



Carolinus HealthCare System

# Dickson Advanced Analytics Group

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Director, Clinical Analytics

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# WHO WE ARE



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# WHO WE ARE

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**Carolinas HealthCare System** has a unique story to share. Operating as a fully integrated system and **connecting and transforming** care delivery throughout the Carolinas, our overarching goal is to provide seamless access to coordinated, high quality healthcare – and provide that care **closer to where our patients live.**

**With 41 hospitals and 900+ care locations,** the depth and breadth of services results in a full continuum of integrated care including:

- Prevention and general wellness
- Primary care at more than 180 locations
- Specialty care via several nationally recognized service lines
- Critical care with one of the largest virtual (e-ICU) programs in the nation
- Continuing care including home health, skilled nursing, hospice, palliative care centers, inpatient/outpatient rehab, and long-term acute care hospital

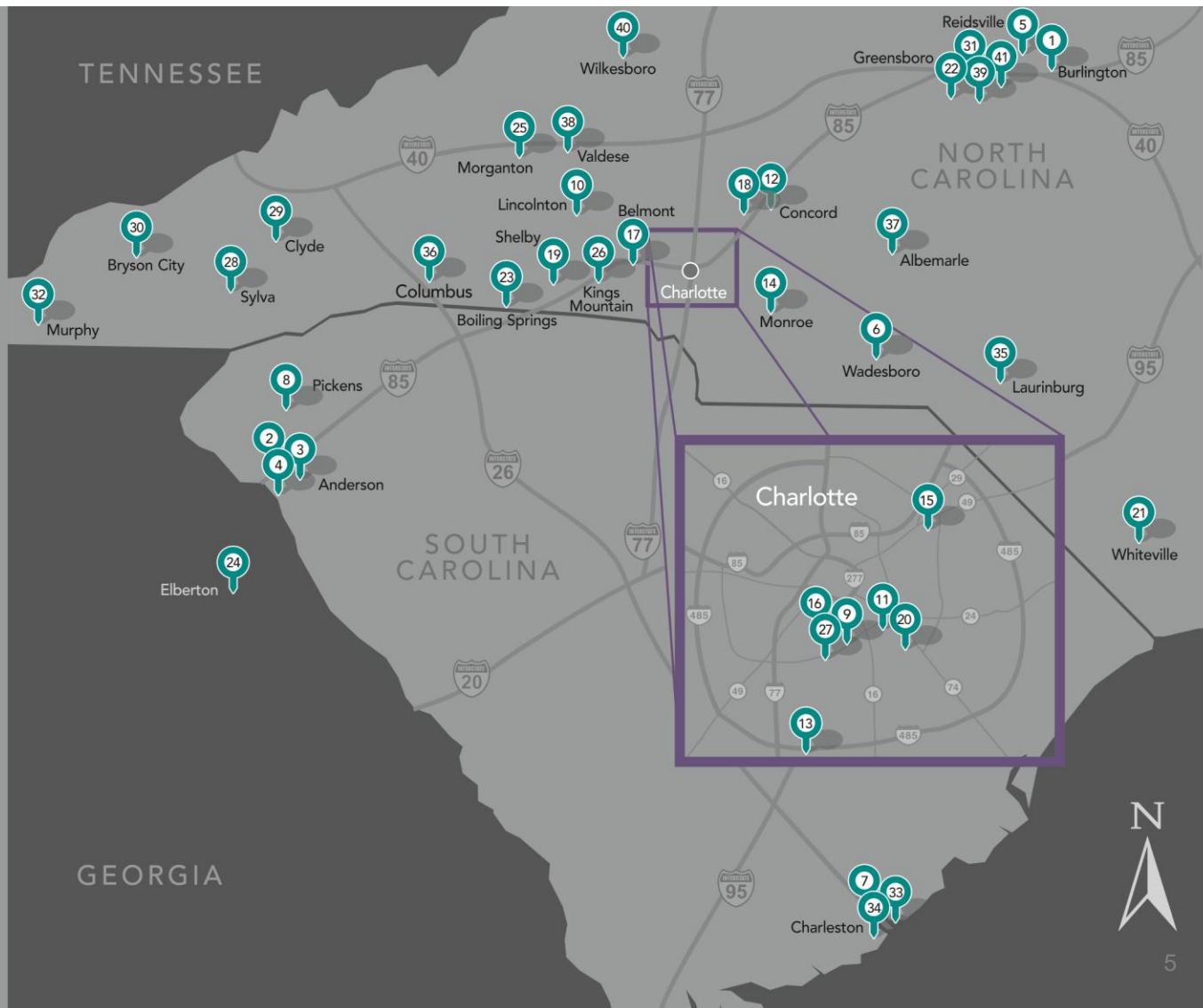
# AT-A-GLANCE

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- **41 hospitals** and **900+ care locations** in North Carolina, South Carolina and Georgia
- More than **7,800** licensed beds
- **10.5 million** patient encounters in 2012
- **3,000+** system-employed physicians, **14,000+** nurses and more than **60,000** employees
- **\$1.25 billion** in community benefit in 2012
- More than **\$8 billion** in annual revenue
- More than **50 disease-specific certifications** from The Joint Commission – one of the highest totals in the country among comparable systems
- The region's only Level I trauma center
- **One** of five academic medical centers in North Carolina
- **One** of the largest HIT and EMR systems in the country

# WHERE WE ARE

1. Alamance Regional Medical Center
2. AnMed Health Medical Center
3. AnMed Health Rehabilitation Hospital
4. AnMed Health Women's and Children's Hospital
5. Annie Penn Hospital
6. Anson Community Hospital
7. Bon Secours/St. Francis Hospital
8. Cannon Memorial Hospital
9. Carolinas Medical Center
10. Carolinas Medical Center-Lincoln
11. Carolinas Medical Center-Mercy
12. Carolinas Medical Center-NorthEast
13. Carolinas Medical Center-Pineville
14. Carolinas Medical Center-Union
15. Carolinas Medical Center-University
16. Carolinas Rehabilitation
17. Carolinas Rehabilitation-Mount Holly
18. Carolinas Rehabilitation-NorthEast
19. Cleveland Regional Medical Center
20. CMC-Randolph
21. Columbus Regional Healthcare System
22. Cone Health Behavioral Health Hospital
23. Crawley Memorial Hospital
24. Elbert Memorial Hospital
25. Grace Hospital
26. Kings Mountain Hospital
27. Levine Children's Hospital
28. MedWest-Harris
29. MedWest-Haywood
30. MedWest-Swain
31. Moses H. Cone Memorial Hospital
32. Murphy Medical Center
33. Roper Hospital
34. Roper St. Francis-Mount Pleasant Hospital
35. Scotland Memorial Hospital
36. St. Luke's Hospital
37. Stanly Regional Medical Center
38. Valdese Hospital
39. Wesley Long Hospital
40. Wilkes Regional Medical Center
41. Women's Hospital





# DATA & ANALYTICS DRIVEN



# DATA & ANALYTICS DRIVEN

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- **A centralized advanced analytics capability with more than 100 team members**
  - Predicts health needs
  - Evaluates and elevates patient outcomes
  - Drives transformative solutions to promote the health of our communities
- **Integrated electronic data warehouse with daily updates supports the platform for consistent business analysis throughout the enterprise**
  - Access to more than a petabyte ( $10^{15}$  bytes) of data across the System to provide business intelligence
- **Predictive analytics to drive care management**
  - Predict in real time a patient's risk for readmission, and create personalized discharge care plans
- **Population health analytics**
  - Population segmentation
  - Employer partnerships
  - Shared savings

