



# HIMSS Clinical & Business Intelligence Community

June 2018 Event

**HIMSS**

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CLINICAL & BUSINESS INTELLIGENCE COMMUNITY

# Welcome

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**Mike Berger, PE, CPHIMS**  
**C&BI Community Co-Chair**

*Vice President, Population Health Informatics & Data Science, Mount Sinai Health System*



**Arthur Panov, MPH, CPHIMS**  
**C&BI Community Co-Chair**

*Chief Architect, Medical Devices and Life Sciences, IBM Watson Health*



**Shelley Price, MS, FHIMSS**  
**C&BI Community Organizer**

*Director, Payer & Life Sciences  
HIMSS | Arlington, VA*

**Joanne Bartley, CAE**  
**C&BI Community Organizer**

*Manager, Health Business Solutions  
HIMSS | Chicago, IL*



# Agenda

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- **Welcome**
- **HIMSS C&BI Community Updates / Announcements**
- **Presentation & Discussion:**
  - ***“Insights into Clinical and Business Intelligence at Mayo Clinic”***
    - ❑ Cris Ross, Chief Information Officer | Mayo Clinic | @MayoClinic
- **Wrap-Up / Next Steps**

# Updates / Announcements



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# New Content to Help You on Your Journey to *Turn Data to Action*

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## Tools & Resources

- ✓ *NEW!* C&BI module to the STEPS to Value Podcast Series
  - Part 1. [Episode #53: Data as a Lever to Transformation](#)
  - Part 2. [Episode #55: The Evolution of Outcomes Measurement for Value-Based Healthcare](#)
  - Part 3. [Episode #56: Overcoming the Cost Challenge in Healthcare](#)
- ✓ *NEW!* [Conversations on Data Sharing for Clinical and Business Intelligence Applications](#)

## Blogs

- ✓ [Deeper Analytic Insights Through Shared Data](#)
- ✓ [Approaching MIPS Cost Performance: Recommendations and Cautionary Advice](#)
- ✓ [10 Tips for Building Useable and Useful Data Visualizations and Dashboards](#)
- ✓ [Data Silos: Together, We Can Bust Them](#)

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# HIMSS19 Global Conference

## *Call for proposals now open!*

### Tell us your organization's transformational experiences

HIMSS seeks compelling organizational experiences — those that highlight the similarities in global transformative healthcare practices and that demonstrate insight, thought leadership, diversity, expertise and lessons learned on the optimal use and value of health information and technology – to be presented at HIMSS19.

Apply today to be a HIMSS19 speaker to share your successes, challenges and opportunities with our attendees. Prior sessions have:

- Demonstrated the adoption and best use of health information and technology
- Related to real-world accomplishments and challenges
- Highlighted best practices and beneficial uses of health information and technology via case studies
- Showcased transformative change in health and healthcare through information and technology

Don't wait — submit your HIMSS19 proposal **today**.



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- Call open **now through July 16**
- 24 categories including:
  - *Data Science/Analytics/Clinical and Business Intelligence*
  - *Population Health Management and Public Health*
  - *Precision Medicine and Genomics*
- Resources to help you submit a successful proposal, including how-to webinars and over a dozen tips!

# FY19 Committees

## *Call for application now open!*

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- 12 Committees:

- *Career Development*
- *Certification (CAHIMS/CPHIMS)*
- *Clinical & Business Intelligence*
- *ConCert*
- *Cybersecurity, Privacy & Security*
- *Global Conference Education*
- *Innovation*
- *Interop/HIE*
- *LTPAC*
- *Nursing*
- *Physician*
- *Public Policy*

### **You are the future of health information and technology**

HIMSS Committees focus on strategic constituencies and key industry topics within health information and technology. Committee positions are open to all HIMSS members that meet the general criteria. Other criteria may be required for specific topics.

- 12 Board approved members
- 2 year appointments
- Aug 1, 2018-Jul 31, 2020
- Application period open **now through July 6**

To learn more about and apply to a committee, visit the HIMSS Committee home page at <http://www.himss.org/get-involved/committees>



# C&BI Community Presentation

*Guest Speaker(s)*



*We will take questions at the end of the presentation...*

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*...Please type your questions into the Q&A box.*

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# Insights into Clinical and Business Intelligence at Mayo Clinic

June 21, 2018  
Cris Ross, CIO, Mayo Clinic

# Outline for discussion

- Building Blocks
  - Assuring quality data with Governance
  - Data sources and technologies
- Purposes of analytics
  - Objectives
  - Reporting tools and purposes

# Mayo Clinic Data Governance

- Data governance initiatives include:
  - Data Standards
  - Data Quality
  - High Value Data
  - Master Data Management
  - Metadata Management
  - Terminology Management

# Mayo Clinic Data Governance

- Committees and Workgroups
  - Data Governance Committee
  - Data Stewardship Council
  - Data Standardization and Quality Workgroup
  - Enterprise API and FHIR Steering Group
  - Clinical Concept Glossary Workgroup

