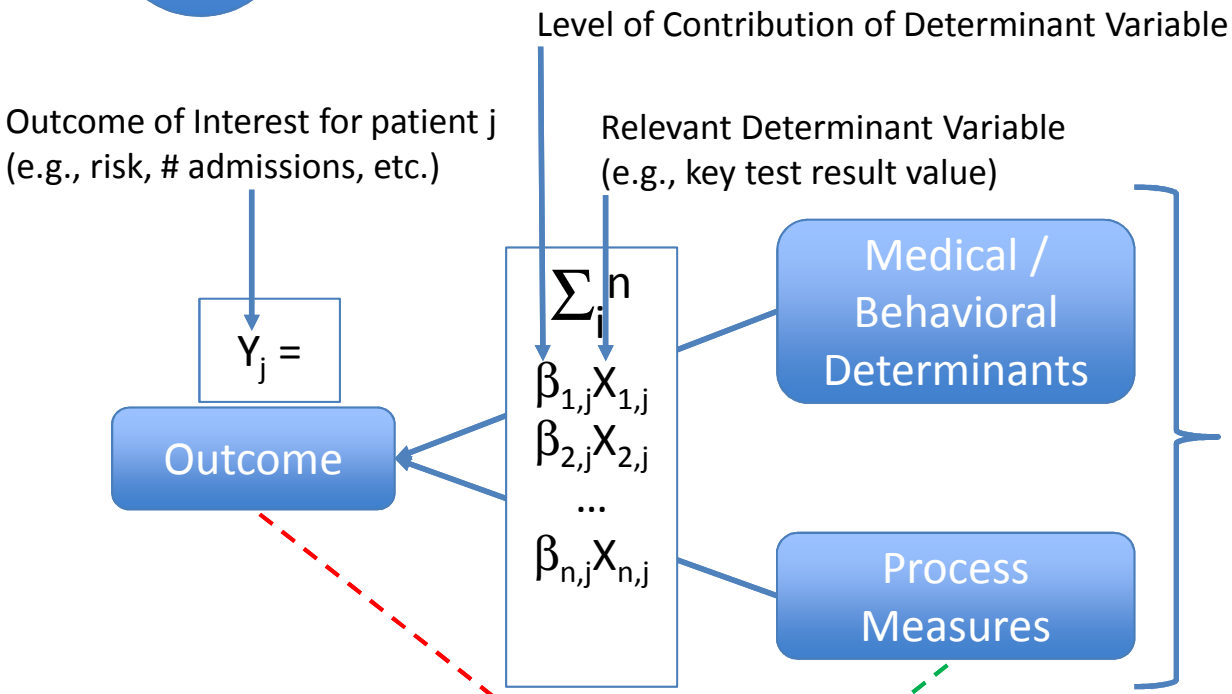
Risk Stratification

- Typically arrived at through some computational method such as regression analysis or clustering
- Dependent variable (e.g., outcome) can be designed to be a rate, such a likelihood percentage
- In order to stratify by a risk of an outcome, the outcome must be defined; however, it can be dynamic or pre-determined, depending on the requirements of the analytic method chosen
- Typically, the math needs to be done, but resulting model is more specific to your exact population

Start Outcomes, Methodology, & Data

- **Outcomes** – Assess if there are fixed outcomes of interest
  - E.g., 25% reduction in admissions making # admissions an outcome
- **Methodology** – Choose analytic methods suited to appropriately mine the population and represent the chosen outcomes
  - Regression analysis is typically used for healthcare population data sets, as well as other techniques such as cluster analysis
- **Data** – Ensure data available both supports measurement of outcomes, and has characteristics that optimize applicability of chosen methods

