NATIONAL CENTER for INTERPROFESSIONAL PRACTICE and EDUCATION

July 28, 2018

Help! What Do I Do With My Data? Defining, Finding and Using Data to Support Your Interprofessional Program or Project

National Center for Interprofessional Practice and Education
Knowledge Generation Team

The National Center for Interprofessional Practice and Education is supported by the Josiah Macy Jr. Foundation, the Robert Wood Johnson Foundation, the Gordon and Betty Moore Foundation, The John A. Hartford Foundation and the University of Minnesota. The National Center was founded with support from a Health Resources and Services Administration Cooperative Agreement Award No.UE5HP25067.

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Physicians: The National Center for Interprofessional Practice and Education designates this live activity for a maximum of **4** *AMA PRA Category 1 Credits*™.

Physician Assistants: The American Academy of Physician Assistants (AAPA) accepts credit from organizations accredited by the ACCME.

Nurses: Participants will be awarded up to **4** contact hours of credit for attendance at this workshop.

Nurse Practitioners: The American Academy of Nurse Practitioners Certification Program (AANPCP) accepts credit from organizations accredited by the ACCME and ANCC.

Pharmacists: This activity is approved for **4** contact hours (.15 CEU) UAN: **JA4008105-0000-18-073-L04-P**

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Connie Delaney and Ahmad AbuSalah

do not have a vested interest in or affiliation with any corporate organization offering financial support for this interprofessional continuing education activity, or any affiliation with a commercial interest whose philosophy could potentially bias their presentation.

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All workshop participants:

- Scan your badge barcode or sign in to each workshop
- Complete workshop evaluations (paper) and end-of-Summit evaluation (electronic)

Those who purchase CE credit:

- MUST sign in to receive credit
- Will be sent a certificate after the Summit

****If you would like CE credit but have not purchased it, see Registration

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Agenda

12:00-12:15 pm	Welcome and Introductions
12:15-12:45 pm	What is Interprofessional Informatics? What Are Your Data Questions?
12:45-1:15 pm	Data Processing Cycle
1:15-1:45 pm	Data Visualization
1:45-2:00 pm	Break
2:00-2:45 pm	Collaborative Work Session: Addressing Your Data Questions
2:45-3:00 pm	What You've Learned: Large Group Debrief
3:00-3:20 pm	Overview of National Center IPE Core Data Set
3:20-3:45 pm	National Center IPE Information Exchange
3:45 – 4:00 pm	Closing Comments and Next Steps

Learning Objectives

- Introduce key concepts in interprofessional informatics and how they can be used to support interprofessional practice and education programs and projects
- Describe how data can be used to answer questions and support decision-making about interprofessional education and collaborative practice in clinical and community environments
- Discover potential applications of big data for your local interprofessional program and project by showcasing National Center and other exemplars and working through participant examples

A little bit about the National Center: The Nexus

Creating a deeply connected, integrated learning system to transform education and care together

NEXUS

National Center Strategic Areas of Focus

LEADING
WITH PURPOSE

LEARNING
WITH PURPOSE

ADVANCING
WITH PURPOSE

SHARING
WITH PURPOSE

What is interprofessional informatics?

What are your data questions?

Health Informatics - Definition

Also called health care informatics, healthcare informatics, medical informatics, nursing informatics, clinical informatics, or biomedical informatics

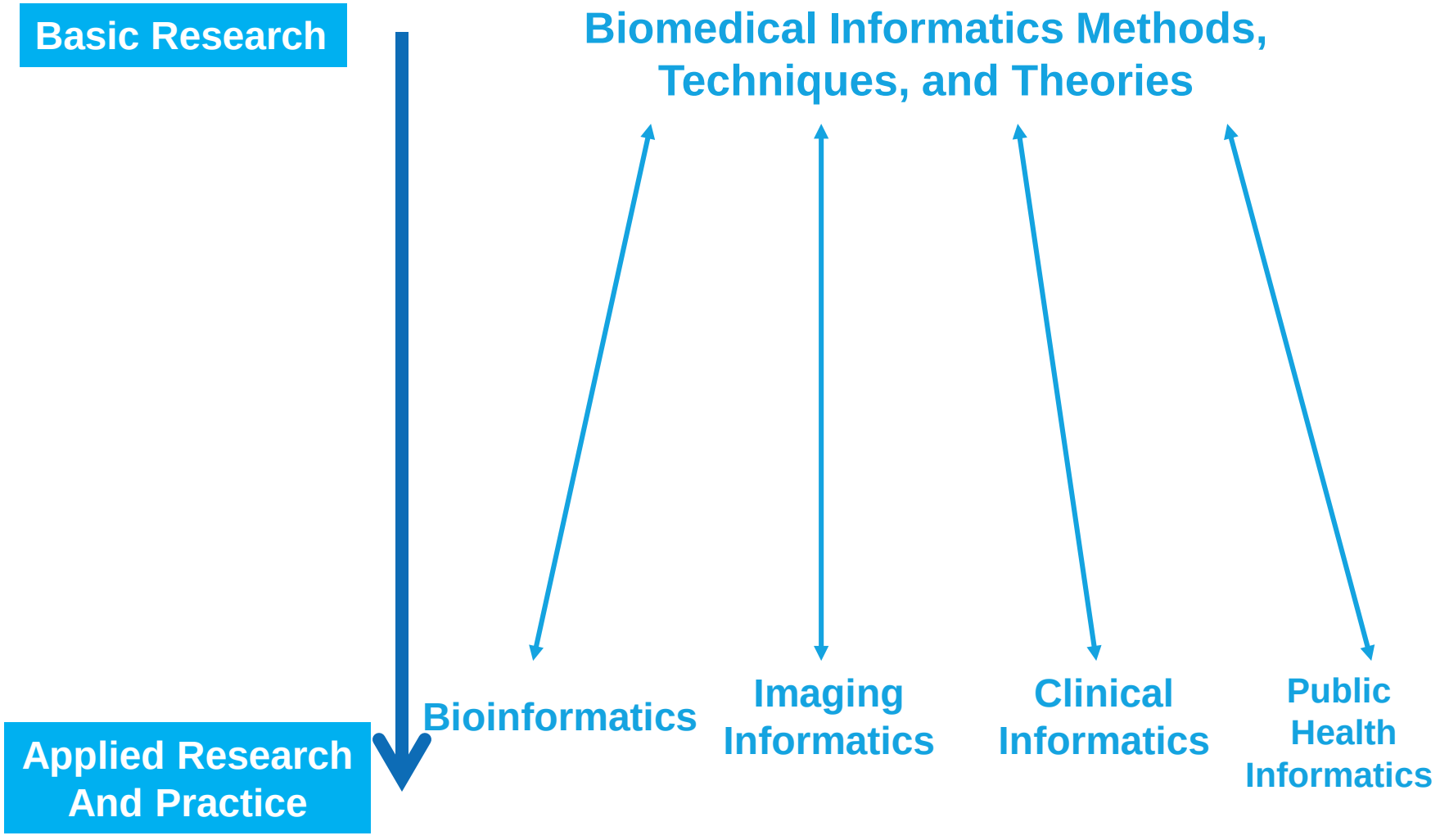
- The NLM (nlm.nih.gov) defines health informatics as "the interdisciplinary study of the design, development, adoption and application of IT-based innovations in healthcare services delivery, management and planning".
  - It deals with the resources, devices, and methods required to optimize the acquisition, storage, retrieval, and use of information in health and biomedicine.
  - Health informatics tools include computers, clinical guidelines, formal medical terminologies, and information and communication systems, amongst others.
  - It is applied to the areas of nursing, clinical medicine, dentistry, pharmacy, public health, occupational therapy, physical therapy, biomedical research, and alternative medicine, all of which are designed to improve the overall of effectiveness of patient care delivery by ensuring that the data generated is of a high quality.
- The disciplines involved include information science, computer science, social science, behavioral science, management science, and others.