# DA<sup>2</sup> VISION

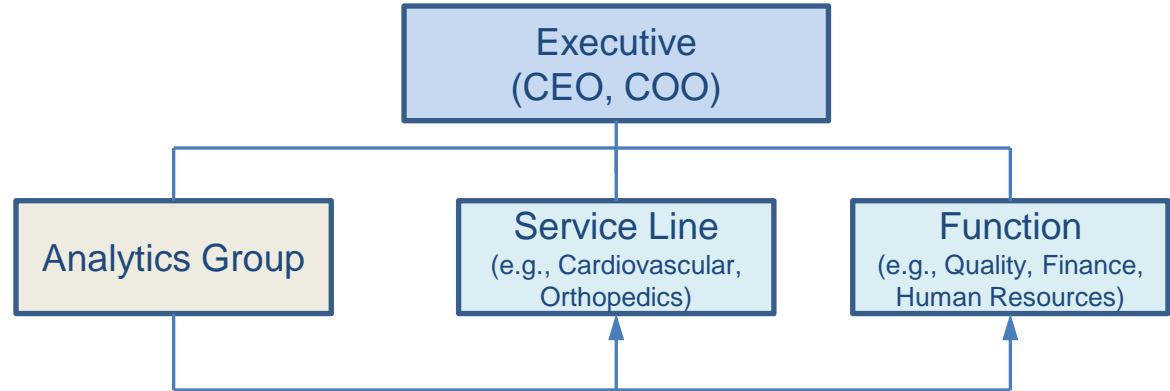
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Dickson Advanced Analytics Group (DA<sup>2</sup>) of Carolinas HealthCare System will be an innovative leader in advanced analytics and business intelligence that predicts health needs, continually elevates patient outcomes, and drives transformative solutions to promote the health of our communities.

