

“I See Data People”

Data Analytics in Rural Health

Ryan Sandefer, MA, CPHIT

David Marc, PhD, CHDA

Rachel Hendrickson, RHIA



The College of
St. Scholastica

Agenda

- Current state of health data analytics in a rural setting
- Driving change with data analytics
- Challenges to adoption
- Leveraging free tools and public data
- Case study: How rural healthcare can use data effectively!

A realistic black hole visualization showing a bright, glowing accretion disk with a dark central shadow, surrounded by a complex, multi-colored ring of light. The text 'EHR' is overlaid in the center in a bold, yellow, outlined font.

EHR

"Realistic black hole in the interstellar movie" by Oliver James, Eugénie von Tunzelmann, Paul Franklin and Kip S Thorne - Gravitational lensing by spinning black holes in astrophysics, and in the movie Interstellar. Licensed under CC BY 3.0 via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:Realistic_black_hole_in_the_interstellar_movie.jpg#/media/File:Realistic_black_hole_in_the_interstellar_movie.jpg

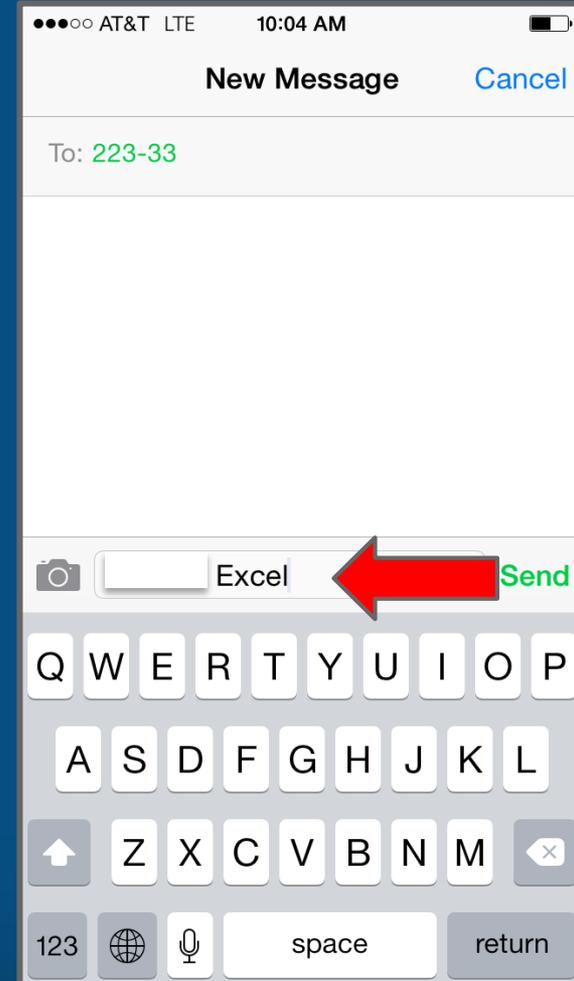
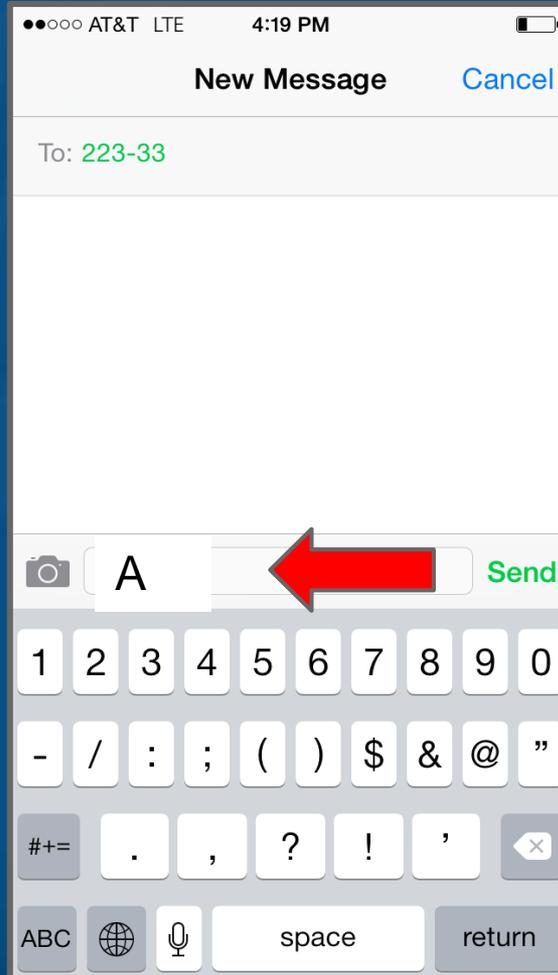
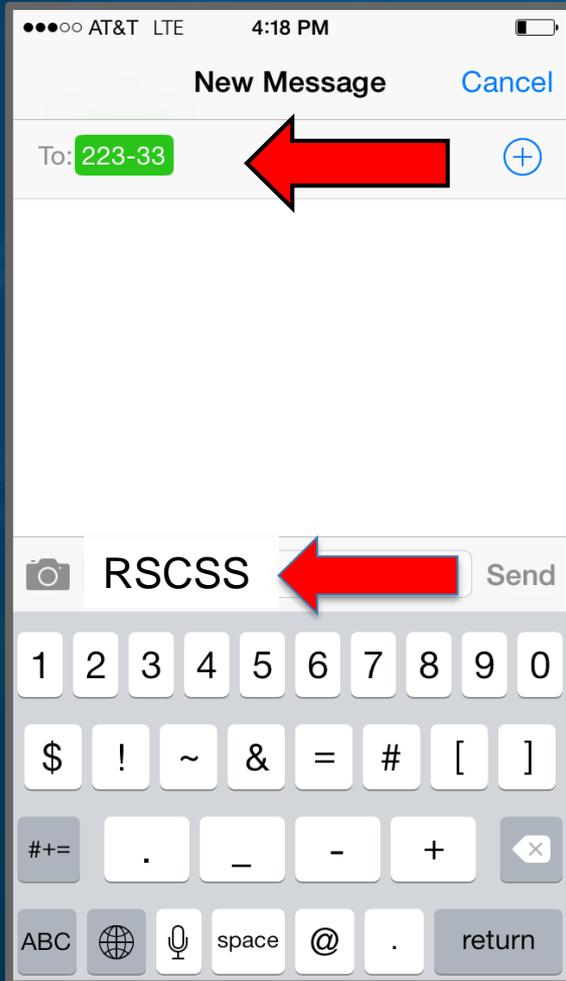