Interprofessional Informatics

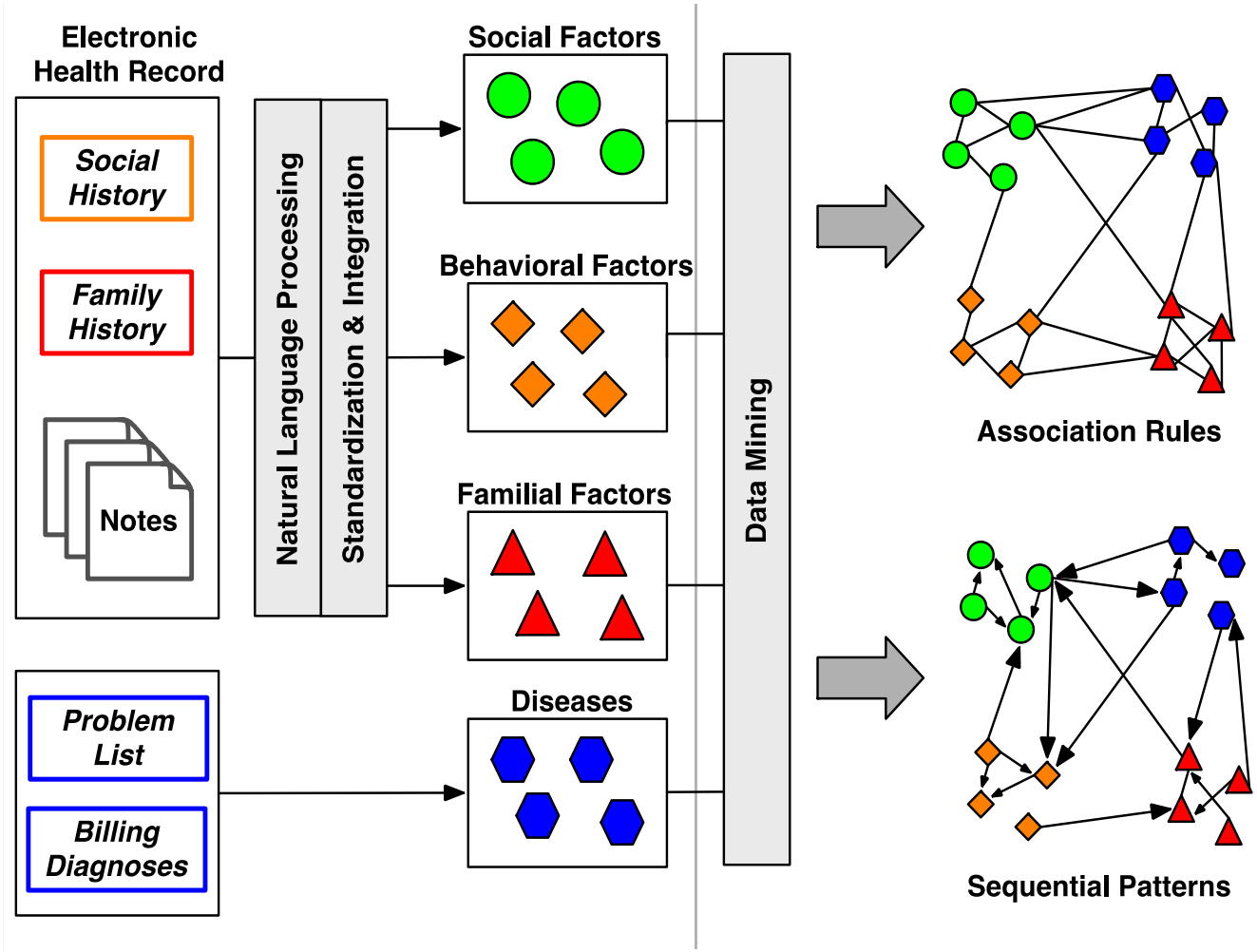
https://www.amia.org/about-amia/science-informatics

- **Scope and Breadth of Biomedical Informatics**: investigates and supports reasoning, modeling, simulation, experimentation and translation across the spectrum from molecules to individuals to populations, from biological to social systems, bridging basic and clinical research and practice, and the healthcare enterprise.
- **Theory and Methodology**: develops, studies, and applies theories, methods, and processes for the generation, storage, retrieval, use, management, and sharing of biomedical data, information, and knowledge.
- **Technological Approach**: builds on and contributes to computer, telecommunication, and information sciences and technologies, emphasizing their application in biomedicine.
- **Human and Social Context**: recognizes that people are the ultimate users of biomedical information, and so draws upon the social and behavioral sciences to inform the design and evaluation of technical solutions, policies, and the evolution of economic, ethical, social, educational, and organizational systems.

Informatics in Perspective



Understanding Associations Between Behavioral, Social, and Familial Factors, and Disease



(1R01LM011364-01 NIH/NLM Chen/Melton)

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WHAT'S ON YOUR MIND?

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WHAT'S ON YOUR MIND? QUESTIONS YOU ARE TRYING TO ANSWER…

- DOES A 1.5 CREDIT COURSE RESULT IN CHANGES IN STUDENT ATTITUDES TOWARDS WORKING IN TEAMS?
- DO TRAINEES SHOW IMPROVED SKILL IN A PRE-DEFINED AREA?
- HOW WELL DO DIFFERENT PROFESSIONS WORK TOGETHER FOR THE SAFETY AND HEALTH OF THE PATIENT?
- IS THIS MODEL AN EFFECTIVE WAY TO DELIVER INTERPROFESSIONAL HEALTHCARE TRAINING?
- DOES OUR MODEL OF INTERPROFESSIONAL CARE IMPROVE PATIENT HEALTH OUTCOMES?
- WHAT ARE THE HEALTH TRENDS AND NEEDS IN A LOCAL HOMELESS POPULATION?

WHAT'S ON YOUR MIND?
TYPES OF DATA YOU ARE WORKING WITH…

- MORE THAN 1000 SURVEY RESPONSES WITH CATEGORICAL DATA
- HARD COPY SURVEYS WITH RAW DATA
- PATIENT MEDICAL RECORD DATA IN EXCEL SPREADSHEETS
- SURVEY RESPONSE DATA IN REDCAP
- COST, PRODUCTIVITY AND STAFF SATISFACTION DATA
- QUALITATIVE INTERVIEW DATA

WHAT'S ON YOUR MIND?
DATA CHALLENGES YOU ANTICIPATE…

- HUMAN ERROR WITH DATA ENTRY
- CONVERTING DATA BETWEEN SYSTEMS (REDCAP, CANVAS, EXCEL)
- TRANSCRIPTION OF QUALITATIVE INTERVIEW DATA AND OBSERVATION SCORING SHEETS
- CREATIVE APPROACHES TO DATA VISUALIZATION
- DATA MANAGEMENT PRINCIPLES FOR DATA SETS THAT HAVE CHANGED ACROSS YEARS
- DEVELOPING DATA SETS FOR SECONDARY RESEARCH AND QI

Other Common Data Questions…

- How do I determine what data to measure?
- Is my data considered a standardized measure?
- What standardized data can I access in the information systems?
- How do I get the data out of the information systems?
- What story can I tell with my data?
- How can my data help me locally?

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DATA PROCESSING CYCLE

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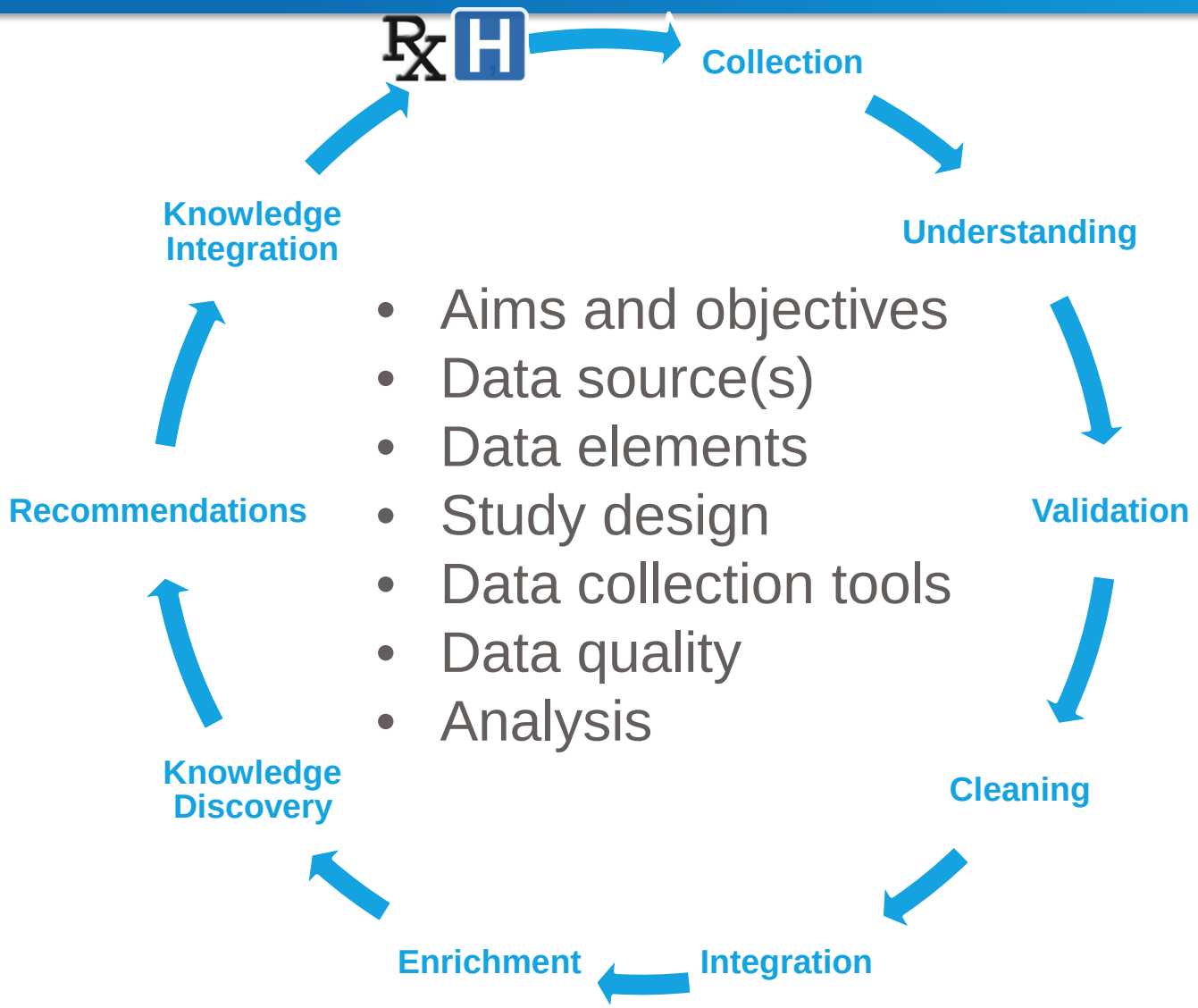
Data Processing