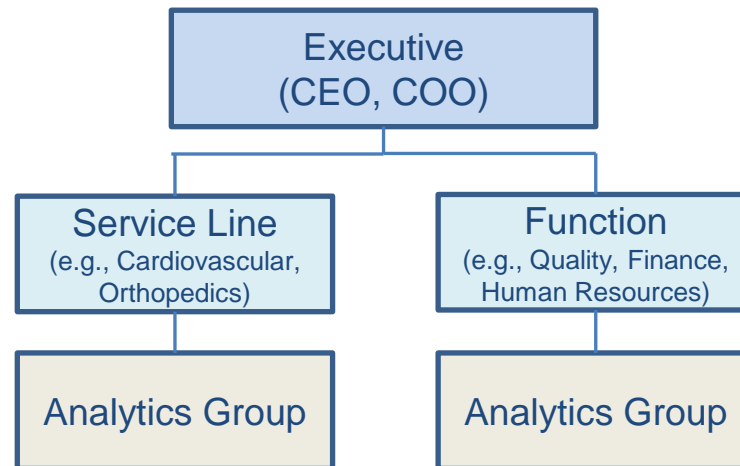


# ANALYTICS MODELS

## Centralized Analytics



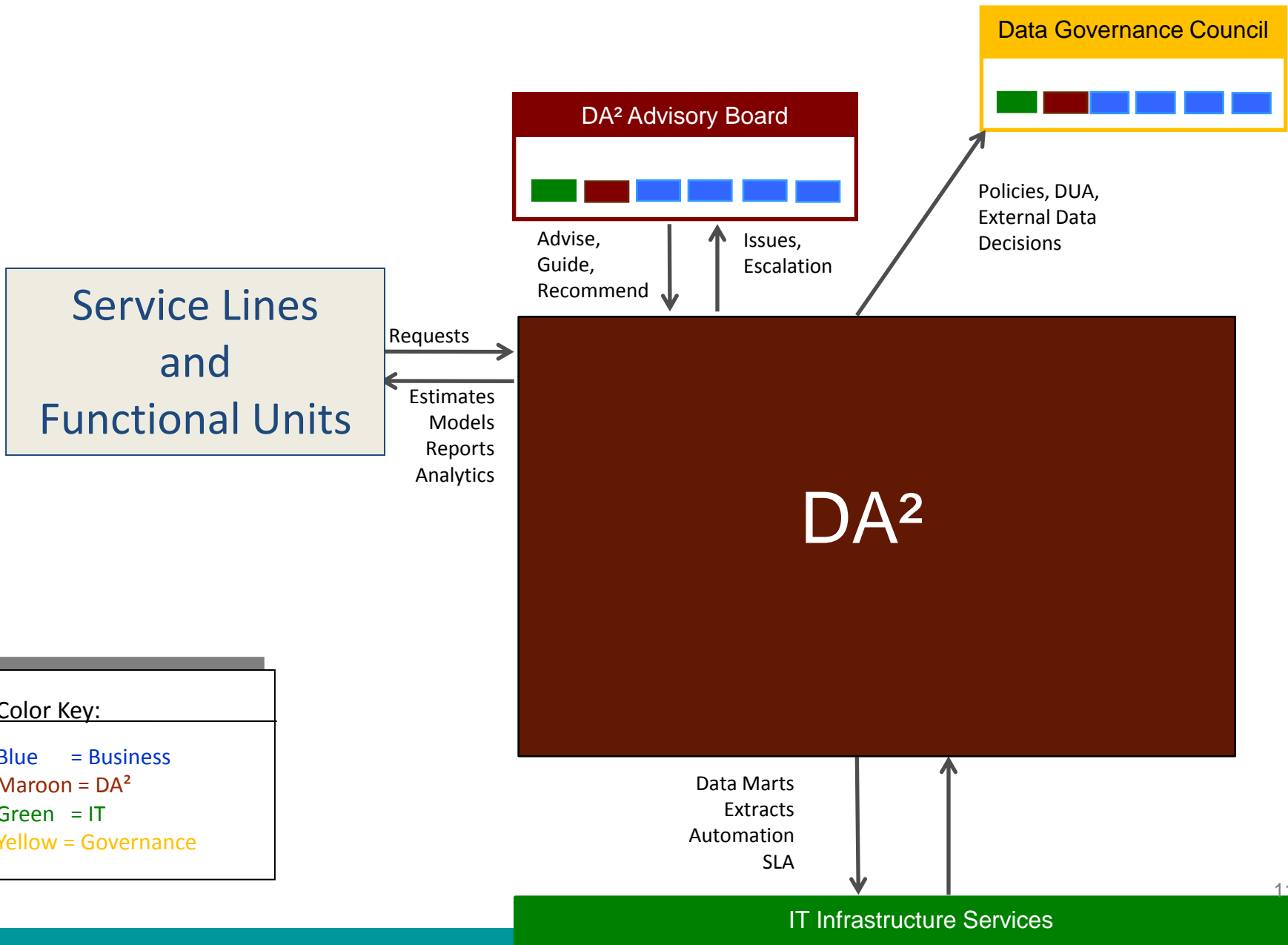
## Decentralized Analytics



# Why build a centralized capability?

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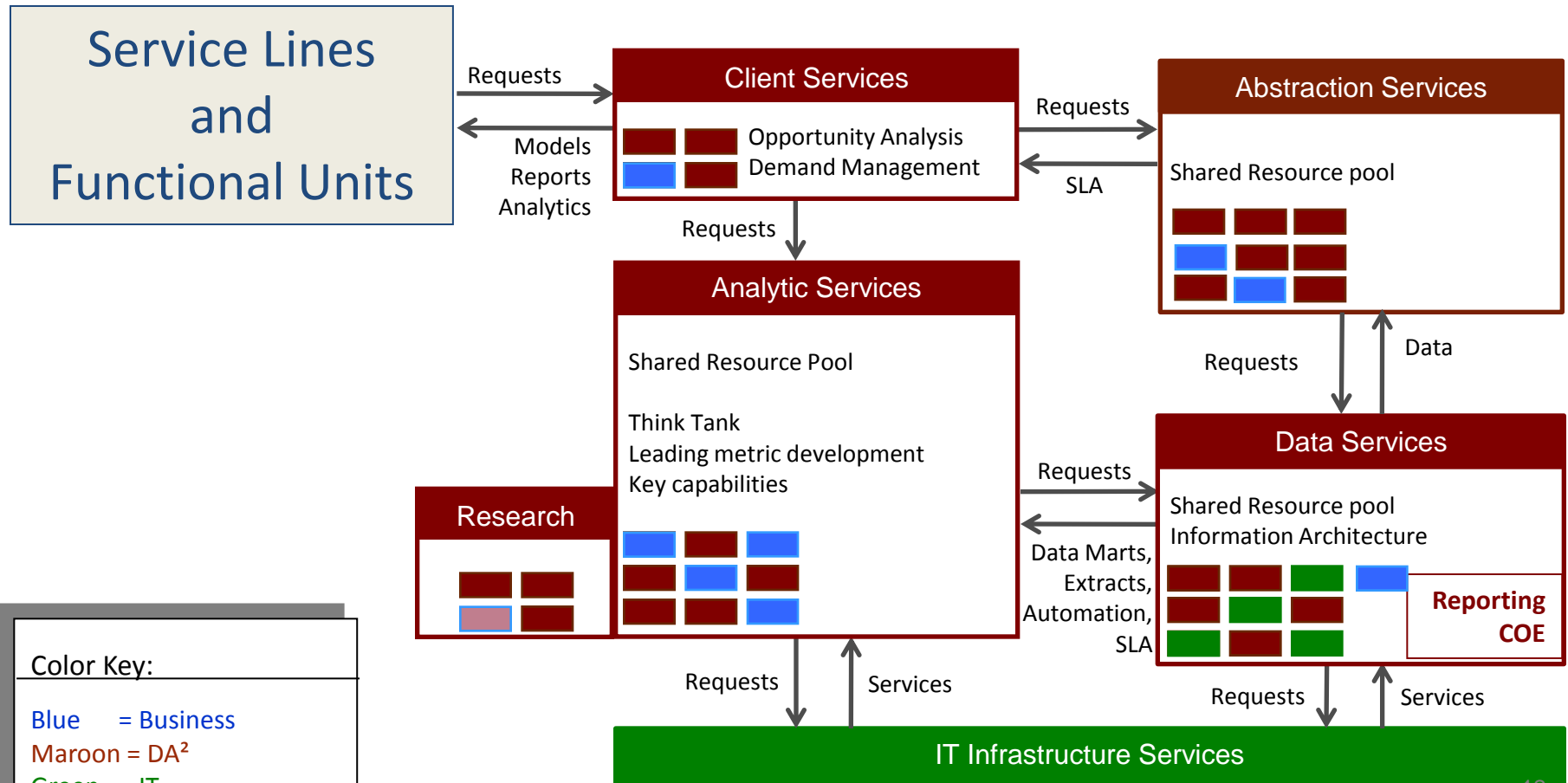
1. Avoid duplicity of work
2. Streamline requests to best suited skill sets
3. Better answers to current questions with more comprehensive data (outcomes, cost, satisfaction, operations)
4. Answers to currently unanswerable questions (across continuum of care)
5. Early preparation for explosion of usable data availability from our EMR
6. Advance a culture of analytics across the enterprise



**Color Key:**

- Blue = Business
- Maroon = DA²
- Green = IT
- Yellow = Governance

# ANALYTIC COMPETENCY





# CORE ANALYTICAL FUNCTIONS

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## Clinical Analytics

- Quality
- Patient Experience
- Public Reporting

## Financial and Operational Analytics

- Performance Metrics
- Marketing
- Business Planning
- Input Cost

## Healthcare Economics

- Forecasting
- Program Evaluation
- Cost Benefit Analysis

## Population Health Analytics

- Employer Partnerships
- Shared Savings/Payment Reform
- Care Management
- Cost of Care

# ANALYTICAL ROLES

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<b><u>Title</u></b>	<b><u>Function</u></b>
Clinical Research Nurse	Medical record abstraction
Informatics Developers	Data preparation & tool development
BI Analysts	Prepare dashboards and reports
Data Scientist	Methodological development for analysis and policy
Statistician	Predictive analytics and statistical methodology
Health Services Researcher	Research outcomes, cost, and payment drivers
Epidemiologist	Analyze population health
Applications Specialist	Technical development of clinical applications
Healthcare Economist	Forecasting, evaluation

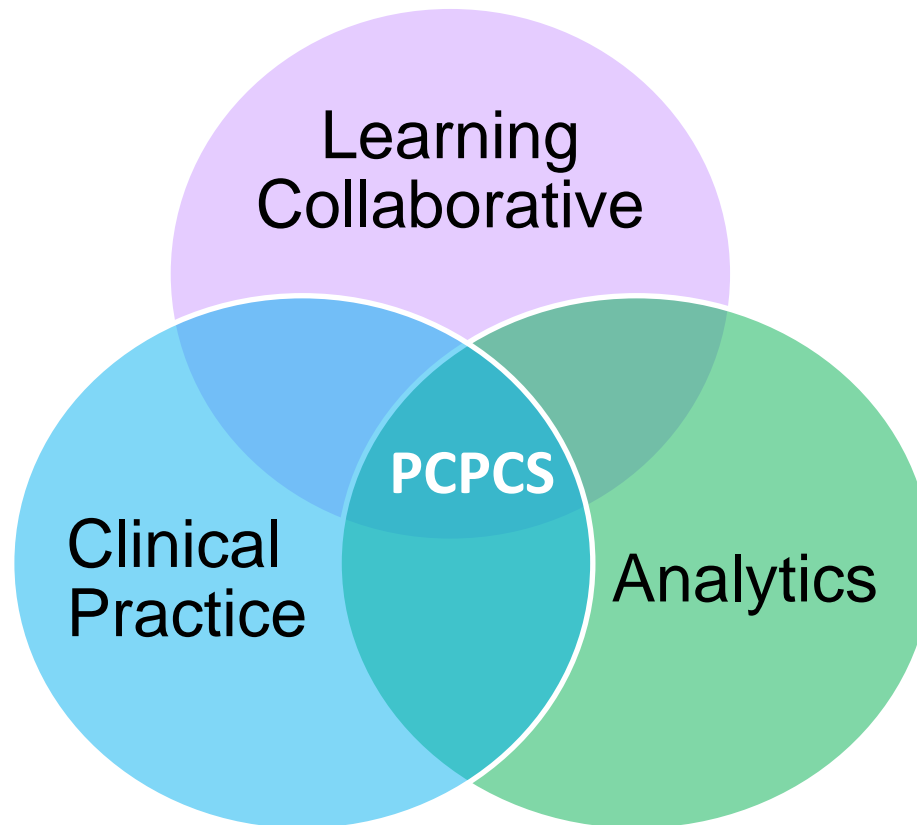
# OUR TOOLS

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# PATIENT-CENTERED POINT OF CARE SUPPORT

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# HELPING PATIENTS THROUGH ANALYTICS







What is a HEN?