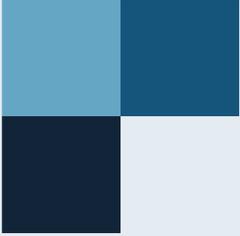
Time to Wake Up... This Session is Interactive!

For the duration of this presentation,
please have your cell phones available.
You will be asked to use them.

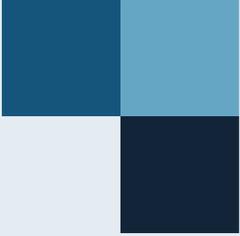


Here's How It Works!





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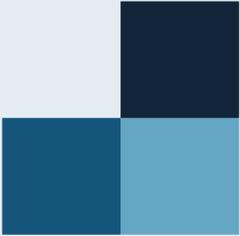
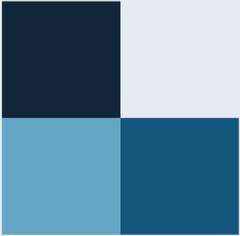
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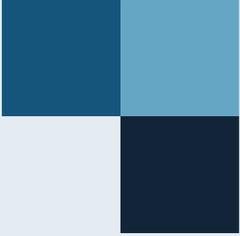
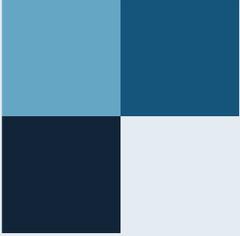
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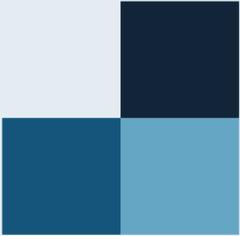
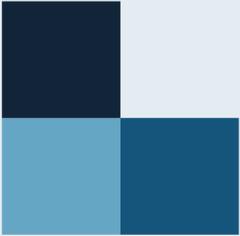
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Defining Data Analytics

- Examination of data with the purpose of drawing conclusions about that information.
- Data analytics is used in many industries to allow companies and organizations to make better decisions and in the sciences to verify or disprove existing models or theories.

Data analysis

The task of transforming, summarizing, or modeling data to allow the user to make meaningful conclusions



Analytics in Healthcare

Analytics: The Nervous System of IT-Enabled Healthcare

The healthcare industry is moving from volume-based reimbursement to value-based reimbursement that is designed to achieve higher quality, lower costs, and a better patient experience.

To succeed, healthcare providers are forming accountable care organizations (ACOs) and restructuring their care delivery systems.

Collecting the Data

80%

of electronic health information

is said to be unstructured. Clinical data, to put it mildly is full of holes.

Clinical Intelligence (CI)

30%

of US hospitals

use a clinical data warehouse/mining solution, according to HIMSS Analytics.