# Data Standards

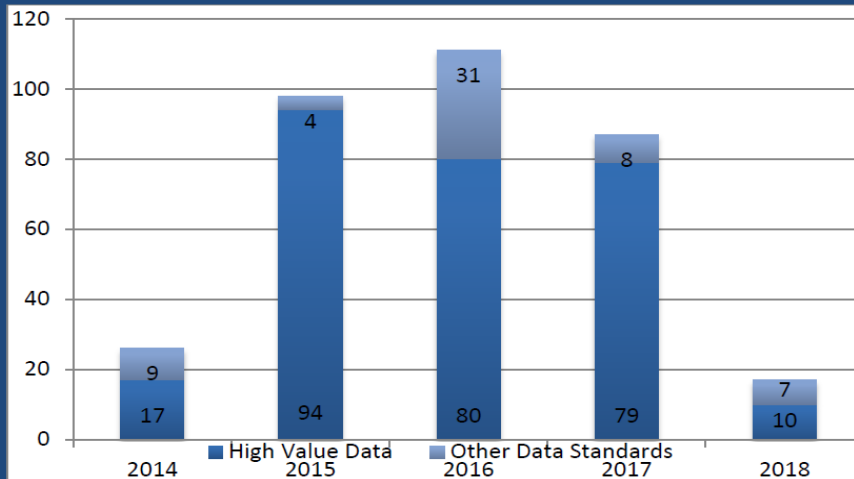
Data standards are supported by a business process, agreed upon by a group of experts, publically vetted across Mayo Clinic, available in an accessible format, and subject to ongoing review and revision processes.



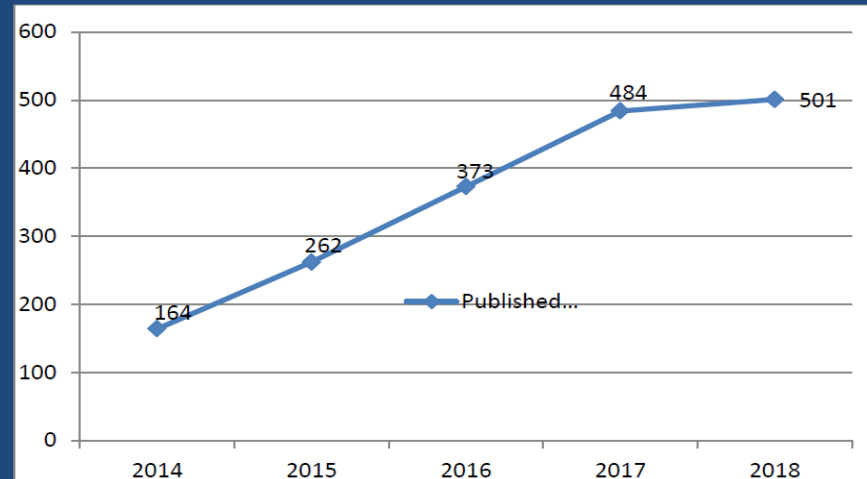
## Mayo Clinic Data Standardization Dashboard

April 2018

Data Governance Approved Data Standards



Approved Data Standards (Cumulative)



# Data Quality

## Six Dimensions of Data Quality – as approved by the Mayo Clinic Data Governance Committee

- **Timeliness** – the data is available in a timely manner determined by the needs of the user and context of the data's use.
- **Uniqueness** – the data is not recorded more than once based upon how the data is defined.
- **Completeness** – the data includes the entire scope of the data collected and reported. Potential limitations are documented.
- **Accuracy** – the data has the correct value(s) and has been validated.
- **Validity** – the data is valid if it conforms to the syntax (format, type, range) of its definition.
- **Consistency** – the data remains the same when comparing two or more representations.

# High Value Data

High Value Data is data that meets the following criteria:

- Essential to our core business
- Supports enterprise analytics
- Used consistently over time
- Supports Mayo Clinic's strategic objectives
- Shared across Mayo Clinic
- Exchanged externally

# Master Data Management

## Master Data

- Master Data is the consistent and uniform set of identifiers and extended attributes that clearly describe the data assets of Mayo Clinic that are critical to be consistently understood and used across a wide range of strategic business processes. Examples of master data at Mayo Clinic are: Identifiers and attributes about patients, non-patient persons, customers, products, materials, suppliers, location and terminologies.

## Master Data Related Business Rules

- Master Data Related Business Rules represent a rule or statement that defines or puts constraints on data or a system and how it is used in a system or displayed in a report.



# Metadata Management



### Narrow Your Search

- All
  - Data Standards
    - Data Governance Approved (0)
  - Data Elements
    - Data Governance Approved (0)
    - UDP Data Topics (0)
  - Business Rules
    - Data Governance Approved (0)
  - Value Sets
    - Data Governance Approved (0)
  - Data Structures
    - Applications (0)
    - Databases (0)
    - Tables (0)
    - Columns (736)
  - Analytics
    - Reports
      - Mayo BOXI - Crystal (0)
      - Mayo BOXI - Webi (0)
      - Epic BOXI - Crystal (0)
      - Epic BOXI - Webi (0)
      - MSBI - SSRS (0)
    - Report Fields
      - Mayo BOXI - Crystal (0)
      - Mayo BOXI - Webi (0)
      - Epic BOXI - Crystal (0)
      - Epic BOXI - Webi (0)
      - MSBI - SSRS (0)

hematocrit

**Search Results: Returning 200 of 739 matches.**   
Sorted By: **Best Match** | [Category](#)

**Name:** [Hematocrit](#)  
**Category:** Columns  
**Sub Category:** Sybase  
**Description:** CREATE VIEW dbo.trnvw\_BMTHarvestCollection (CollectionId,DonorTxEventId,DonorTxEntityTypeCode, UnitNumber,StartTime,StopTime, BMTMaterialType,Volume,NudeatedCellRawCount, MononucleatedPercent,CD34Percent,CD3Percent, ...

**Name:** [Hematocrit](#)  
**Category:** Columns  
**Sub Category:** Sybase  
**Description:** eatedPercent / 100)), 2)) GranulocytesRawCount, convert(numeric(9,2), round(hc.Volume \* hc.Hematocrit / 100, 2)) RBCRawCount, convert(numeric(9,2), round(hc.Volume \* hc.NudeatedCellRawCount \* 0.01 / h...