# HOSPITAL ENGAGEMENT NETWORK

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Centers for Medicare & Medicaid Services Innovation Center (CMMI) announced 'Partnership for Patients' April 2011

Provides funding to create Hospital Engagement Networks (HENs) to achieve two core goals:

- 1 – reduce preventable hospital readmissions by 20%
- 2 – reduce inpatient harm by 40%

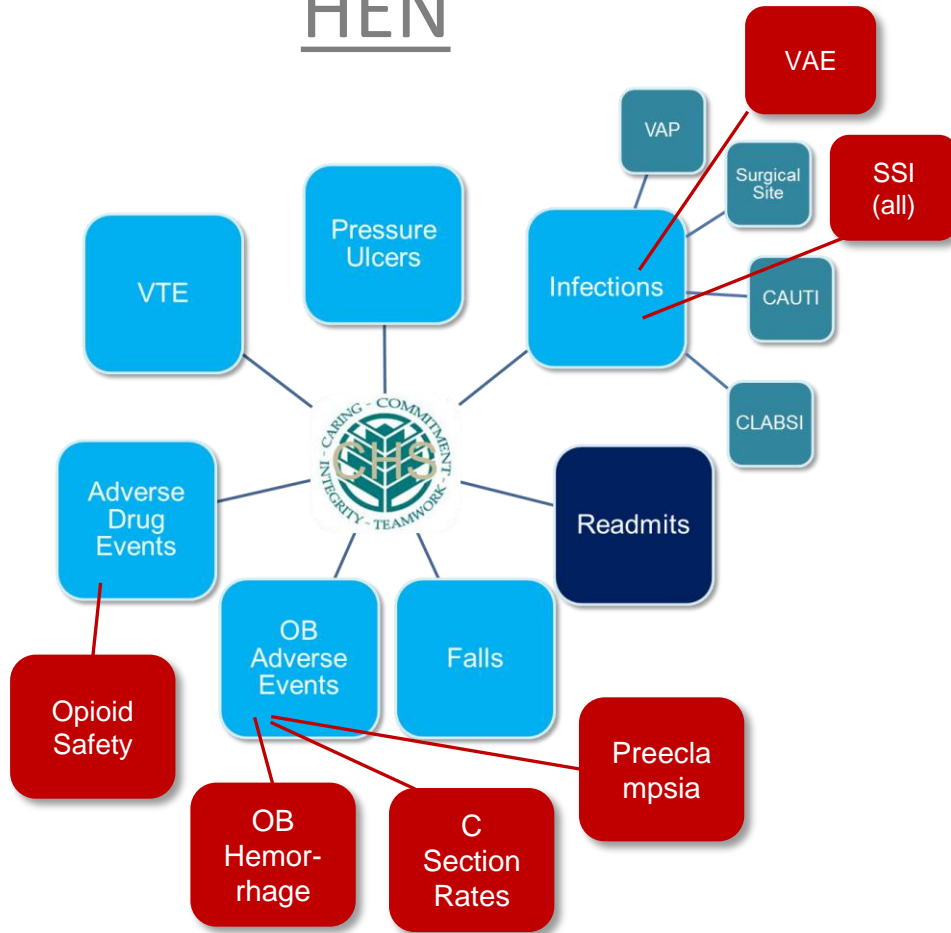
HEN performance period is 3 years (2012-2014)

27 HENs across the country, one of 5 healthcare systems awarded the contract

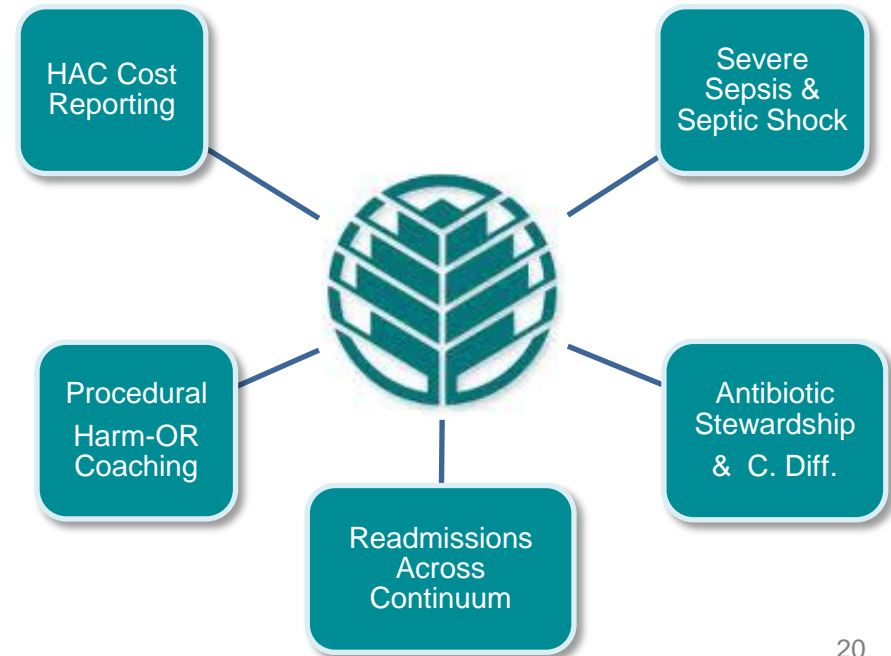
Leading Edge Advance Practice Topics (LEAPT) contract awarded to six high performing HENs to accomplish additional deep dives into new harm areas (Oct 2013 – Dec 2014)