Business Intelligence (BI)

33%

of healthcare organizations use BI tools

BENEFITS INCLUDE:

1. More cost-effective operations
2. Quality improvement.
3. Patient Satisfaction
4. Labor Costs

Performance Evaluation

YEAR
2015

eligible professionals and hospitals

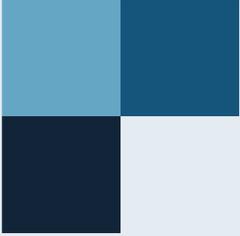
under the Medicare EHR incentive programs will face payment reductions if they do not meet the MU requirements, according to the Federal Health IT Strategic Plan

**Beyond 2015:
Transformed Health Care**

1. Enhanced ability to study care delivery payment systems
2. Empowered individuals increased transparency

Health Data Analytics in a Rural Setting

- **Data analytics needs are similar in urban and rural settings**
 - **Revenue (multiple payment models)**
 - **Quality**
 - **Program evaluation**
 - **Risk**



Your poll will show here

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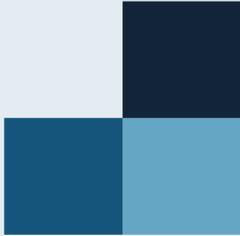
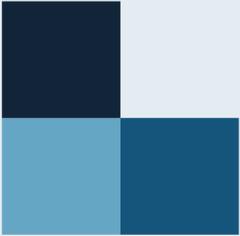
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or

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Health Data Analytics in a Rural Setting – Challenges

- **Particular difficulty with:**
 - Retaining IT staff
 - Health IT Implementation
 - Hardware and infrastructure

Hook, Grant, and Samarth, Health Information Technology and Health Information Exchange Implementation in Rural and Underserved Areas: Findings from the AHRQ Health IT Portfolio; Daphne, “Critical Access: The Need to Connect. Connecting Midsize Hospitals to Rural Critical Access Hospitals Is Important to the Growth of Both--but There Are Things Larger Hospitals Need to Know.”; Bahensky et al., “HIT Implementation in Critical Access Hospitals: Extent of Implementation and Business Strategies Supporting IT Use”; Lake, Collins Higgins, and Ginsburg, “Fostering Health Information Technology in Small Physician Practices: Lessons from Independent Practice Associations.”

Health Data Analytics in a Rural Setting – Challenges

...rural and critical access facilities want to adopt data analytics to support population health management, but they lack adequate resources and expertise, and face a large learning curve.

...At the National Rural Health Association meeting this past February, there was wide consensus among members that they needed to move to analytics.



The screenshot shows a news article from HealthData Management. The title is "Rural hospitals moving to ACO model see need for analytics". The author is Joseph Goedert, published on March 04, 2016, at 2:37pm EST. The article discusses the challenges rural hospitals face in adopting data analytics for population health management, mentioning a meeting at HIMSS16 and the need for standardized reporting.

HealthData Management All Sections ▾

Rural hospitals moving to ACO model see need for analytics

By **Joseph Goedert**
Published **March 04 2016, 2:37pm EST**

More in
Data analytics
Healthcare analytics
Predictive analytics

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Like other hospitals across the nation, rural and critical access facilities want to adopt data analytics to support population health management, but they lack adequate resources and expertise, and face a large learning curve.

But the desire is there, said Tim Jarm, CEO at Alliant Management Services, a small hospital management company serving 16 facilities in five states, during an interview at HIMSS16. At the National Rural Health Association meeting this past February, there was wide consensus among members that they needed to move to analytics.



Three of Alliant Management's hospitals already are in an accountable care organization, with most of the rest getting entering such arrangements in May. In the past two years, Alliant helped the facilities aggregate data to get ready for analytics, but because the hospitals use five different information systems, more help was needed to manage the data and turn it into actionable information.

The hospitals turned to the analytics platform of Sentry Data Systems, but over time with the urgencies of daily work, the platform wasn't being used. So Alliant Management took over the project through an outsourcing arrangement and now uses the platform to compile 10 basic reports that are customized for each hospital, Jarm said. They include revenue



Challenges to Adoption

- People
- Access to data
- Access to software
- Training
- Time!

It looks like you're doing data analytics.

Would you like help?

- Get help with data analytics
- Proceed without help
- Don't show me this tip again



Data Analytics Process

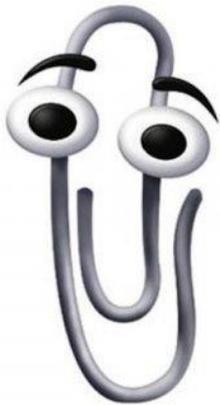
1. Get data
2. Develop questions
3. Prepare the data
4. Normalize the data
5. Transform the data
6. Summarize the data
7. Visualize the data
8. Develop Conclusions

Cool! It looks like you're developing a list. Can I help?

