Safe Harbor Notice

This presentation describes features that are under development by MicroStrategy. The objective of this presentation is to provide insight into MicroStrategy’s technology direction. The functionalities described herein may or may not be released as shown.

This presentation contains statements that may constitute “forward-looking statements” for purposes of the safe harbor provisions under the Private Securities Litigation Reform Act of 1995, including estimates of future technology releases. Forward-looking statements inherently involve risks and uncertainties that could cause actual results of MicroStrategy Incorporated and its subsidiaries (collectively, the “Company”) to differ materially from the forward-looking statements.

Factors that could contribute to such differences include: the Company’s ability to develop, market and deliver on a timely and cost-effective basis new or enhanced offerings that respond to technological change or new customer requirements; delays in the Company’s ability to develop or ship new products; the extent and timing of market acceptance of MicroStrategy’s new offerings; continued acceptance of the Company’s other products in the marketplace; competitive factors; general economic conditions; and other risks detailed in the Company’s registration statements and periodic reports filed with the Securities and Exchange Commission. By making these forward-looking statements, the Company undertakes no obligation to update these statements for revisions or changes after the date of this presentation.
Introduction

Erik Okerholm,
MHA/MIM, MCE
Senior Sales Engineer, South Region (TOLA)
BI – 20 Years

• Intern, The Riner Group
• Administrative Fellow, Duke University Medical Center
• Product Consultant, MicroStrategy
• MSTR Technical & Education Liaison - IBM Global Services PS
• VP, Functional Architect - BBVA Compass (MSTR)
• Business Intelligence Architect – Zilliant (MSTR OEM)
• MSTR Contractor, Partner - Dell, Farm Credit Bank of TX
• Sr. Sales Engineer, MicroStrategy
• MicroStrategy National Healthcare Expert Panelist
• Triple Certified - MicroStrategy Certified Engineer (MCE)
Educational Background

M.S. Human Anatomy & Physiology (equivalent)
The Ohio State University College of Medicine; Medical Education Career Pathway (MEDPATH), Columbus, OH

M.H.A. (Master of Health Administration) with Honors,
Washington University School of Medicine, St. Louis, MO.

M.I.M. (Master of Information Management),
Emphasis in Database Structure and Management , Washington University School of Engineering and Applied Science, St. Louis, MO.

Duke University Medical Center Hospital Administrative Fellow
2 Year Post Graduate Fellowship with a comprehensive exposure to hospital operations in one of the nation’s leading hospitals. In addition, Fellows have access to a broad range of services and sites that are part of Duke Medicine.

  • During the first year, the Fellows participate in structured rotations throughout the hospital and health system, while also completing a diverse range of management projects.
  • During the second year, the Fellows pursue an area of interest based on personal and professional goals, as well as organizational opportunities. Throughout the fellowship, Duke University Hospital Fellows gain invaluable experience in hospital operations through exposure to Senior Administration, significant project work and structured rotations.
Agenda

• Healthcare Drivers for Analytics and Mobility
• MicroStrategy Solutions for Healthcare
• **Demo**: Boost Quality of Care with Analytical Insights
• **Demo**: Making Better Decisions in the Opioid Crisis
• **Demo**: Leveraging Predictive Analytics
• **Demo**: Identify Savings by Reducing Hospital Readmissions
• Q&A Session
The Healthcare Ecosystem

- Increasingly patient centric – more focus on quality of care and patient satisfaction

- Shifting from a pay-for-service approach to value-based, pay-for-performance models

- Regulatory pressure to improve population health while reducing the cost of care

- Stakeholders “joining forces” to provide more unified patient care and reduce duplication of effort
Give buyers deep insight into the costs, service levels and performance of competing vendors to help negotiate the best values for supplies and services.

**SUPPLY CHAIN MANAGEMENT**

**HOSPITAL PERFORMANCE**

Assess performance versus peer organizations and help uncover shortcomings in operational efficiency, quality of care, and patient satisfaction.

**REVENUE CYCLE OPTIMIZATION**

Facilitate the discovery of cash flow anomalies, improvement of claims processes, and reduction of the burdens of pay-for-performance reporting and cost accounting.