Before you start:

- Think Automation and Standardization
- Reduce (eliminate if possible) manual data entry
- Consult local informatics teams

Key Points

- **Data Collection**
  - Data sources: EMR, Claims, Survey, Cost
  - Structured vs. Unstructured data
  - RedCap, EPIC, etc.

- **Data Quality Management:**
  - Data values, Business Logic and workflows
  - Defining meaningful/valid/correct values [e.g. PB values]

- **Data Integration & Codeset Management**
  - Billing: ICD9/10, CPT. Clinical: SNOMED, HL7, LOINC, RxNorm, NDC
  - Is it 1:1 Mapping? Are the mappings clearly defined? Code Updates

- **Define your “Window of Interest”:**
  - Consider specific codes or related codes as well. (Small n problem)
  - Hard to define: Full Encounter or Episode of Care (insurance)
  - E.g. Find all complications following a certain surgical procedure?

- **Regulations**
  - HIPPA || IRB || Office of Compliance || Office of General Council || Data Security
  - NIST: National Institute of Standards and Technology

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DATA VISUALIZATION:

DISCOVERING THE POWER OF VISUALIZATION USING DATA FROM THE REAL WORLD

Special thanks to Karen A. Monsen, PhD, RN, FAAN
University of Minnesota School of Nursing

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Acknowledgments

- University of Minnesota Center for Nursing Informatics
- Omaha System Partnership
- Omaha System Data Collaborative
- Hennepin County Medical Center Informatics Team
- Fairview Home Care and Hospice
- Minnesota Department of Health Early Hearing Detection and Intervention Program
- Omaha System Icons Study
- Earl E. Bakken Center for Spirituality and Healing
- CaringBridge
- Home Care and Hospice Data Agencies/Clinicians
- David Pieczkiewicz, Era Kim, & all co-authors & funders

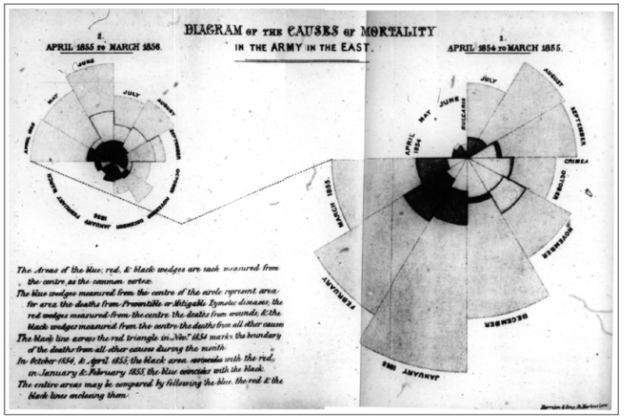
Visualization Mandate

- Massive amounts of EHR and health-related data are being generated
- Within the data are hidden patterns in health and healthcare that can inform policy and practice
- Visualization is a key strategy for pattern discovery in large datasets

Visualization Happy: Your Brain on Pictures

- Brains prefer pictures to numbers or words
  - Brains are wired to interpret the world visually
  - Brains process visual cues in .25 seconds
  - Brains make rapid connections between new visual information and stored information
    - https://www.columnfivemedia.com/why-your-brain-loves-visual-content-infographic

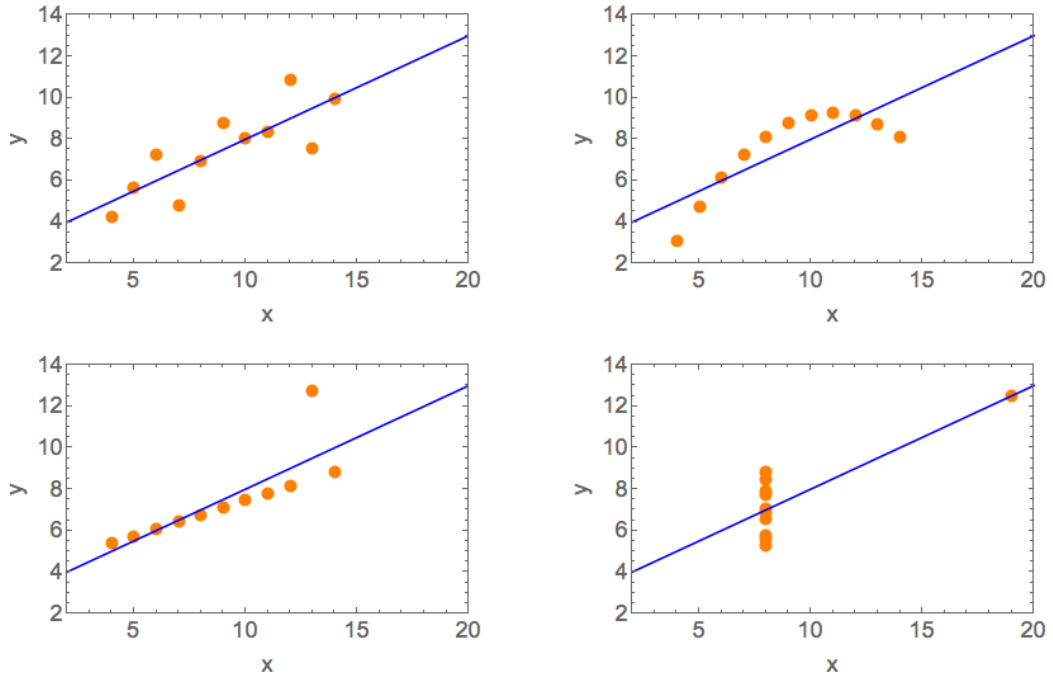
- Florence Nightingale knew this



Monsen, K.A., Peterson, J. J. , Mathiason, M. A., Kim, E., Lee, S., Chi, C. L., Pieczkiewicz, D. S. (2015). Data visualization techniques to showcase nursing care quality. Computers, Informatics, Nursing, 33(10), 417-426. doi: 10/1097/CIN.000000000000190

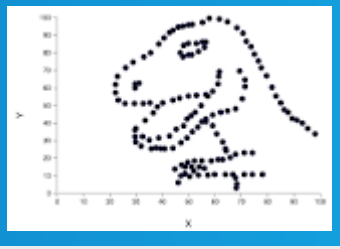
Visualization Better Understanding: Anscombe's Quartet