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**Sub Category:** Sybase  
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**Sub Category:** Sybase  
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# Terminology Management

## Terminology Management

Home » Data Governance » Terminology Management

A significant challenge facing the healthcare community is the ability to efficiently share and use data across clinical care processes, business functions, and systems. To address this challenge, there is an increased emphasis and effort both nationally and within healthcare organizations to develop and adapt standard terminologies.

### Healthcare Terminology Benefits

•Administrative function support (e.g., billing) •Quality improvement and reporting •Analytics and research

•Interoperability of healthcare systems •Clinical decision support •Population Health Management

### Terminology Resources



[Mayo Clinic Data Standards](#)



[Terms Viewer](#)



[Available Terminology](#)



[Release Content](#)



[Mayo Clinic Problem List](#)



[TERMS Implementation FHIR Guide](#)



[Architectural Documents](#)



[Terminology Delivery Services](#)

# Data Governance Committee

## Mayo Clinic Data Governance Committee

### **(Selected) Responsibilities include:**

- ...Develop a culture and discipline of data governance...
- Develop, advance, and sponsor short- and long-range strategies and priorities for data governance...
- ...enforce compliance with approved data standards and policies
- Sponsor the Data Quality program
- Establish policies and principles for an overarching data architecture and supporting infrastructure
- Oversee the development of Standardized Terminology
- ...achieve high levels of data standardization, data quality and resolution to data-related issues
- Develop metrics to monitor Data Governance performance

# Data Sources

- Well-structured data from systems of record
  - EHR, ERP, Lab, etc.
- Data requiring annotation
  - Radiology, Cardiology, etc.
- Data requiring abstraction
  - Notes and narrative
- Data requiring enrichment
  - Streaming data from monitors, derived data targets
- Others...

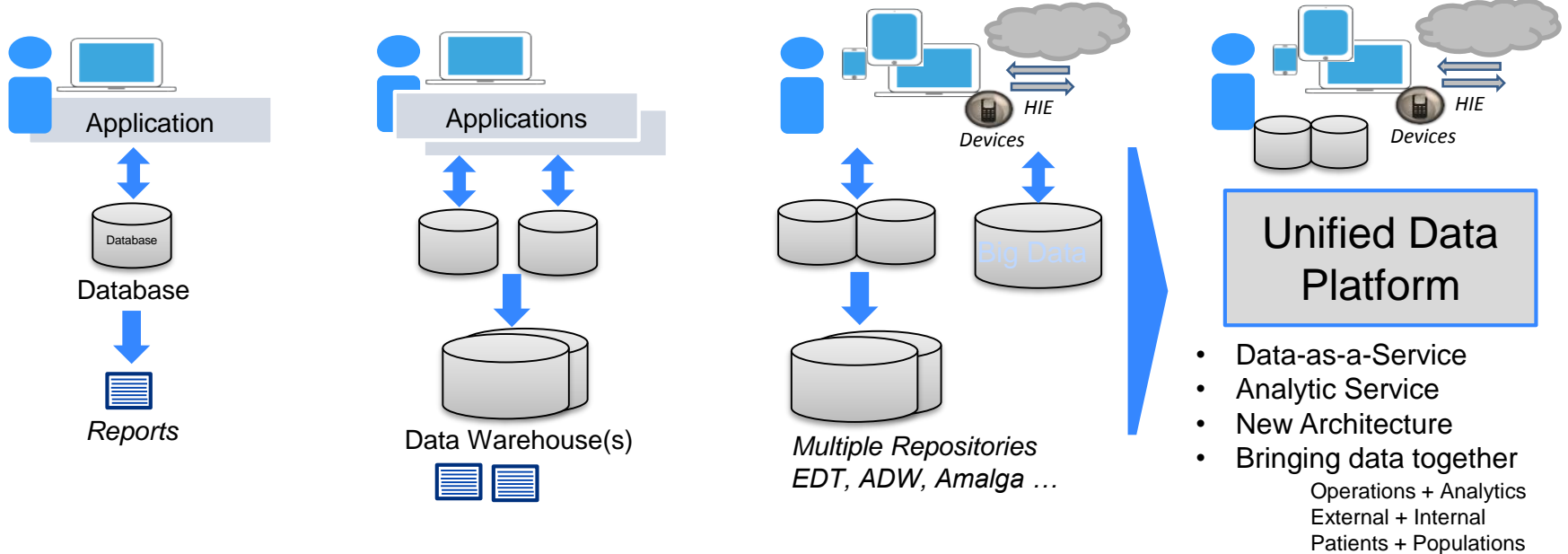
# Evolution of Business Needs and Data

The Practice computerizes  
Paper → Electronic

More automation ...  
Introduction to data  
warehouses

New applications, new devices,  
hosted software, introduction to  
Big Data

Unified Data approach  
begins to advance current  
and strategic goals



- Data-as-a-Service
- Analytic Service
- New Architecture
- Bringing data together
  - Operations + Analytics
  - External + Internal
  - Patients + Populations