**Digital Patient ID Badge**

Empower patients to securely manage their healthcare lifecycle from a single mobile app, knowing that Usher’s advanced authentication capabilities will protect their sensitive information.

**Digital Staff ID Badge**

Issue digital badges to physicians and clinical staff to help secure hospital facilities, restrict access to sensitive patient information, and more effectively monitor onsite activity.

**Patient Centered Medical Home**

MicroStrategy mobile apps empower healthcare professionals with the resources they need to deliver the best possible care to their patients.

**Patient Insight Analysis**

Analyze patient and member data for insight into brand perception, quality of care, public health concerns, and consumer preferences for care delivery.

**Digital Staff ID Badge**

Use public and in-house data to assess physician performance and quality of care, optimize time management, and promote proper billing practices.

**Hospital Operations**

Mobilize workflows to help boost productivity, increase utilization of scarce clinical and ER resources, and reduce wait times.

**Hospital Performance**

Assess performance versus peer organizations and help uncover shortcomings in operational efficiency, quality of care, and patient satisfaction.

**Revenue Cycle Optimization**

Facilitate the discovery of cash flow anomalies, improvement of claims processes, and reduction of the burdens of pay-for-performance reporting and cost accounting.

**Mobile**

**Mobile**

**Digital Patient ID Badge**

**Digital Staff ID Badge**

**Doctor Performance**

Use sophisticated analytics and advanced visualizations to help uncover improper billing practices and other fraudulent behaviors.

**Population Health Management**

By applying sophisticated predictive analytics to member health data, ACOs can assess patient risk and proactively deliver care, helping to improve overall population health.

**Claims Analysis**

Analyze end-to-end processes across claim systems, product lines, and business units for operational effectiveness and member retention.

**Fraud and Abuse Analysis**

Analyze end-to-end processes across claim systems, product lines, and business units for operational effectiveness and member retention.
Big Ideas in Healthcare

**Hospital Performance**
Assess performance versus peer organizations and uncover shortcomings in operational efficiency, quality of care, and patient satisfaction

**Doctor Performance**
Use public and in-house data to optimize physician time management and promote proper billing practices

**Digital Badges**
Issue digital badges to physicians and clinical staff to help secure hospital facilities and effectively monitor onsite activity

**Population Health**
Apply sophisticated, predictive analytics to EHR systems to assess patient risk, proactively deliver care, and improve overall population health
Healthcare Application: Hospital Performance

Assess performance versus peer organizations and help uncover shortcomings in operational efficiency, quality of care, and patient satisfaction

- Intuitive visualizations provide an at-a-glance summary of key metrics and trends related to overall hospital performance
- Quickly uncover issues related to financial performance and patient satisfaction scores (PSAT)
- Compare PSAT scores against goals and drill deeper to explore contributing factors such as length of stay (LOS) and patient wait times
- Uncover specialty areas that are potentially underperforming and drill deeper to identify the root causes for cost overruns

Quickly digest KPIs and trends related to revenue, profitability and patient satisfaction (PSAT)

Drill deeper for details into financial performance and the quality of patient care

Identify specialty areas that are most profitable and those that are potentially underperforming

Monitor patient satisfaction measures as an indication of the quality of care
Healthcare Application: Doctor Performance

Give physician managers and individual doctors insight into productivity and billing activities

- Track billable work (RVUs) against benchmarks for specific procedures or payer groups
- Monitor physician productivity trends in terms of new and recurring patient visits
- View data across entire staff or for individual physicians
- Drill to uncover anomalies in a doctor’s time management or billing practices
- Give physician managers and individual doctors insight into their productivity and billing performance against internal benchmarks
- Compare overall performance against peers with scoring based on patient resolution times, readmissions, punctuality, and productivity
- Identify top performing physicians and those that might require coaching or additional training
- Scrutinize doctor billing practices to detect any anomalies or time management issues
CHRISTUS Health: Physician Performance

Profile

Ranked among the top 10 Catholic health systems in the United States by size, the CHRISTUS Health system includes more than 40 hospitals and facilities in seven U.S. states, Chile, Colombia and six states in Mexico, with assets of more than $4.6 billion.

