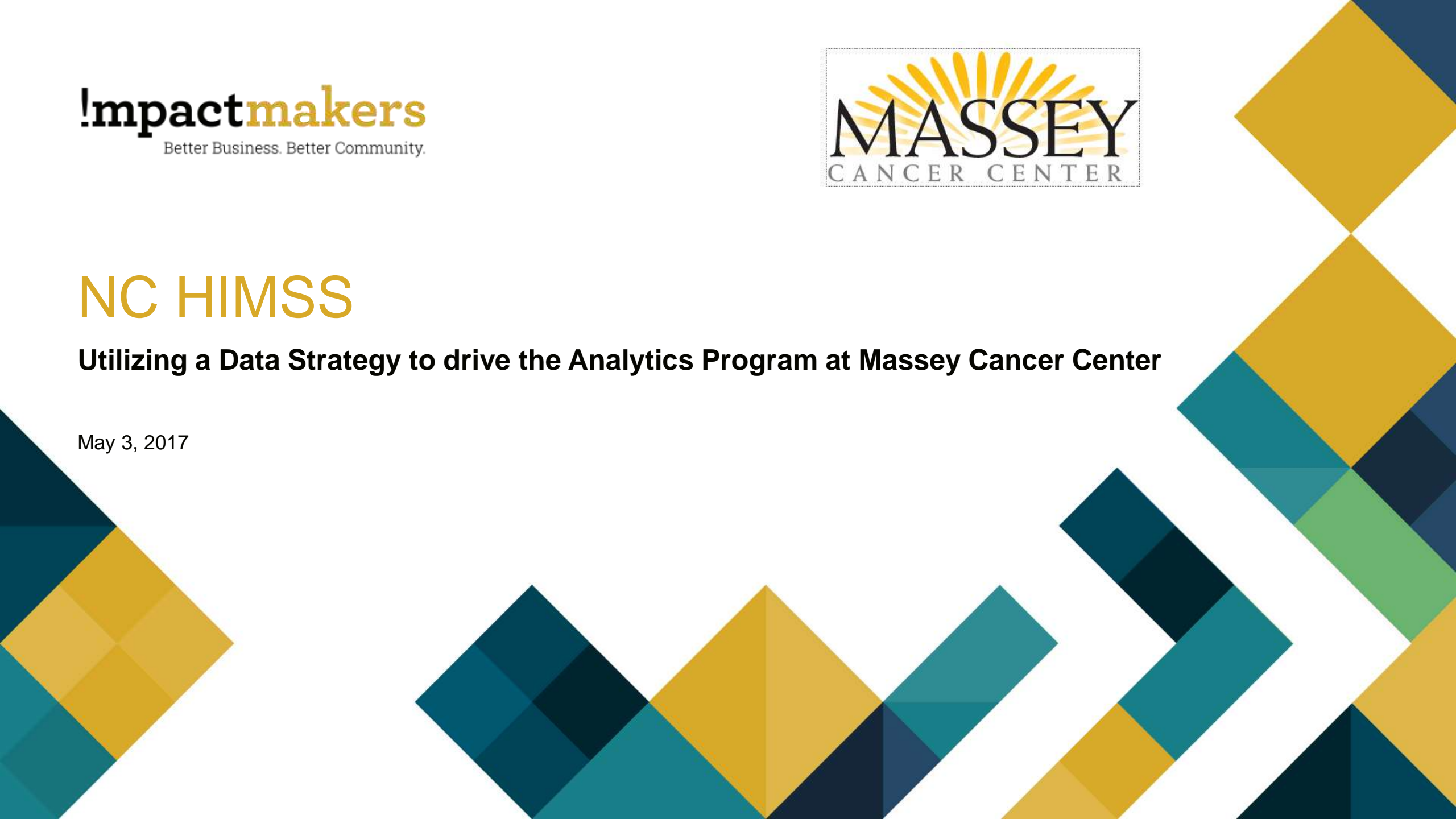




# NC HIMSS

## Utilizing a Data Strategy to drive the Analytics Program at Massey Cancer Center

May 3, 2017



# Abstract

Hear a case study from the Massey Cancer Center on utilizing a data strategy to drive their analytics program; example outcomes include gathering the data needed to make the case for creating, sustaining and expanding palliative care services. Many healthcare organizations struggle with palliative care. By using data and analytics, palliative care programs can grow and advance. This case study will highlight using analytics to improve outcomes, improve care delivery, and reduce costs. We conclude the presentation with a retrospective look at applying the newly developed HIMSS Adoption Model for Analytics Maturity (AMAM) to the Massey case study. This will help to further introduce the AMAM to the HIMSS membership and provide another dimension for reviewing the case study approach.

# Session Presenters



## J. Brian Cassel, PhD

Assistant professor, Hematology/Oncology &  
Palliative Care

Associate director, cancer informatics core  
Massey Cancer Center

Virginia Commonwealth University

[Brian.Cassel@VCUhealth.org](mailto:Brian.Cassel@VCUhealth.org)



## Lewis A. Broome

Principal Consultant  
Data & Analytics Practice Lead

Impact Makers

Richmond, VA

[lbroome@Impactmakers.com](mailto:lbroome@Impactmakers.com)

# About Massey Cancer Center

- ❖ NCI Designated Cancer Center
- ❖ Associated w/ Virginia Commonwealth University Healthcare System
- ❖ Multidisciplinary Care
- ❖ Clinical Trials
- ❖ Bone Marrow Transplant Center
- ❖ Nationally Recognized Palliative Care Program