# HOSPITAL ENGAGEMENT NETWORK

## HEN



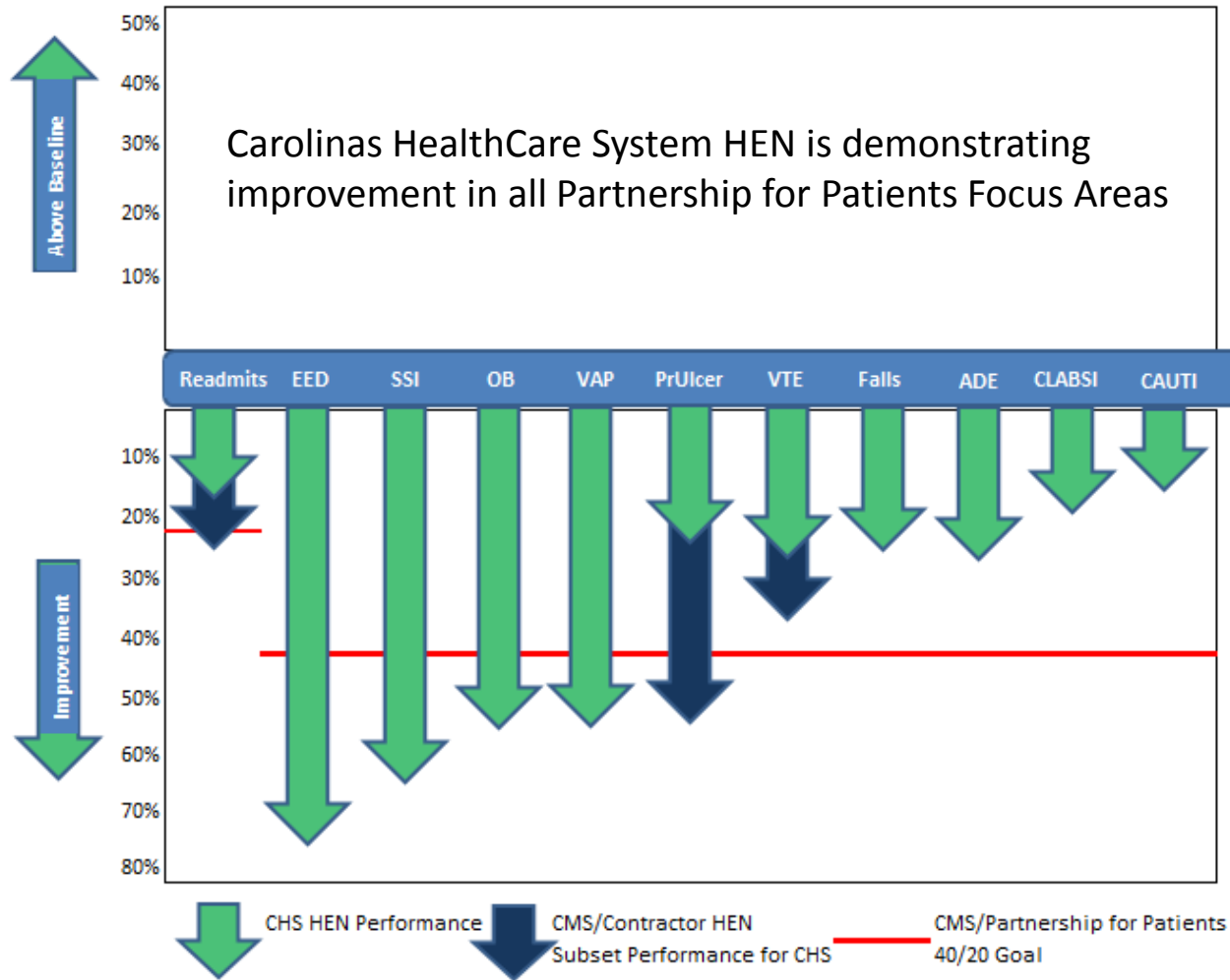
## LEAPT





# HOSPITAL ENGAGEMENT NETWORK

## Carolinas HealthCare System HEN Progress to 40/20 Goals



# HEN: KEYS TO SUCCESS

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Alignment of CHS Quality Goals with HEN focus areas

Engagement through combined “top-down” and “bottom-up” structure

Centralized data analytics and innovation (predicting readmission risk)

Data transparency and “healthy” competition

HEN Quality Coaches and Key Staff from Medication Safety and Infection Prevention to provide high level perspective and guidance

Leadership awareness, presence and engagement

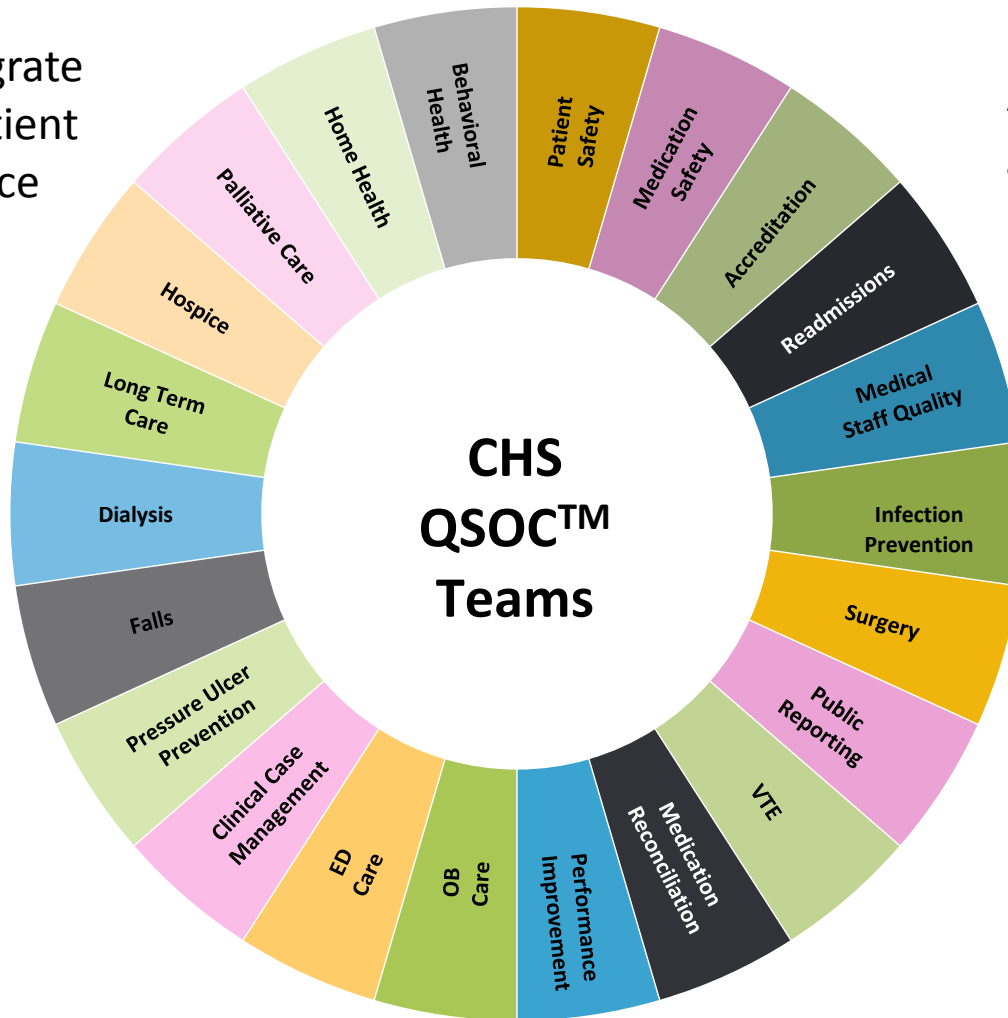
# QUALITY SAFETY OPERATIONS COUNCIL

Drive and integrate quality and patient safety excellence

Address existing gaps in care

Monthly videoconference meetings

Foster team contribution to achieving clinical excellence



Formal, coordinated structure

Rapid replication of best practices

# QUALITY AND PATIENT SAFETY

**Early  
August  
2013**

CHS Quality  
and Service  
Goals  
Retreat

**September  
2013**

Definitions,  
Baseline, and  
Target  
Development

**November  
2013**

QCC  
Endorses  
2014 Goal  
Targets

**Late August  
2013**

Preliminary  
QCC  
Discussion of  
Priorities

**October  
2013**

Facility  
Presentations

**December  
2013**

QCC Chair  
Reviews  
Specific  
Goals and  
Final Goals  
are Published  
to QCC for  
Comment

# QUALITY AND PATIENT SAFETY

CHS Graph (Home)