Application

• CHRISTUS lacked a standard communications platform and had become reliant on a time-consuming process of converting paper reporting to PDF and posting to a shared drive

• With operations across three states, CHRISTUS was experiencing delays in communicating information and inconsistencies within the data. Unexpected surprises during compensation conversations provided the motivation to find a new approach

• With a communications portal leveraging MicroStrategy’s unified data model, physicians now have information at their fingertips, and no more surprises

• Through the Profile page, physicians can easily communicate questions, concerns, comments and announcements while continuously being updated on the progress towards resolution

• Physicians can easily track billing trends and patient productivity while measuring themselves against National MGMA Benchmarks

• With compensation calculators featuring “what-if” scenarios powered by predictive analytics, physicians always know what to expect from a compensation perspective

Ranked among the top 10 Catholic health systems in the United States by size, the CHRISTUS Health system includes more than 40 hospitals and facilities in seven U.S. states, Chile, Colombia and six states in Mexico, with assets of more than $4.6 billion.
Healthcare Application: Revenue Cycle Optimization

Uncover cash flow anomalies, improve claims processes, and reduce the burdens of pay-for-performance reporting and cost accounting

- Manage financial performance more effectively by harmonizing billing, payment, and remittance data
- Access additional screens for reporting on KPIs related to accounts receivable, cash receipts, and claims reimbursements and denials
- Quickly identify and respond to issues, such as delayed reimbursements or denied claims
- Uncover the root cause of revenue cycle delays, such as incorrect diagnostic coding

Intuitive visualizations help uncover payment irregularities

Easily track charges and billing data across all payer categories

Instantly access KPIs related to accounts receivable, cash receipts, and payer interactions
Healthcare Application: Digital Staff Badges

Issue digital badges to physicians and clinical staff to help secure hospital facilities, restrict access to sensitive patient information, and effectively monitor onsite activity.

- Lock down access to hospital systems and facilities by issuing Usher digital badges to physicians, nurses, and staff.
- Tighten internal security using multi-factor, proximity-based authentication including push notifications and biometrics.
- Ensure that only qualified staff have access to sensitive patient information and records.
- Restrict access to hospital facilities based on individual credentials.
- Monitor on-site activities with a real-time view of badge holder locations.

Functionality provided

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<tr>
<th>Administrator</th>
<th>Doctor</th>
<th>Nurse</th>
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<td>Unlock workstations/enterprise applications</td>
<td>Access electronic health records</td>
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<td>Remote access to VPN</td>
<td>Access to Emergency Room</td>
<td>Recovery Room entry</td>
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<tr>
<td>Entry into Records Room</td>
<td>Access to e-prescriptions</td>
<td>Security entry</td>
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<tr>
<td>Entrance to facilities/garage</td>
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<td>Staff Location / Activity / Communications</td>
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Patient First Mentality – A Tradition at Univ of Iowa Children’s

After the first quarter of every Iowa home game, everyone in the stadium – the crowd of 70,500-plus spectators, the players and staff from both teams – all turn toward the hospital and wave to the kids who are able to make it up to the 12th floor to watch.

Experiences like that can motivate patients in an ineffable way, said Hightower. "Kids wait all week for game day," she said.
Another functionality of the in-room system is to give parents more of a sense of order and control. At an academic medical center such as UI Health Care, said Hightower, a patient might have "20, 30, 40 people in and out of a room on a given day. They don't always know who those people are. So we have an RTLS-enabled locator devices connected …, so when a physician or nurse or housekeeping walks in, a picture of that person is displayed, along with their title and their role. It provides important information to the families, that these people are supposed to be in the room."
Monitor Movement, Wait Times, Pharmacy Cart Access…

Monitor Building Activity
- View User movements through time and space
40 Stories of Data Breaches in 2017

The Biggest Healthcare Breaches of 2017

**Highlights:**
- 266,123 patients at Pacific Alliance Medical Center
- 300,000 patients at Women’s Health Care Group of Pennsylvania
- 14 Million customers at Verizon
- 1.1 Million enrolled in Indiana Medicaid and CHIP
- 14,633 patients at invitro fertilization clinic in New Jersey.
- 500,000 children health data stolen from pediatricians
- 918,000 patients at Health Now Networks telemarketer blunder
- 80,000 patient records at my alma mater Washington University School of Medicine
- 7 years of data at Denton Hearth Group in Texas
Wearables & Virtual assistants like Amazon's Alexa could change the way care is delivered

Amazon Alexa skill from Northwell Health points users to nearby ERs, away from long waits

Mayo Clinic arms Amazon Alexa with first-aid skill.

