Regenstrief Institute
Better Care. Better Health.

Maturity, Deployment & Adoption Models for Research IT/Informatics

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CRF IT Roundtable
Washington DC
November 3, 2017

In the next 30 min…

- Motivation for developing "maturity" and related models (background) for Research IT
- Types of models and measures
  - Maturity vs. Deployment
- Reviewing models from related initiatives
  - Health IT (e.g. EMR), Education IT, Vendor-specific
- Update on recent activities
- Next steps
- Discussion…

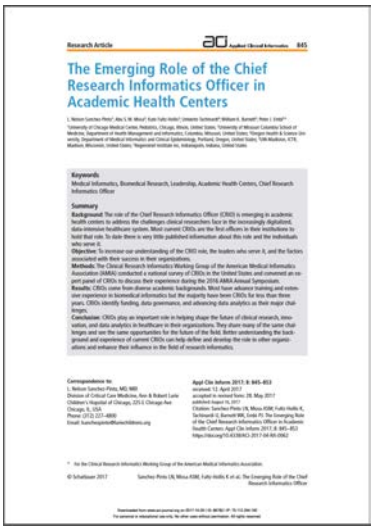
Our discussions of Research IT Maturity Models

- CRF IT Roundtable
  - Long history of exploring these issues
  - Many panels/discussions of Research IT support
  - Conducted surveys and reports
- Over past three years, more focus on topics like:
  - Managing research protocols/processes
  - Participant Recruitment
  - Enabling data re-use/sharing
  - Governance and support considerations
- Last year's discussion, led group to flesh out topic

Motivation behind Models for Research IT

Why do this now?

- Research IT/Informatics maturing
  - Infrastructure capabilities growing
  - Functionality improving
  - Standard approaches emerging
  - Governance increasingly important
- What benefit would models provide?
  - Organizations would benefit from guidance
  - Research IT professionals benefit from benchmarks
  - Leading to improvements in research efficiency, productivity


The Emerging Role of the Chief Research Informatics Officer in Academic Health Centers

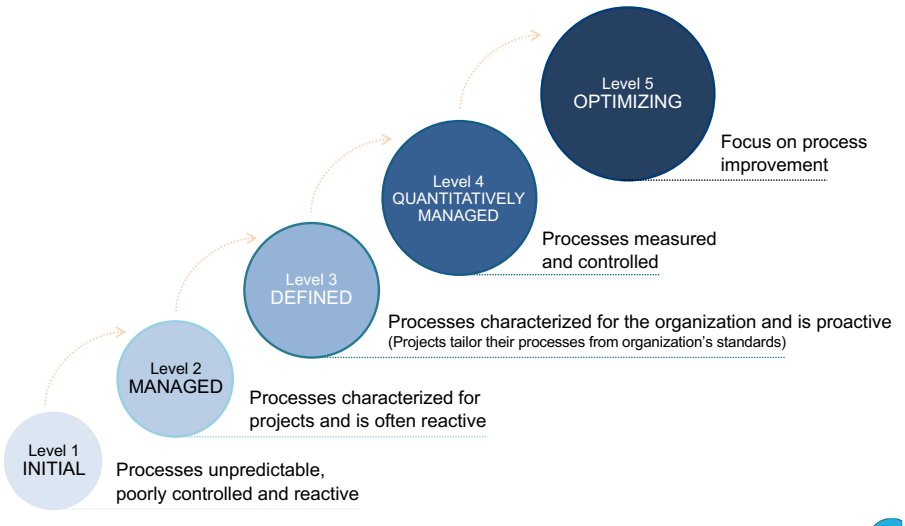
Research IT Models: Audiences

- Target Audiences include:
  - Academic Health Systems/leaders
  - Researchers and Research leadership
  - Health System IT organizations
  - Health system/clinical enterprise
  - IT and Informatics professionals
  - Research and Health IT Vendors
  - Research sponsors/funding agencies
  - Patients/Public
  - Regulatory agencies/government

