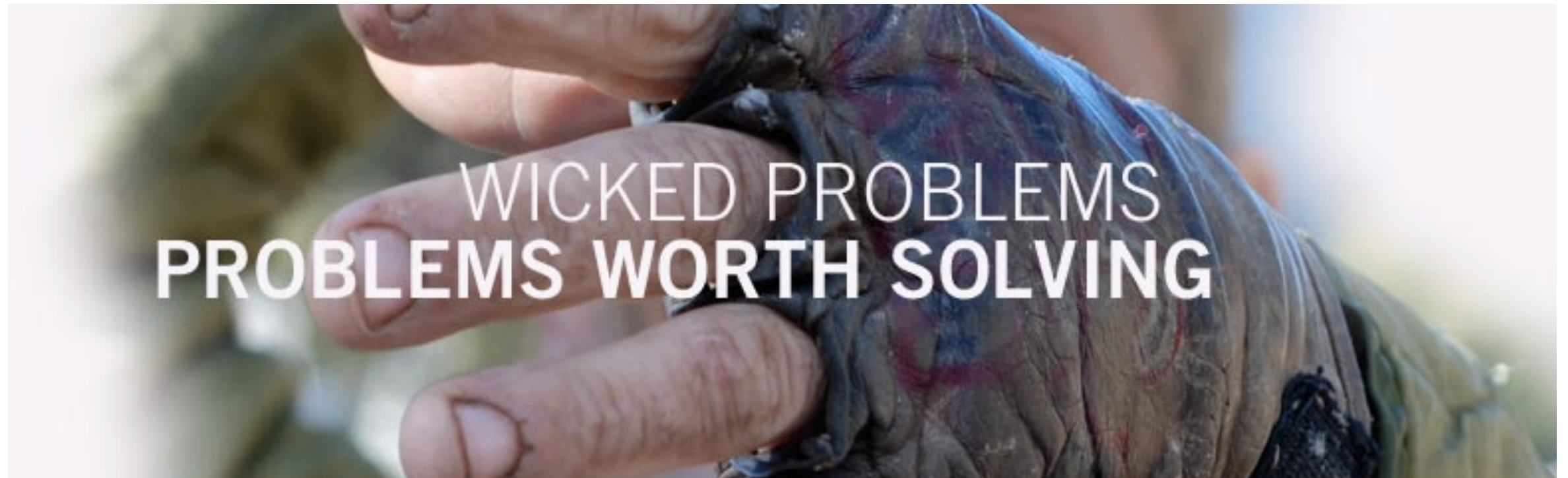


Two “Wicked Problems” in Healthcare: The Case of Cancer



see: https://www.wickedproblems.com/1_wicked_problems.php

Bradford W. Hesse, PhD
Chief, Health Communication and
Informatics Research Branch



Wicked Problems

1. **Connecting Health.** How do we use CSLS to create adaptive, supportive health systems to nudge healthy behaviors, close gaps, and prevent error?
2. **Moonshot.** How do we use CSLS to integrate knowledge and double our pace against a complex set of diseases?

November 15,
2016



I. Connecting Health

THE CANCER LETTER

Jan. 24, 2014

• www.cancerletter.com

• Vol. 40 No. 4

“We know what kinds of things need to be done to increase the number of people who survive from 350 per day to 1,000.”

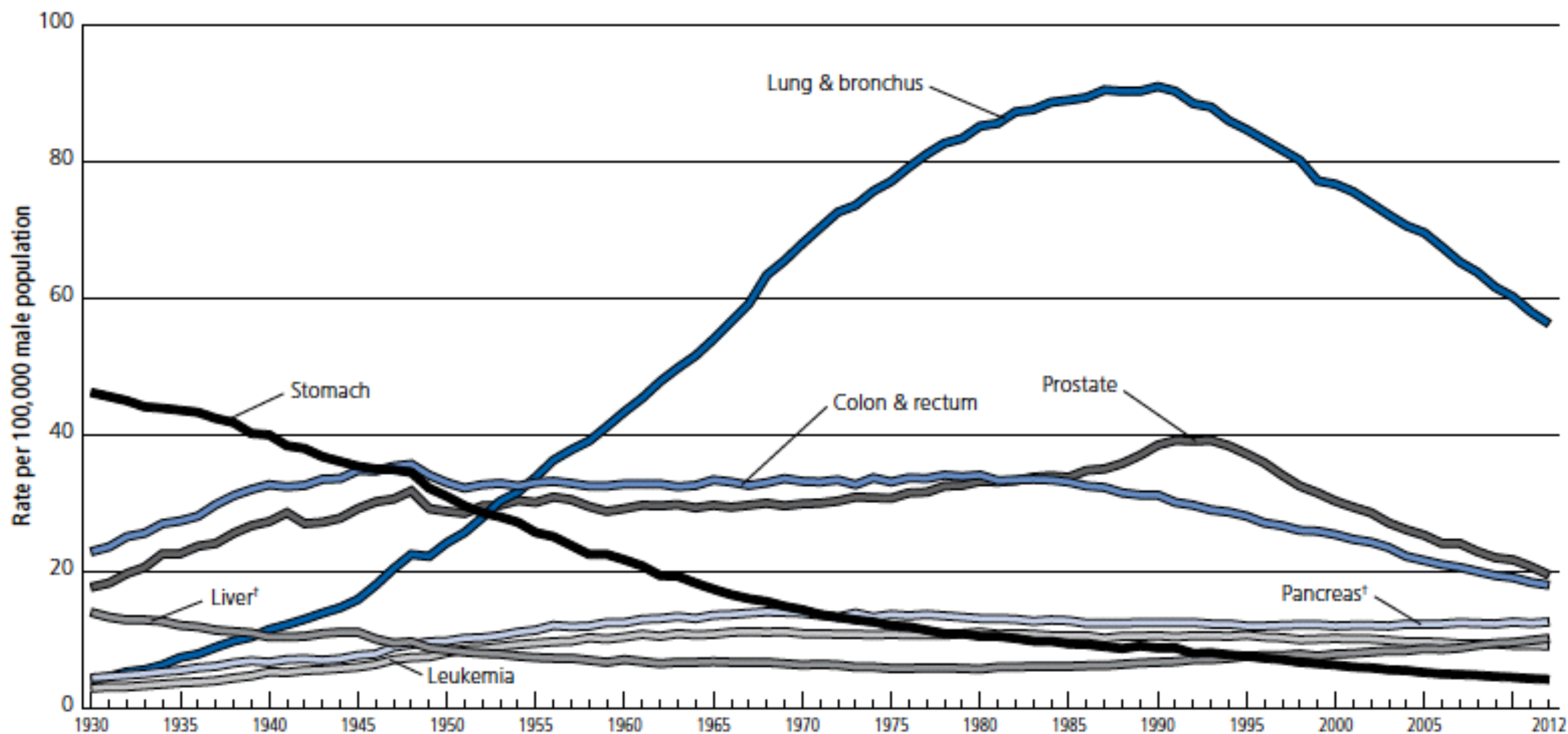


John Seffrin, CEO American Cancer Society

*Source: Jemal, A., Siegel, R., Xu, J., & Ward, E. Cancer statistics, 2010. CA Cancer J Clin, 60(5), 277-300.

I. Connecting Health

Figure 1. Trends in Age-adjusted Cancer Death Rates* by Site, Males, US, 1930-2012



*Per 100,000, age adjusted to the 2000 US standard population. †Mortality rates for pancreatic and liver cancers are increasing.

