



GE Healthcare IT

The power of analytics Transforming data into actionable insights

Laurent Rotival

President & CEO , GE Healthcare IT , EAGM Region

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Imagination at work.

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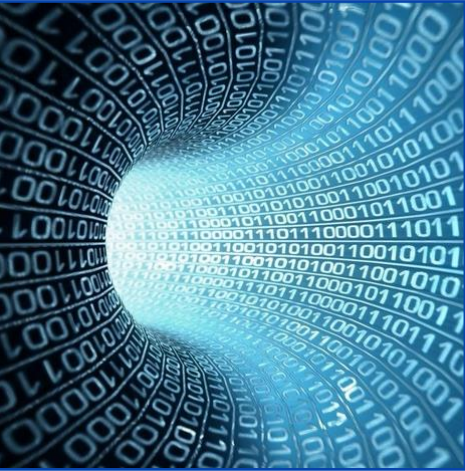
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What is Big Data?



Volume
Data Quantity



Variety
Data Types



Velocity
Data Speed



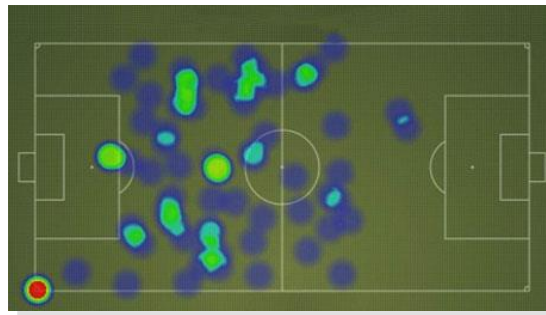
Value
Data Impact



12th player in football – Big Data analytics



Result:
Tottenham vs. Manchester City
0-6
(English Premier League, 2013)



Result:
Arsenal vs. Sunderland
4-1
(English Premier League, 2013)



Result:
World Cup 2014 Winner
Germany

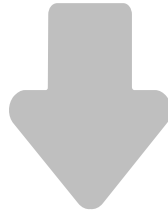


Source: <http://www.quora.com/How-are-player-heat-maps-generated-in-football>

Healthcare is under pressure



Chronic Diseases^{1,2,3,4}



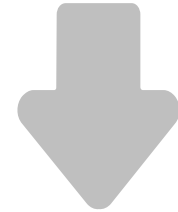
of Physicians/
Specialists^{5,6,7,8}



Medical Errors¹⁰



Variability in
Treatment⁹



Patient Care
Experience

Results: Raising costs, waste, and inefficiencies

1 Baseline year 2006 - <http://www.who.int/mediacentre/news/releases/2003/pr27/en/>

2 Baseline year 2006 - <http://icds.uoregon.edu/wp-content/uploads/2011/07/brookmeyer2007.pdf>

3 Baseline year 2006 -

http://www.who.int/cardiovascular_diseases/en/cvd_atlas_15_burden_stroke.pdf

4 Baseline year 2006 - <http://depts.washington.edu/rfgh/wordpress/wp-content/uploads/2011/04/Global-burden-of-chronic-dz-JAMA-2004.pdf>

5 <https://www.aamc.org/download/286592/data/>

6 <http://pr.euractiv.com/pr/possible-shortage-two-million-health-care-workers-2020-eu-taking-action-prevent-impending-crisis>.

7 http://www.chinadaily.com.cn/china/2011-07/07/content_12858248.htm.