Metro Group ▼

Regional Group ▼

PSC Graph

Email Portal Team

## Hospital Name

### Quality and Service Metrics 2014

	Base	Target	Stretch	Apr2013 - Mar2014	YTD*	Num	Den
<b>Patient Safety Composite Score (Rolling Year)</b>	0.818	0.777	0.736		0.733	.	.
<b>Inpatient Mortality O/E</b>	0.767	0.718	0.672		0.775	1,357	1,752
<b>Appropriate Care Score, Acute</b>	94.4	97	99		97.445	11,441	11,741
<b>Uncontrolled A1C, Ambulatory</b>	15.4	16.7	13		17.248	28,622	165,948
<b>Breast Cancer Screening, Ambulatory</b>	66.3	70.2	74.6		67.741	310,453	458,291
<b>Likelihood to Recommend***</b>	77.02	78.32	79.65		75.403	.	4,060
<b>Hospital-Wide 30 Day Readmissions O/E**</b>	0.937	0.866	0.804		0.894	2,377	2,659
<b>Home Care Transfers to Inpatient Acute Care</b>	5.28	4.94	4.6		4.824	471	97,638
<b>Length of Stay O/E</b>	1.139	1.092	1.052		1.102	238,762	216,684
<b>ED Patient with LOS ≤ 180 Minutes</b>	.	.	.		64.305	164,592	255,957

\* Click on YTD metric to navigate to details. Missing YTD values indicate 2014 data currently not available.

\*\* Cut off date for readmissions is February 12, 2014 to reduce effect of incomplete data.

\*\*\* Likelihood to Recommend pull date from Press-Ganey is April 10, 2014.

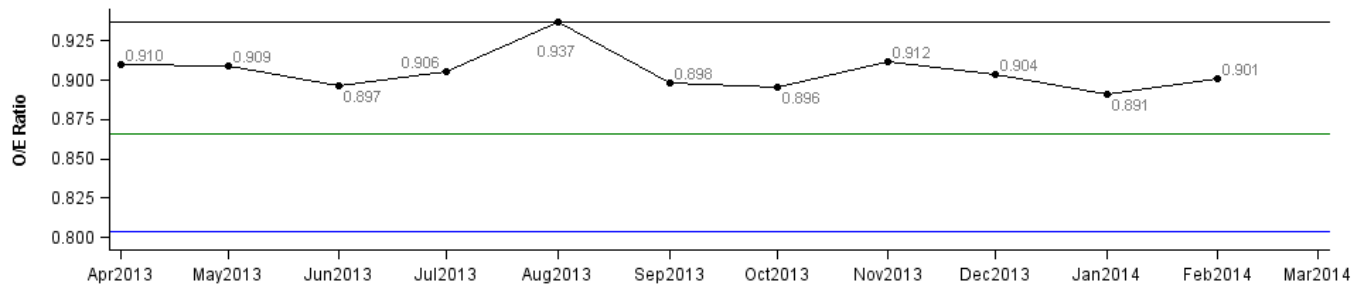
YTD Colors: ■ No Goals Set | ■ Below Base | ■ Below Target | ■ Above Target | ■ Above Stretch

One



Carolina HealthCare System

# QUALITY AND PATIENT SAFETY



Anson Community Hospital	0.397
Carolinas Medical Center - Randolph	0.425
Roper St. Francis Mount Pleasant Hospital	0.444
Cone Womens Hospital	0.454
Bon Secours St. Francis Hospital	0.596
Cannon Memorial Hospital	0.605
Carolinas Medical Center - University	0.615
Carolinas Medical Center - Mercy	0.640
Roper Hospital	0.651
Kings Mountain Hospital	0.651
Murphy Medical Center	0.659
Stanly Regional Medical Center	0.746
Elbert Memorial Hospital	0.757
Carolinas Medical Center - Lincoln	0.816
Scotland Memorial Hospital	0.840
Wesley Long Hospital	0.843
Carolinas Medical Center - Union	0.853
Carolinas Medical Center - Pineville	0.860
Carolinas Medical Center - Blue Ridge	0.875
Annie Penn Hospital	0.877
Moses Cone Memorial Hospital	0.892
Cleveland Regional Medical Center	0.906
Wilkes Regional Medical Center	0.926
Alamance Regional Hospital	1.018
Carolinas Medical Center - NorthEast	1.021
Carolinas Medical Center	1.033
Cone Behavioral Health Hospital	1.072

		Jan2014	Feb2014	Mar2014
<b>Behavioral</b>	Observed	15	8	
	Expected	25	11	
<b>Cardiorespiratory</b>	Index Visits	296	118	
	Observed	387	146	
	Expected	453	151	
<b>Cardiovascular</b>	Index Visits	2932	929	
	Observed	115	40	
	Expected	114	44	
<b>Neurological</b>	Index Visits	1102	444	
	Observed	88	33	
	Expected	80	32	
<b>Medicine</b>	Index Visits	877	353	
	Observed	797	277	
	Expected	894	317	
<b>OBGYN</b>	Index Visits	6444	2366	
	Observed	66	34	
	Expected	77	31	
<b>Surgical</b>	Index Visits	2699	1096	
	Observed	275	96	
	Expected	312	118	
	Index Visits	3998	1535	




# QUALITY AND PATIENT SAFETY

## Patient Safety Composite Metrics 2014

	Apr2013 - Mar2014	Current Rolling Year					
		O/E Events		Contribution By Metric	Excess Events	Excess Events To Target	Excess Events To Stretch
Catheter Associated Urinary Tract Infection *		1,394	38	1.38%	11	17	18
Central Line Associated Bloodstream Infection *		0.485	10	7.74%	-10	-6	-5
Clostridium Difficile (Lab ID) *		0.927	52	16.73%	-4	8	10
Falls with moderate to severe injury and Other Trauma		0.447	11	1.77%	-13	-8	-7
PC-01 Early elective delivery		0.202	3	0.08%	-11	-8	-8
PSI-03 Pressure ulcer		0.110	3	0.15%	-24	-18	-17
PSI-04 Death among surgical inpatients		0.733	21	32.34%	-7	-1	0
PSI-06 Iatrogenic pneumothorax		0.428	3	1.17%	-4	-2	-2
PSI-11 Postoperative respiratory failure		0.513	9	22.67%	-8	-4	-4
PSI-12 Postoperative PE or DVT		0.718	22	8.07%	-8	-2	0
PSI-13 Postoperative sepsis		0.183	1	0.87%	-4	-3	-3
PSI-14 Postoperative wound dehiscence		0.511	1	1.22%	0	0	0
PSI-15 Accidental puncture or laceration		0.190	9	1.48%	-38	-28	-26
PSI-17 Birth trauma rate - injury to neonate		0.554	3	0.02%	-2	-1	-1
PSI-18 Obstetric trauma rate - vaginal delivery with instrument		0.523	15	0.08%	-13	-7	-6
PSI-19 Obstetric trauma rate - vaginal delivery w/o instrument		0.734	26	0.03%	-9	-1	0
Surgical Site Infection (COLO/HYST) *		0.568	5	4.19%	-3	-1	-1
<b>Patient Safety Composite Score</b>		<b>0.604</b>	<b>YTD</b>				

# QUALITY AND PATIENT SAFETY

Patient Detail Reports 2014



**Select Facility\***

- All Facilities Listed
- Alamance
- AnMed Health
- Annie Penn
- Anson
- Bon Secours St Francis

**Select Date Range (Optional)**

March 2014    March 2014  
Begin Month    End Month

\*Press and hold CTRL key to select multiple facilities.