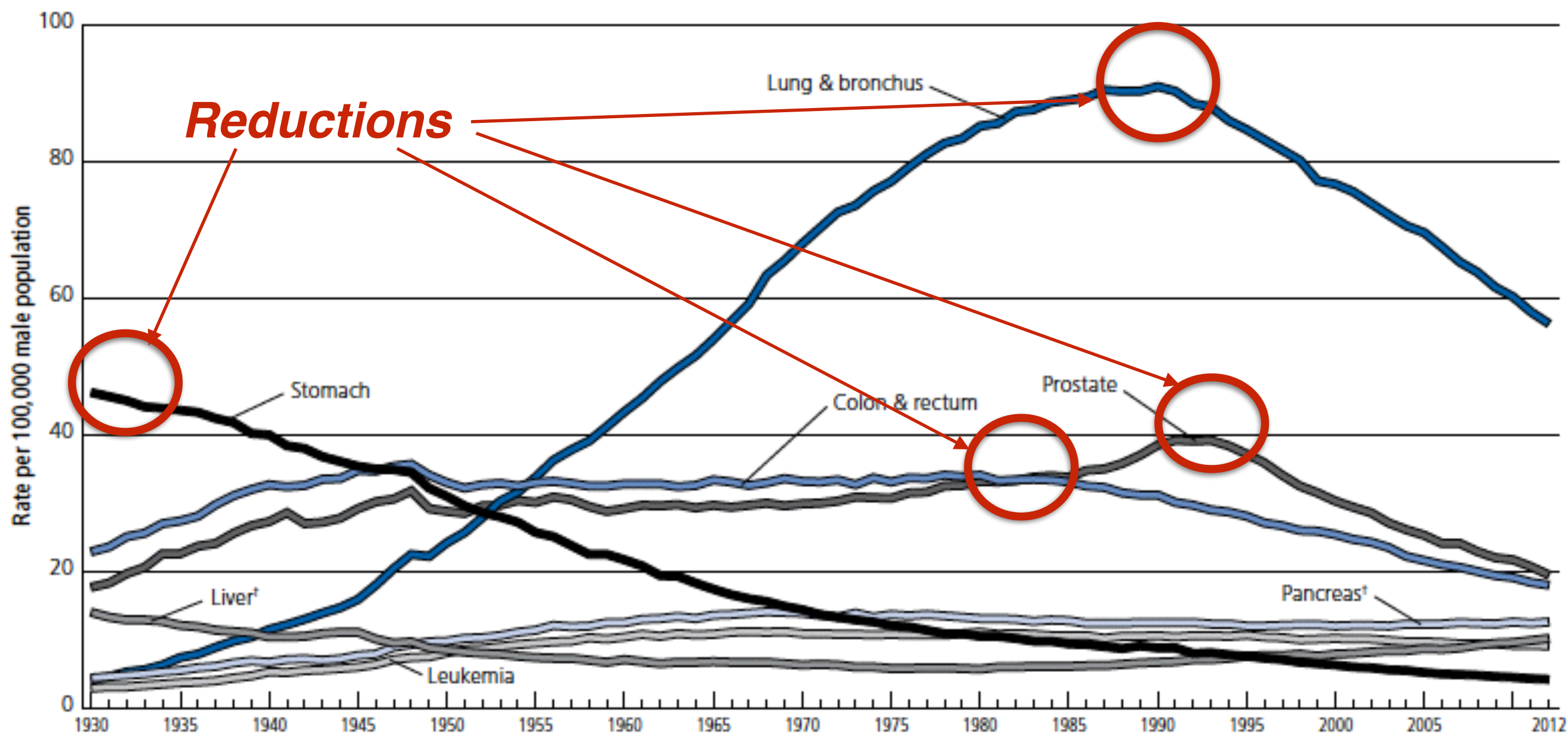
Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancers of the liver, lung and bronchus, and colon and rectum are affected by these coding changes.

Source: US Mortality Volumes 1930 to 1959 and US Mortality Data 1960 to 2012, National Center for Health Statistics, Centers for Disease Control and Prevention.

©2016, American Cancer Society, Inc., Surveillance Research

I. Connecting Health

Figure 1. Trends in Age-adjusted Cancer Death Rates* by Site, Males, US, 1930-2012



*Per 100,000, age adjusted to the 2000 US standard population. †Mortality rates for pancreatic and liver cancers are increasing.

Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancers of the liver, lung and bronchus, and colon and rectum are affected by these coding changes.

Source: US Mortality Volumes 1930 to 1959 and US Mortality Data 1960 to 2012, National Center for Health Statistics, Centers for Disease Control and Prevention.

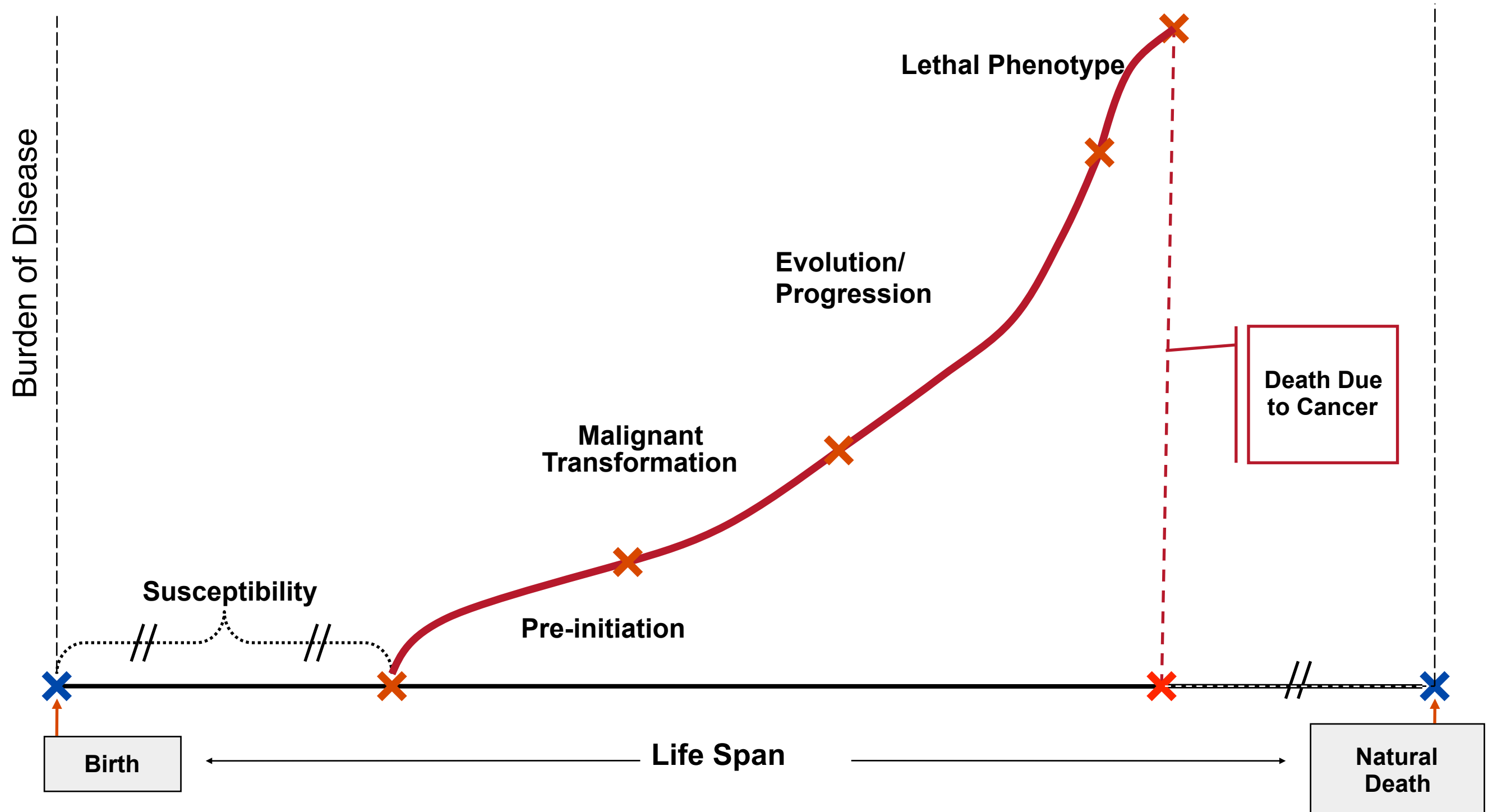
©2016, American Cancer Society, Inc., Surveillance Research