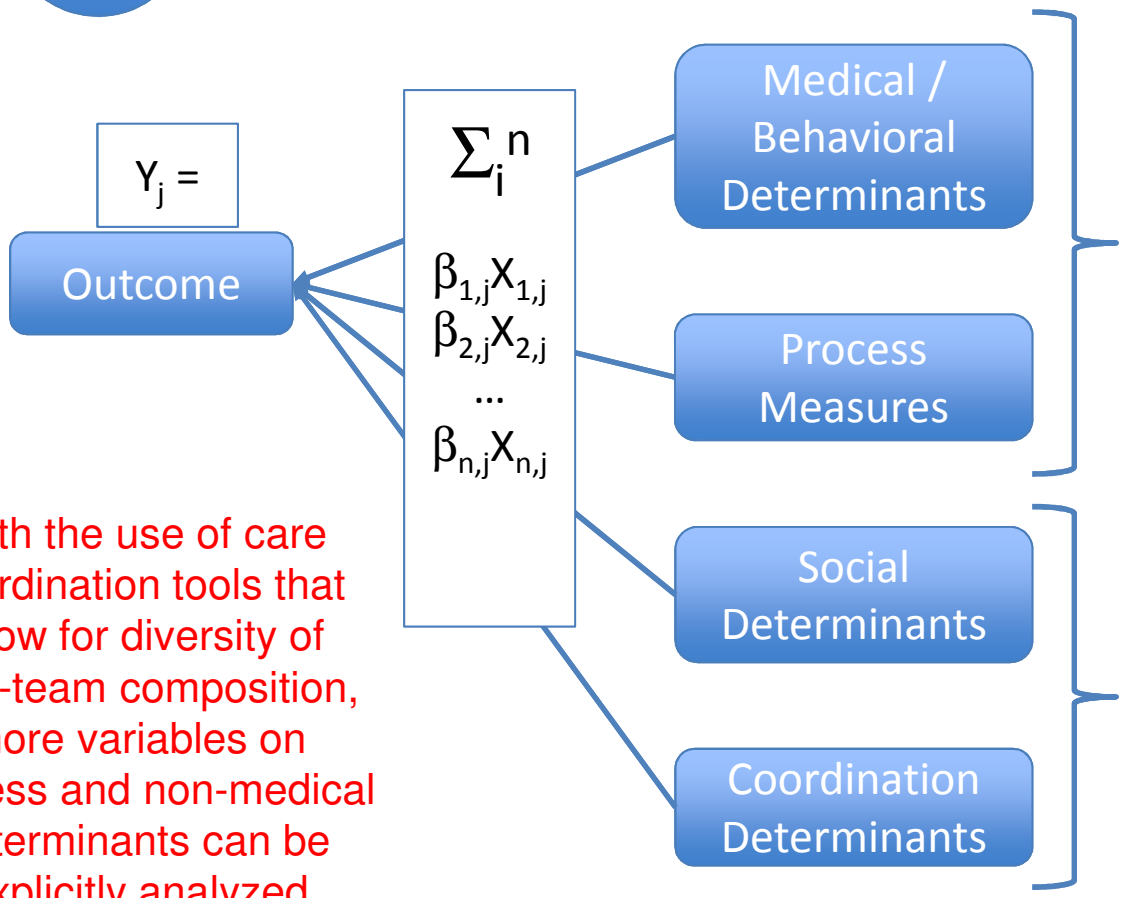
1 Processing The Data That Matters



C. Diabetes Mellitus			
	Measure Name	Measure Steward	Measure Type
	PQI # 3 (DM Long term complications)	AHRQ	Outcome
	Comprehensive Diabetes screening (HbA1c, lipid profile, dilated eye exam, nephropathy)	NCQA	Process

- Regression analysis can be used to "learn by example" so model predicts future from past examples
- Traditionally, outcomes measurement would be a function of medical data alone.

1 Processing The Data That Matters



Claims, EHR/HIE/HIS Data (e.g., SHIN-NY)

Community-wide Coordination Tools: Assessments, Care Plan, Consensus Patient Summary, etc.