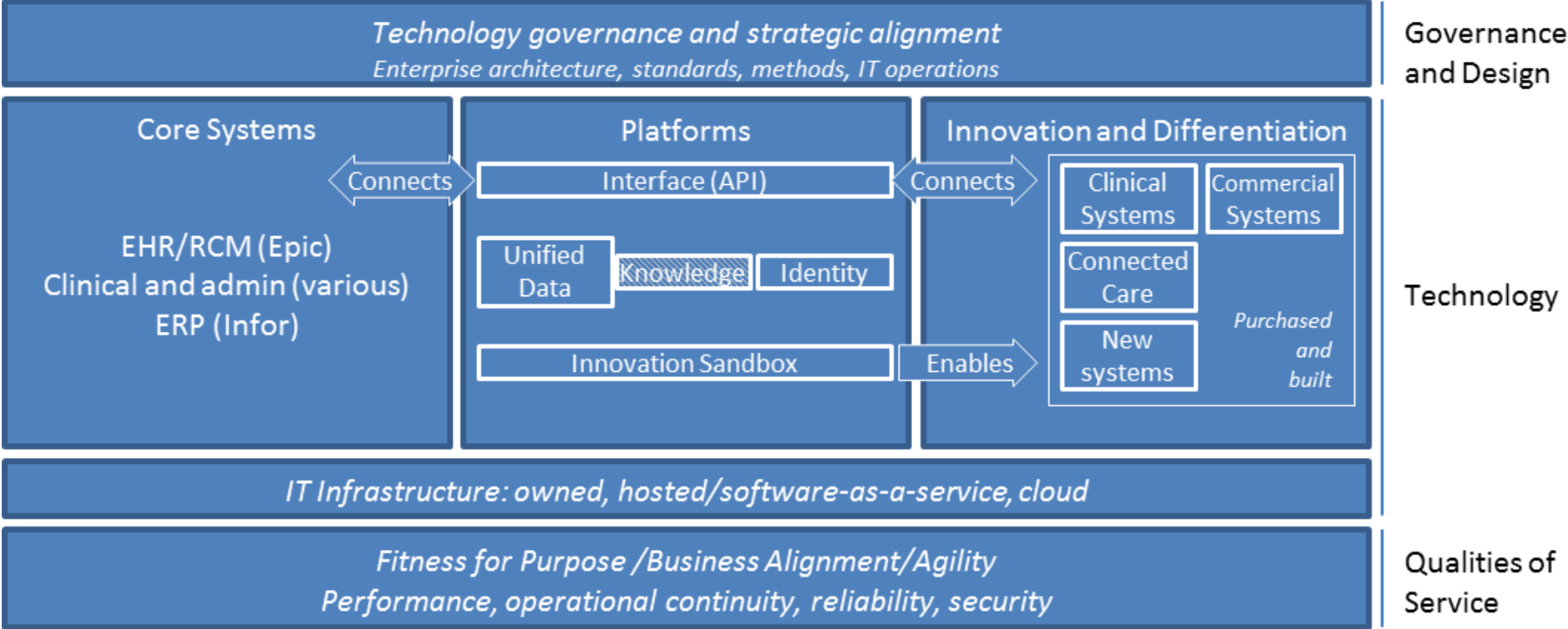
# Unified Data Platform

The Unified Data Platform (UDP) is Mayo Clinic's engine to acquire, enrich, and deliver data.

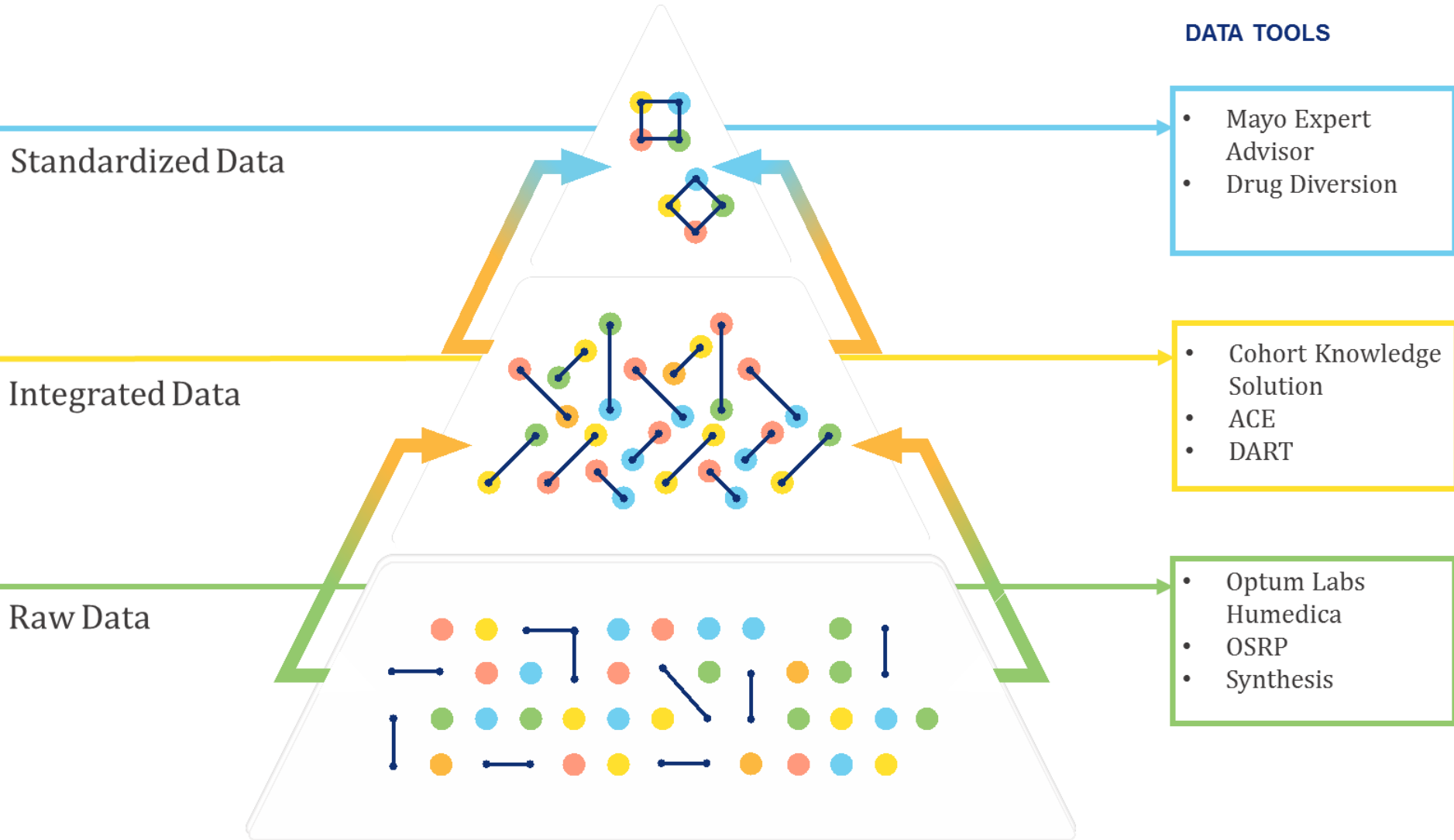
The UDP delivers data using scalable modern technology services for viewing, analytics, and transactions.