Fitbit: Allows end users to access activity time series data from Fitbit directly in MicroStrategy, and allows users to build visualizations in minutes. “Quantified Self”

Apple, Aetna may bring Apple Watch to insurance customers: 4 things to know
Healthcare Application: Population Health Management

By applying sophisticated, predictive analytics to EHRs, health organizations can assess patient risk, proactively deliver care, and improve overall population health

- Apply predictive analytics across EHR systems to generate a comprehensive profile of member health
- Recommend specific preemptive care measures based on patient’s risk profile
- Justify reimbursement claims by tracking objectives for risk score and cost saving improvements
- Modify patient profiles directly from web or mobile interfaces using embedded write-back features
- Consume entire patient history using highly organized, easy-to-read dashboards

Write-back capabilities enable practitioners to make changes and modify the patient profile on-the-fly

Profile for a particular patient that displays all information on a single screen – including links to access image scans and SOAP notes

Write-back capabilities are available both on web and mobile and can be structured to suit various workflows

Flexible and secure access of records from any device
Business Intelligence, Insight, Action in Healthcare is Making a Difference

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Making a Difference Together

MicroStrategy
Helping Payors & Providers with the Opioid Crisis and Analysis

NHS Forth Valley: Capacity, Flow, and Bed Provisioning

Profile

Industry specifics: Healthcare – Legislative bodies
Location: United Kingdom
Products: Architect, Mobile, Server, Web
Core capabilities: Enterprise Analytics Platform, Mobile Analytics, Mobile Productivity Apps

Application

• As patient demand and case complexity increased sharply, NHS Forth Valley was having great difficulty adhering to a strict “seen within four hours” waiting policy

• Using MicroStrategy, NHS Forth Valley created a detailed dashboard that produces a real-time, overall picture of patient movement and bed availability

• With an automated system of alerts, the dashboard gives staff the information they need to meet the pressure of the four-hour patient access targets

• If the four-hour target is breached, the dashboard enables staff to uncover a root cause, whether it is a high number of admissions, or high flow of patients

• The solution includes threshold trigger points for escalating action in a systematic and consistent manner, ensuring the most effective clinical governance
Allscripts: Population Health Analytics

Profile

Allscripts is a leading provider of integrated healthcare IT solutions. Connecting over 180,000 physicians, 2,500 hospitals, and 45,000 physician practices, Allscripts employs over 7,000 employees in 20 locations across the globe. By providing powerful IT and analytics solutions, Allscripts enables smarter care, delivered with greater precision, for healthier patients, populations, and communities.

Application

- Allscripts offers several subscription-based SaaS products that provide healthcare organizations and professionals with key compliance information related to the meaningful use of electronic health records (EHRs), population health, and physician performance.

- Seeking to standardize and enhance the analytical and reporting capabilities offered in these products, Allscripts chose MicroStrategy for the quality of its self-service reporting and analytics tools, sophisticated platform security, and ability to generate dynamic SQL.

- Allscripts is using the embedded MicroStrategy functionality to power a population health application that draws from one of the largest patient databases in the industry, with records for over 150 million patients.

- Subscribers use MicroStrategy self-service capabilities to analyze population health across different practices, hospitals, and regions, and report across the whole system with ease.

- With MicroStrategy, Allscripts is able to support 3,500+ clients with two BI administrators and end users are enjoying increased interactivity and ease of use, unaware that they’re using a separate, embedded analytics tool.
POWERED BY ANALYTICS
Meet Population Health Heavyweight UMass Memorial

THOMAS SCORNAVACCA, D.O.
SENIOR MEDICAL DIRECTOR
POPULATION HEALTH

Geography and Key Statistics

UMMACO Participating Providers in 2017
- PCPs 482
- Specialists 1,372
- Other 675
- Total = 2,529

UMMACO Profile
- Hospitals 9
- FQHCs 4
- Preferred SNFs 17
- Medical Groups 86
Utilization Analytics

Patient Risk Matrix

- Complex care assessment.
- Prevention & wellness focus.
- Urgent (Illness/Trauma)
- Sickest (Chronic Disease)
- Healthy
- Rising Risk (Bubbles Up)

Evaluate potential to benefit from complex care management.
Assess need for complex care management intervention.
Clinical management by Providers.