With the use of care coordination tools that allow for diversity of care-team composition, more variables on process and non-medical determinants can be explicitly analyzed

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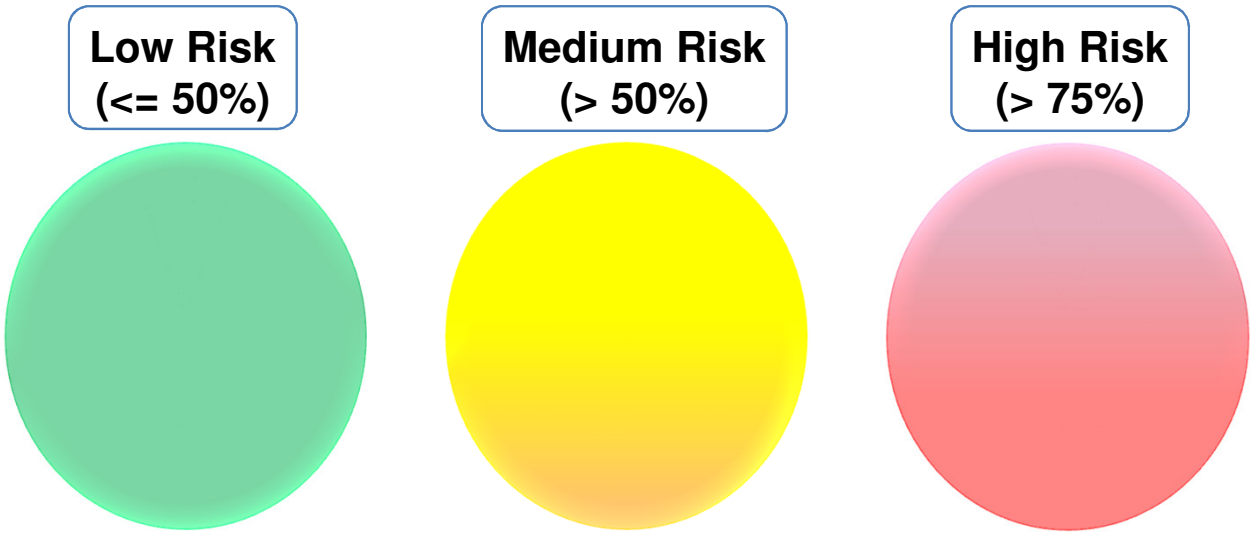
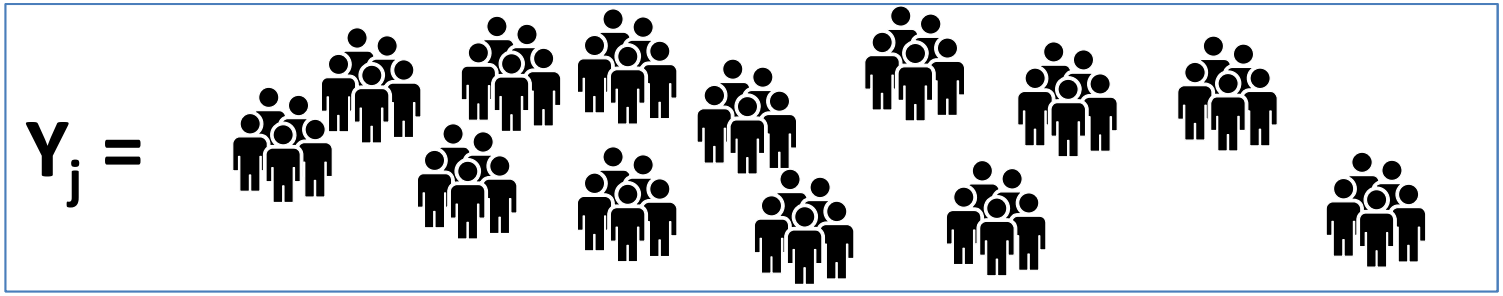
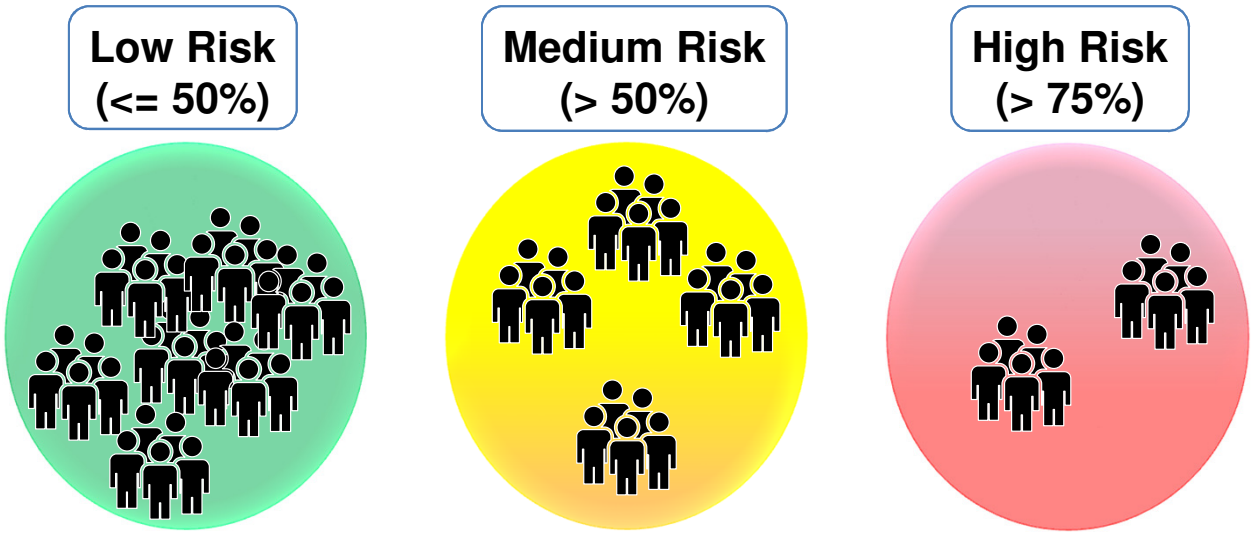
2 Apply Model & Segment