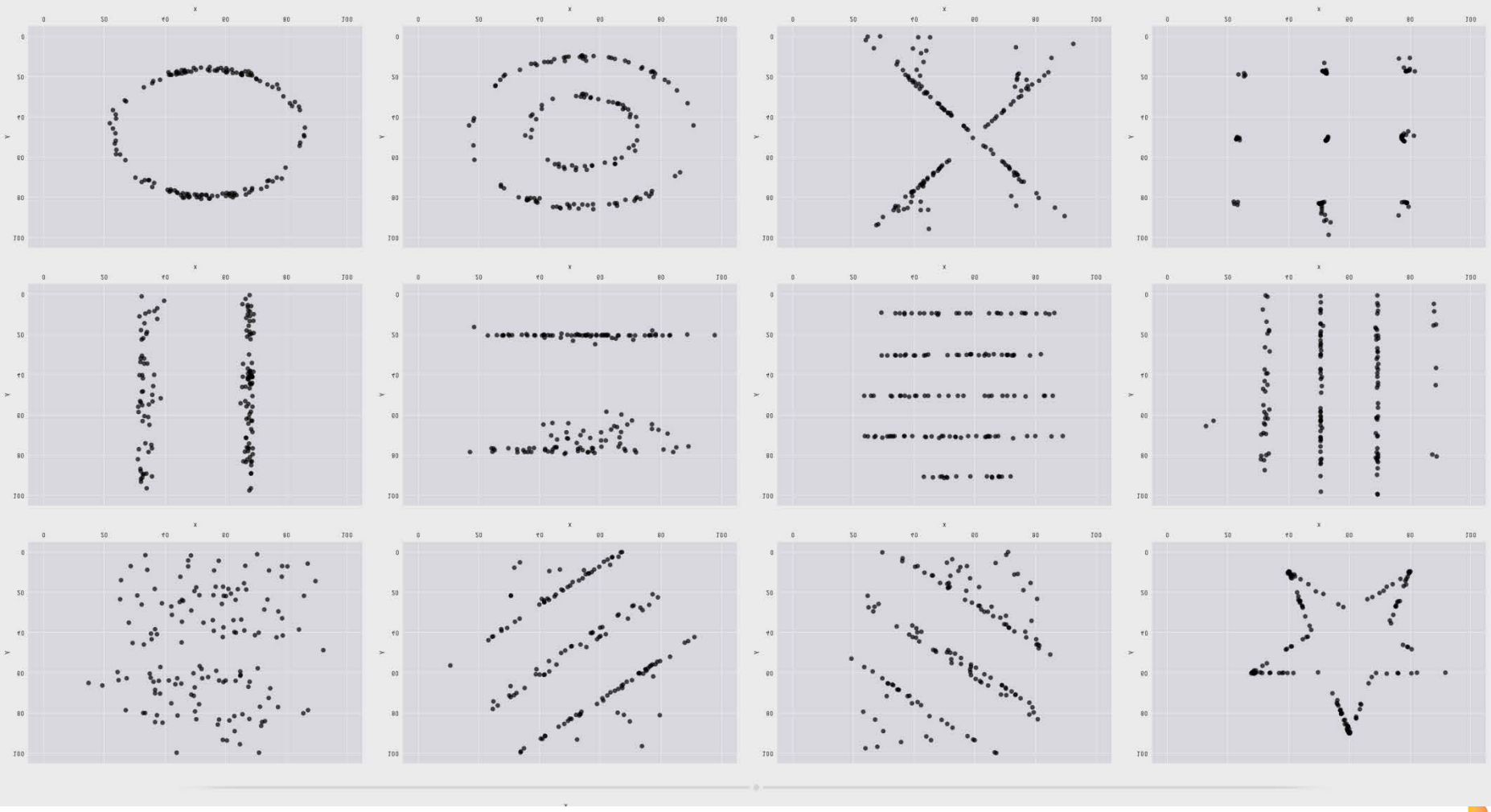
- Four sets of data that have the same means, variances, correlation, and linear fit.



Anscombe, F. J. (1973). "Graphs in Statistical Analysis". American Statistician. 27 (1): 17–21.

Datasaurus Dozen

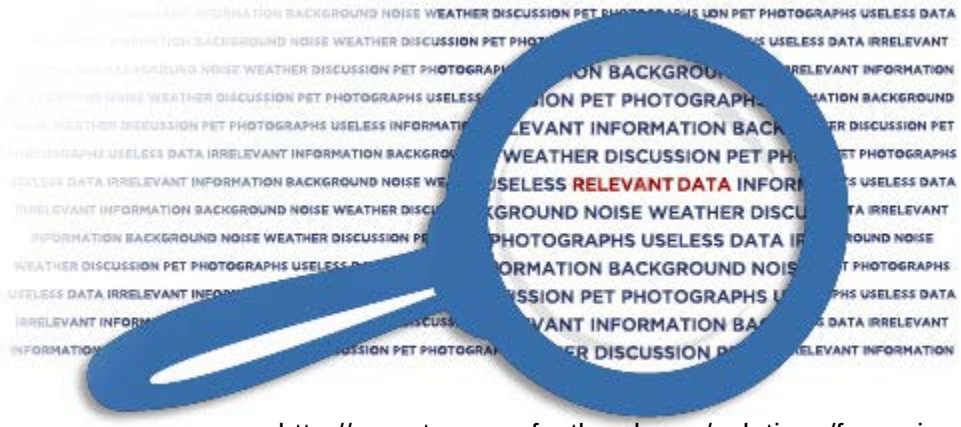




"never trust summary statistics alone; always visualize your data“ – Alberto Cairo https://www.autodeskresearch.com/publications/samestats

Create Meaningful Displays and Find Patterns

- Make data interpretable in real time
- Or make data interpretable for research
- Uncover new associations
- Generate hypotheses for further testing



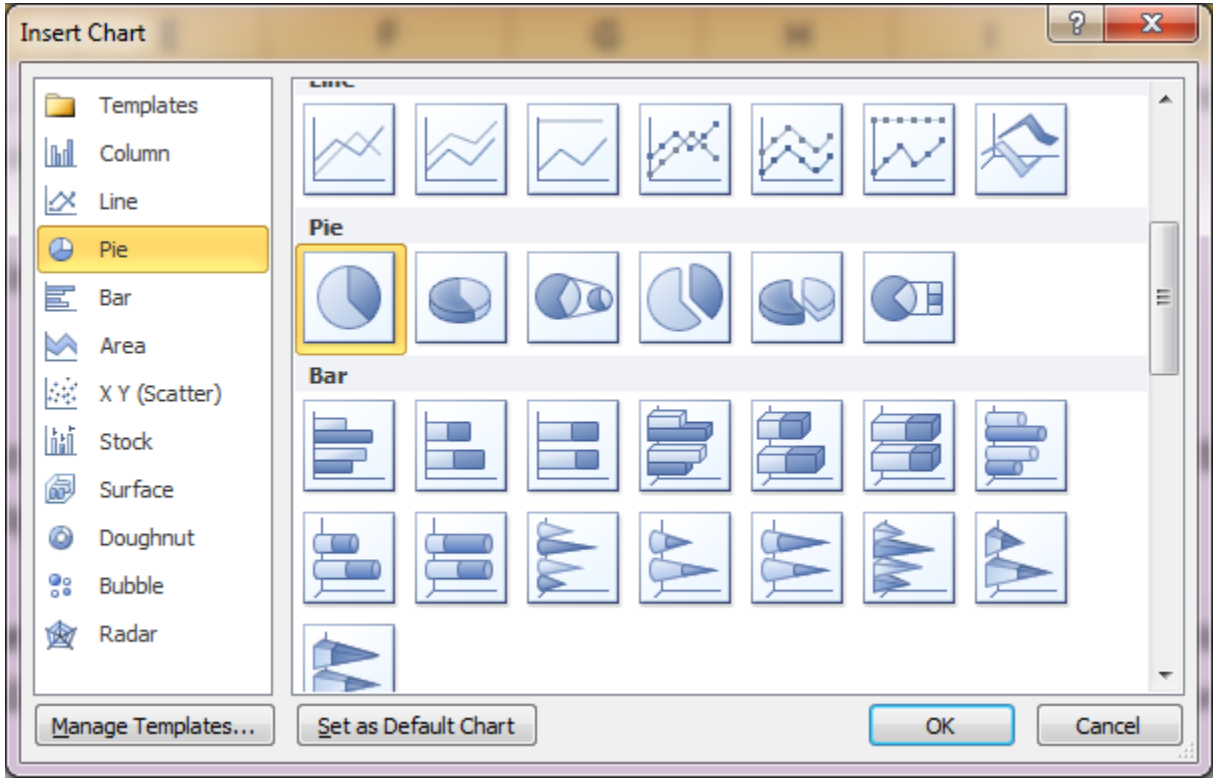
http://www.transperfectlegal.com/solutions/forensic