1. Unification of data acquisition to support EHR Conversion Historic Data Load, Patient Historic Viewer, and Data Archival
2. Convergence and consolidation of data systems, infrastructure, and technology for data aggregation and data delivery
3. Further Mayo's data capabilities through new data integration and data processing technology for data discovery and enrichment

# Data in Architecture Context



# What data is in UDP?





## UDP-like products

- Provided by EHR vendors: e.g., Cerner HealthIntent, Epic Cognitive Computing Platform, etc.
- Specialty repositories
- Services provided by cloud vendors for ingest, data enrichment, structured and unstructured data technologies

# Purposes of analytics

- Mayo Clinic is an academic medical center whose primary purpose is treating patients: the needs of the patients come first.
- Practice
  - Managing care, providing data for patients and their caregivers, managing populations and cohorts, improving quality, managing services and resources, etc.
- Research
  - Extracting insights from data, acquiring data for research not explicitly required for care (with consent, e.g., Bio Repositories), etc.
- Education
  - Use of data for teaching and training

# Reporting Infrastructure

- Epic
  - 4,935 reports (as of June 12)
  - Slicer Dicer for analysis
- Infor
  - Financial, HR, Supply Chain
- Other system standard transactional reporting
  - Lab, Departmental systems, etc.
- Business Intelligence
  - Self-service tools: Tableau, Microsoft Business Intelligence, SAP Business Objects

# Reporting Tools – examples

- Enterprise
  - Financial Performance – IMPACT
- Financial and Resource Management
  - Financial Statements – INFOR and Business Objects
  - Patient Care Reporting Package – financial, volume, resource and productivity metrics
  - EPSi – cost reporting (commercial application)
- Market Insights

# Reporting Tools - examples continued

- Practice Management
  - Access reporting
  - Professional Performance Profiles (P3) – a dashboard with a visual overview of patient satisfaction, volume of patient visits, resources, productivity and finances.
- Provider Insights
  - Individual and group performance
  - Registry Assist - manages patient cohorts. The user can incorporate non-discrete data (clinical notes) with discrete data for analytical purposes.
- Population Health
- Analyst Tools & Cubes

# Emerging technologies and analytics

- Deeper analytics from petabyte-class data
- Predictive analytics and event-driven processing
- Visualization and simulation
- Machine-assisted abstraction
- Machine learning and artificial intelligence

# Artificial intelligence

Artificial Intelligence (AI) is a branch of computer science which attempts to emulate human problem-solving skills. AI is a branch of computer science that loosely attempts to mimic the intelligence and behavior of human beings.

## AI Technique

Machine Learning (ML)

Deep Learning (DL)

Natural Language Processing (NLP)

Robotic Process Automation (RPA)