I. Connecting Health

Pathogenesis

Projected Deaths
in US (2016):

595,690



I. Connecting Health

Primary Prevention

Projected Deaths
in US (2016):

357,414

238,276 Lives Saved



e.g., 40% Reduction
(experts say 30-50% is
behaviorally caused)



Burden of Disease



*Avert or Delay
its Onset*



Susceptibility



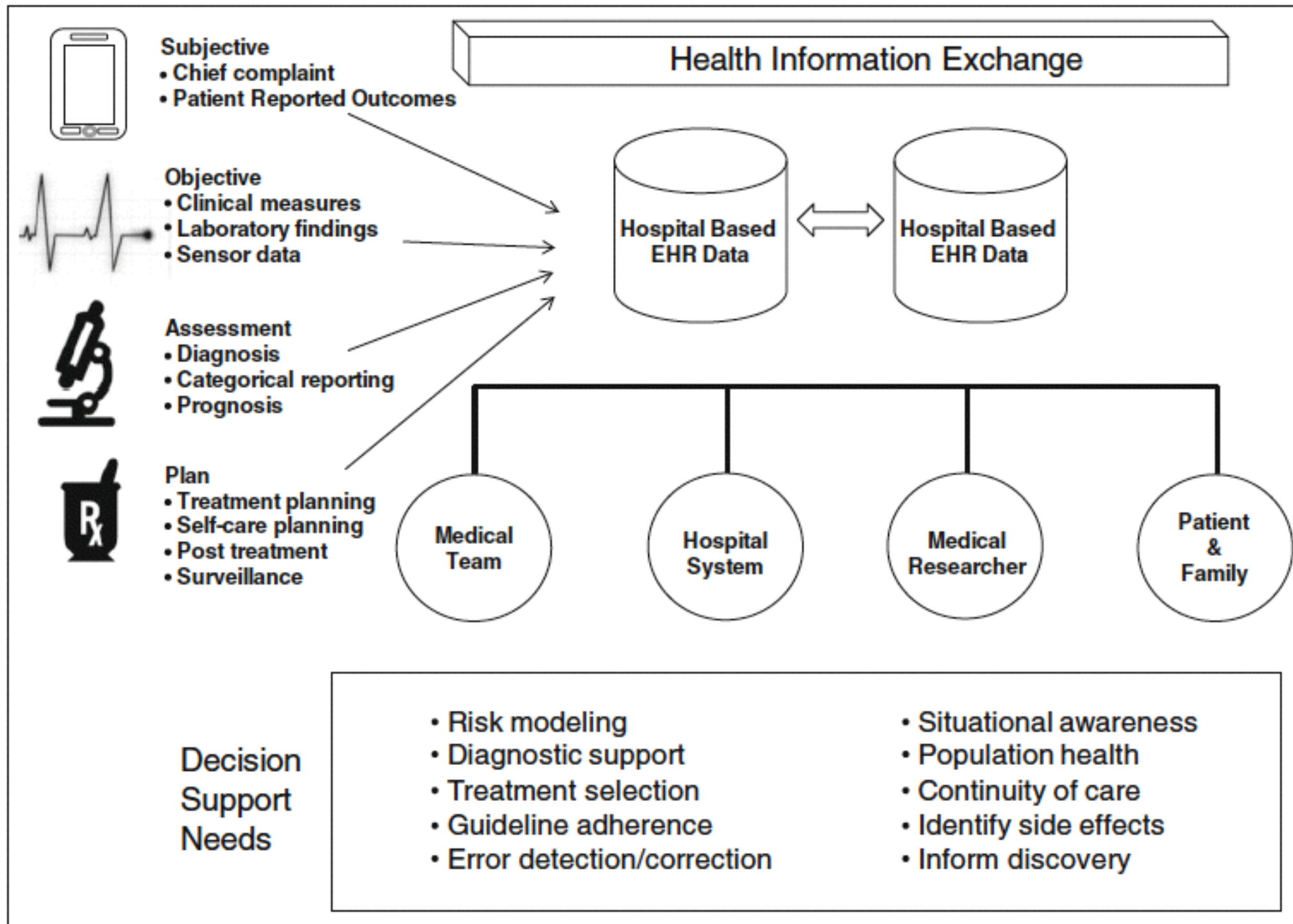
Birth

Life Span

Natural Death

I. Connecting Health

Data Rich Learning System



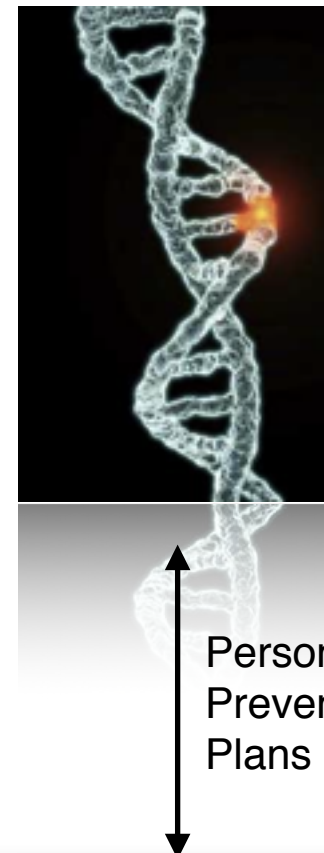
I. Connecting Health