Data for Visualization

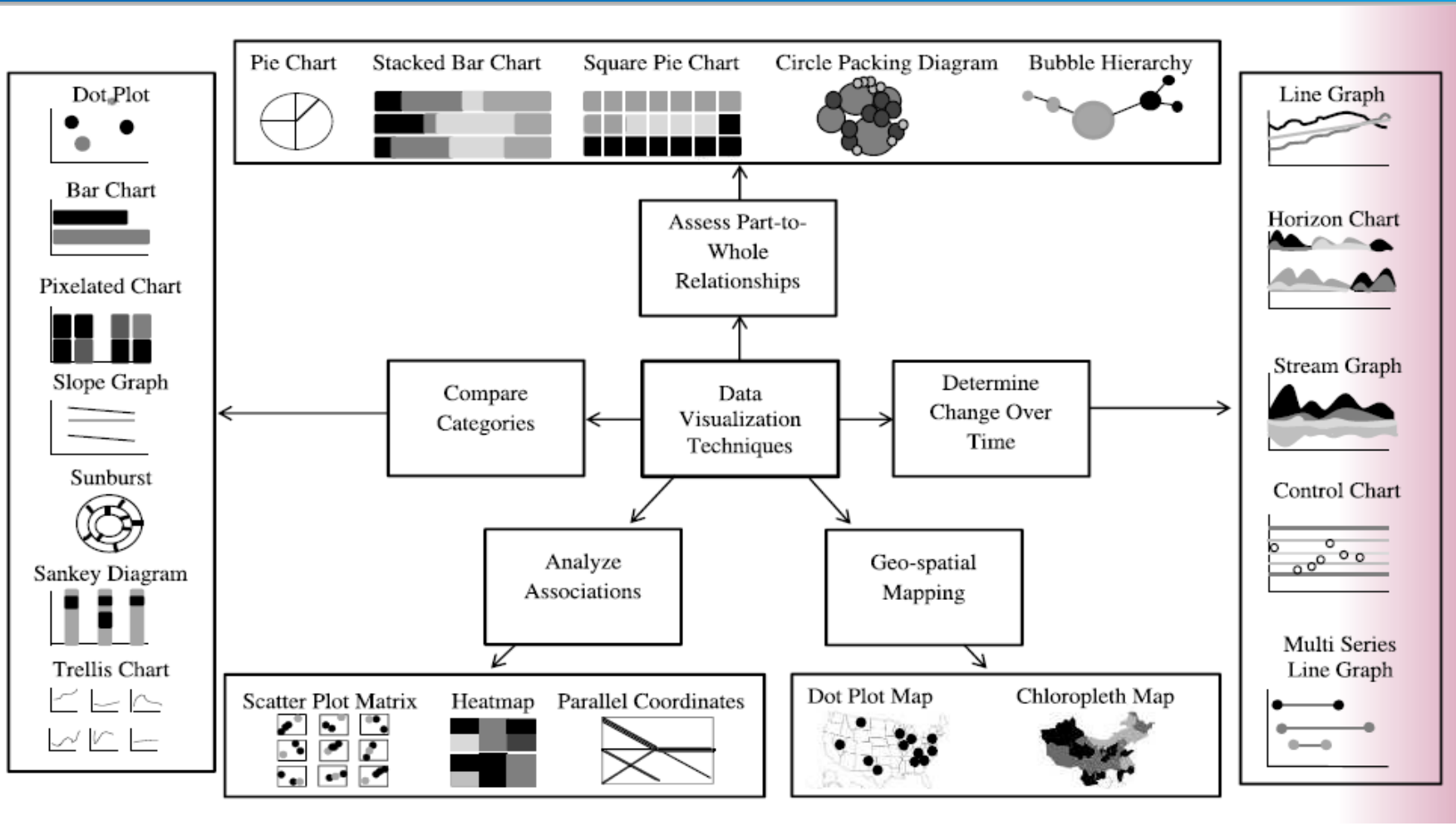
- Standardized, structured data are essential
  - May be categorical (boxes) or continuous (lines)
  - Other data types must be pre-processed to create either categorical or continuous data
  - Relationships among variables should be known and specified

Visualization Easy:
Quick Accessible Software

- Tableau
- Excel
- D3
- SPSS
- R
- SAS



Visualization Decisions



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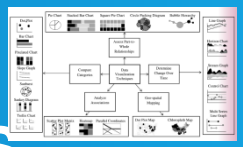
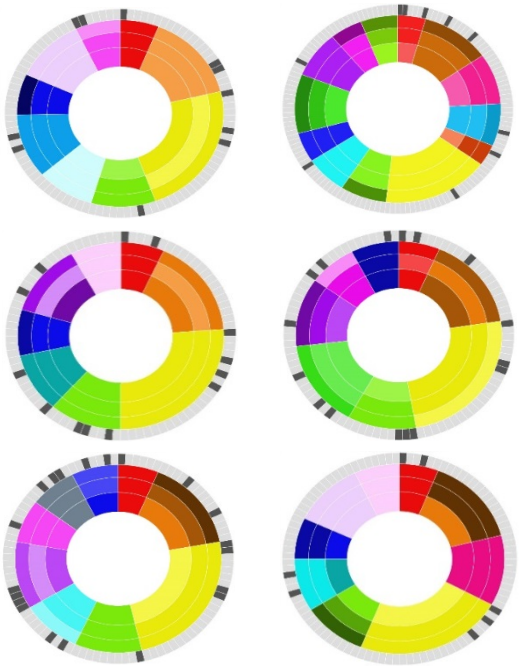
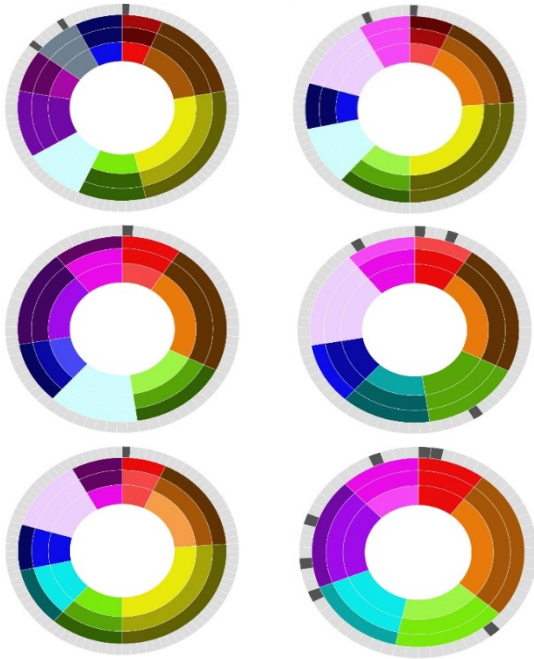
Visualizing the Whole Person: Sunbursts



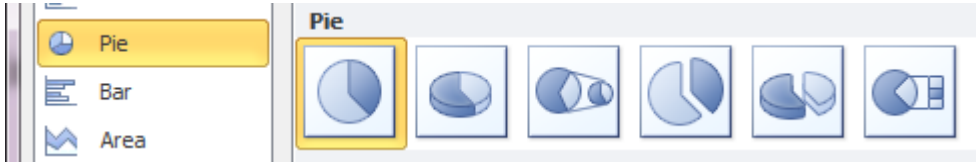


- Documentation patterns suggest a comprehensive, holistic nursing assessment.
- The presence of mental health signs and symptom tends to be associated with more problems and worse outcomes



Key:

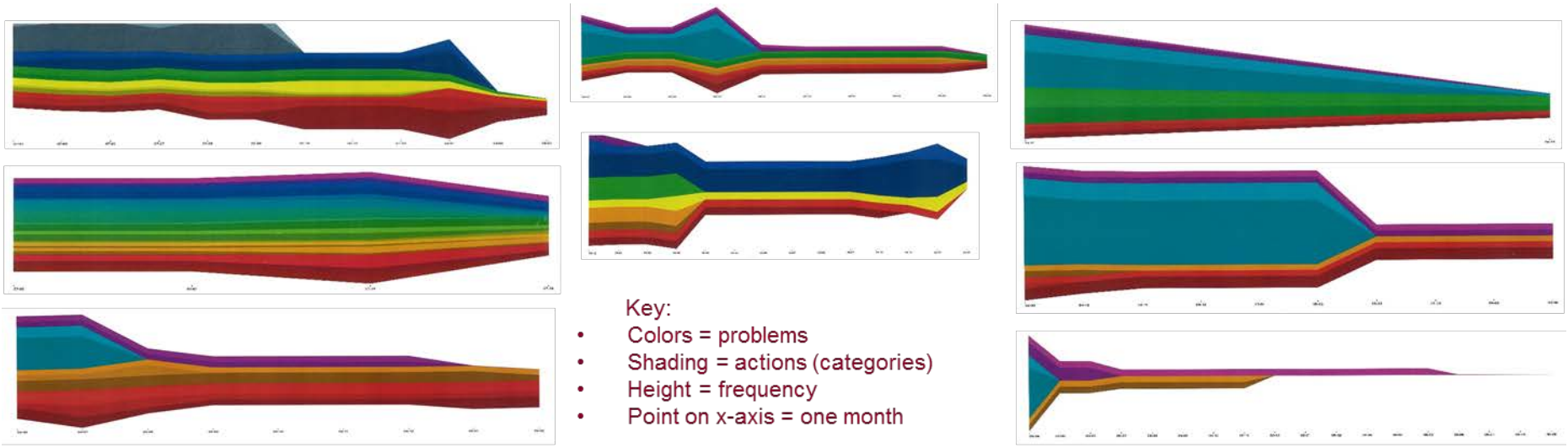
- Colors = problems
- Shading = risk
- Rings = Knowledge, Behavior, and Status
- Tabs = signs/symptoms