“Learning from Your Data”
Patient Risk Matrix

- Complex care assessment
- Prevention & wellness focus
- Urgent (Recent/Recent)
- Solvent (Chronic Disease)
- Healthy
- Rising Risk (Rises Up)

Evaluate potential to benefit from complex care management.
Assess need for complex care management interventions.
Clinical management by Providers.

“Learning from Your Data”

Medicare ACO Total Medical Expense and Future High Cost Risk

- Urgent
- Sickest
- Healthy
- Rising Risk

Future Inpatient Relative Risk Based on Claims (12 months)

- Quadrant
- [Quadrant 1: Low Risk, Quadrant 2: High Risk, Quadrant 3: Low Risk, Quadrant 4: High Risk, Grand Total]
A Predictive Modeling Approach to ICU Admissions at Boston Children’s Hospital
Intensive Care Unit Capacity Issue

I can predict with 75% accuracy you will be discharged in 3 days or less.

The bulk of our bedded days come from long stay patients.
ROC Curve for Daily Predictions of 8+ More Days in MSICU

Logistic model trained with CY2016 and validated with Jan-Jul 2017 data

ROC Area 0.881
## Daily Usage - MSICU

### List of patients resident in 7S ICU at 10/16/2017 11:59 PM

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Boston Children's Hospital

Until every child is well

Harvard Medical School
Teaching Hospital
Avoiding/Reducing Hospital Readmissions
Hospital Acquired Condition

30-Day Readmission Rates to U.S. Hospitals

1 in 5 patients with these procedures were readmitted:
- 23% Amputation of the lower extremity
- 19% Heart valve procedures
- 32% Sickle cell anemia
- 32% Gangrene

Sources: The Healthcare Cost & Utilization Project (HCUP) Statistical Briefs #153 and #154, 2010

American Institutes for Research | www.ahrq.gov

$538M
amount 2,588 hospitals will have deducted from their Medicare payments due to high readmission rates

Source: Centers for Medicare & Medicaid Services

30 days
Patients readmitted within this time frame can lead to a penalty of 3% of income from Medicare

HAC SCORE
$/Year = 1.5 billion
20% from CMS (150 million)
1% reduction in CMS triggered.

By Procedure
- Nearly one in five patients with these common procedures was readmitted:
  - 23% Amputation of lower extremity
  - 19% Heart valve procedures
  - 19% Debridement of a wound, infection, or burn

By Diagnosis
- Nearly one in four patients with these common diagnoses was readmitted:
  - 25% Congestive heart failure
  - 22% Schizophrenia
  - 22% Acute and unspecified renal failure

Readmission Rates by Payer
- Medicare patients have a higher percentage of readmissions than other patients

Source: HCUP Statistical Briefs #153 and #154
http://www.hcup-us.ahrq.gov/reports/statbriefs/statbriefs.jsp
Acute Decompensated Heart Failure

According to the American Heart Association, heart failure is the leading cause of hospitalization among adults 65 or older, a fact made even more significant given the aging of the population.

Among ADHF patients who are admitted to the hospital, approximately 24% are re-hospitalized in one month and 50% are re-hospitalized in six months. Inpatient care for these patients is costly, accounting for about 60% of total heart failure expenditures.

Hospitalization for ADHF is a powerful predictor of readmission and post-discharge death in patients with chronic HF.

Mortality rates are as high as 20% after discharge.
How predictive analytics helped reduce readmissions at UnityPoint Health

Engaging with different stakeholders and coaching care teams has helped the health system realize a 40 percent improvement in 30-day readmissions.
What Predictive Analytic ROI Looks Like

32% drop in Readmissions

$4,894,000 in avoided cost

2,331 LOS days saved
Break the Bank on Hospital Readmissions

10 Clicks or Less to Save

$6.2 Million
Questions?
Thank You

Erik Okerholm
eokerholm@microstrategy.com

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