**15,000 PATIENTS**

**2,600 SURGICAL PROCEDURES**

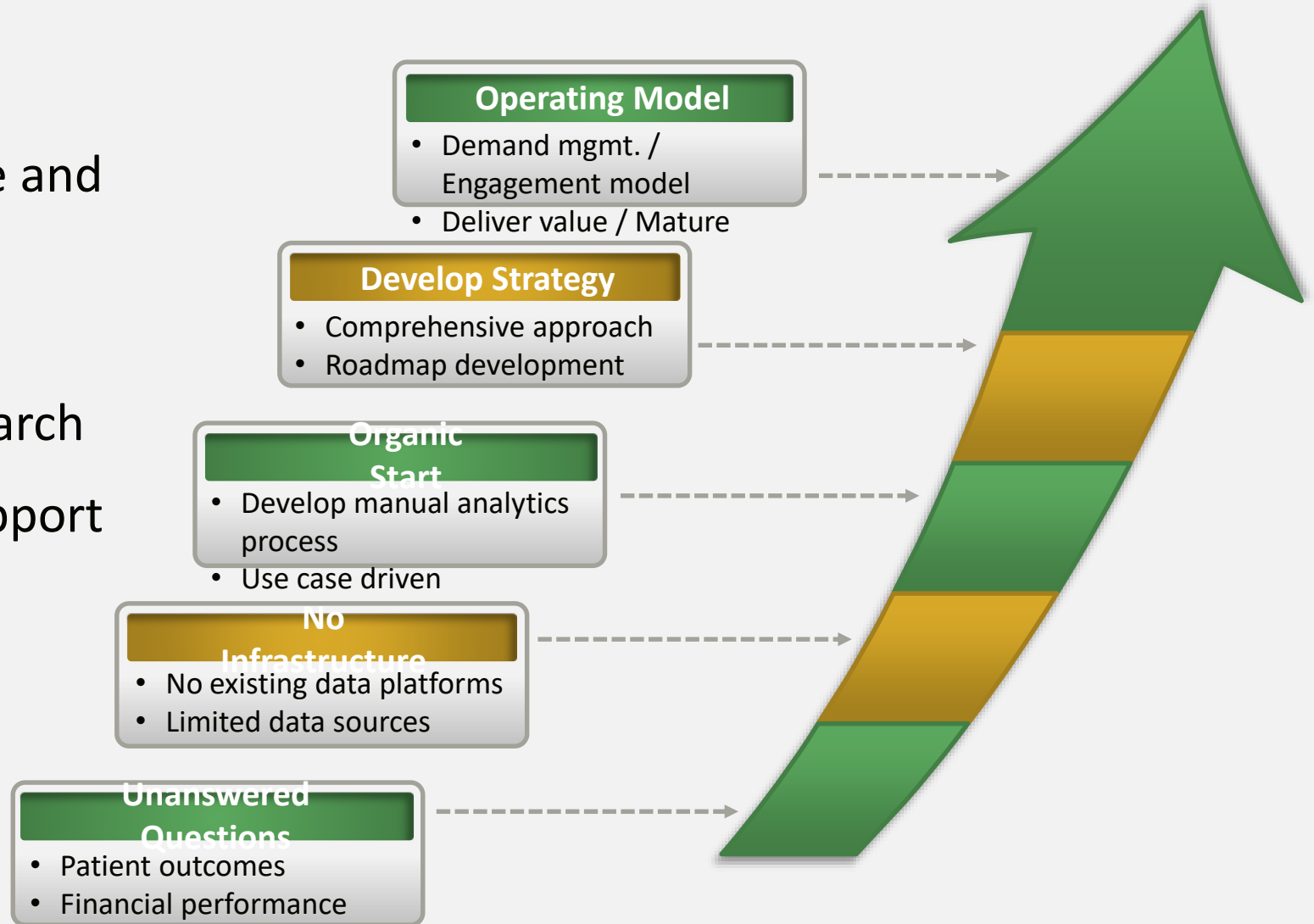
**44,900 CANCER TREATMENTS**

**160 BONE MARROW TRANSPLANTS**

**450 CLINICIANS & 200 RESEARCHERS**

# Developing Analytics at Massey

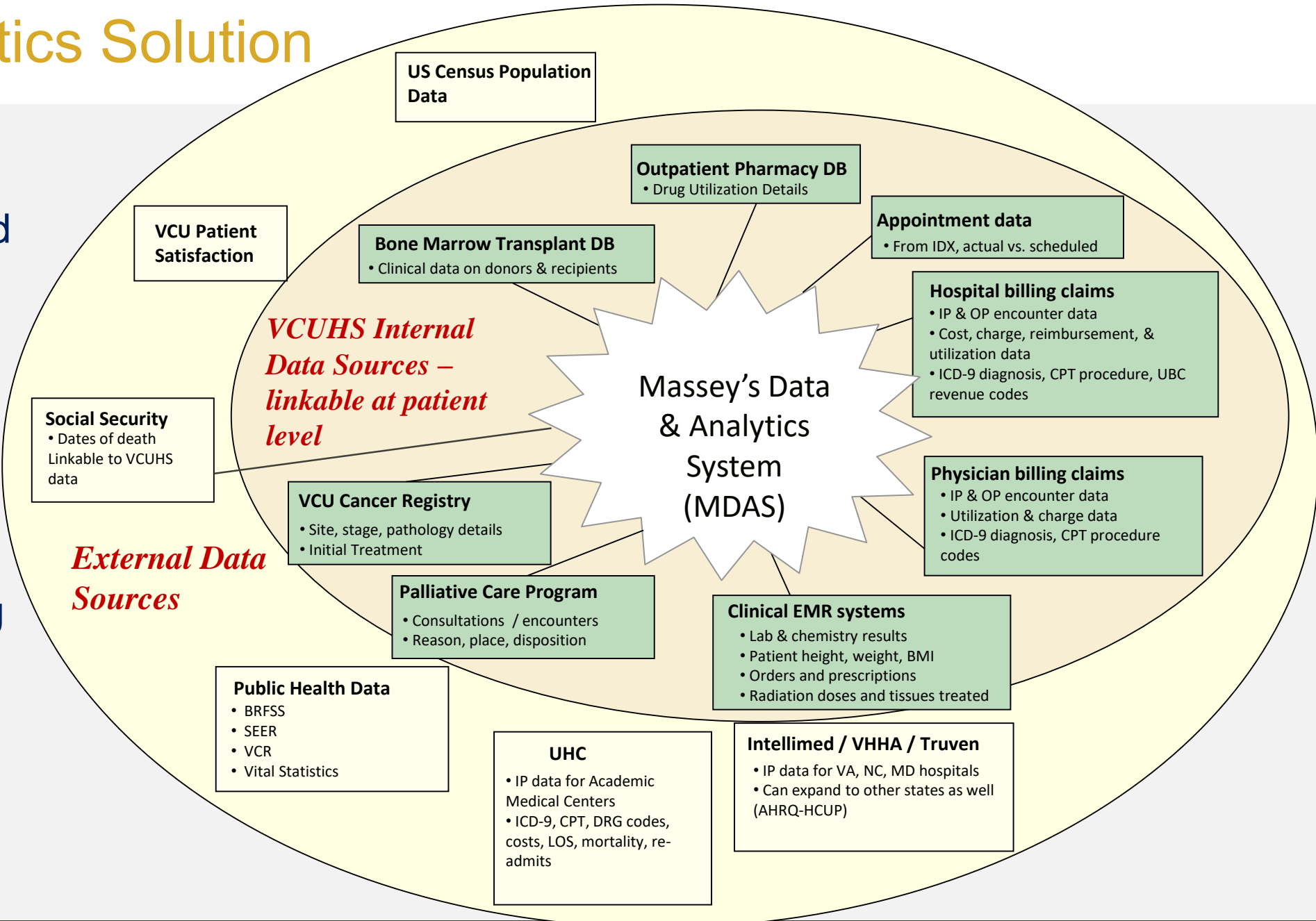
- ❖ Crawl, Walk, Run Approach
- ❖ Data Strategy enabled re-use and scale
- ❖ Use case driven solutions
- ❖ Ad hoc analyses key for research
- ❖ Cancer center leadership support



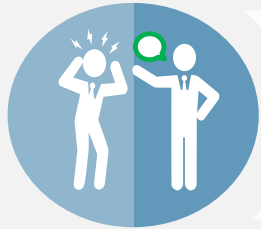
# Massey's Analytics Solution

## MDAS Supports:

- ❖ Clinical inquiry and reporting
- ❖ Operational reporting
- ❖ Research inquiry
- ❖ Outreach efforts
- ❖ Financial reporting
- ❖ Maps
- ❖ Business development



# Broad View of Data and Analytics



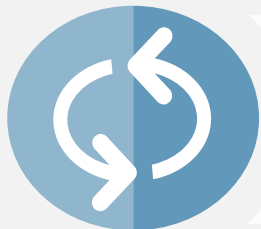
## Data discussions with 200+ organizations

- Healthcare; Financial Services; Supply Chain Mgmt.; Non-profit; Government



## Common patterns

- Challenges
- Solutions
- Miststeps



## Repeated behaviors of data-driven organizations

- Business focused data needs
- Comprehensive solutions – people, process, data, culture & technology



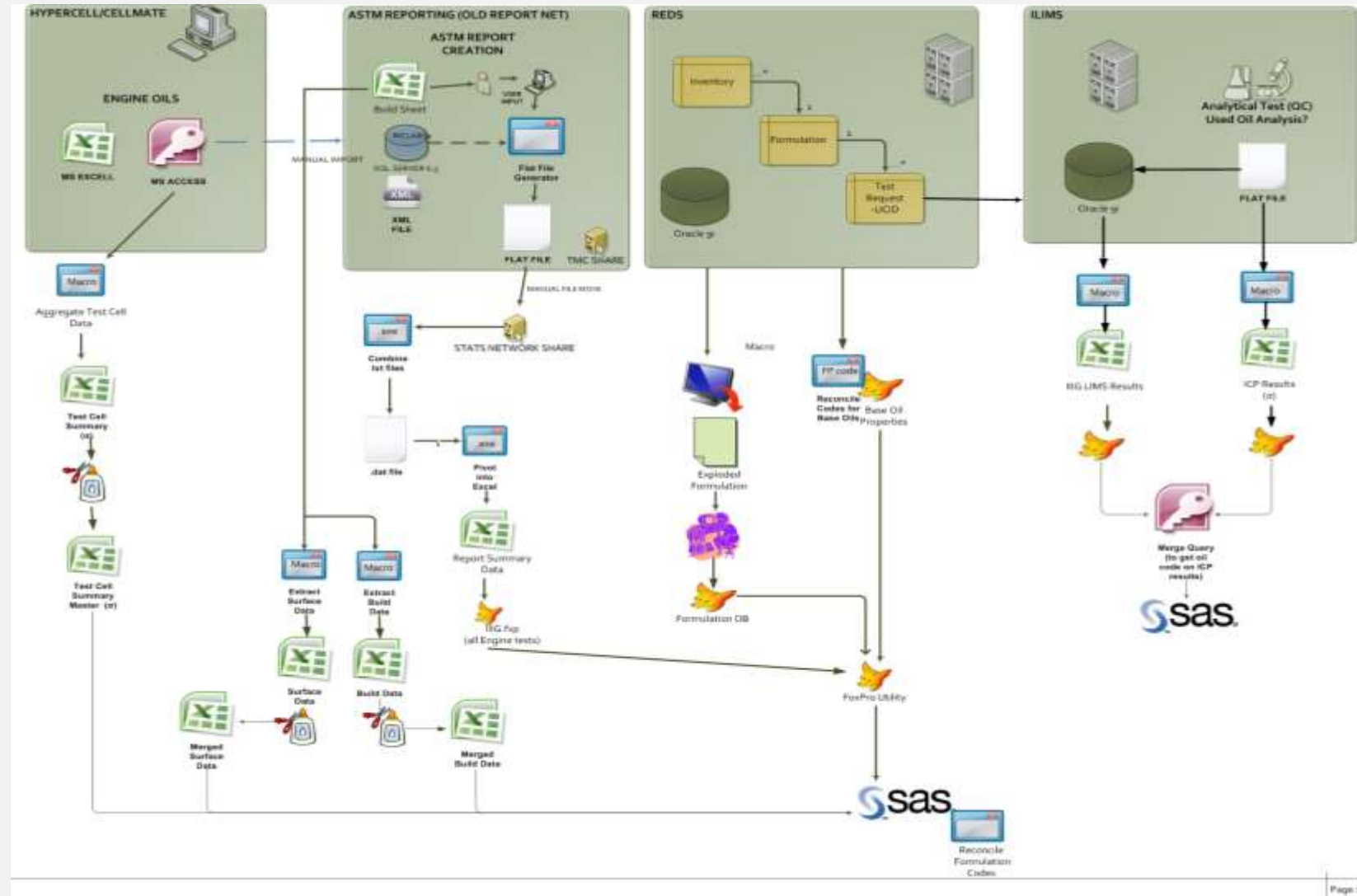
## Trends

- Industry-specific data & analytics maturity models
- Industry-specific data sharing exchanges – “Rising tide lifts all boats”