## Select Patient Detail Report

- Patient Safety Composite
- Readmissions
- Inpatient Mortality

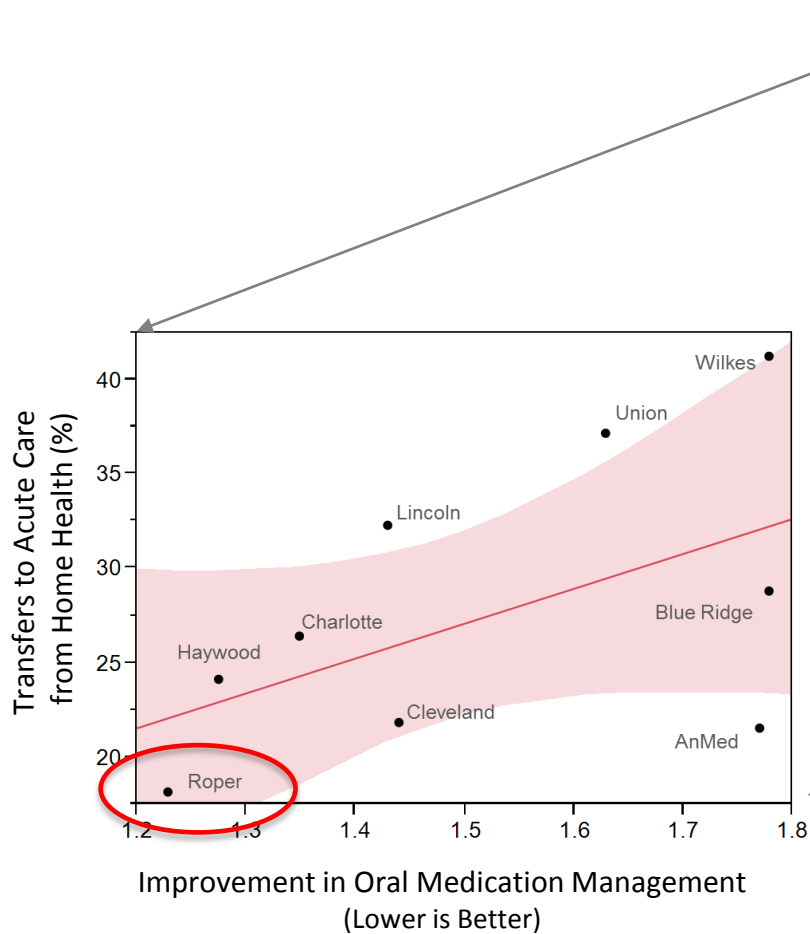
# QUALITY AND PATIENT SAFETY

CHS Graph (Home)	Metro Group ▼	Regional Group ▼	PSC Graph	Email Portal Team			
<b>Hospital Name</b>							
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# HOME HEALTH TRANSFERS



863 Admissions Avoided  
\$7.9 Million Savings

# HOME HEALTH TRANSFERS

Telemonitoring Yields  
Significant Improvement in  
Readmissions

	7 Days	14 Days	30 Days
Usual Care (N = 1137)	11.9%	19.9%	29.1%
Telemonitor (N = 638)	8.5%	14.9%	22.6%
	p = 0.028	p = 0.016	p = 0.012

22.3%  
Reduction

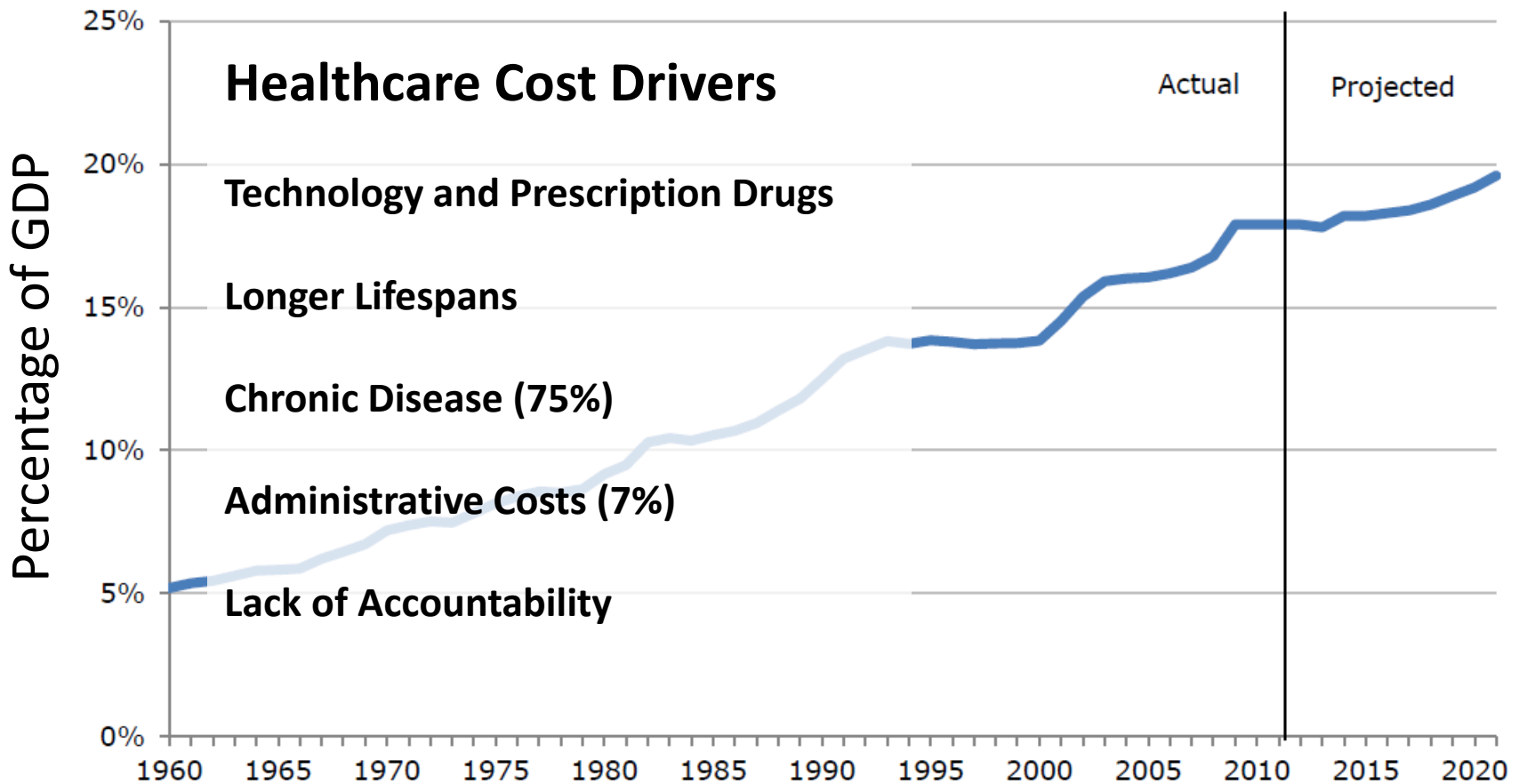


# OUR FUTURE STATE





# ANNUAL HEALTH EXPENDITURES



Source: Centers for Medicare and Medicaid Services.