Primary Prevention

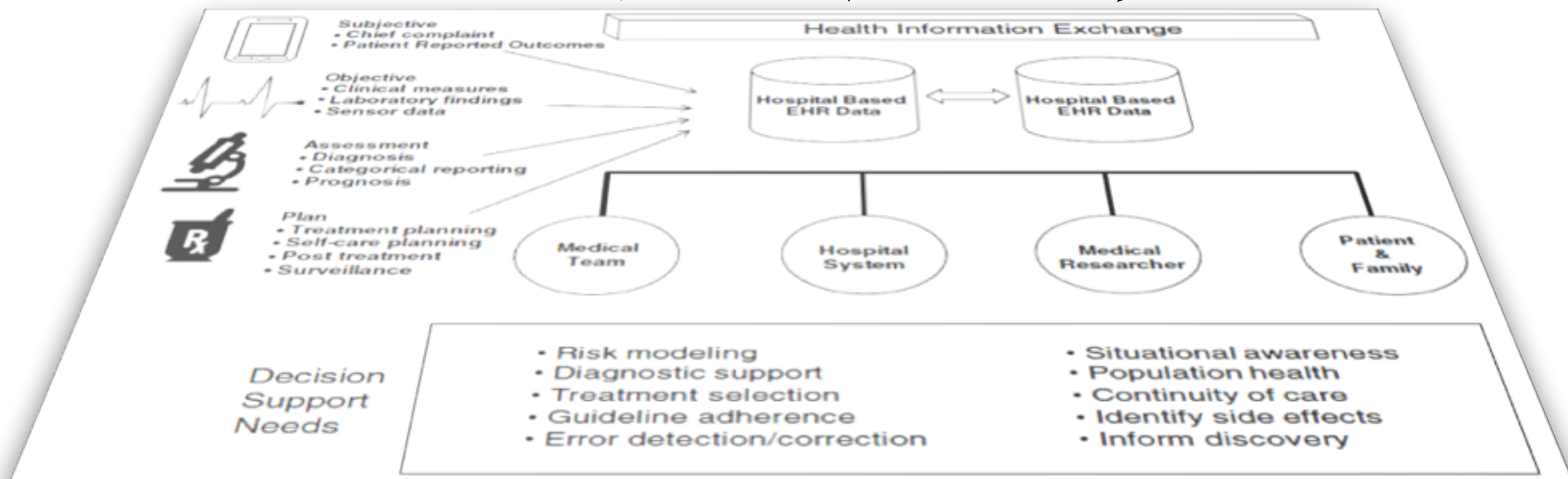
*Behavioral Monitoring,
Adaptive Decision Support*



*Genetically Informed
Risk Profile*



*Real Time, Updated Decision
Support (individuals & populations)*



I. Connecting Health

Primary Prevention

Patient Rights



Genetically Informed Risk Profile

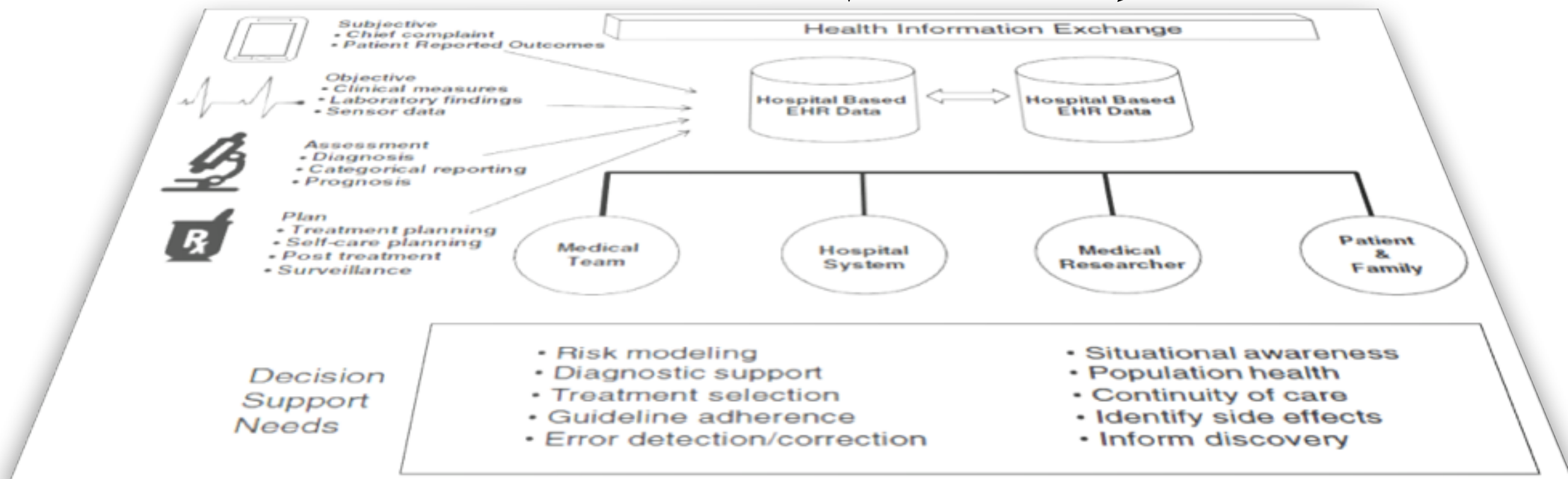


Personalized Prevention Plans

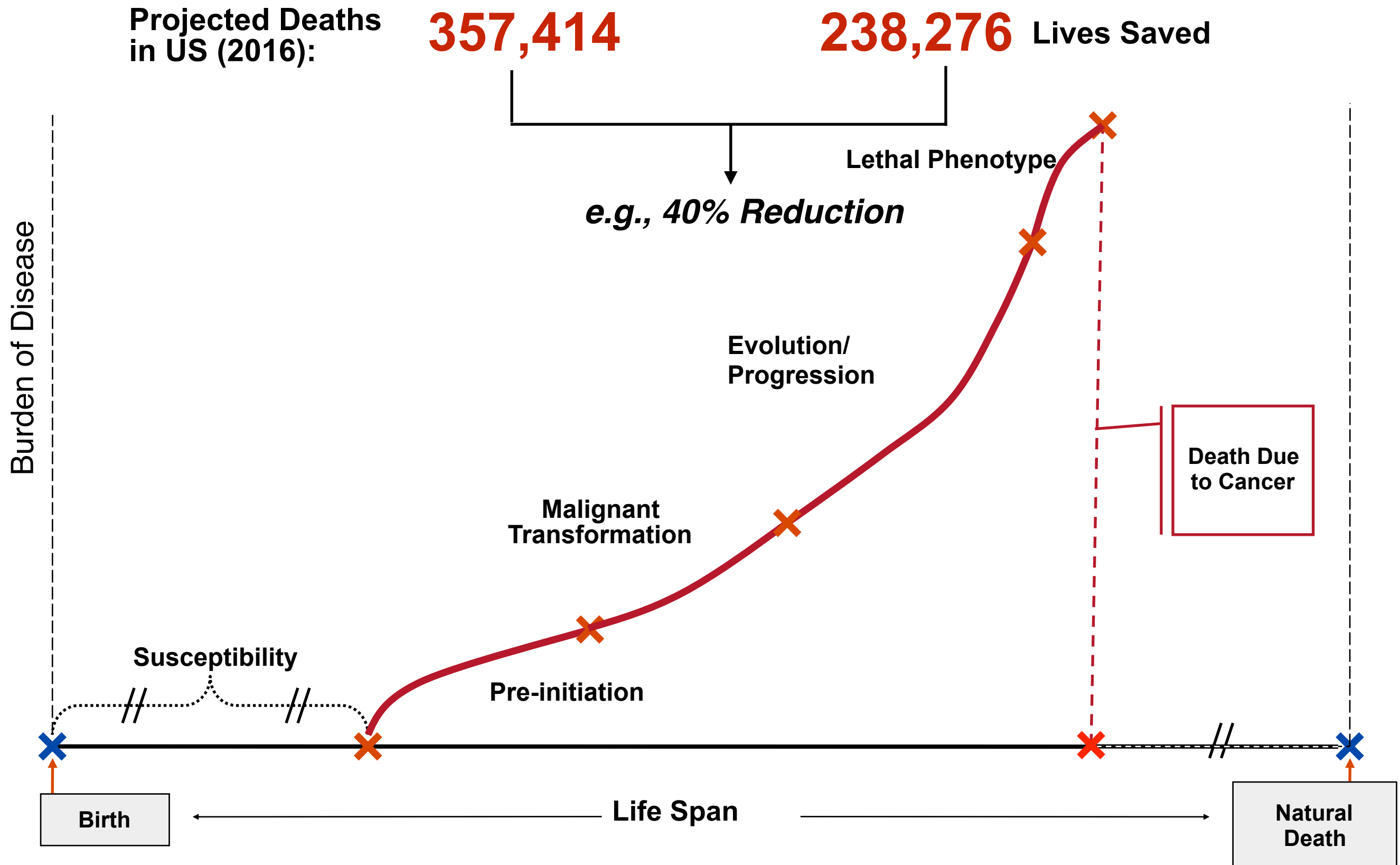
Real Time, Updated Decision Support (individuals & populations)