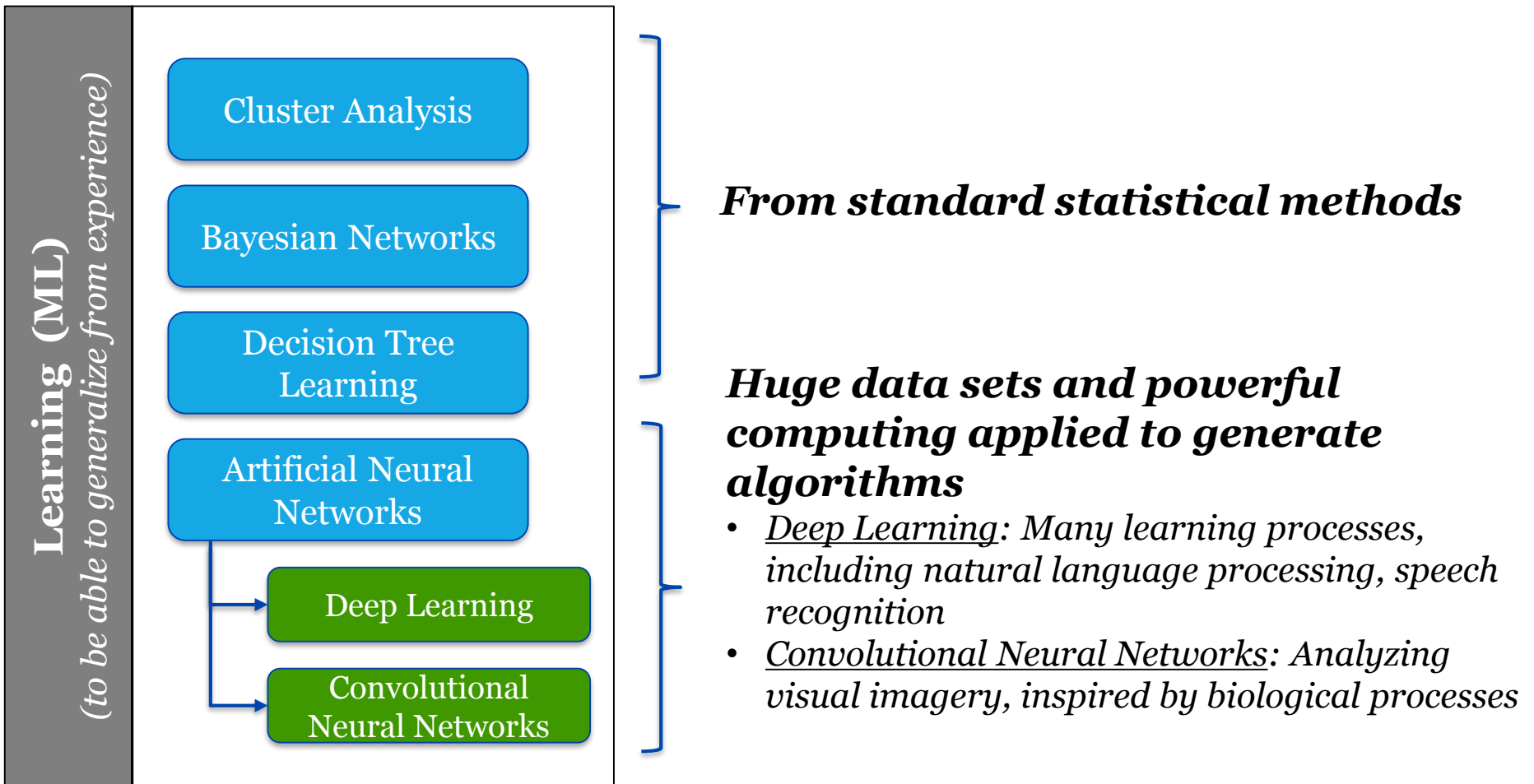
Speech Recognition

Image Recognition

Search

# Machine learning

A very incomplete but instructive map of ML terminology

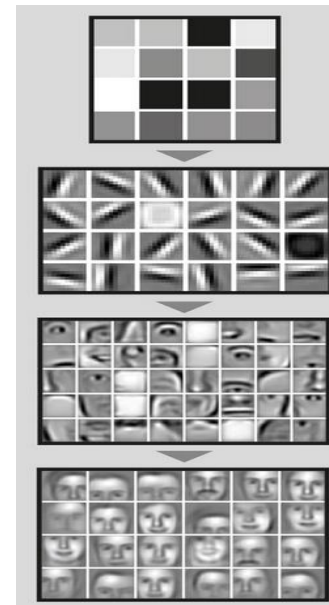
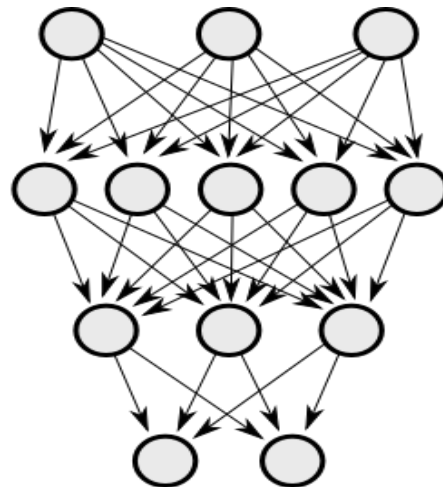




# Deep learning

Deep Learning (DL) is a Machine Learning technique that can learn effective representations of data, especially patterns

***Generic representation of a deep learning model***

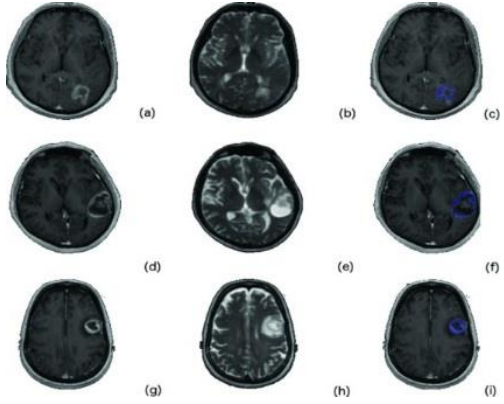


# Examples of AI in medical care

**Medical Physics**  
Current Issue | Authors | Submissions | Advertise | Search

Med Phys. 2016 Jun; 43(6): 2835–2844. PMID: PMC4866963  
Published online 2016 May 13. doi: [10.1118/1.4948668](https://doi.org/10.1118/1.4948668)

## MRI texture features as biomarkers to predict MGMT methylation status in glioblastomas



**nature**  
International journal of science

Letter

## Dermatologist-level classification of skin cancer with deep neural networks

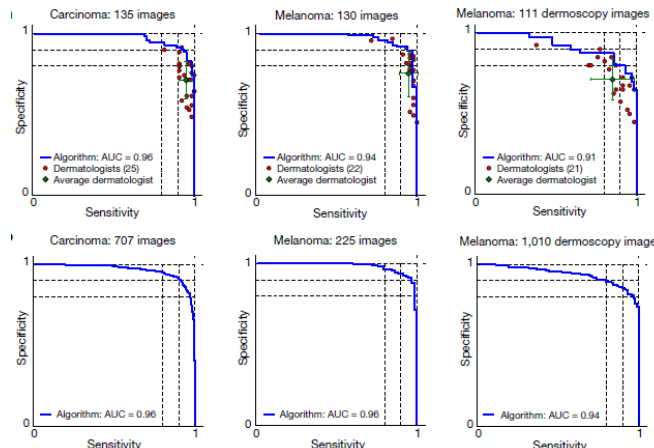


Image Type	Algorithm AUC	Dermatologists (n)	Average Dermatologist AUC
Carcinoma: 135 images	0.96	25	~0.85
Melanoma: 130 images	0.94	22	~0.85
Melanoma: 111 dermoscopy images	0.91	21	~0.85
Carcinoma: 707 images	0.96	-	-
Melanoma: 225 images	0.96	-	-
Melanoma: 1,010 dermoscopy images	0.94	-	-

# AI in healthcare

AI is being used to address problems across the healthcare value chain.