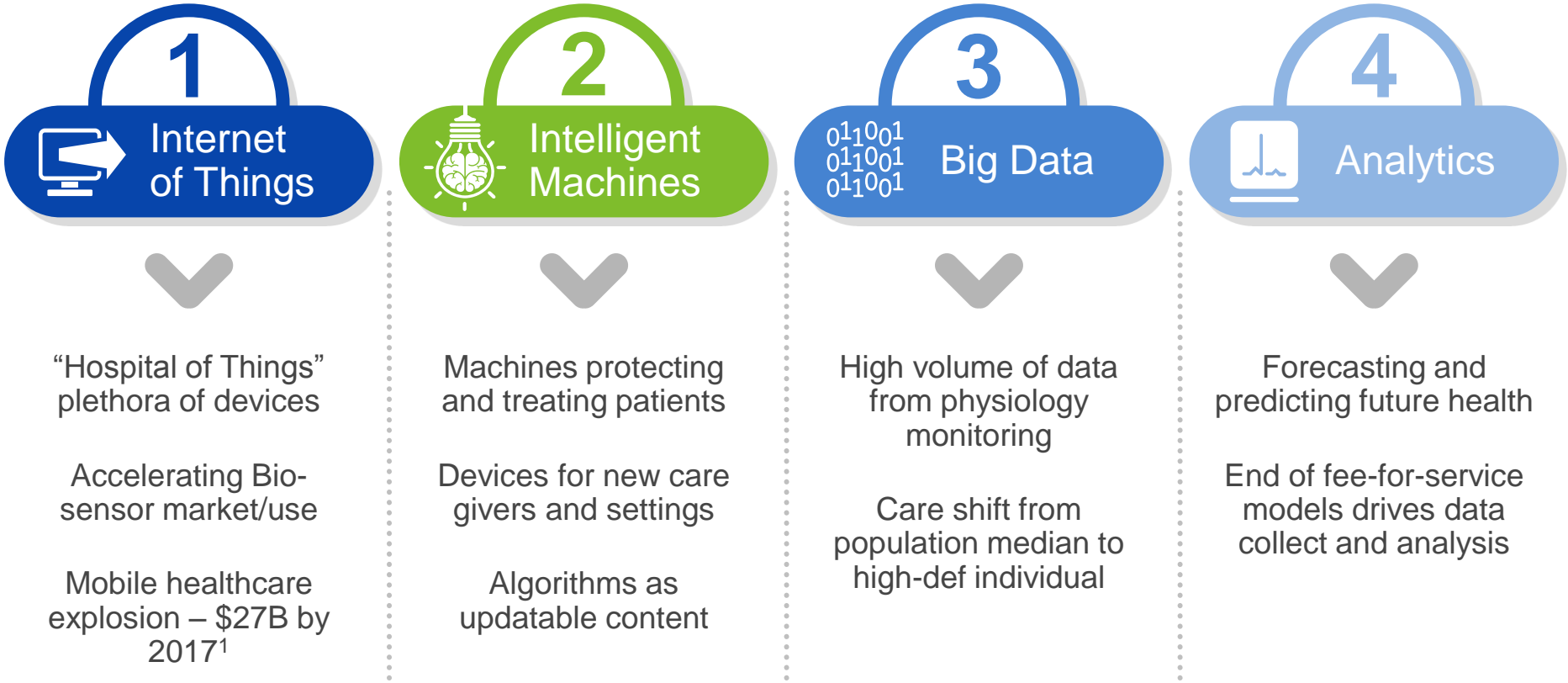
8 <http://www.reuters.com/article/2013/06/28/us-brazil-doctors-idUSBRE95R13N20130628>

9 Sept 2014, Peer360 research report – Unnecessary Imaging, Up to \$12 Billion Wasted Each Year

10 Diagnostic Errors—*The Next Frontier for Patient Safety* David E. Newman-Toker, MD, PhD; Peter J. Pronovost, MD, PhD JAMA. 2009;301(10):1060-1062. doi:10.1001/jama.2009.249.



A convergence of enabling technologies is setting the stage for industry transformation



¹ \$27B by 2017 for Mobile health services:
The market for mHealth services has now entered the commercialization phase and will reach \$26 billion globally by 2017 according to new “Global Mobile Health Market Report 2013-2017” by research2guidance. The report is one of the leading publications in the mHealth market. Companies that have purchased previous editions of the report includes: Agfa Healthcare, DTAG, Fresenius, Fujitso, GE Healthcare, LG, Nokia, Novartis, Pfizer, Qualcomm, Roche, Roland Berger, Sanofi Aventis and many more.