# Repeating Pattern: What Analytics Often Looks Like

- ❖ Not scalable
- ❖ Difficult to validate results
- ❖ Difficult to collaborate
- ❖ Increased “data wrangling” costs
- ❖ Compliance & security challenges when PHI involved



Source: Data Blueprint: [www.datablueprint.com](http://www.datablueprint.com)



# The Good and the Bad

## Good Data Practices



### Identify your most important data

Don't try to collect ALL the data, in order to optimize the data we need to segment the most important data.

### Get data correct the first time

"The quality of data is fixed at the moment of creation. But we don't actually judge that quality until the moment of use." Dr. Tom Redman

### Connect data creation & consumption

Data consumption needs drive data creation rules. Data-driven org.'s proactively manage data lineage.

### Strategy & Leadership

How data are used – e.g. Context – matters, a lot when defining the data.



## Bad Data Practices



### Thinking about Data as an IT Problem

Non-value added solutions. "data for data sake"



### "Find & Fix" Data Quality Issues

It's a losing battle. Limited ROI & not sustainable. Long term value must focus on solving root cause issues.



### Shadow Data Solutions

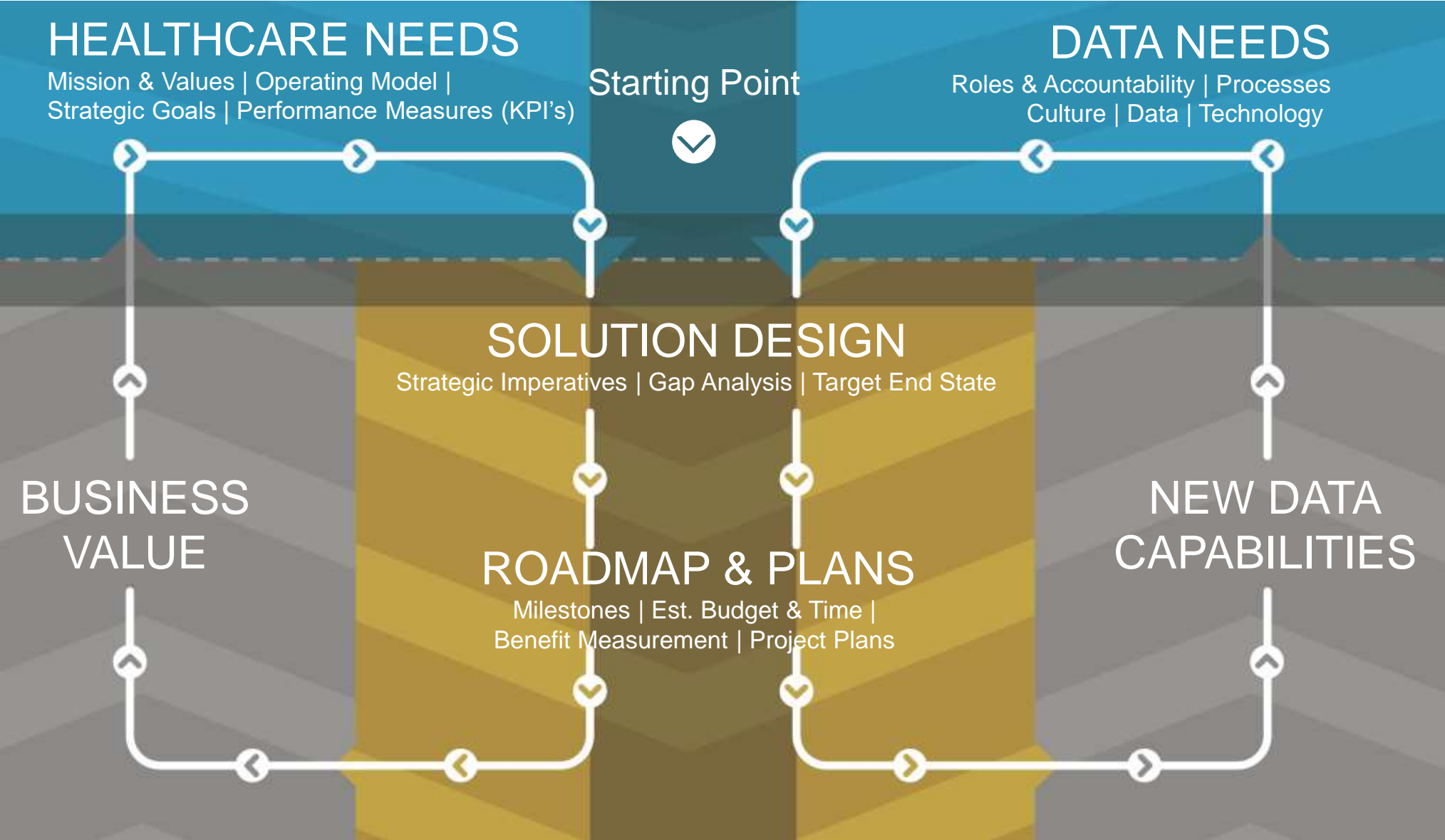
Happens when there is a lack of trust in the data. Result: death by a 1000 cuts and lose control of the data.