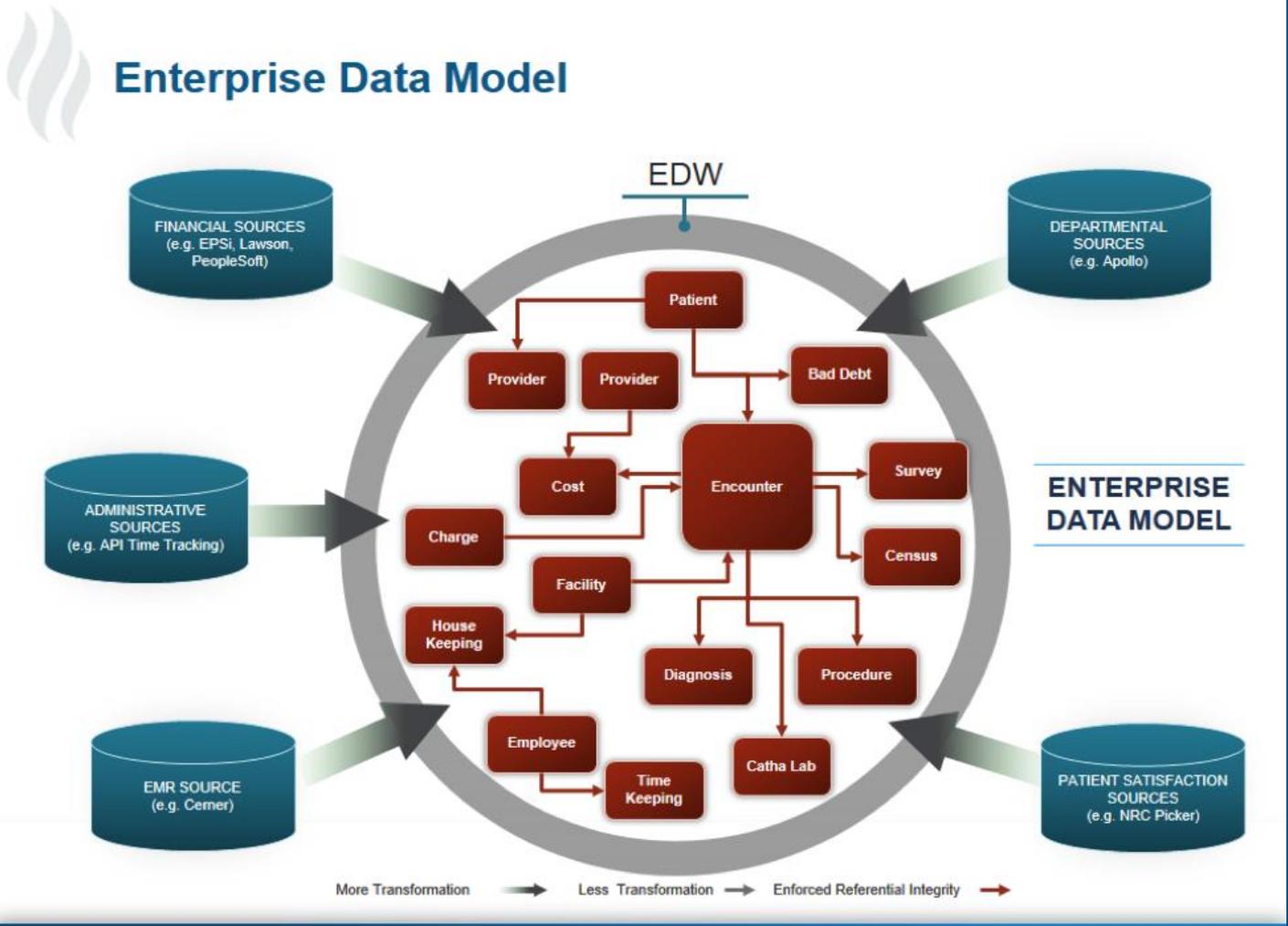


Where do we start?

It looks like you need some data ...

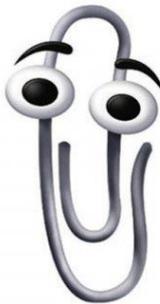


Get the data!



We have the data...now what?

- We need software



It looks like you have some data. Now what?