Population-Derived Algorithms



I. Connecting Health



I. Connecting Health

Early Detection

Projected Deaths
in US (2016):

268,060

327,630 Lives Saved

e.g., 55% Reduction
(taking another 15% for
early detection)

*Detect &
Eradicate*



Burden of Disease

Susceptibility

Pre-initiation

Birth

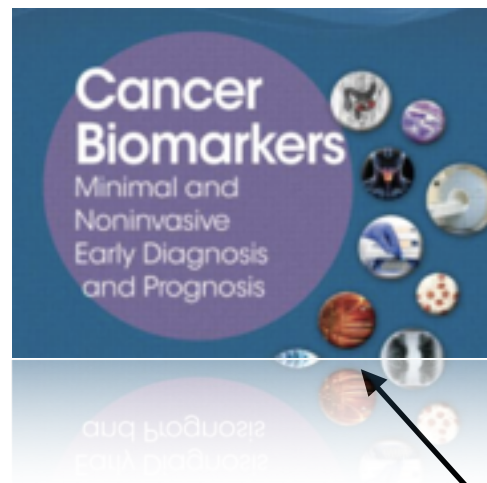
Life Span

Natural
Death

I. Connecting Health

Early Detection

*Proteomically
Informed Biomarkers*



*Personalized Patient Data
Model, Just in Time support*



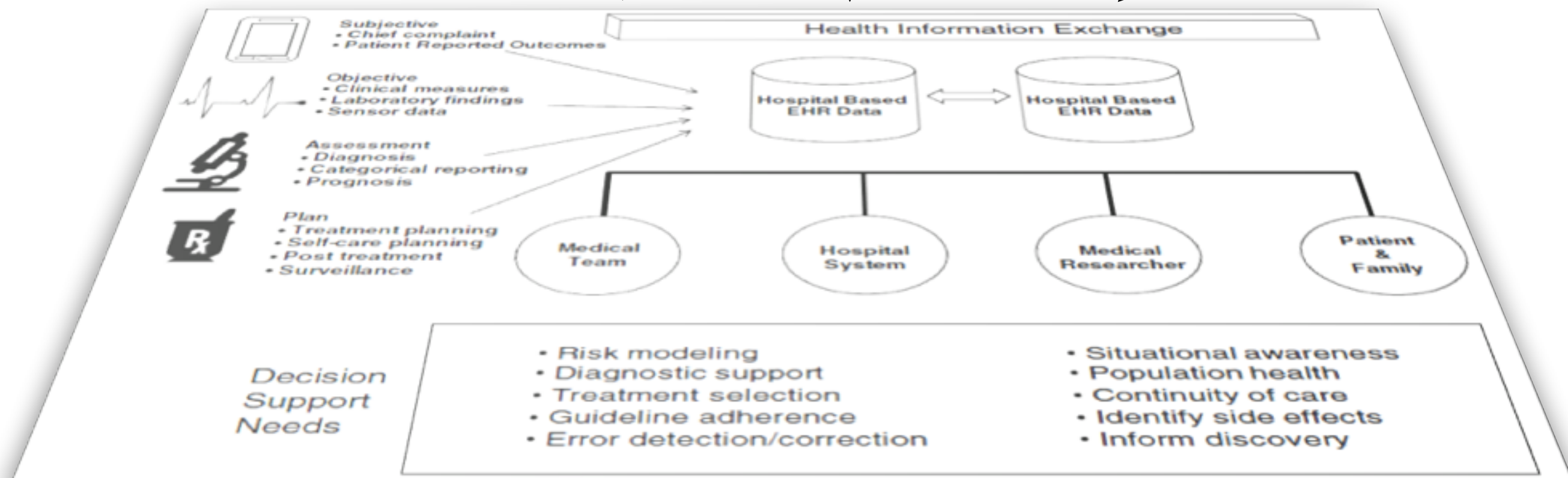
*Data Driven Service Improvement
for Practices & Hospitals*