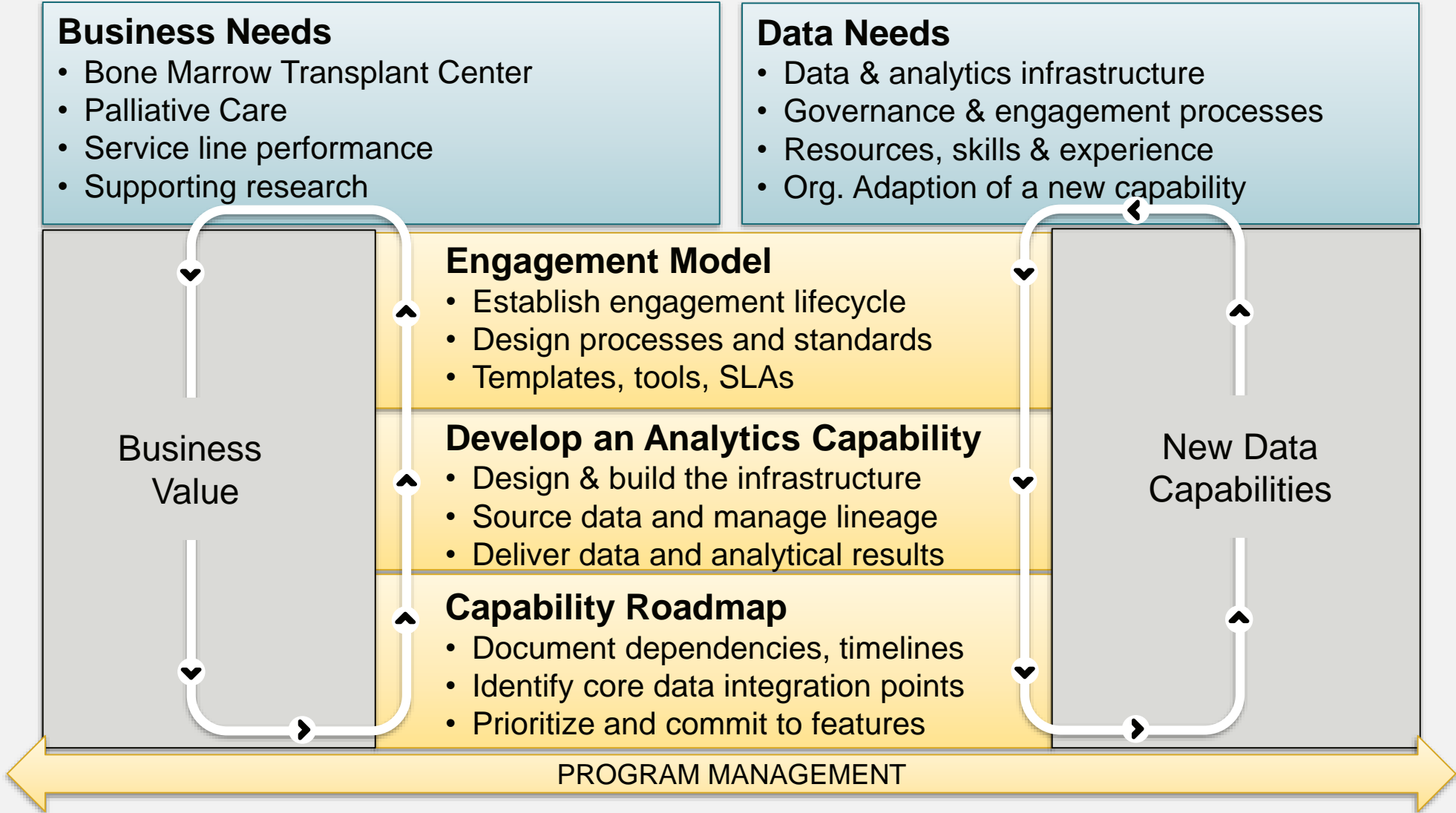
### No data ownership or strategy

Data efforts must be coordinated. Data-driven agencies require senior leadership, thinking & planning

# Data Strategy Framework



# Massey's Data Strategy for Analytics



# Example Case: Palliative Care integrated with cancer care

- ❖ 49 yo female diagnosed with stage IV NSCLC (brain mets) develops severe nausea/vomiting & vertigo 4 months into treatment.
- ❖ Aggressive management of symptoms in supportive care clinic allowed her to improve & continue with cancer treatment while avoiding admission.
- ❖ Followed concurrently in supportive care clinic & MedOnc clinic.
- ❖ Currently she is alive on home hospice, 20 months after diagnosis and 16 months after first PC visit.

# Remarkable range of positive outcomes achieved through Palliative Care

Rabow Arch Intern Med 2004, JPSM 2003

PC in primary care clinic for late-stage COPD, CHF, Ca patients

Improved: dyspnea, anxiety, spiritual well-being, sleep quality, satisfaction with care

Temel NEJM 2010 / JPM 2016

Outpatient PC for late-stage NSCLC patients

Improved: survival, quality of life, depressive symptoms

Brumley JAGS 2007 (see also Cassel Kerr Johnson Hoefer JAGS 2016)

Home-based PC for home-bound patients with Ca, CHF, COPD

Improved: satisfaction, at-home deaths, fewer ED visits and hospitalizations

Lukas JPM 2013

Home-based PC for patients with advanced complex illness

Improved: Fewer hospitalizations, lower costs, fewer 30-day readmissions

Bakitas JAMA 2009 (ENABLE II)

Psychoeducational sessions for patients with advanced cancer

Improved: quality of life, depressive symptoms

Bakitas JCO 2015 (ENABLE III)

Tele-health psycho-educational sessions for patients with advanced cancer

Improved: Survival

Rabow et al, Moving Upstream: A review of the Evidence of the Impact of Outpatient Palliative Care. J Palliat Med. 2013; 16(12):1540-9

# Recognized Financial Impact of Palliative Care

## THE WALL STREET JOURNAL.

© 2004 Dow Jones & Company. All Rights Reserved

WEDNESDAY, MARCH 10, 2004 - VOL. CCXLIII NO. 48 - \*\* \$1.00

### Final Days

## Unlikely Way to Cut Hospital Costs: Comfort the Dying

### Care, Not Cure

Average cost for terminally ill patients in palliative and nonpalliative programs during their final five days at one hospital

	NON-PCU	PCU
Drugs and chemotherapy	\$2,267	\$511
Lab	1,134	56
Diagnostic imaging	615	29
Medical supplies	1,821	731
Room & nursing	4,330	3,708
Other	2,152	278
<b>Total</b>	<b>\$12,319</b>	<b>\$5,313</b>

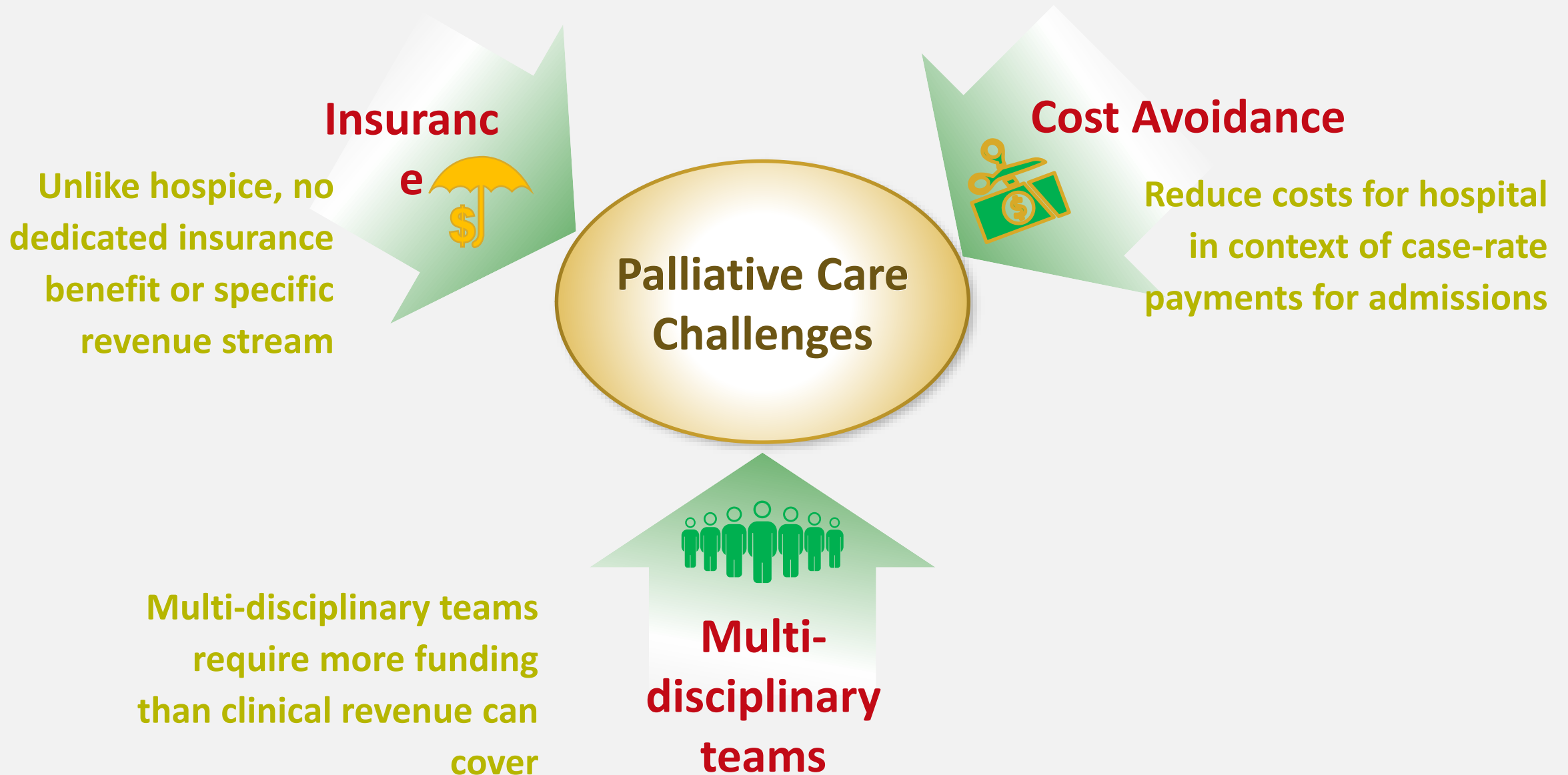
Note: PCU stands for palliative care unit. Each figure represents average cost of last five days for a cancer patient aged 65-plus, prior to in-hospital death. Figures are for 2001 and 2002.

Source: Virginia Commonwealth University medical center

Cost-avoidance in drugs (-77%), labs (-95%), imaging (-95%), supplies (-60%).