Health of a  
Population

Mortality rates  
Admissions per 1,000

Likelihood to recommend  
AHRQ PSIs

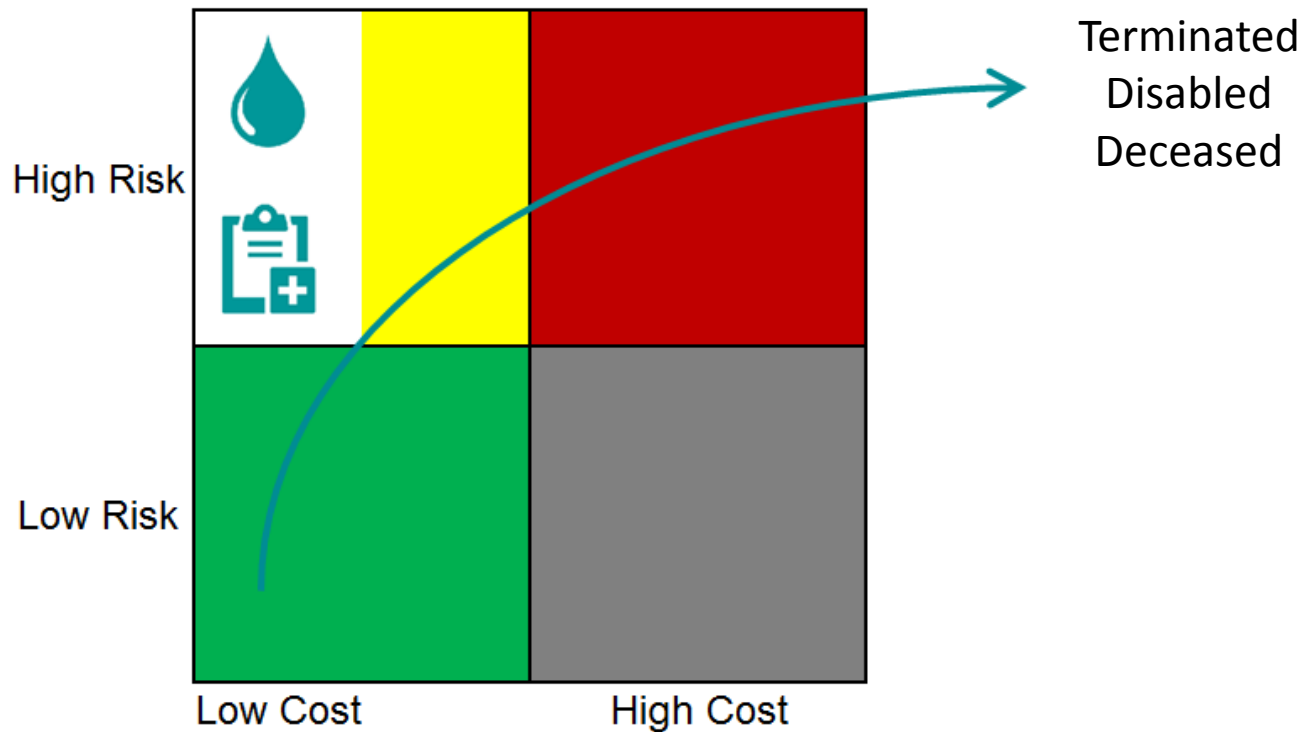
Experience of  
Care

Per Capita  
Cost

Per Member Per Month

# The *Triple Aim*

# Limit Chronic Disease Progression



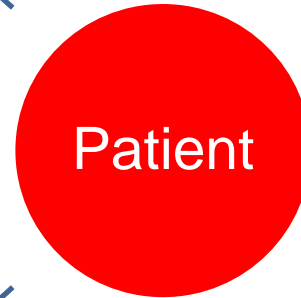
# Completing the 360° View

## Consumer Data

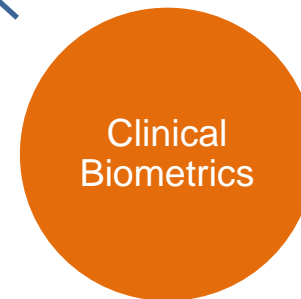
provides socio-geographic consumption trends



**Personal Health Survey** captures health and lifestyle risks not readily available elsewhere



**Claims** supply a wealth of medical data at the member level



**Biometric and Clinical Data** identify the status of disease not just its presence

# Completing the 360° View

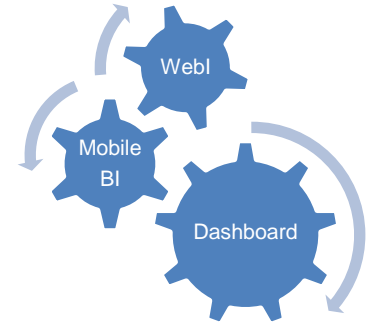
- **Multi-year strategy**
- **11-system integration**
- **>300 users** (including call center)
- **360° Patient View CRM for Care Management**



# ENTERPRISE DATA WAREHOUSE



- Statistical analysis
- Predictive Analytics
- Optimization

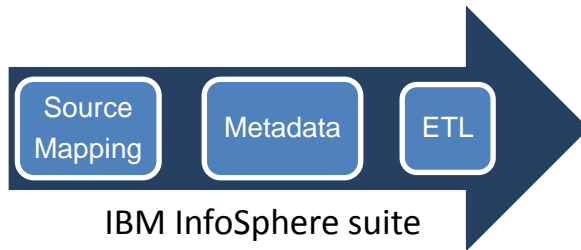


Business  
Glossary

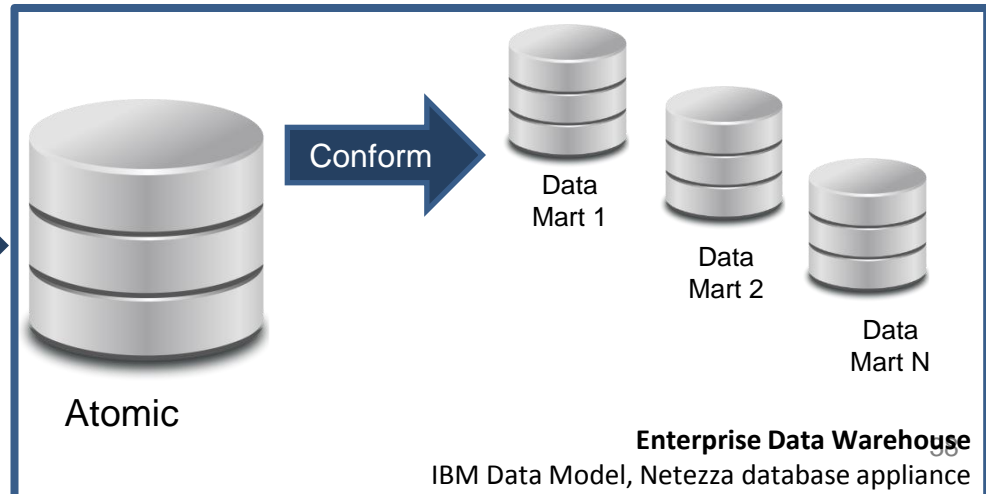
Universe / Semantic  
Layer



Source Systems



IBM InfoSphere suite



Atomic

Data  
Mart 1

Data  
Mart 2

Data  
Mart N

**Enterprise Data Warehouse**

IBM Data Model, Netezza database appliance

One



Carolina HealthCare System





Carolinan HealthCare System

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