Kim, E., Monsen, K. A., Pieczkiewicz, D. S. (2013). Visualization of Omaha System data enables data-driven analysis of outcomes. American Medical Informatics Association Annual Meeting, Washington D.C - Sunbursts by Era Kim

Visualizing Interventions: Streamgraphs

- Using Data Visualization to Detect Nursing Intervention Patterns

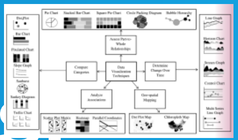


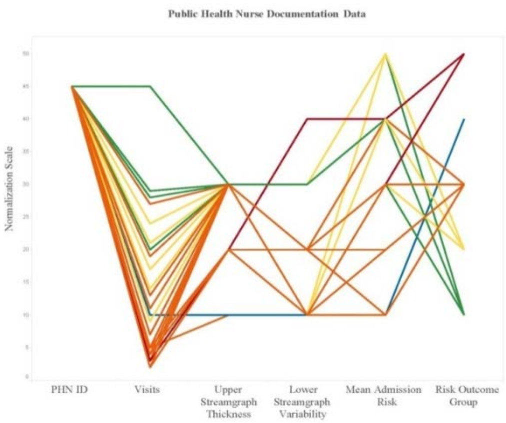
Key:

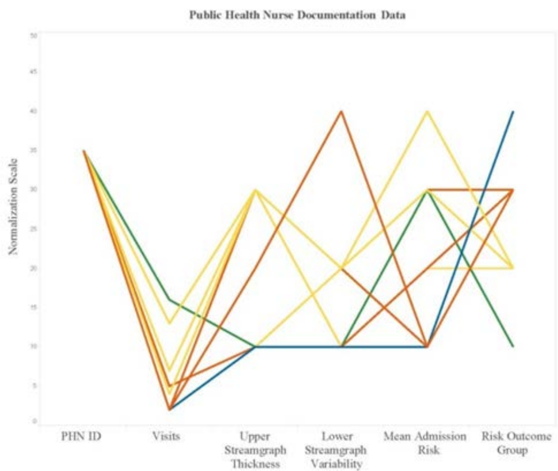
- Colors = problems
- Shading = actions (categories)
- Height = frequency
- Point on x-axis = one month

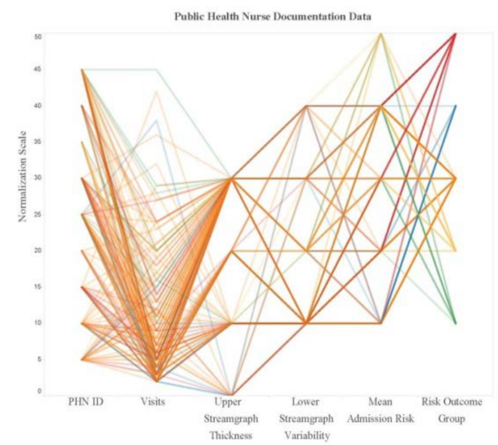
Monsen, K. A., Peterson, J. J., Mathiason, M. A., Kim, E., Votava, B., & Pieczkiewicz, D. S. (2017). Discovering public health nurse–specific family home visiting intervention patterns using visualization techniques. *Western Journal of Nursing Research, 39*, 127-146. doi:10.1177/0193945916679663 Streamgraphs by Era Kim

Relating Nurses, Problems, Interventions, Risk, and Outcomes









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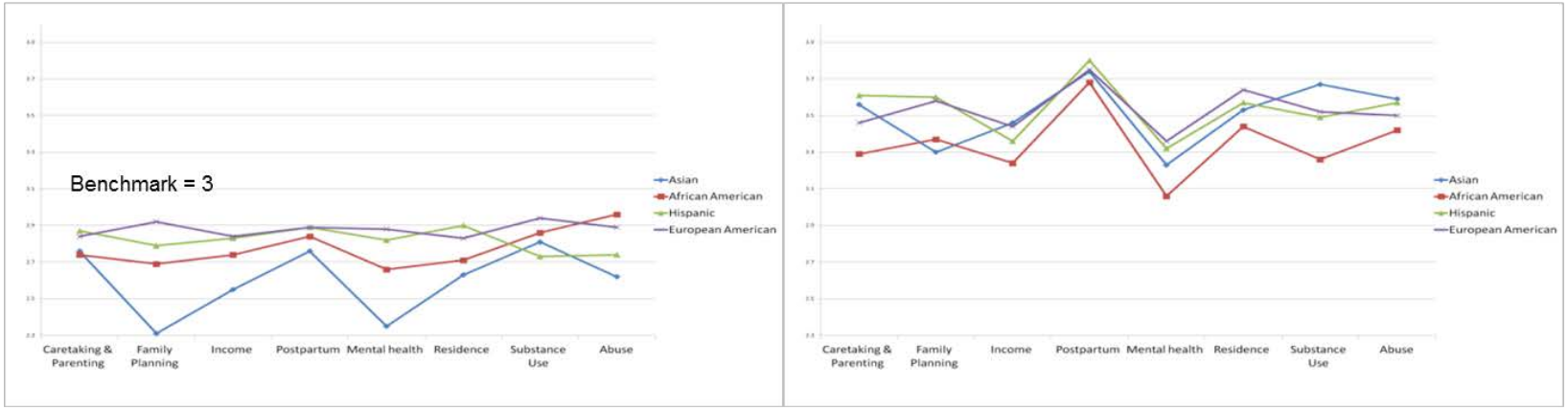
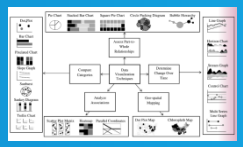
Visualizing Impact

- Shows the complexity of the problem
- Provides convincing evidence of the outcome
- Demonstrates value of care

- Knowledge scores across problems over time
- Pre-intervention, patterns by race/ethnicity - Post-intervention, patterns by problem



Multi-series line graphs by Karen Monsen



Heatmap Visualization of SBDH

				Income			Mental health			Abuse					Substance use	
SBDH Item Subgroups	Proportion of the sample (N=4263)	married (n=914)	minority (n=2435)	low/no income (n=2812)	able to buy only necessities (n=340)	difficulty buying necessities (n=374)	sadness/hopelessness/decreased self-esteem (n=669)	loss of interest/involvement in activities/self-care (n=194)	difficulty managing strss (n=51)	attacked verbally (n=129)	fearful/hypervigilant behavior (n=38)	consistent negative messages (n=80)	assaulted sexually (n=68)	welts/bruises/burns/other injuries (n=34)	abuses alcohol (n=90)	smokes/uses tobacco products (n=48)
0	0.07	0.17														
1	0.20	0.32	0.13	0.09	0.03	0.01	0.02	0.03							0.01	0.03
2	0.32	0.36	0.31	0.35	0.11	0.09	0.14	0.07	0.06	0.07	0.03	0.03	0.03	0.06	0.17	0.01
3	0.25	0.10	0.34	0.34	0.33	0.26	0.29	0.23	0.10	0.14	0.13	0.15	0.29	0.03	0.24	0.01
4	0.10	0.03	0.15	0.15	0.35	0.35	0.03	0.29	0.35	0.29	0.16	0.24	0.23	0.29	0.23	0.31
5 to 10	0.05	0.02	0.08	0.08	0.19	0.29	0.25	0.39	0.49	0.48	0.68	0.59	0.46	0.44	0.34	0.46

Monsen, K. A., Brandt, J. K., Brueshoff, B., Chi, C. L., Mathiason, M. A., Swenson, S. M., & Thorson, D. R. (2017). Social determinants and health disparities associated with outcomes of women of childbearing age receiving public health nurse home visiting services. JOGNN, 46 (2), 292-303. doi: 10.1016/j.jogn.2016.11.014. Heat map by Karen Monsen.


Break time

Collaborative Work Session

Addressing Your Data Questions

Activity: What stage are you in?

1. Planning
2. Implementation
3. Analysis

Do you have the following items clearly defined for your project?

- Study design
- Data sources
- Data collection: tools/methods || automated/manual
- Data quality: Automated || Manual
- Storage: PHI-compliant servers || Encrypted || Dual Authentication || Who manages the servers?
- Regulations: data collection and sharing policies
- Did you receive support from local informatics, IT and compliance teams?