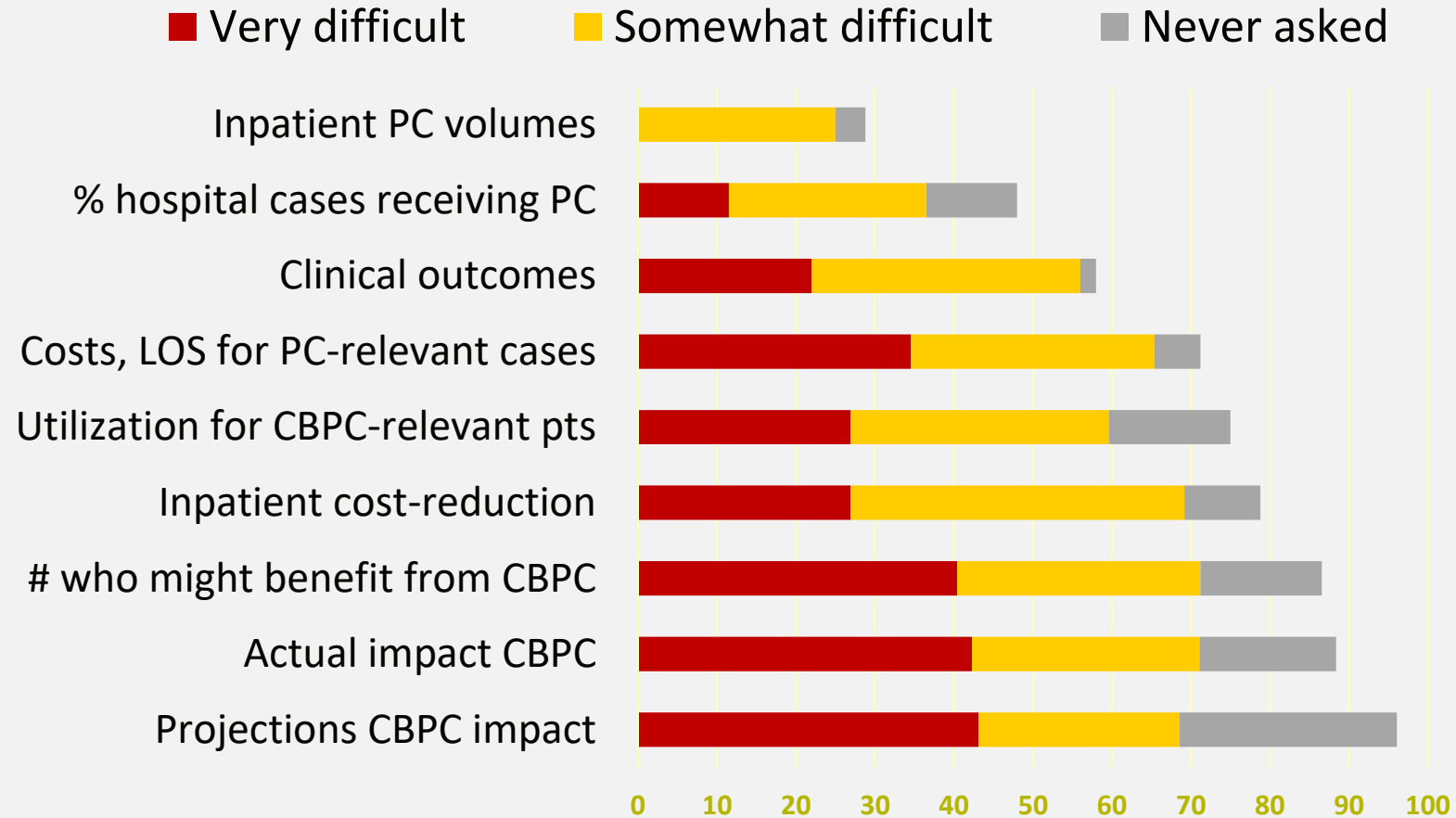


# So what's the problem?





# PC programs struggling to prove their outcomes



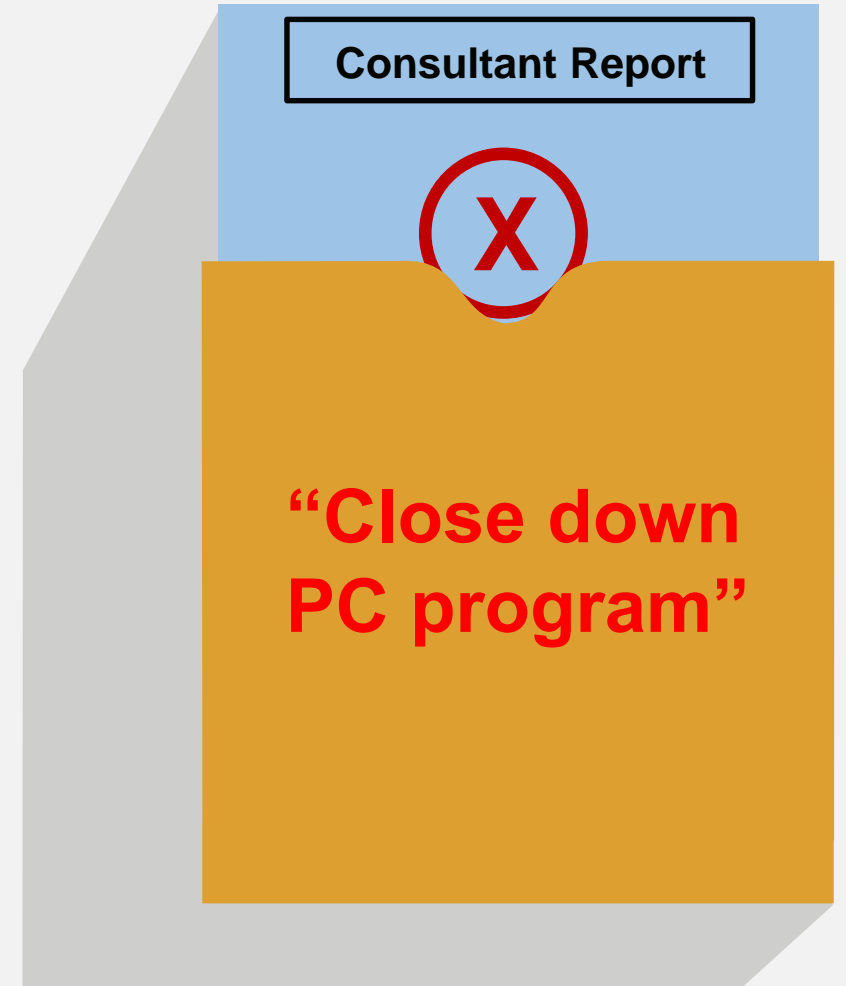
Cassel, Kerr, Broome. "Data challenges for planning and evaluating palliative care programs". J Palliat Med. 2016 Jan;19(1):4-5.

# Overcoming the Challenges at Massey

- ❖ Start by understanding what questions need to be answered
- ❖ Take a crawl, walk, run approach
- ❖ Think and plan strategically about data solutions
- ❖ Understand the current environment – what to leverage and gaps to close
- ❖ Implement foundational data management capabilities for scalability and repeatability
- ❖ Make solutions easy to use – integrate into workflows

# Massey's Palliative Care program was in trouble

- ❖ VCU Massey opened one of first Palliative Care Units in the nation in May 2000.
- ❖ Consultants recommended closing it in 2002 because PCU cases cost a lot more than reimbursement.
- ❖ Detailed financial analyses of PCU patients, compared to other EOL admissions, convinced consultants that the unit produced significant cost-reduction
- ❖ Unit stayed open; financial analyses became core part of training curriculum for > 1,000 other programs in the country



# Palliative care is unfolding in three steps

## Inpatient Programs

- ❖ Late 1990's forward
- ❖ Passive
- ❖ Reactive
- ❖ Waiting for patients to be admitted & referred