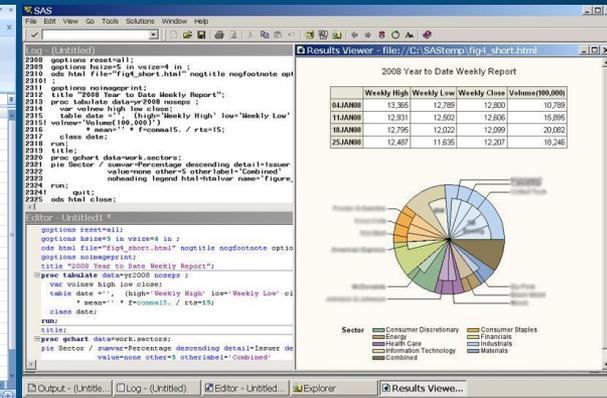
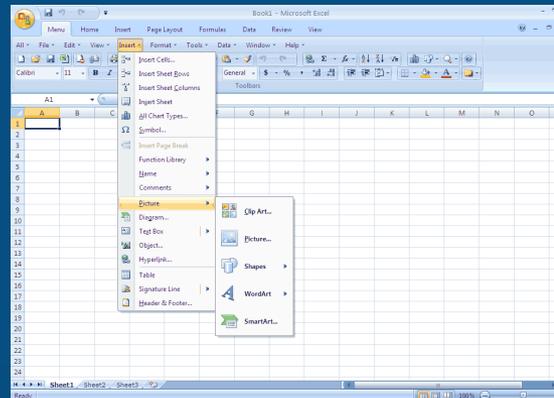
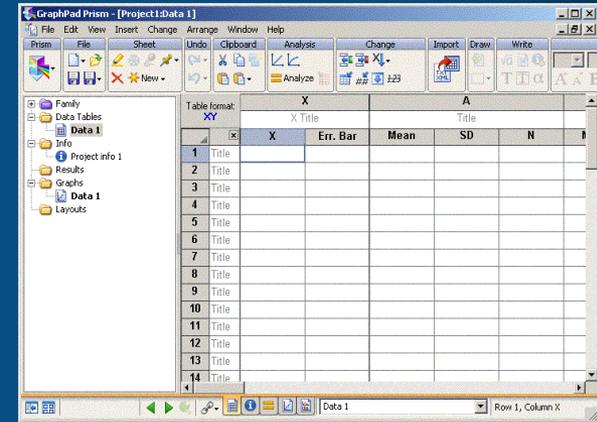
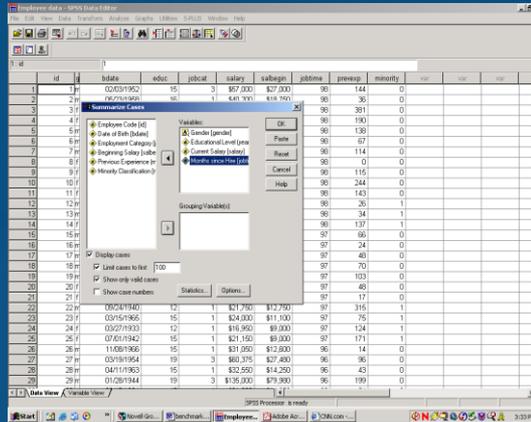
Licensed Software

SPSS → most applicable for psychological research

Prism → most applicable for biological research

Excel → better spreadsheet than stats software

SAS → very powerful, versatile, expensive, and widely accepted

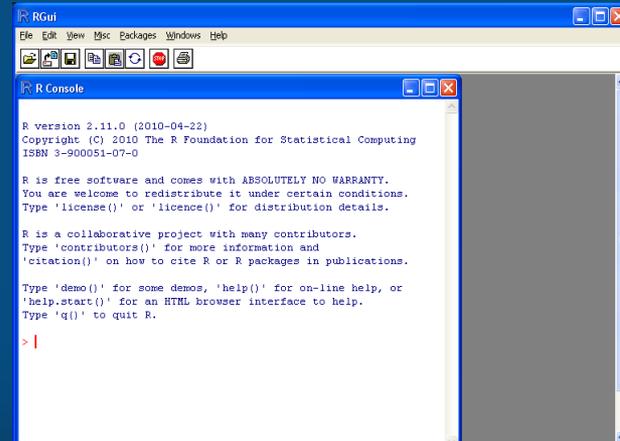
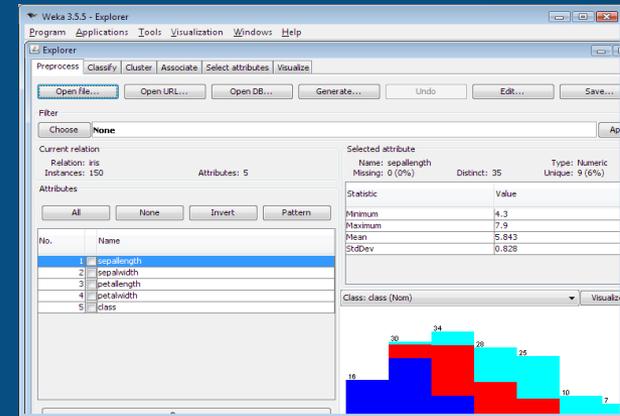
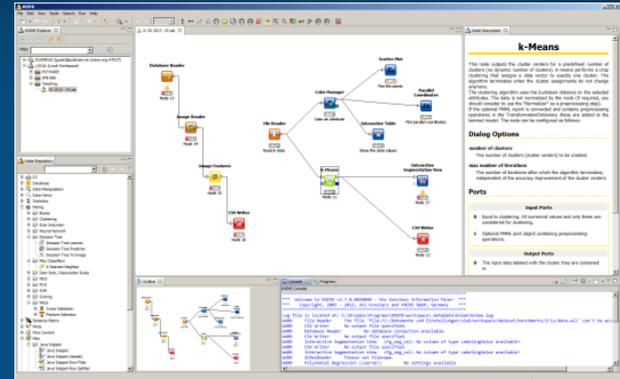