What You Learned

Large Group Debrief

NATIONAL CENTER for INTERPROFESSIONAL PRACTICE and EDUCATION

NATIONAL CENTER IPE CORE DATA SET & IPE INFORMATION EXCHANGE

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Why an IPE Core Data Set

Standard measures that are applicable and comparable across environments.

Minimum data set needed to advance our collective understanding of what works and what doesn't work in interprofessional education and collaborative practice.

What's in the IPE Core Data Set?

learner outcomes,
educational learning environment,
clinical learning environment,
population health,
provider wellbeing,
patient experience, and
use of health services (cost)

Components of the IPE Core Data Set

Education

- Education Environment
- Interprofessional Collaborative Competencies (ICCAS)

Nexus

- Quadruple Aim Outcomes
- Critical Incidents

Clinical Practice

- Clinical Environment
- Collaborative Environment (ACE-15)

Education Learning Environment and Clinical Learning Environment Domains

Organizational **Structure** for IPE

Organizational **Culture** for IPE

Organizational **Investments** in IPE

Nexus Project Teams and Processes

Professional Development Opportunities

Managing the Nexus Project

Purpose of Education and Clinical Learning Environment Focus

- To understand descriptive data on characteristics of the environment
- To assess the broader organizational culture/climate/amount of support for IPE
- To assess the intensity (dosage) of the intervention
- To assess challenges and opportunities associated with implementing the Nexus

For Learners:
Interprofessional Collaborative Competencies (ICCAS)

- Communication
- Collaboration
- Roles and Responsibilities
- Collaborative Family, Patient-Centered Approach
- Conflict Management/ Resolution
- Team Functioning

For Providers: Collaborative Environment (ACE-15 – Nexus) Domains

- Shared Goals
- Clear Roles
- Mutual Trust
- Effective Communication
- Measurable Processes and Outcomes
- Organizational Support

At the Nexus: Quadruple Aim Outcomes

Population Health

Cost

Patient Experience

Provider Well-Being

At the Nexus: Critical Incidents
Informing enabling and interfering factors

A **critical incident** is any event that produces a fork in the road or is a turning point for a project

Critical incidents can have a positive, negative, or neutral effect on a project

Is a normal part of project implementation

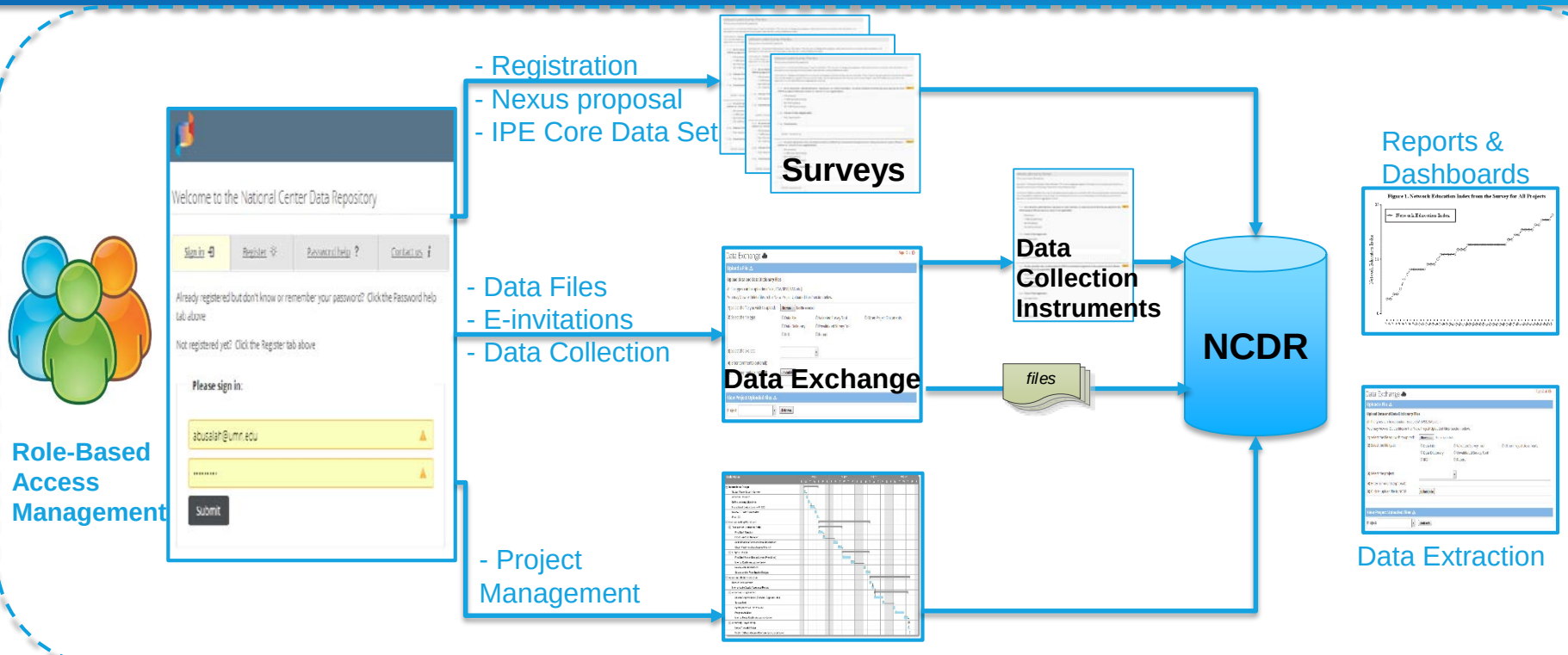
At the Nexus: Critical Incidents
What we have learned from 100+ critical incidents

Why use an Information Exchange?

National Center IPE Information Exchange

State of the art infrastructure
and data sharing
among members
to support interprofessional
practice and education
knowledge generation

National Center IPE Information Exchange



PHI Compliant Environment || Secure Data Transfer & Storage || Role-Based Access || Encrypted DB

Compliant with IRB || Health Info Privacy & Compliance Office || Center of Exc. for HIPAA Data

National Center IPE Information Exchange

National Center Data Repository

Secure, HIPAA compliant platform and first of its kind data repository focused on interprofessional practice and education, housed at the University of Minnesota.

IPE Core Data Set

Standard measures applicable and comparable across environments exploring key elements of education, practice and the Nexus

Informatics Driven Dashboard

Easy access to data through dashboards and standardized reports; additional analysis available through advanced analytics, big data and comparable data sets

Data Collection Tools

Standardized tools accessed online through the National IPE Information Exchange. Authorized users have timely access to their project data.