- **Clinical Decision Support**

- Medical Imaging – Pathology and Radiology
- Medical Signal Processing – Cardiology and Neurology
- Genomics
- Population Health + Value-Based Care
- Real-World Evidence / Comparative Effectiveness
- Reducing Medical Error and Improving Patient Outcomes

# AI in healthcare

AI is being used to address problems across the healthcare value chain.

- **Clinical Trials**

- Patient Recruitment
- Patient Monitoring + Safety

- **Hospital Operations**

- Reducing Physician Clerical Burden
- Improving Patient Experience



**“Machines will be capable, within twenty years, of doing any work a man can do.”**

*– Herbert Simon, 1956*



**“In from three to eight years we will have a machine with the general intelligence of an average human being.”**

*– Marvin Minsky, 1966*

# Conclusions

- Well-governed data is foundational
- Modern data management is required
- An arsenal of reporting tools
- Understanding clinical and business objectives for analytics
- Emerging technologies based on machine intelligence

# Questions?

# Wrap-Up / Next Steps

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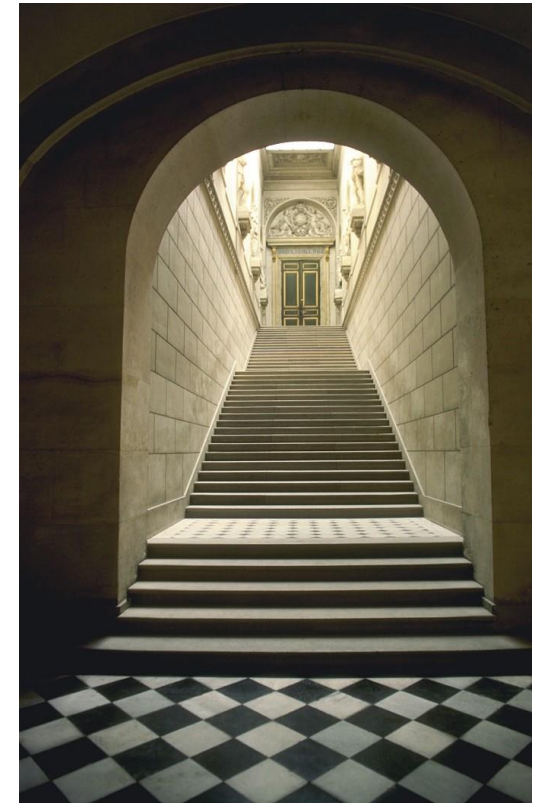
- **Want to get involved?**

- ✓ Topic or Speaker ideas
- ✓ Key Note Presenter
- ✓ Blogger | Tweeting

**Contact  
Shelley Price or  
Joanne Bartley**

- **Community Website**

- ✓ Visit the 'Session Recordings' tab at [www.himss.org/ClinBusIntelCommunity](http://www.himss.org/ClinBusIntelCommunity) for a copy of this or previous presentations





# Wrap-Up / Next Steps

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## Earn CAHIMS & CPHIMS credit!

The HIMSS C&BI Community is pleased to offer webinar attendees up to one continuing education (CE) hour for use in fulfilling the CE requirements of the Certified Professional in Healthcare Information & Management Systems (CPHIMS) and the Certified Associate in Healthcare Information & Management Systems (CAHIMS) programs.

Visit the C&BI Community [website](#) for more information.



# Wrap-Up / Next Steps

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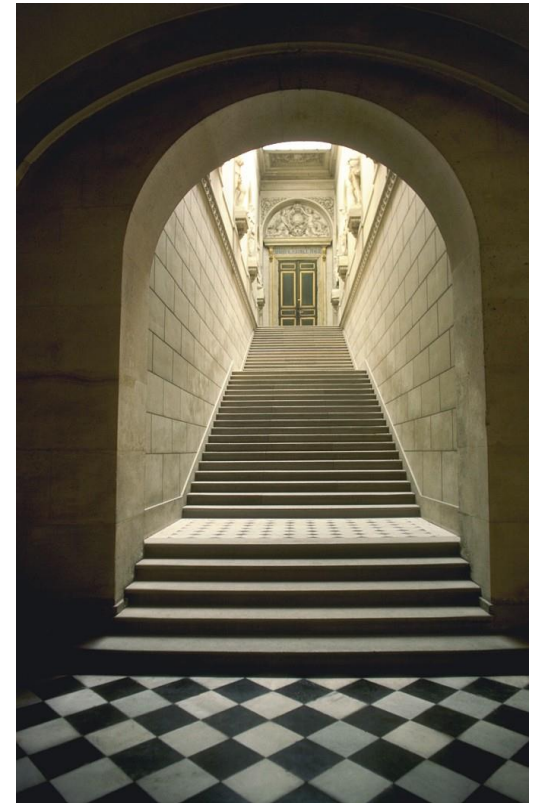
***JOIN US!***

Next meeting: ***Thursday, July 26, 2018***

➤ ***TITLE: TBA***

Speaker(s):

- ❑ **Eyal Zimlichman, MD, CMO/Chief Innovation Officer | Sheba Medical Center, Tel Aviv, Israel**



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# FY18 Leadership & Contact Information

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## Co-Chairs:

Mike Berger, PE, CPHIMS  
Vice President, Population Health Informatics & Data Science  
Mount Sinai Health System  
[michael.berger@mountsinai.org](mailto:michael.berger@mountsinai.org)

Arthur Panov, MPH, CPHIMS  
Chief Architect, Medical Devices and Life Sciences,  
IBM Watson Health  
[apanov@us.ibm.com](mailto:apanov@us.ibm.com)

## HIMSS Community Organizers:

Shelley Price, MS, FHIMSS  
Director, Payer and Life Sciences  
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[sprice@himss.org](mailto:sprice@himss.org) | [@SPriceHIMSS](https://twitter.com/SPriceHIMSS)

Joanne Bartley, CAE  
Manager, Health Business Solutions  
HIMSS  
[jbartley@himss.org](mailto:jbartley@himss.org)

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# Thank you!!!