3 Auto-Classify New Patients & Update Patient Progress

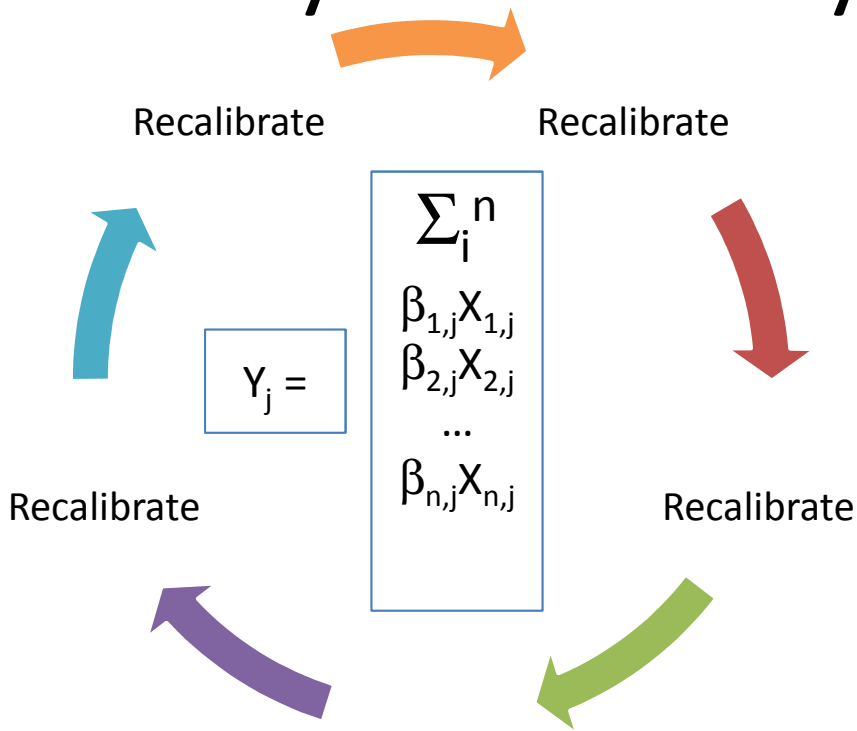


Technology tools should perform this ongoing automated classification to facilitate workflow

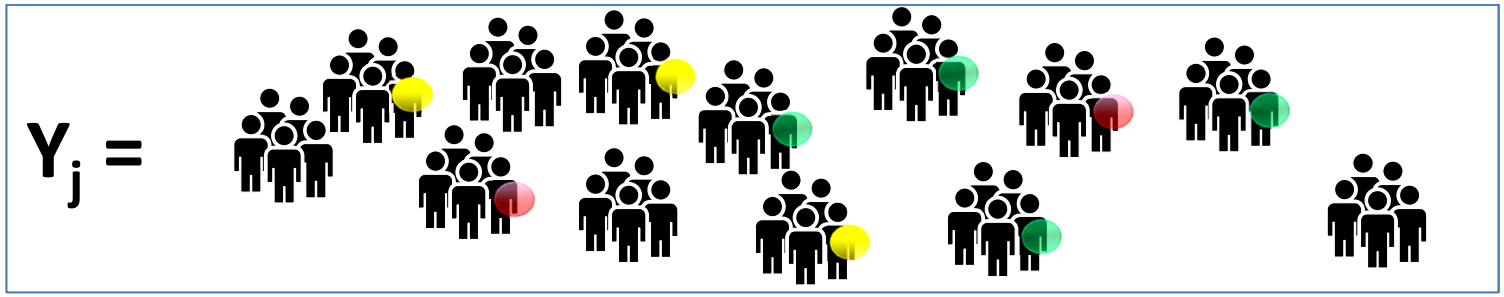
$Y_j =$

4 Periodically Reset Analytic Model

Sample present-day population to update model characteristics regarding determinant relevance and contribution level



Can replace previous patient classifications, or maintain longitudinal risk history for population analysis (intervention contributions should grow as time goes on)