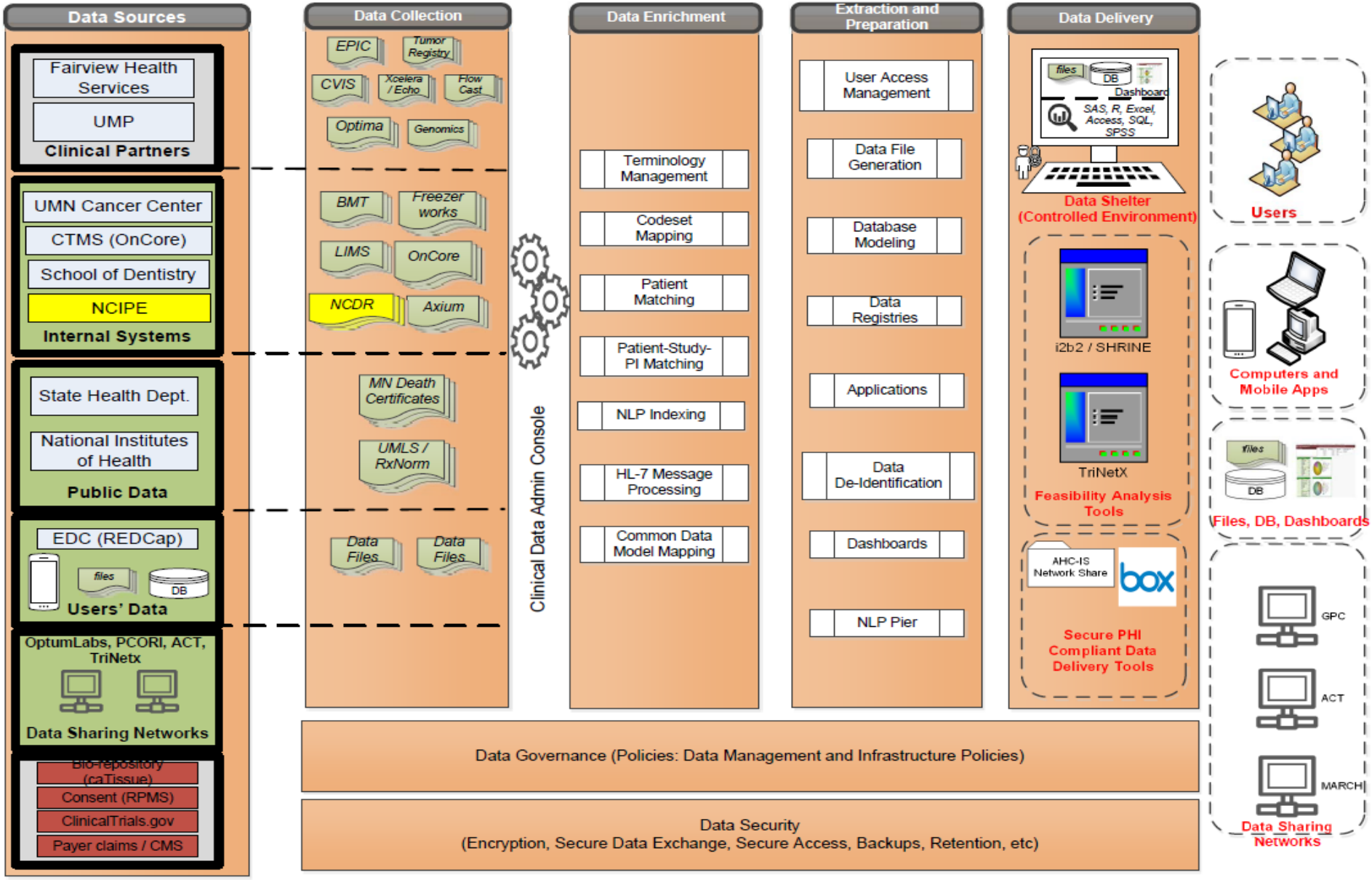
Project Management

Authorized users have the ability to manage users access, review project status, and send invitations to other users to join their projects.

Big Data Infrastructure

- Leverages the University of Minnesota AHC Secure Data Environment for big data analytics
- AHC Secure Data Environment provides robust, secure, and validated capabilities that brings together data from disparate sources to create cohesive datasets for research and operational analysis.
- Sources include:
  - Epic EHR
  - Genomics data
  - REDCap surveys
  - OnCore
  - Medical device data
  - Mobile phone applications
  - Secure data feeds

ACADEMIC HEALTH CENTER – SECURE DATA ENVIRONMENT



Data Sources

- **Academic Health Center Information Exchange (AHC-IE):**
  - **EMR Data:** Records for > 2.7 Million Fairview Patients
  - **Genomics data:** Tumor Sequence Data || Germline Data
  - **Fairview Cancer Registry:** Contains discrete cancer patients data
  - **CVIS:** Contains discrete clinical data from Fairview Cath Labs. (catheterization laboratory procedures)
  - **Optima/PaceArt:** Cardiac medical devices Interrogations data
  - **Xcelera/Echo:** Discrete data from Xcelera cardiology image management system.
  - **UMP Flowcast:** Contains professional billing data (eg. diagnoses, procedures, departments) for UMP providers.

- **Masonic Cancer Center Data Registries and Repositories**
  - ***Bone Marrow Transplant Research database (BMT):*** Captures post- transplant outcome data on subjects.
  - ***Laboratory information management system (LIMS):*** Subjects' samples data such as number of aliquots, analyte, etc.
  - ***FreezerWorks:*** Research samples freezer inventory data. Such as: Freezer name, shelf, rows, box etc.

- **OptumLabs Data Warehouse (OLDW):**
  - De-identified claims and electronic health records data for >150M lives (20% with EMR data).

- **OnCore® enterprise CTMS:** Extraction of Clinical Trial Data that are managed by OnCore® enterprise CTMS

- **Dental Records:** AaxiUm records through School of Dentistry (in progress)

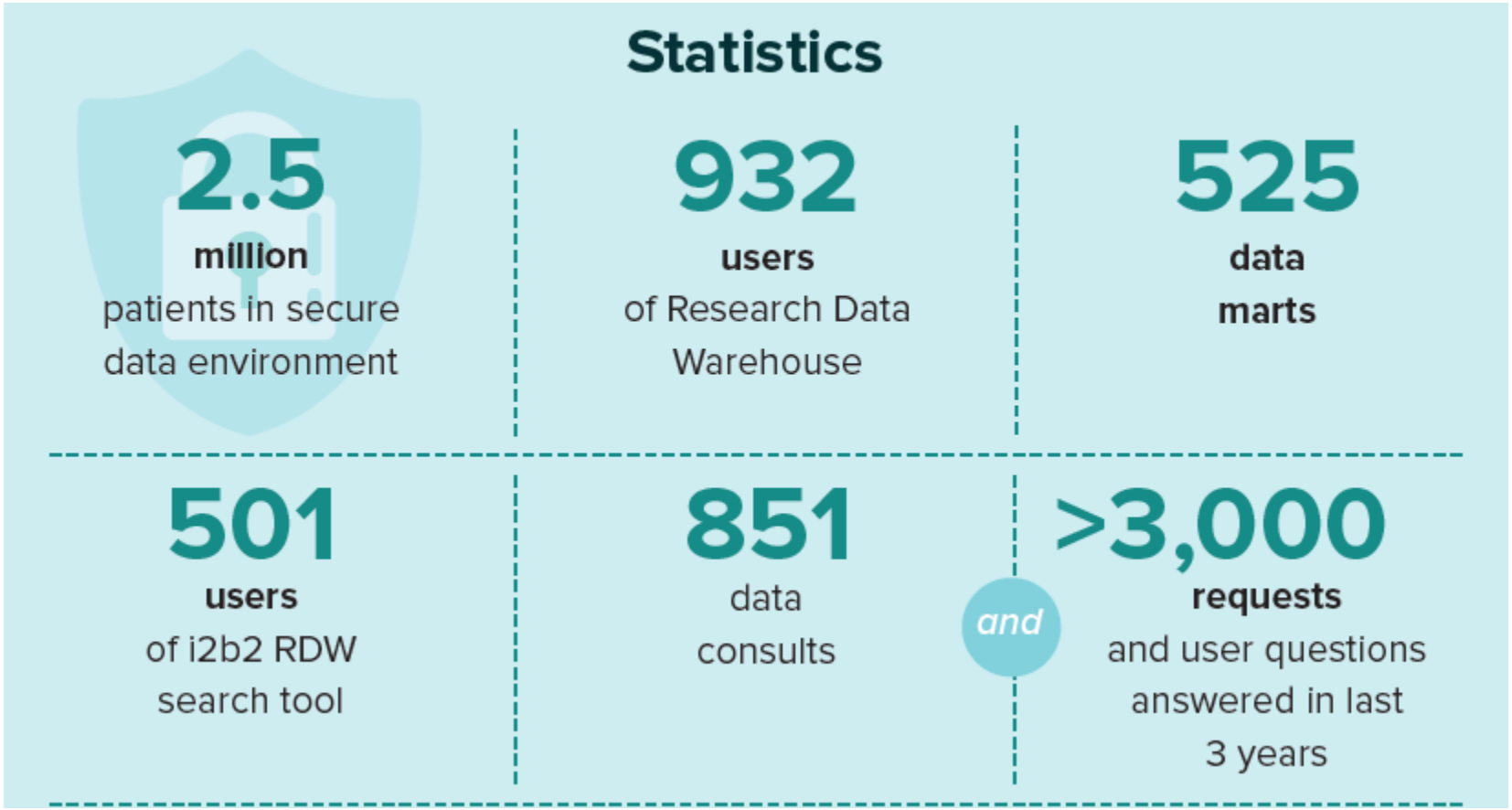
- **Master Death Index:** Death Certificates through Minnesota Department of Health

- **Spatial Data:** The Clinical EMR data is geocoded and enhanced latitude / longitude / block data elements

- **UMLS Data:** Standard Terminology and code sets including ICD-9/10, LOINC, NDF-RT, RxNorm, CPT, HCPCS

- **Ad-hoc Requests:** AHRQ, CMS, Other Institutes, etc.

Statistics*



Q1, 2017

Next Steps


Yes, I did it!
I WILL DO IT
I CAN DO IT
I'LL TRY TO DO IT
HOW DO I DO IT?
I WANT TO DO IT
I CAN'T DO IT
I WON'T DO IT
WHICH STEP HAVE YOU REACHED TODAY?

Next Steps – Creating an Action Plan

- Identify one local resource you will explore to support your data needs
- Identify one strategy you will explore to automate or standardize your data collection
- Identify one additional action step you will take toward your data goals

Closing Comments

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