Predictive, Low
Impact Screening

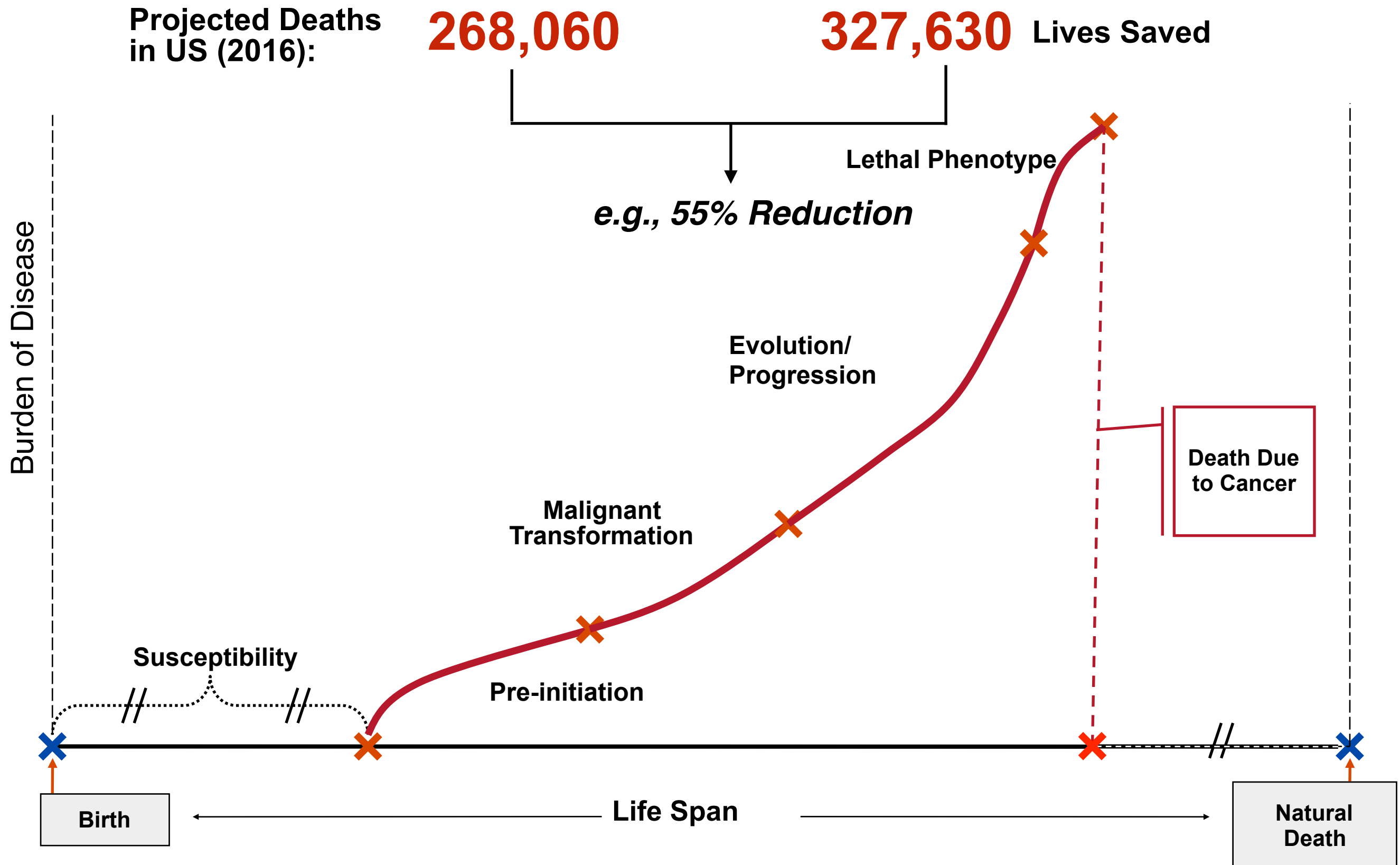
Personalized Care

Population Updated
Personalization



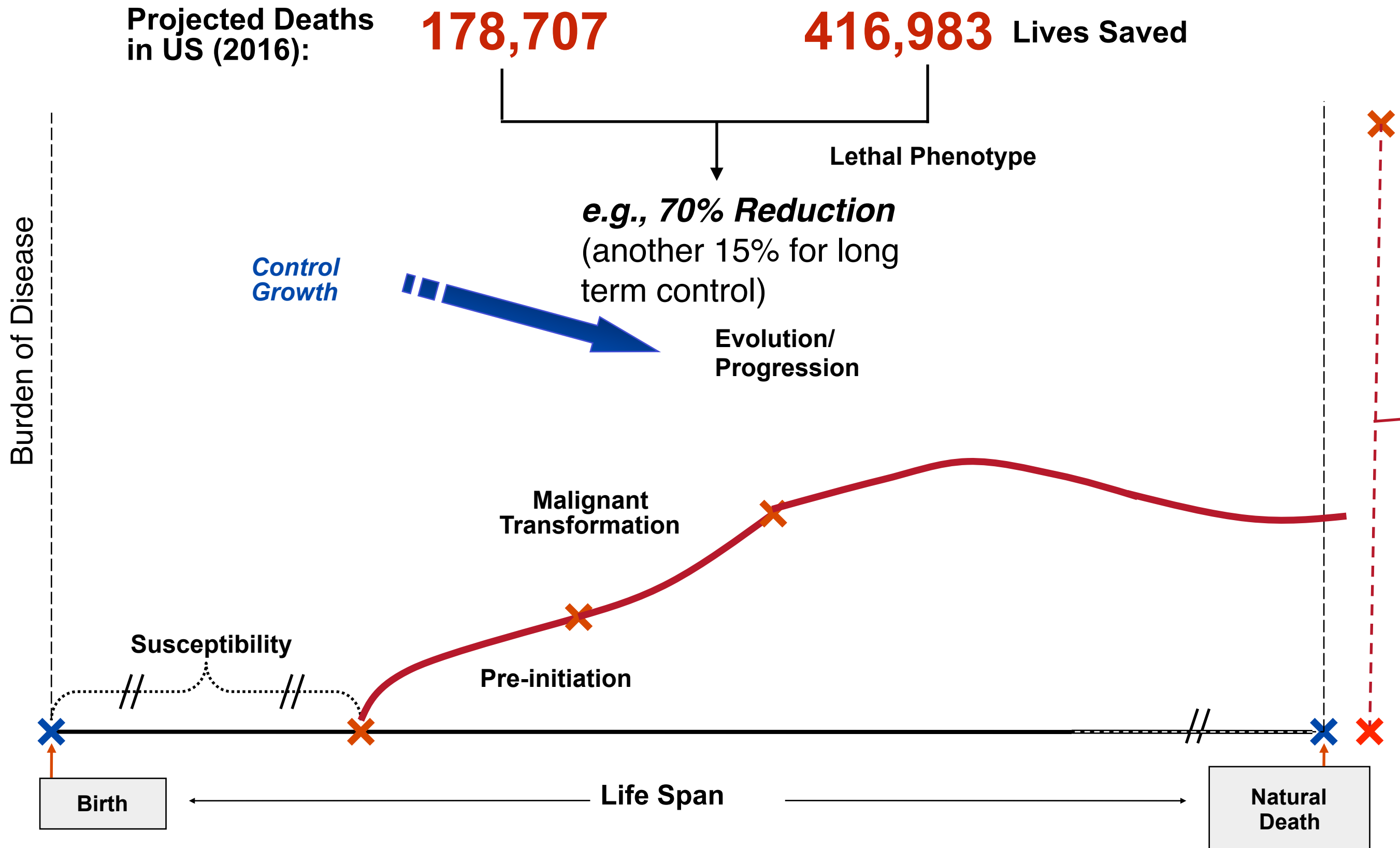
I. Connecting Health

Control Growth



I. Connecting Health

Control Growth



I. Connecting Health

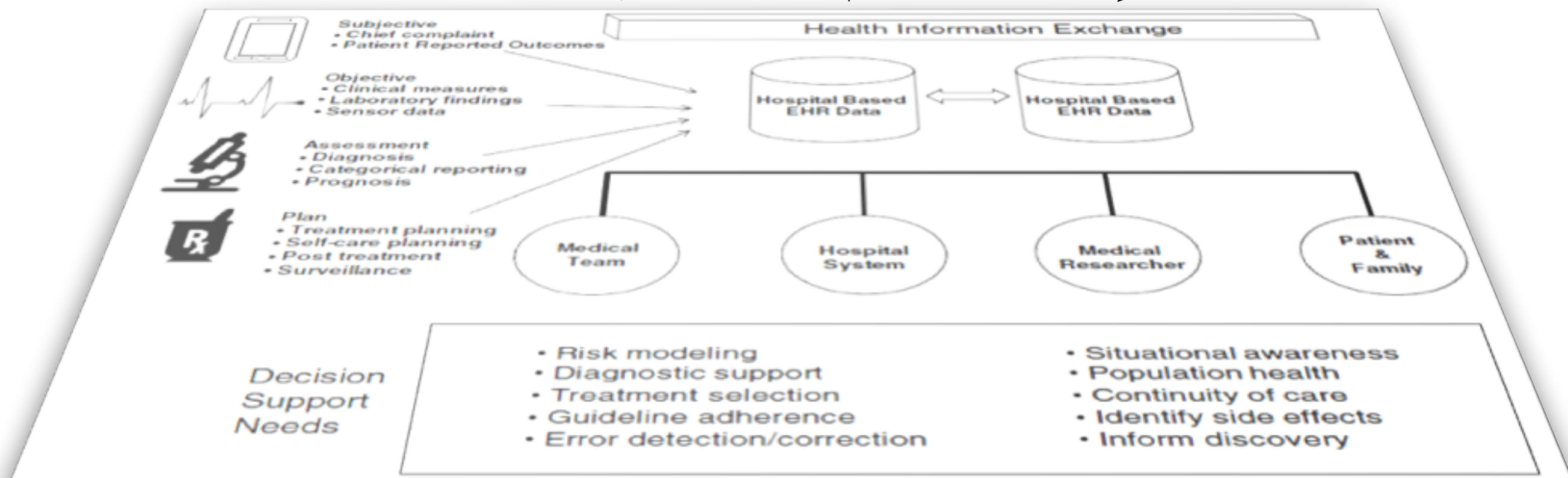
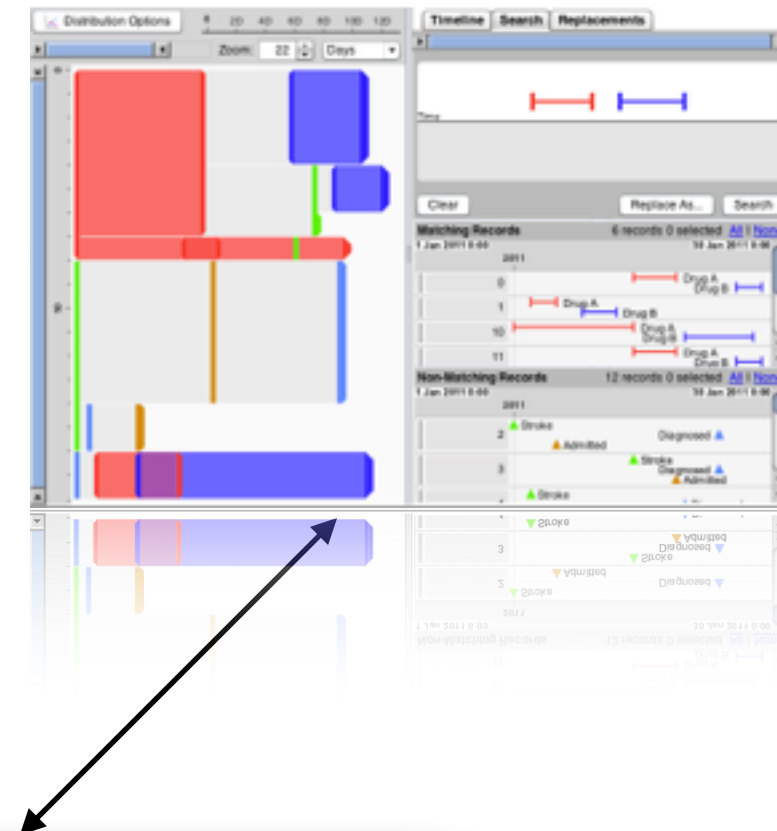
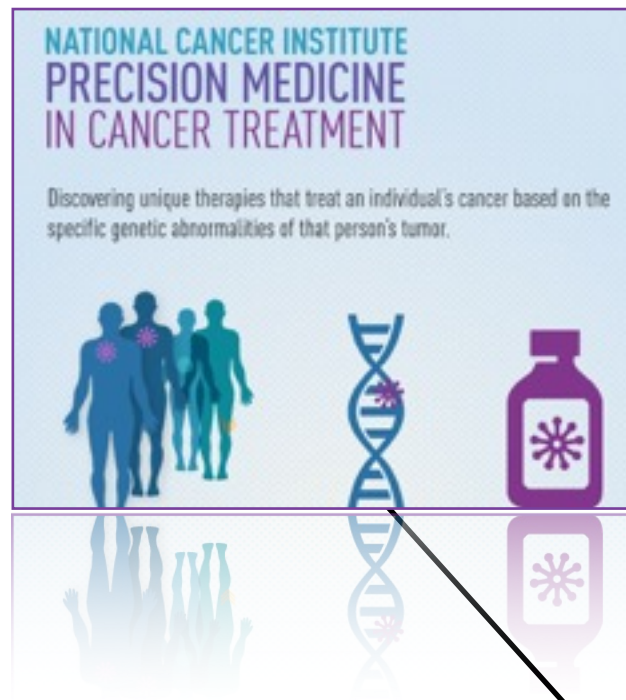
Control Growth