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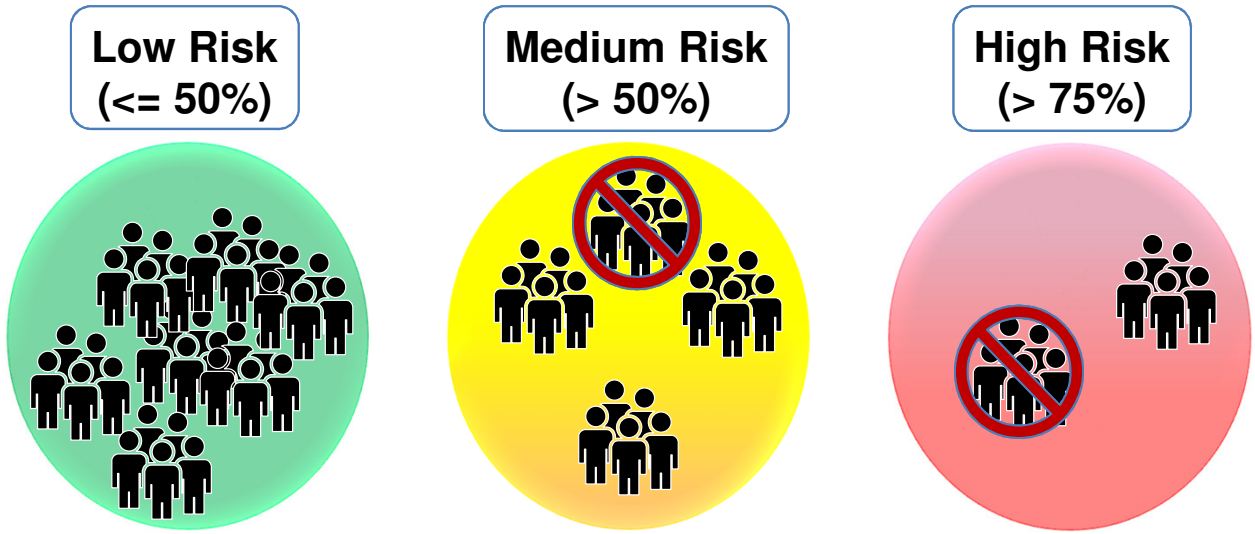
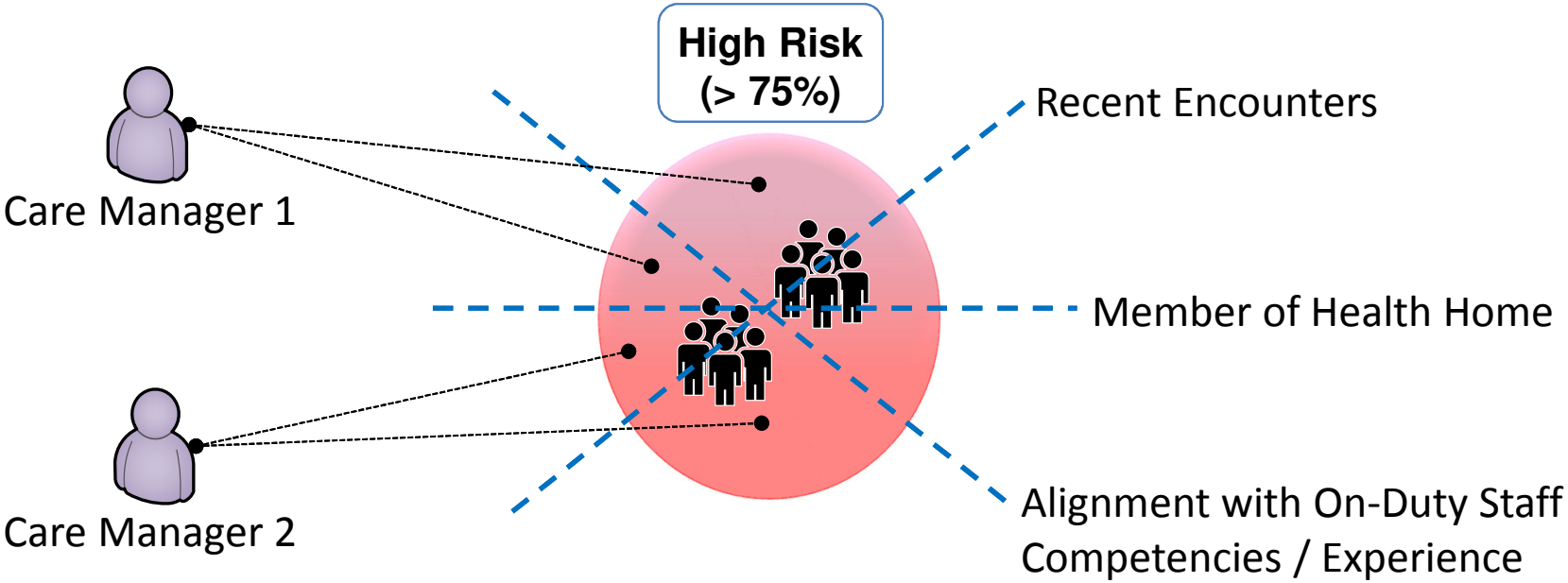
5 Analyze for Meaningful Impact



Sensitivity Analysis can be performed to determine if planned interventions will likely result in meaningful change in patient condition (i.e., move to a lower risk category). Where potential impact is projected to be minimal, care management activities can be re-prioritized.