Free Software

KNIME → free, intuitive data mining

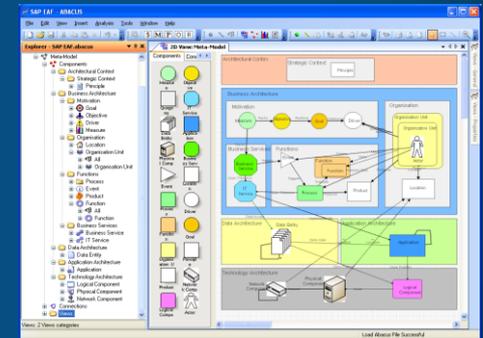
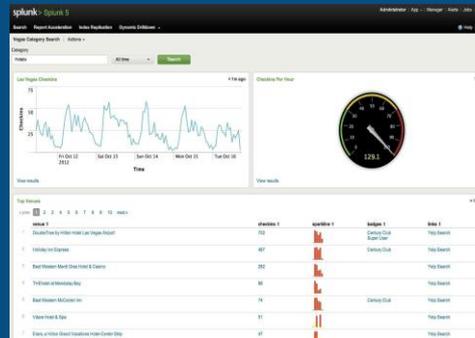
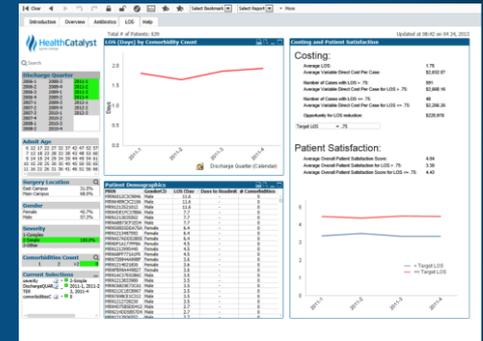
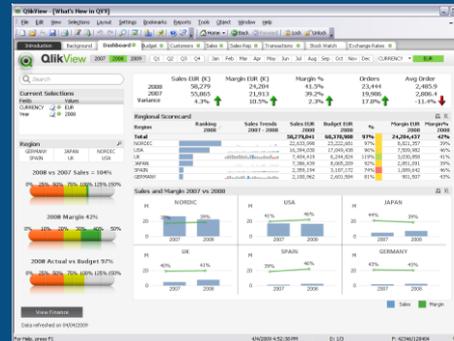
Weka → free data mining software, more difficult to learn

R → powerful, versatile open-source analytics platform



Enterprise Data Warehousing and Analytics

- QlikView
- HealthCatalyst
- Splunk
- SAS Enterprise
- SAP
- Many more...



The Open-Source Option

- Free to distribute
- Source code is available
- Software can be modified by anyone
- Must be technology neutral
- For more information see:

<http://opensource.org/definition>

- **R**
 - Statistics and visualization
 - <http://www.r-project.org>
- **Hadoop**
 - Supports parallel processing
 - <http://hadoop.apache.org>
- **Augustus**
 - Deploys statistical models under the PMML language
 - <https://code.google.com/p/augustus/>

What does your analytics platform need to do?

- Data manipulation
- Statistics
 - Descriptive statistics
 - Hypothesis testing
 - Data mining
- Visualization
 - Exploratory data analysis



What do analysts need?

- The correct infrastructure is needed to support data **collection**, **integration** and **transformation** to establish a strong foundation that supports the types of **analytics** that can lead to real change

Analyzing the data

- How?
 - Think of this at different levels and consider organizational needs
 - Descriptive stats
 - Distribution, center, spread, outliers
 - Inferential statistics
 - T-tests, ANOVA, linear regressions, Wilcoxin ranked-sum
 - Data mining
 - Neural networks, decision trees, random forest, k-means clustering

Workforce Needs

- **Survey of Minnesota and North Dakota healthcare organizations**
 - 1. Top Barrier to Analytics: Workforce**
 - 2. Greatest Skills Gap: Analytic Software Knowledge**
 - 3. 64% of respondents reported training and developing current employees to obtain analytics experience**

Training Options

- **Formal Academic Training, e.g. data science and predictive analytics**
- **Vendor Training, e.g. EHR or analytics platform training**
- **Workshops, e.g. data visualization**
- **Web Tutorials**

Hands-on Web Resources



CHAPTER 1

Try R

In this first chapter, we'll cover basic R expressions. We'll start simple, with numbers, strings, and true/false values. Then we'll show you how to store those values in variables, and how to pass them to functions. We'll show you how to get help on functions when you're stuck. Finally we'll load an R script in from a file.