Creating insight from Big Data



Outcomes

Clinical
Quality

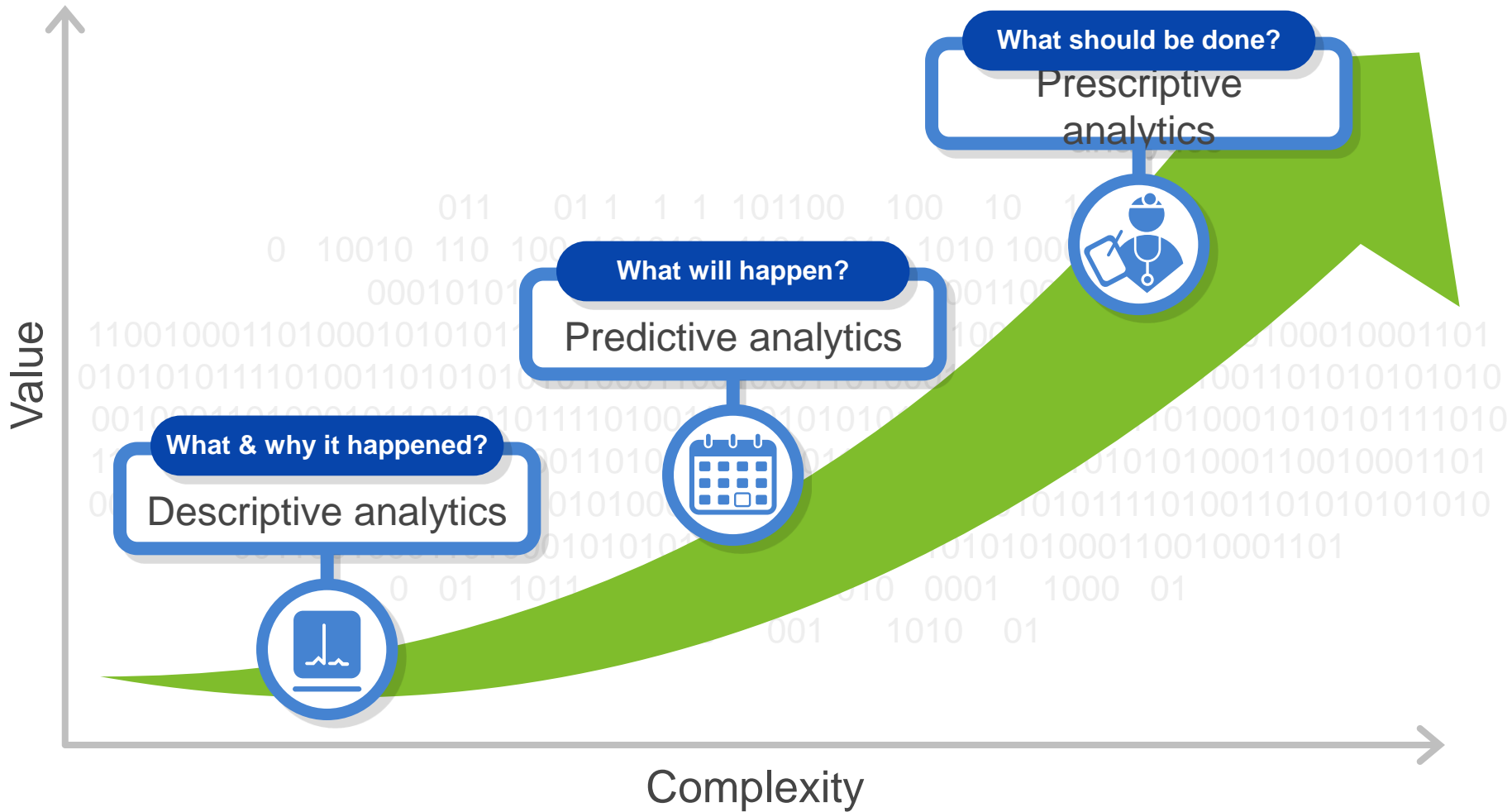
Operational
Efficiency

Financial
Performance

Data → Actionable Insights → Outcomes



Big Data analytics – maturity model and value



A transformational shift happening in healthcare delivery

Past

Future



Patient care



Population care



Episodic of care



Clinical pathway



Cure the symptom



Discover the cause



Heal the sick



Prevent the sickness



Traditional role of patients and doctor is changing



- **Patients** record clinical data
- **Data** determines need for doctor's visit
- **Patients** share data to compare treatment options
- **Smart devices** are a source of information on stroke¹
- **Home-health devices** alert clinical intervention



¹ Smartphone apps are a significant source of information related to stroke. An increasing participation of healthcare agencies should be encouraged to promote dissemination of scientifically valid information *J Stroke*. 2014 May;16(2):86-90. doi: 10.5853/jos.2014.16.2.86. Epub 2014 May 30. Smart phone applications as a source of information on stroke. Dubey D1, Amritphale A2, Sawhney A3, Amritphale N4, Dubey P5, Pandey A1



Efficient hospital operations



Optimize Patient Safety & Security



- ER returns within 72 hours
- Hospital induced patient accidents



Efficiency & Performance



- Patient wait times and diagnosis turnaround time
- Asset & labor utilization rates



Costs Savings



- Material/equipment consumption rates
- Bed blockers (Length Of Stay > 30 days)