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# APPENDIX

# About Us: FY2018 C&BI Committee Members



**Ellen Harper, DNP, RN-BC, MBA, FAAN\***  
**FY18 C&BI Committee Chair**

Adjunct Faculty, U of Minnesota School of Nursing  
President, CEO, Blue Water Informatics, LLC



**Mitch Kwiatkowski**  
Sr. Director, Informatics  
Gateway Health



**Claudine Beron, PMP**  
**FY18 C&BI Committee Vice-Chair**

CEO  
Initiate Government Solutions, LLC



**Raj Lakhanpal, MD, FACEP\***

CEO  
Spectramedix



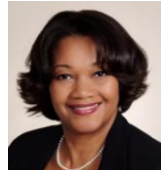
**Meg Broderick, MBA, MPA, CPHIMS\***

Consultant



**Anne Park, MPH, MSMIS\***

Sr. Business Systems Analyst  
MD Anderson Cancer Center



**Sharon Davis, MS, CPHIMS, PMP**

Clinical Programs Manager  
Government Programs - Clinical Operations Solutions  
Team  
Blue Cross Blue Shield of Texas



**Anthony C Villanueva, CPHIMS**

CIO, Vice President of IT/IS  
Neighborhood Health



**Jeff Fuller, MS, FACHE\***

Executive Director, Analytical Solutions  
U of North Carolina (UNC) Healthcare System



**Anthony T. Williams, MBA\***

Chief Information Officer  
American Family Care, Inc.



**Kevin Gormley, PhD, ME**

Principal Data Scientist  
MITRE



**Amber Zimmermann, BSN, MBA, RN-BC**

Sr Manager, Health Data Analytics  
Philips Healthcare

*\* Indicates a returning  
committee member*



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# About Us: FY18 C&BI Community, Task Force, Workgroup Leadership

## Community Co-Chairs



**Mike Berger, PE, CPHIMS**  
Vice President, Population Health  
Informatics and Data Science  
Mount Sinai Health



**Arthur Panov, MPH, CPHIMS**  
Healthcare and Life Sciences Architecture  
IBM Watson Health



## Precision Medicine Workgroup Chair

**BG Jones**  
SVP - Business Development  
PierianDX

## C&BI for Population Health Task Force Co-Chairs



**Marius Petruc, MD, MS**  
President  
Informatics Solutions, LLC



**Michelle Vislosky, M.B.A., FACHE**  
Director of Health System  
Partnerships  
Syapse



# About Us: C&BI Community

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Looking to better leverage clinical & business intelligence tools, technologies, and strategies to help you and your organization meet patient care delivery, clinical and health outcome, and business operation goals? Our community supports activities that promote ***peer-to-peer networking, problem solving, solution sharing, and education.***

HIMSS C&BI Community webinars let members dig into pertinent subjects throughout the year. Our ongoing web-based programs cover topics such as:

- Data aggregation and access through EDW and cloud solutions
- Data management, validation, quality, and integration
- Descriptive, retrospective, predictive, and prescriptive analytics
- Governance – data and program
- Population health management – including attribution and risk stratification
- Precision medicine
- Predictive modeling
- Reporting, dashboards, and visualization techniques
- Resource management
- Skills sets and staffing



# About Us: C&BI Community

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- Open to all HIMSS members (current membership: *approximately 8,300 people*).  
Join the C&BI Community today:
  1. Login into your HIMSS account in the [Member Center](#)
  2. Click the tab "My Involvement" | select "Participation" dropdown
  3. Click on "Edit Participations"
  4. Check the "Clinical & Business Intelligence Community" box
  5. Click "Save"
- Will meet virtually 6 times/year
- Agenda for the meetings may include:
  - News you can use!** New content and events
  - 2-Minute Drills** presented by various Community members
  - Topical discussion** with key note presenter



## The '2-Minute Drill'

is based loosely on the sports analogy, and in this case is a fast-paced (short in length) presentation on a hot, emerging, or timely topic, news event (e.g. research paper, game-changing market or technology news), or recent and relevant event (e.g., federal public meeting, legislative/federal/judicial news, critical conference or educational event).

2-Minute Drills foster greater peer-to-peer networking, member engagement, problem solving, solution sharing, and education. If you are interested in presenting any drills,

**please contact Shelley Price.**

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# About Us: Task Force

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## C&BI for Population Health Task Force

**CO-CHAIR: Marius Petruc, MD, MS** | President | Informatics Solutions, LLC

**CO-CHAIR: Michelle Vislosky, MBA, FACHE** | Director of Health System Partnerships  
| Syapse

This group creates resources and tools that employ practical guidance and unbiased information to help healthcare organizations (providers, hospitals, integrated delivery networks, health plans and other stakeholders) use C&BI to harness, use and analyze data captured in the healthcare setting to execute population health management initiatives and improve care and health outcomes.

***Meeting times:*** 3<sup>rd</sup> Tuesday of the month, 4:00-5:00pm ET