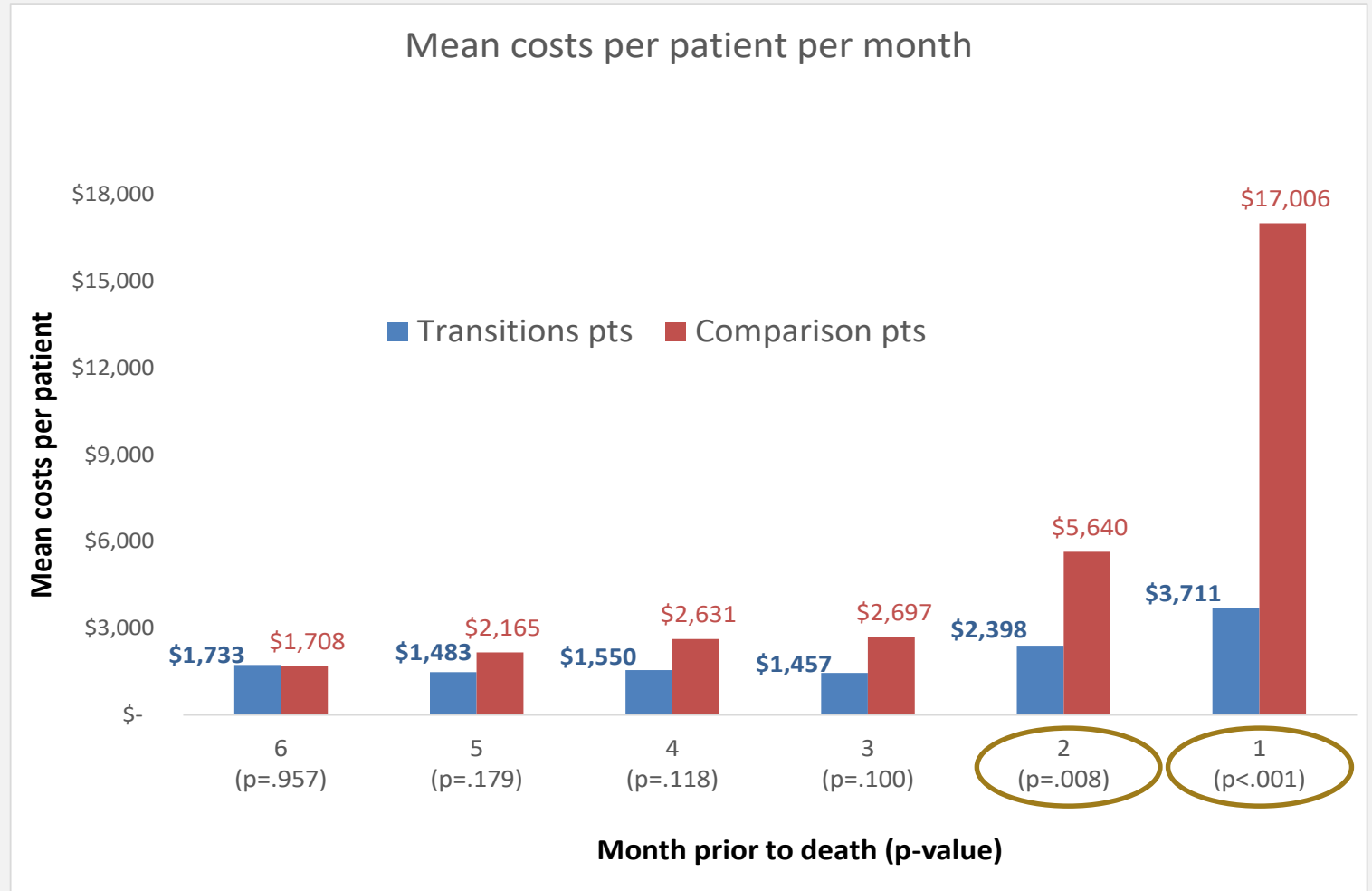
Phase	Decision to be made	Data Needed	Data Management	Analytic capability	Subject matter expertise
1 – inpatient	Yes/No, \$	Inpatient fiscal	Ad hoc	✓	✓
2 – outpatient	Yes / No, How, How much, \$	All settings, death date	Tactical	✓✓	✓✓
3 – precision	When to proactively trigger PC for Mrs. Smith	Clinical, utilization, robust models	Strategic	✓✓✓	✓✓✓

# Early Success (w/ Inpatient) by Asking the Right Questions

- ❖ How do PC-relevant cases compare to others in terms of costs and PC use?
- ❖ What are the daily costs before and after PC encounter?
- ❖ What are the costs, quality metrics, and involvement of PC in final months of life?
- ❖ How do we get and manage the data necessary for answering these questions?

# Mean healthcare costs per patient per month

*178 Transitions pts enrolled for at least six months prior to death and 515 matched comparison patients. Does not include hospice or Transitions program costs.*



# Outpatient Programs

- ❖ 2007 forward
- ❖ Earlier in disease course
- ❖ Meeting patients in ambulatory settings and home

Phase	Decision to be made	Data Needed	Data Management	Analytic capability	Subject matter expertise
1 – inpatient	Yes/No, \$	Inpatient fiscal	Ad hoc	✓	✓
2 – outpatient	Yes / No, How, How much, \$	All settings, death date	Tactical	✓✓	✓✓
3 – precision	When to proactively trigger PC for Mrs. Smith	Clinical, utilization, robust models	Strategic	✓✓✓	✓✓✓



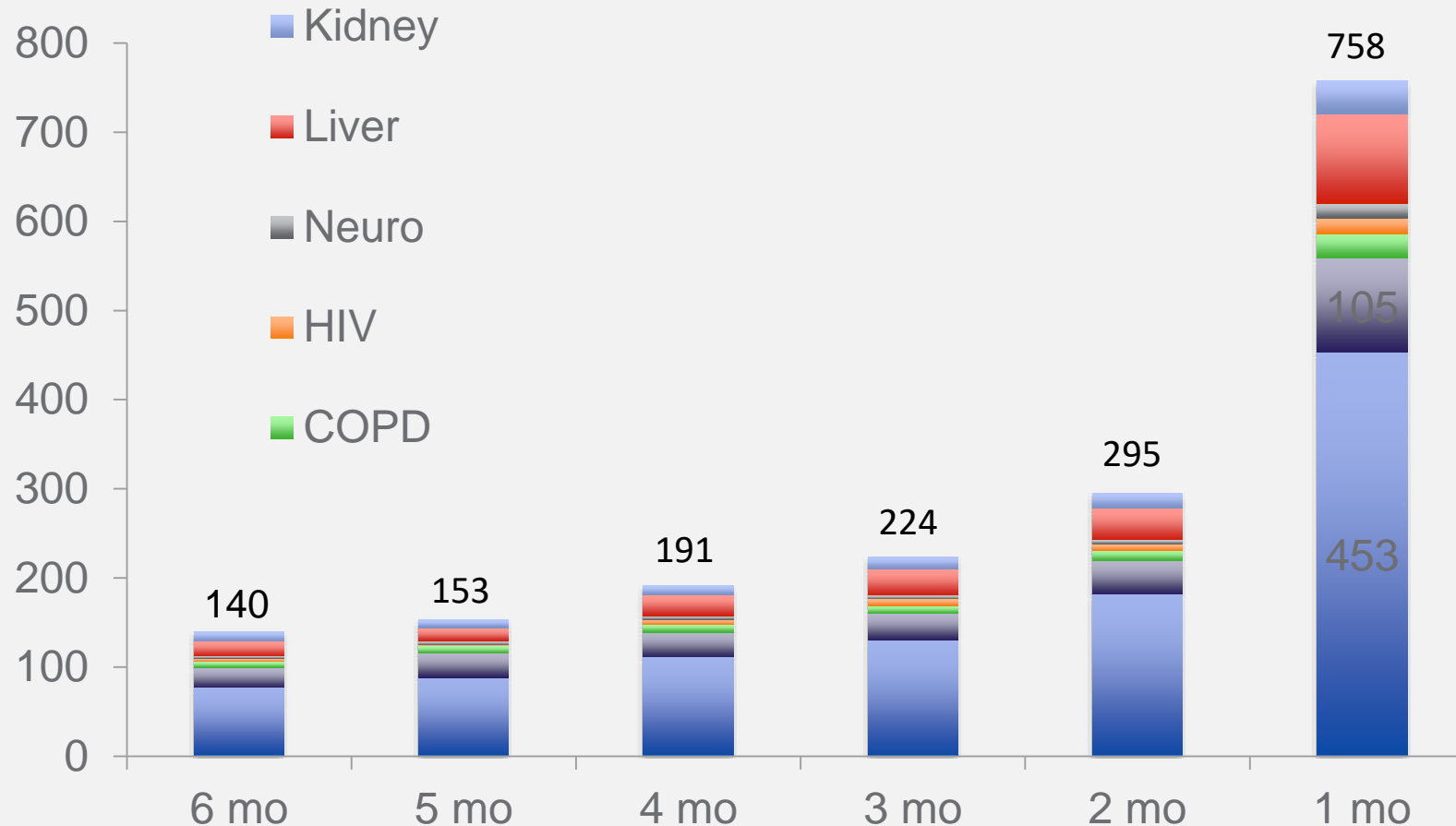
# Business Data Needs Driving Outpatient Programs

- ❖ What are utilization, costs, revenue of PC-relevant patients in months prior to death?
- ❖ Which patients are receiving palliative care, and when?
- ❖ How many patients could be met earlier by PC proactively?
- ❖ What would it take to provide PC for them?
- ❖ Data challenges: Need to know date of death, and to use population health / longitudinal analytic approach