*Personalized (Precision)
Treatment Plan*

*Dynamically Updated Care &
Survivorship Plan*

*Life Long View of Care, Proactive
Vigilance Based on Updated Models*

Treatment,
Survivorship



Wicked Problems

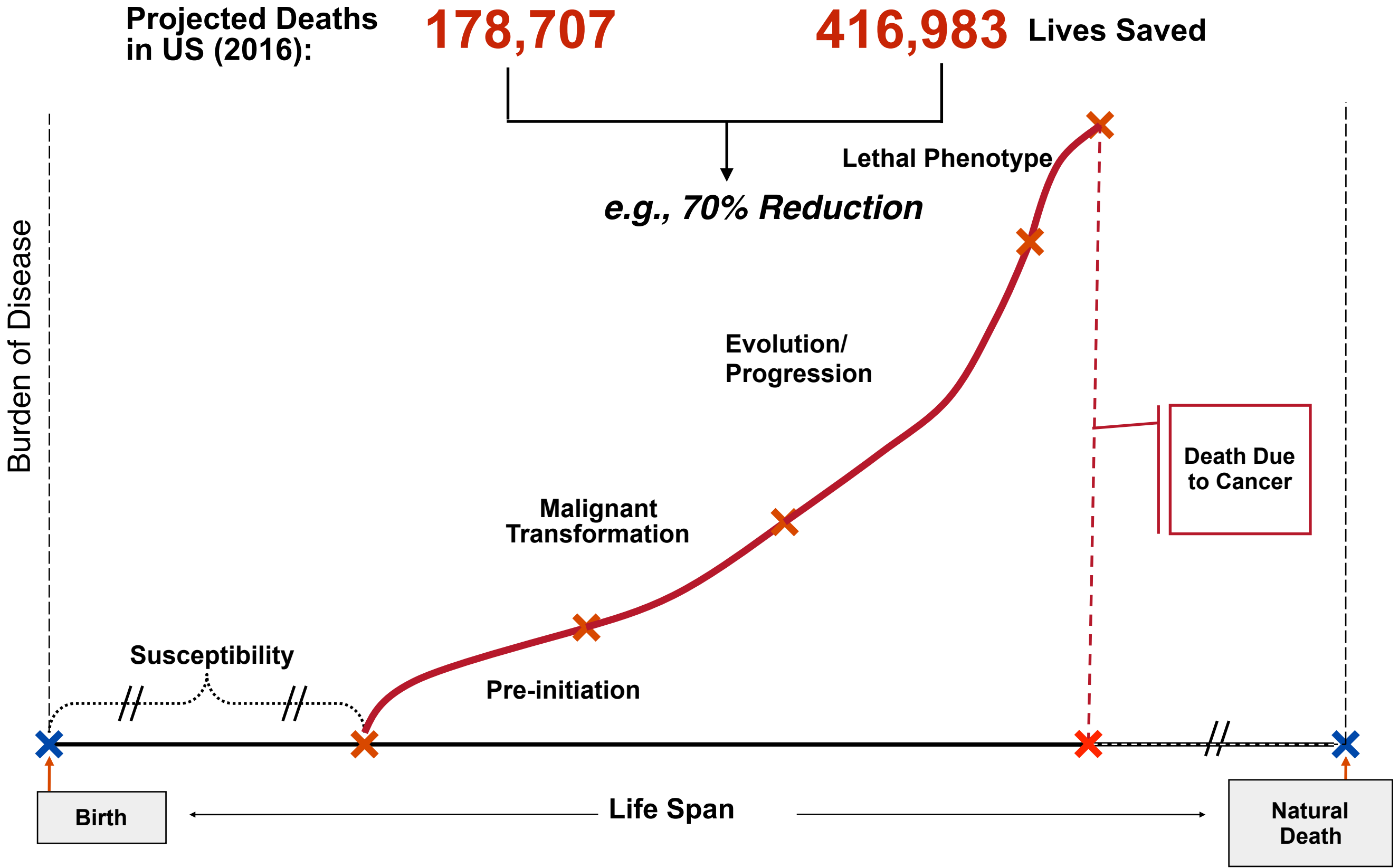
1. **Connecting Health.** How do we use CSLS to create adaptive, supportive health systems to nudge healthy behaviors, close gaps, and prevent error?