Clinical Insights



- Data algorithm to predict sepsis¹
- Data algorithm to predicted future risk of metabolic syndrome²

1 Gregory B. Steinberg, MB, BCh; Bruce W. Church, PhD; Carol J. McCall, FSA, MAAA; Adam B. Scott, MBA; and Brian P. Kalis, MBA - See more at: <http://www.ajmc.com/publications/issue/2014/2014-vol20-n6/Novel-Predictive-Models-for-Metabolic-Syndrome-Risk-A-Big-Data-Analytic-Approach#sthash.yxMBQg2L.dpuf>

2 Puopolo KM, Draper D, Wi S, et al. Estimating the probability of neonatal early-onset infection on the basis of maternal risk factors. Pediatrics 2011;128:e1155-63.



Integrating imaging, data, and analytics to help win against cancer

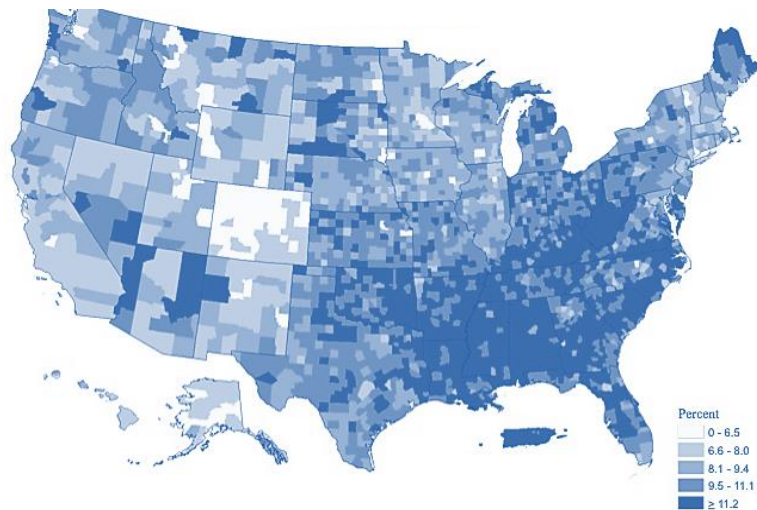
The screenshot displays a software interface for cancer research, divided into several functional areas:

- Plate Navigation:** Located in the top-left, it features a grid of colored circles representing a 96-well plate layout. Below the grid are four channels labeled Ch 1, Ch 2, Ch 3, and Ch 4, each with a corresponding thumbnail image.
- Microscopy View:** The central area shows a grayscale image of cells. Two regions are highlighted with colored circles and labeled: "Live Tgt 39" (green) and "Dead Tgt 42" (red).
- Analytics Protocol:** On the left side, below the navigation, it includes fields for "Protocol" and "Destination", a "View Protocol Phases" checkbox, and control buttons for "Play", "Pause", and "Stop".
- Event Status:** Below the protocol section, it shows a "View" dropdown and a "Show 10 entries" indicator.
- Data Plot:** On the right side, a scatter plot shows data points for three fields of view (FOV 1, FOV 2, FOV 3). The x-axis ranges from 150 to 190, and the y-axis ranges from 20 to 140. FOV 1 is represented by blue circles, FOV 2 by orange circles, and FOV 3 by a single green triangle.
- Data Table:** Below the plot is a table with columns labeled "Foo" and "Bar". The table contains multiple rows of data, with one cell in the second row, third column highlighted in red.



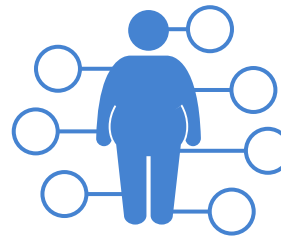
Outcomes: **Clinical Study**

Predicting individualized risk of Metabolic Syndrome in patients^{1,2}

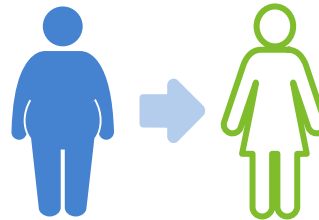


Country-level Estimates of Diagnosed Diabetes among Adults ≥ 20 years United States 2009

Cost of diabetes in US now \$245 Billion²



Predictor



Regular doctor visit

Actionable insights

1

>30% US population has Metabolic Syndrome^{1,2}

2

Algorithms used to predict probability^{1,2}

3

Regular doctor visit lowers risk in 90% of individuals^{1,2}

1 Novel Predictive Models for Metabolic Syndrome Risk: A “Big Data” Analytic Approach Published Online: June 26, 2014 Gregory B. Steinberg, MB, BCh; Bruce W. Church, PhD; Carol J. McCall, FSA, MAAA; Adam B. Scott, MBA; and Brian P. Kalis, MBA See more at:

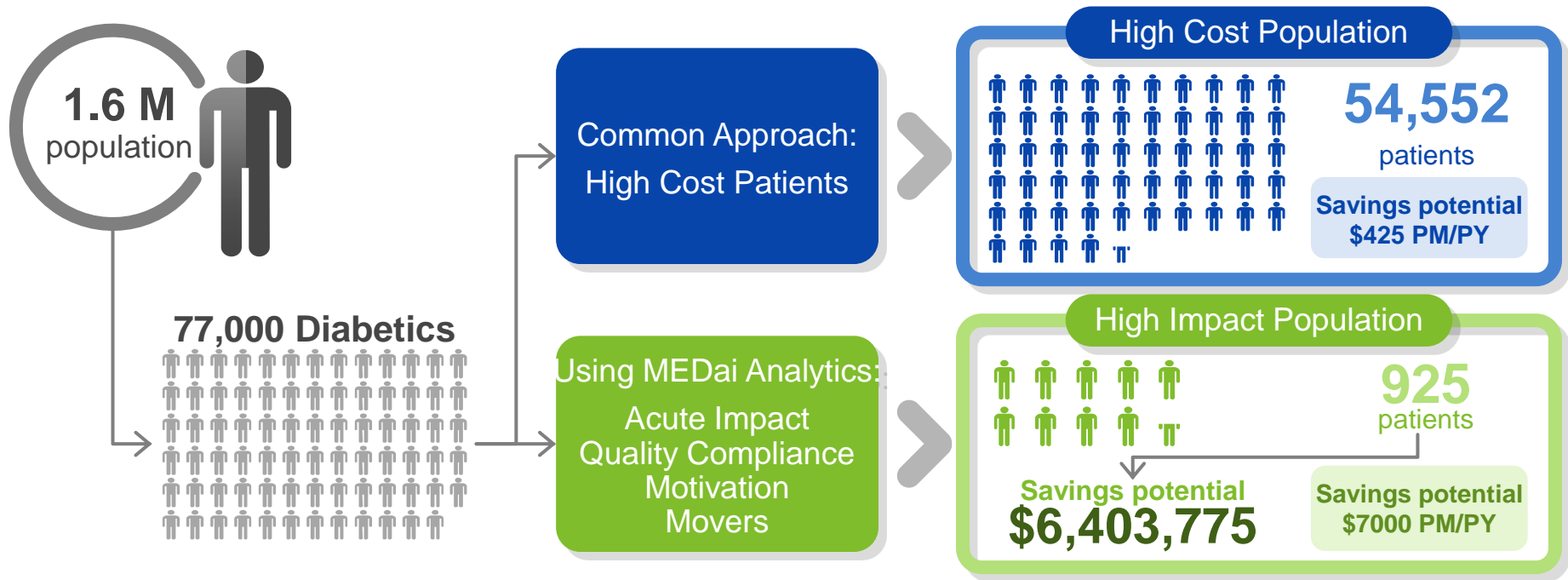
<http://www.ajmc.com/publications/issue/2014/2014-vol20-n6/Novel-Predictive-Models-for-Metabolic-Syndrome-Risk-A-Big-Data-Analytic-Approach#sthash.4WzKre10.dpuf2>

2 The American Diabetes Association (Association) released new research on March 6, 2013 - See more at: <http://www.diabetes.org/advocacy/news-events/cost-of-diabetes.html#sthash.SaP7ys7T.dpuf>



Data: **Clinical** – Population health management

Risk management and return on intervention



Focus on the right interventions with the most actionable patients

Risk Management, powered by LexisNexis® with MEDai science, identifies populations of patients, stratifies them (by risk, utilization, motivation and other factors), predicts costs and potential savings, and supports care management to drive better outcomes. The numbers represented in this slide resulted from an internally developed scenario specifically for demonstration purposes to show the value of combining the predictive results from Caradigm's MEDai to find the people who would be most impacted by intervention and management over the next 12 months rather than focusing on only those who were the highest cost, highest risk retrospectively (past 12 months).



Critical success factors – key take aways

1

Data “liquidity” is crucial – unlock the data sitting in disparate systems

2

Focus and prioritize top opportunities to analyze

3

Get some key wins to affect change in the organization to implement key actions