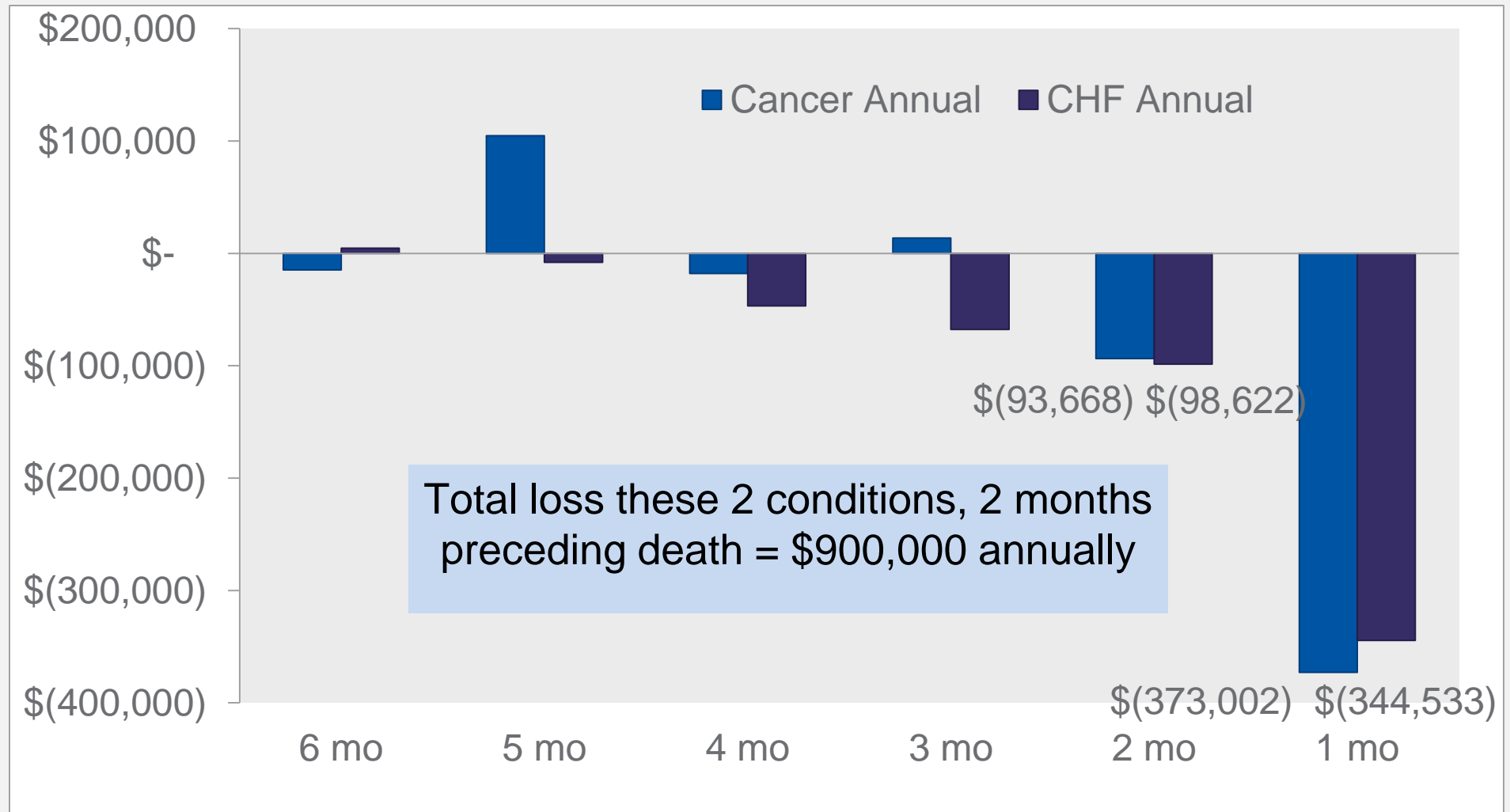
# Frequency of hospitalizations

## Admissions spike in final month of life

Analysis of decedent admission patterns, VCU, FY10-12



# Annual Medicare inpatient net margin by month



Analysis of EOL utilization patterns, VCU, FY10-12. See Cassel JB, Kerr KM, et al. The Business Case for Palliative Care: Translating Research Into Program Development in the U.S. Journal of Pain and Symptom Management (2015) (In press).

# Precision-based Palliative Care

- ❖ 2015 forward
- ❖ Proactive
- ❖ Available broadly
- ❖ Triggered
- ❖ Prompted

Phase	Decision to be made	Data Needed	Data Management	Analytic capability	Subject matter expertise
1 – inpatient	Yes/No, \$	Inpatient fiscal	Ad hoc	✓	✓
2 – outpatient	Yes / No, How, How much, \$	All settings, death date	Tactical	✓ ✓	✓ ✓
3 – precision	When to proactively trigger PC for Mrs. Smith	Clinical, utilization, robust models	Strategic	✓ ✓ ✓	✓ ✓ ✓

# Business Data Needs Driving Precision Palliative Care

How do we identify the next patient who will need PC, before it's "too little, too late"?

- ❖ Redesign from cancer data mart to enterprise data warehouse
- ❖ Build out foundational data management capabilities
- ❖ Easy integration of clinical (biometric, biomarker, laboratory, orders, prescriptions) and utilization / fiscal data
- ❖ Incorporate external data if possible via health information exchanges or payer data
- ❖ Robust statistical modeling that is setting and population-specific

# Success metrics from PC case study

- ❖ Clinical, financial, and academic outcomes justify VCU program and its expansion over the years
- ❖ VCU program a training center for specialists and >150 teams
- ❖ Palliative care financial models central to expansion of PC field to over two-thirds of US hospitals
- ❖ VCU palliative care papers published since 2003 cited by over 1,400 others

# Google invests in Frist-founded Aspire Health

Oct 3, 2016, 10:03am CDT

**Eleanor Kennedy**  
Staff Reporter  
Nashville  
Business Journal



Aspire Health, the palliative care company co-founded by former Senate Majority Leader Bill Frist, has closed a \$32 million funding round that was led by another big name: GV (formerly Google Ventures), the venture capital arm of tech giant Alphabet Inc. (Google's parent company)



Bill Frist is chairman

## RELATED CONTENT

Aspire Health makes move to downtown skyscraper

Aspire Health plots rapid growth

Bill Frist aims to build health care giant; Zycron

“Their investment will allow Aspire to continue improving the way we care for our patients, including **enriching our use of innovative data analytics and technology to enhance the support our clinicians can provide patients at home.**” – CEO Brad Smith



Nashville Business Journal 2015



# Palliative Care - much more could be done

- ❖ Reduces pain, distress; improves quality of life; maintains or enhances survival
- ❖ Estimated 4.03 million patients who might benefit from inpatient PC services are not being served
- ❖ These 4.03 million patients could expect savings of \$2,131 per admission, at \$8.59 billion annually.
- ❖ Estimated 5.8 million individuals who might benefit from community-based PC are not being served
- ❖ These 5.8 million individuals could expect an average reduction in health care costs (\$18,140 per) is estimated at \$106.6 billion, annually.

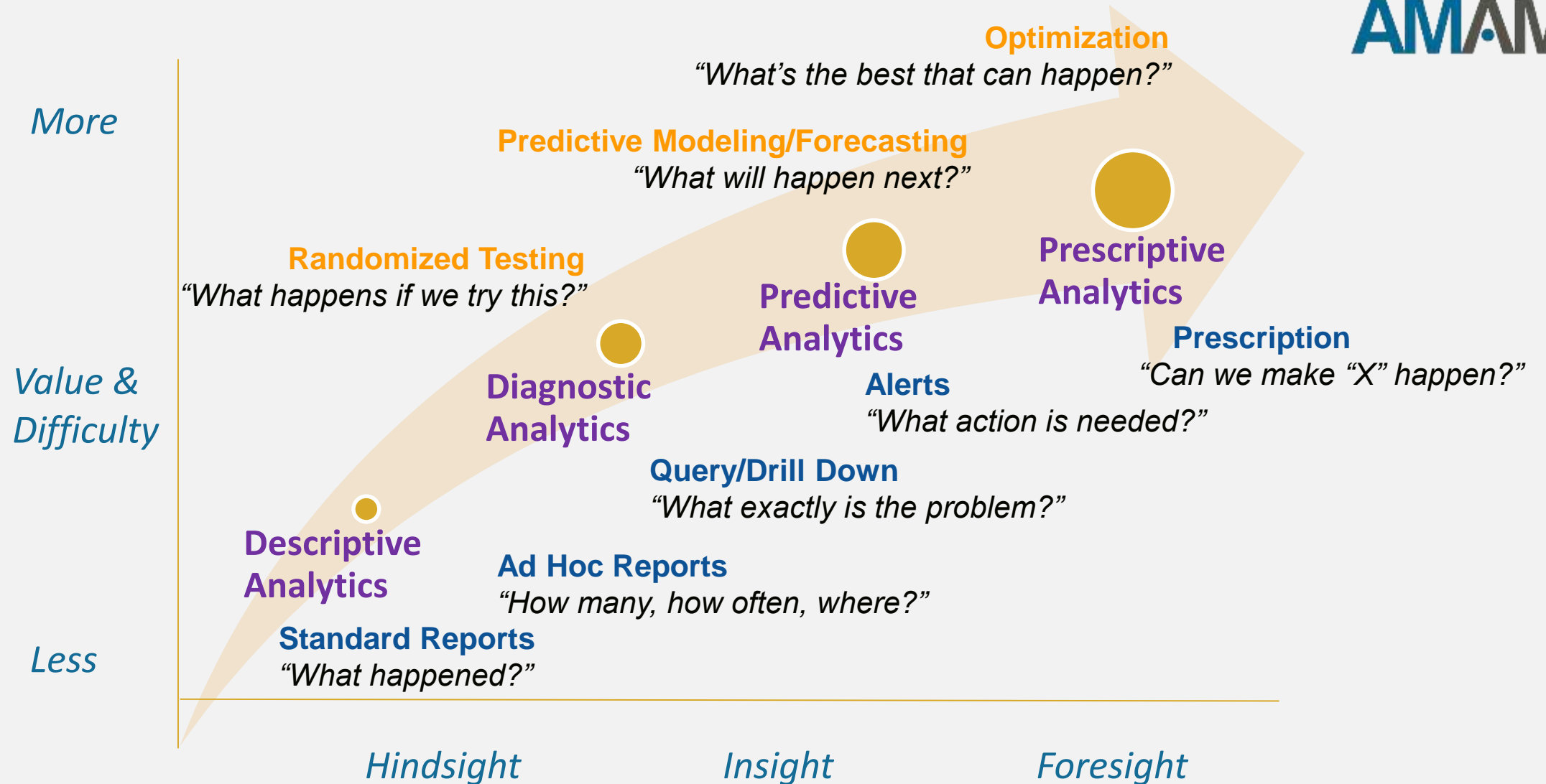
## Sources:

National Palliative Care Registry™ Annual Survey Summary, 2014; VHA-UHC Alliance Research Institute

Morrison RS, Penrod JD, Cassel JB, Caust-Ellenbogen M, Litke A, Spragens L, Meier DE; Palliative Care Leadership Centers' Outcomes Group. Cost savings associated with US hospital palliative care consultation programs. Arch Intern Med. 2008 Sep 8;168(16):1783-90. PMID: 18779466.

Brumley RD, Enguidanos S, Jamison P, Seitz R, Morgenstern N, Saito S, et al. Increased satisfaction with care and lower costs: results of a randomized trial of in-home palliative care. J Am Geriatr Soc 2007;55:993-1000. PMID: 17608870

# Analytics Value Curve



## Model Overview

- ❖ Capability oriented approach (not technology oriented)
- ❖ Healthcare industry specific, internationally applicable
- ❖ Leverages an 8 stage maturity model, like EMR Adoption
  - ❖ Prescriptive
  - ❖ Each stage has specific compliance goals
  - ❖ Bullet point description of compliance requirements
  - ❖ Clearly defined requirements
  - ❖ Standard terminology
- ❖ Simple assessment outlines a clear path to analytics maturity

## 1. Data content growth

- Basic data to advanced data
- Aligned with clinical, financial, and operational analytics activities

## 2. Analytics competency growth

- Start simple and work to master specific competencies
- Enhance performance tracking / clinical decision support
- Appropriate analytics maturation for individual parts of the organization


## 3. Infrastructure growth

- Flexible approaches to accommodate a wide variety of situations
- Vendor neutral
- Timely data, centrally accessible

## 4. Data Governance growth

- Quality data and resource management
- Executive suite and strategic alignment

# AMAM Stages

STAGE	 Adoption Model for Analytics Maturity Cumulative Capabilities	
7	Personalized medicine & prescriptive analytics	} Mass customization of care
6	Clinical risk intervention & predictive analytics	}
5	Enhancing quality of care, population health, and understanding the economics of care	} Advance clinical, operational, and financial analytics
4	Measuring & managing evidence based care, care variability, and waste reduction	}
3	Efficient, consistent internal and external report production and agility	}
2	Core data warehouse workout: centralized database with an analytics competency center	} Build a strong foundation
1	Foundation building: data aggregation and initial data governance	}
0	Fragmented point solutions	

- Stage 7** • 7x24 biometrics, behavioral health outcomes data
- Stage 6** • Social determinants of health, patient reported outcomes data
- Stage 5** • Bedside devices, monitoring, home care, and pharmacy data
- Stage 4** • Data marts, expanded payment data, holistic view of patient
- Stage 3** • Wide reaching clinical, financial, operational, and external content
- Stage 2** • Insurance claims, historical data
- Stage 1** • EHR, revenue cycle, GL, supply chain, patient experience data

## Example

### Example Baseline Achievement

- Achieved Stage 2 compliance
- 32% model compliance
- Has made progress through Stage 6

Stage Achievement	2
Overall Compliance	32%
Stage 7	0%
Stage 6	4%
Stage 5	15%
Stage 4	28%
Stage 3	25%
Stage 2	75%
Stage 1	77%



## For each of the 4 AMAM Focus Areas

- Stage achievement
- Overall compliance
- Stage progress

Example

Focus Area Details	Data Content	Infrastructure	Data Governance	Analytics Competency
	Focus Area Stage Achievement	2	5	5
Focus Area Compliance	48%	79%	88%	39%
Stage 7	0%	25%	25%	0%
Stage 6	20%	25%	50%	21%
Stage 5	19%	75%	75%	22%
Stage 4	80%	88%	94%	94%
Stage 3	46%	75%	88%	50%
Stage 2	100%	92%	100%	83%
Stage 1	71%	94%	100%	75%

## Infrastructure Achievement

Infrastructure Achievement	5
Focus Area Compliance	79%
Stage 7	25%
Stage 6	25%
Stage 5	75%
Stage 4	86%
Stage 3	75%
Stage 2	91%
Stage 1	94%

## Example

- Updates from system of record in < 24 hours
- Updates from system of record in < 1 week
- Updates from system of record in < 2 weeks
- Widely accessible analytics driven dashboards track KPI's
- Broadly accessed reporting solution, database schema in place
- Centralized formal repository, enterprise-wide ad-hoc & reporting
- Historical data, metadata, centralized operational data store

## Opportunities

Opportunities identified by **green** highlighting are those that represent the next logical step on the analytics journey. Those highlighted in **red** represent opportunities to strengthen the analytics foundation.

Compliance Statement	Compliance Level
Primary data sources are updated less than 24 hours from when there are system of record change	Minimally Enabled
Primary data sources are updated less than 1 week from when there are system of record changes	Minimally Enabled
Primary data sources are updated less than 2 weeks from when there are system of record change	Mostly Enabled
Widely accessible analytics driven dashboards are regularly monitored in order to track high volume and high risk clinical activities, patient cohorts, and critical organizational processes	Mostly Enabled
The data warehouse has a wide reaching database schema inclusive of clinical, financial, operational data	Mostly Enabled
There is a data warehouse driven reporting solution that allows organization staff from the front lines to the executive suite have a responsive electronic and dynamic method for accessing current and historical key performance indicators (KPIs)	Mostly Enabled
The data warehouse supports an enterprise wide reporting solution(s)	Mostly Enabled
There is a searchable metadata repository for all collected data available and accessible across the enterprise	Mostly Enabled

# BACKUP SLIDES

- Stage 7** • Updates from system of record in < 24 hours
- Stage 6** • Updates from system of record in < 1 week
- Stage 5** • Updates from system of record in < 2 weeks
- Stage 4** • Widely accessible analytics driven dashboards track KPI's
- Stage 3** • Broadly accessed reporting solution, database schema in place
- Stage 2** • Centralized formal repository, enterprise-wide ad-hoc & reporting
- Stage 1** • Historical data, metadata, centralized operational data store

- Stage 7** • Tightly aligned with org. strategic, financial, and clinical leadership
- Stage 6** • Accountable for managing the economics of care (cost & quality)
- Stage 5** • Supporting org. wide quality-based performance measurements
- Stage 4** • Widely accessible analytics driven dashboards track KPI's
- Stage 3** • Standard terminologies, external data release policy & process
- Stage 2** • Patient registry evolution, Master Data Management, data literacy
- Stage 1** • Analytics strategy with executive support, regular meetings

- Stage 7** • Prescriptive analytics, mass customization of care, wellness mngmt.
- Stage 6** • Analytic motive addresses high volume diagnosis-based cohorts
- Stage 5** • Pop health, sig. enabled at point of care, precision registries
- Stage 4** • Focused on best practices, minimizing waste, & reducing variability
- Stage 3** • Consistent, efficient rpt. production supporting ops. & mngmt.
- Stage 2** • Analytics competency center, registry portfolio buildout
- Stage 1** • Education, skills of analytics resources are profiled and inventoried