Let's get started!

Try R is Sponsored By:



Complete to
Unlock

Expressions 1.1

Type anything at the prompt, and R will evaluate it and print the answer.

Let's try some simple math. Type the below command.

[Or, if you prefer, click on the command and it will be typed into the console for you!]

```
1 + 1
```

```
> 1+1
[1] 2
> █
```

Type the string "Arr, matey!". (Don't forget the quotes!)

```
> "Arr, matey!"
[1] "Arr, matey!"
```



<http://tryr.codeschool.com/>

Web-Resources

Healthcare Data Analytics Portal

Healthcare data is being generated at an unprecedented rate and meaningful use of EHRs is integrally linked to this trend. This portal provides tools and resources aimed to assist healthcare organizations gain maximum value from their EHR data related to meaningful use and beyond.

Understand | **Collect** | **Analyze**

An introduction to data analytics, meaningful use, and data governance. | An introduction to the principles of data management and clinical quality measures. | An introduction to data analysis techniques and methods for using analytics for change.

Overview

Meaningful use is an initiative requiring the use of certified electronic health record (EHR) technology to:

- Improve quality, safety, efficiency, and reduce health disparities
- Engage patients and family
- Improve care coordination, and population and public health
- Maintain privacy and security of patient health information

The goal of the program is to improve outcomes, empower patients, and produce more research through technology adoption, data collection, and information analysis and use. Thus, analytics is a central component of achieving the goals of meaningful use.

Tools and Resources

Browse all of the resources in the portal using the [Resources List](#) >

Meaningful Use and Data Analytics

An overview of the Meaningful Use program and the role of data analytics.

[KHA REACH- Meaningful use and data analytics.pdf](#)

Data Analytics Toolkit- Meaningful Use and Data Analytics

Who is Eligible?

Eligible Professionals:

- Doctors of medicine or osteopathy
- Doctors of dental surgery or dental medicine
- Doctors of podiatry
- Doctors of optometry
- Doctors of chiropractic
- Midwives*
- Nurse practitioners*
- Some PAs*

* Only eligible for Medicaid incentive

REACH - Achieving meaningful use of your EHR

Tools and Resources

User Guide for Meaningful Use

Source: CMS

This guide can help eligible hospitals navigate the online attestation module for submitting Meaningful Use measures to CMS.

Medical Informatics Resources

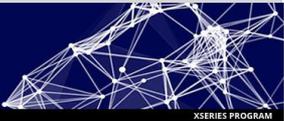
Source: University of West Florida

The University of West Florida developed a resource that offers information on medical informatics related topics.

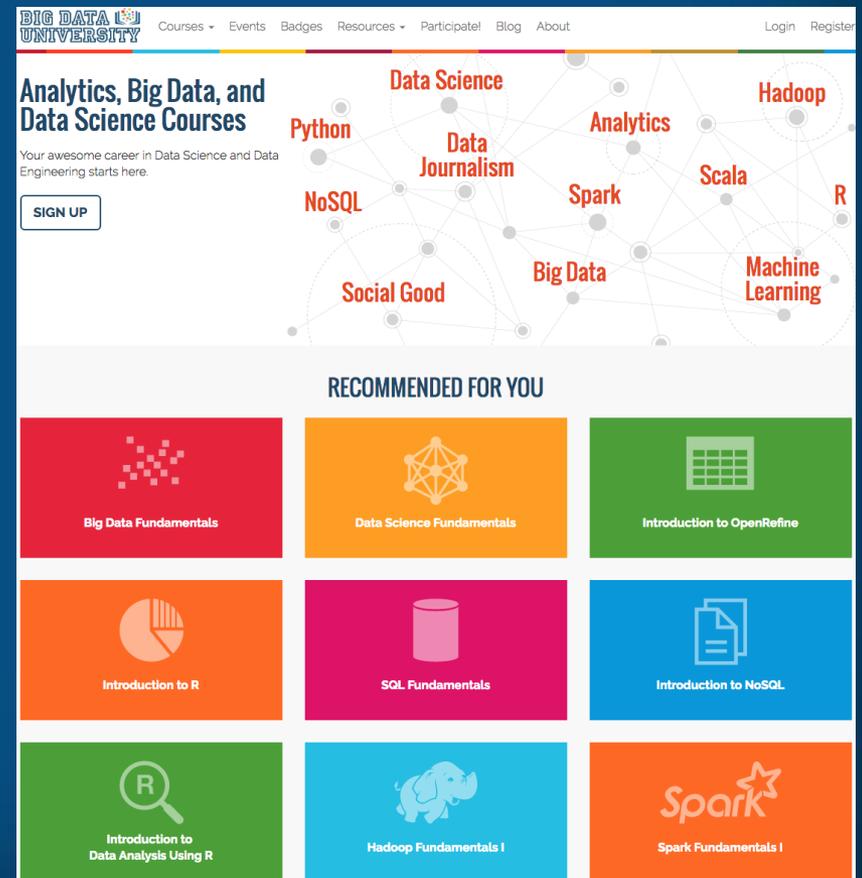
<http://css.edu/academics/school-of-health-sciences/undergraduate-areas-of-study/health-information-management/healthcare-data-analytics-portal.html>