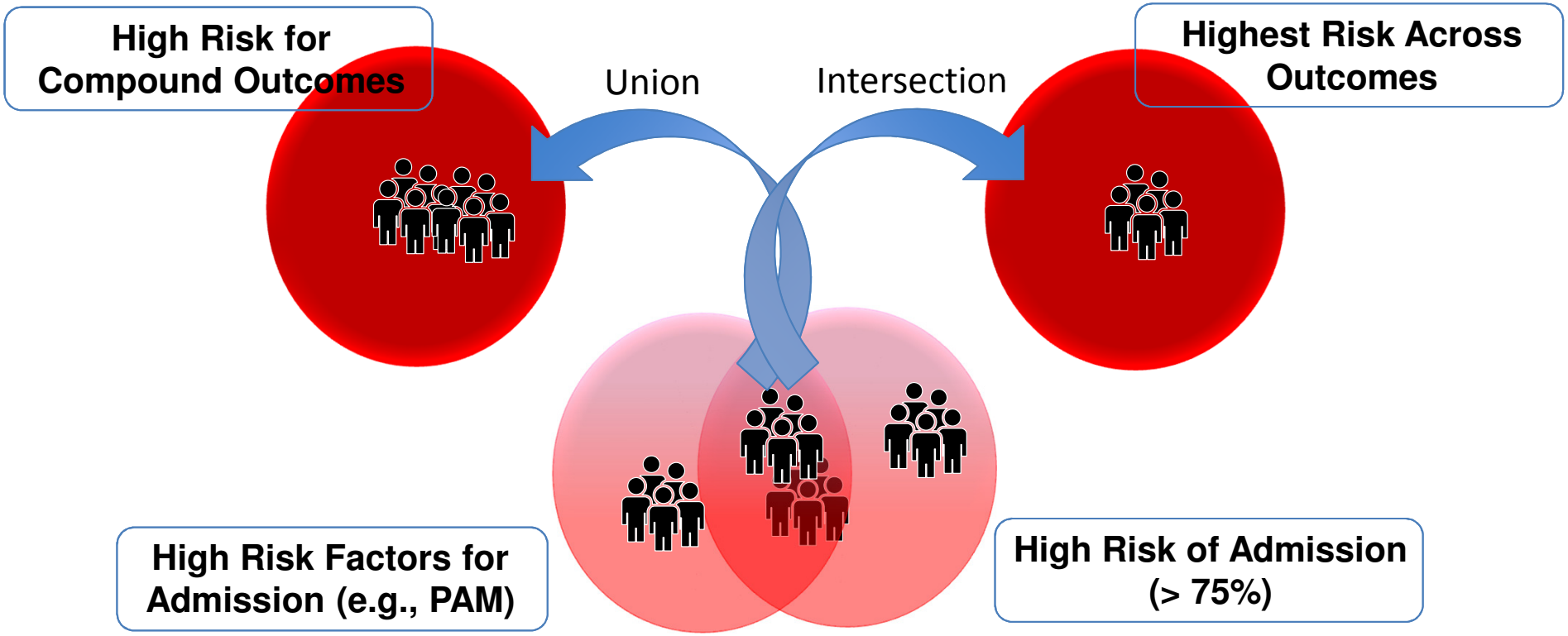
6 Further Stratify for Workflow



Beyond the top level stratifications which are more global in nature, there should be temporal derivative stratifications allowed to optimize work assignments and care management efficacy.