2. **Moonshot.** How do we use CSLS to integrate knowledge and double our pace against a complex set of diseases?

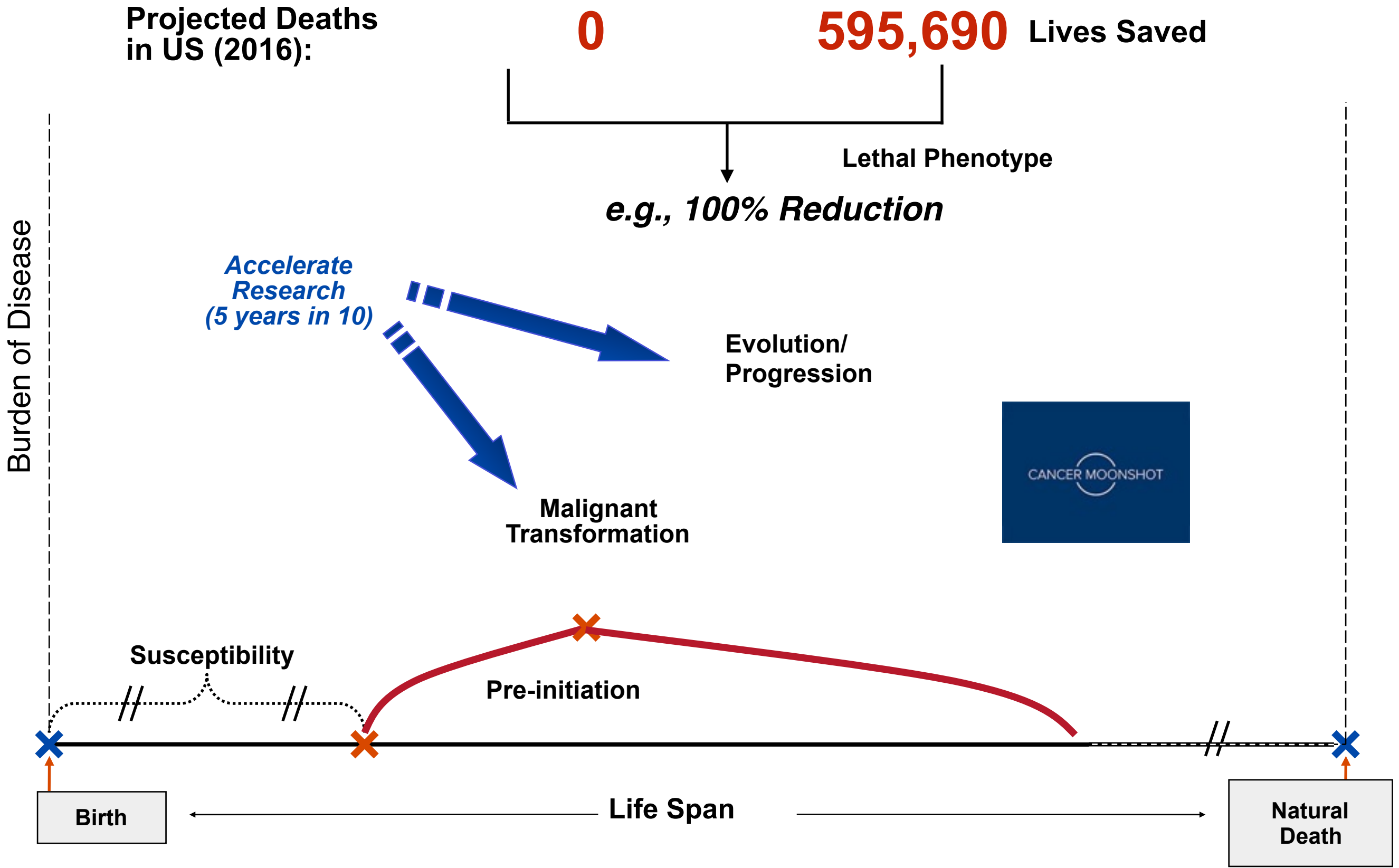


2. Moonshot



2. Moonshot

Faster Cures



2. Moonshot

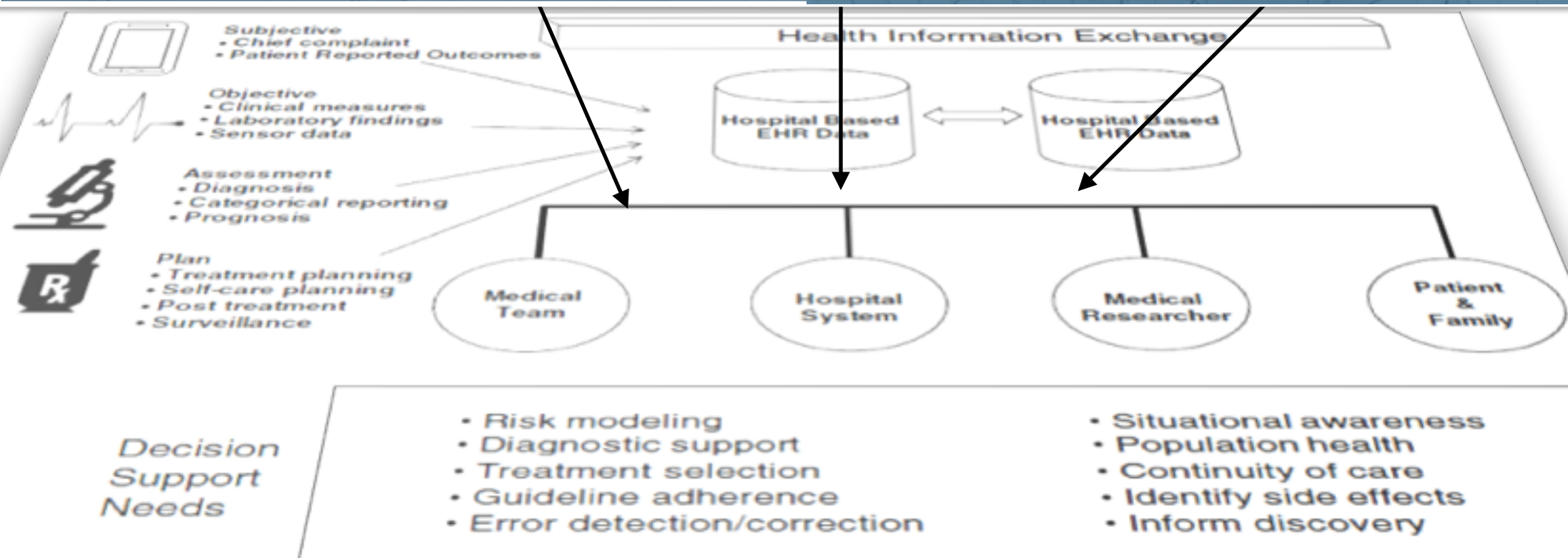
Recommendation A:

Network for Direct Patient Engagement

Basic Discovery: Suggesting New Hypotheses from Shared Data

Pharmacovigilance through Collectively Donated Symptom Data

Faster Clinical Trials with Greater Participation among Patients



Thank You!



hesseb@mail.nih.gov