Free Courses/MOOCs

<https://www.edx.org/course/subject/data-analysis-statistics/>

 <p>Data Science and Analytics in Context Learn the foundations of statistical thinking, the power of machine learning, and enabling</p> <p>ColumbiaX Current</p>	 <p>Data Science and Engineering with Apache Spark Learn how to use Spark.</p> <p>UC BerkeleyX Current</p>	 <p>Genomics Data Analysis Learn advanced techniques to analyze genomics data using open source software,</p> <p>HarvardX Current</p>
 <p>Analyzing and Visualizing Data with Excel</p> <p>Microsoft DAT206x Current Starts: May 30, 2016 - Self-Paced</p>	 <p>Analyzing and Visualizing Data with Power BI</p> <p>Microsoft DAT207x Current Starts: May 30, 2016 - Self-Paced</p>	 <p>Preparing for the AP* Statistics Exam</p> <p>Tennessee Board of Regents STATx Starting Soon Starts: June 6, 2016 - Self-Paced</p>
 <p>Marketing Analytics: Marketing Measurement Strategy</p> <p>UC BerkeleyX BUSADM466.1x Starting Soon Starts: June 7, 2016</p>	 <p>Introduction to Python for Data Science</p> <p>Microsoft DAT208x Starting Soon Starts: June 13, 2016 - Self-Paced</p>	 <p>Introduction to R for Data Science</p> <p>Microsoft DAT204x Starting Soon Starts: June 13, 2016 - Self-Paced</p>

<http://bigdatauniversity.com/>



The screenshot shows the Big Data University website. The top navigation bar includes 'Courses', 'Events', 'Badges', 'Resources', 'Participate!', 'Blog', 'About', 'Login', and 'Register'. The main content area features a network diagram with nodes for 'Data Science', 'Analytics', 'Hadoop', 'Python', 'Data Journalism', 'NoSQL', 'Spark', 'Scala', 'R', 'Social Good', 'Big Data', and 'Machine Learning'. Below this is a 'RECOMMENDED FOR YOU' section with a grid of course cards:

- Big Data Fundamentals
- Data Science Fundamentals
- Introduction to OpenRefine
- Introduction to R
- SQL Fundamentals
- Introduction to NoSQL
- Introduction to Data Analysis Using R
- Hadoop Fundamentals I
- Spark Fundamentals I

Determine What Drives Data Analytics in Your Organization

- **Big data isn't just for big organizations**
- **What drives data analytics?**
 - **Demanding reporting needs**
 - **Unique patient populations**
 - **Data quality**
 - **Health information exchange (HIE)**
 - **Care coordination**

Identify & Understand your Data

- **Take inventory of the data in your organization**
- **Metadata matters**
 - How is it generated?
 - How it is managed?
 - Where is it stored?
 - What is the purpose?
 - Do data standards apply?
 - Is the data reported?

Build a Data Infrastructure that Supports Data Analytics

- **Data infrastructure should support high quality data capture**
- **Data capture impacts analytical capabilities**
- **Consider access and availability**
- **Leverage existing technology**

Utilize Data Analytics Tools

- **It's OK to start with the basics**
- **Microsoft Excel**
 - **Meaningful Use**
- **You don't have to be a data expert to analyze data**

Take Action

- **Make data analytics a priority**
- **Use analytics to make your data “actionable”**
- **Allow data analytics to support and drive decision making**
 - **Determine risks**
 - **Identify opportunities**
 - **Validate costs and benefits**
 - **Drive growth and innovation**

Contact Us

Ryan Sandefer, MA, CPHIT

rsandefe@css.edu

(218) 625-4931

David Marc, PhD, CHDA

dmarc@css.edu

(218) 625-4892

Rachel Hendrickson, RHIA

RHendrickson@cloquethospital.com

(218) 878-7019