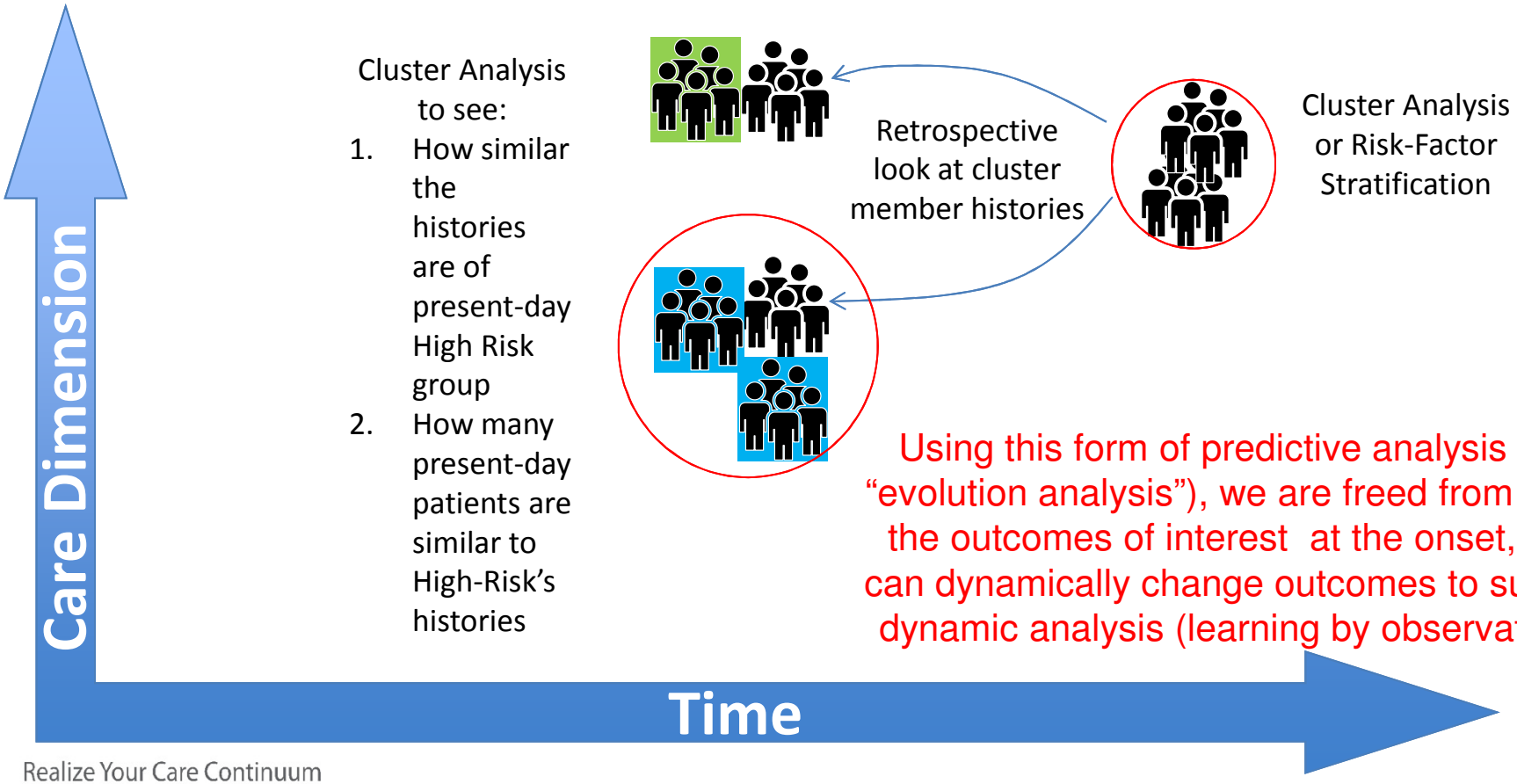
Meld Analytics for Nuanced Targeting

7



By combining the resultant sets from stratification, more refined or inclusive sets can be constructed in order to

Sidebar Dynamic-Outcome Predictions



What is The Takeaway…

Analytics are part & parcel with care delivery

Thank You for Your Time and Attention!

Presented By:
LeRoy Jones, CEO – GSI Health
www.gsihealth.com

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