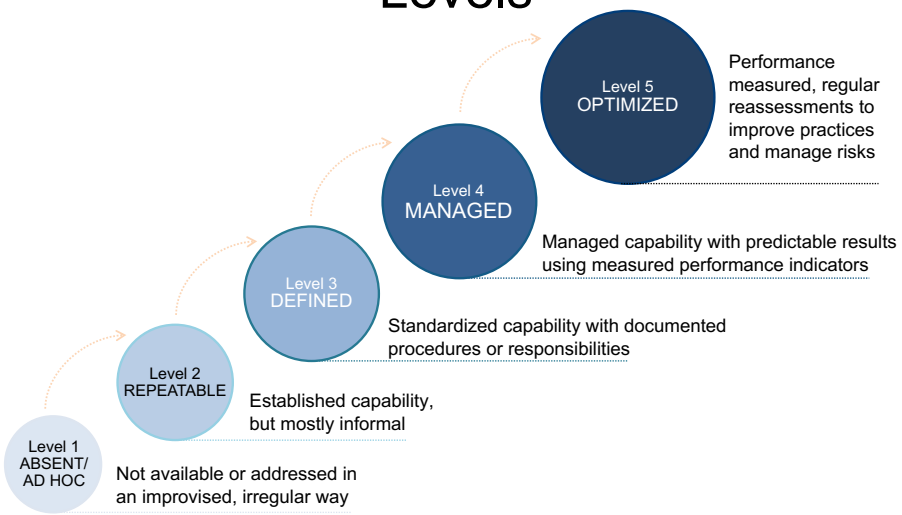
Types of Models

- Maturity Model or Index
  - "Maturity" refers to degree of formality and optimization of processes
  - Maturity Index:
    - Measures and organizations capacity to deliver a service, taking into account factors such as:
      - Culture, Processes, Organization
- Deployment/Adoption Index
  - Measures degree to which institution has deployed and adopted technologies and/or functionality related to delivering a service

Characteristics of Maturity Levels



Characteristics of Deployment Levels



Maturity vs. Deployment/Adoption

- **Maturity Index**
  - Related to standardizing and optimizing **processes** and functions
  - Related to technology adoption, but not technology centric, per se
- **Deployment/Adoption Index**
  - Related to optimizing technology adoption and use for particular outcomes
  - Focused on technological **capabilities**, infrastructure supported by organizational processes

CRF has evaluated "deployment" in past

- **"Current State of Information Technologies for the Clinical Research Enterprise across Academic Medical Centers"** (Murphy SN, et al. Clin Trans Sci. 2012)
- **Goals:** Clinical Research Forum IT Roundtable group surveyed member organizations to assess current state, changes in Research IT infrastructure since prior surveys in 2005 and 2007.
- **Methods:** Survey to all member sites. Four main areas:
  - The use of IT in research compliance, such as conflicts of interest, research budgeting, and reporting to the Institutional Review Board (IRB);
  - The use of IT for electronic data capture (EDC) requirements related to clinical studies and trials of different size;
  - The use of data repositories for the repurposing of clinical care data for research; and,
  - The IT infrastructure needs and support for research collaboration and communication.

"Current State of Information Technologies for the Clinical Research Enterprise across Academic Medical Centers" (Murphy SN, et al. Clin Trans Sci. 2012)

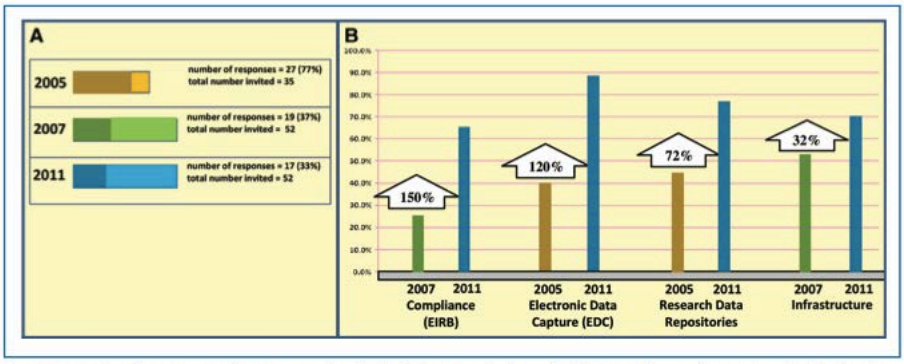


Figure 1. Comparison of response rates and responses regarding adoption of major categories of research IT infrastructure between the current (2011) and previous (2005 and 2007) surveys. (**A**) It demonstrates the response rate difference. (**B**) It depicts percentage increases for each category.

"Current State of Information Technologies for the Clinical Research Enterprise across Academic Medical Centers"
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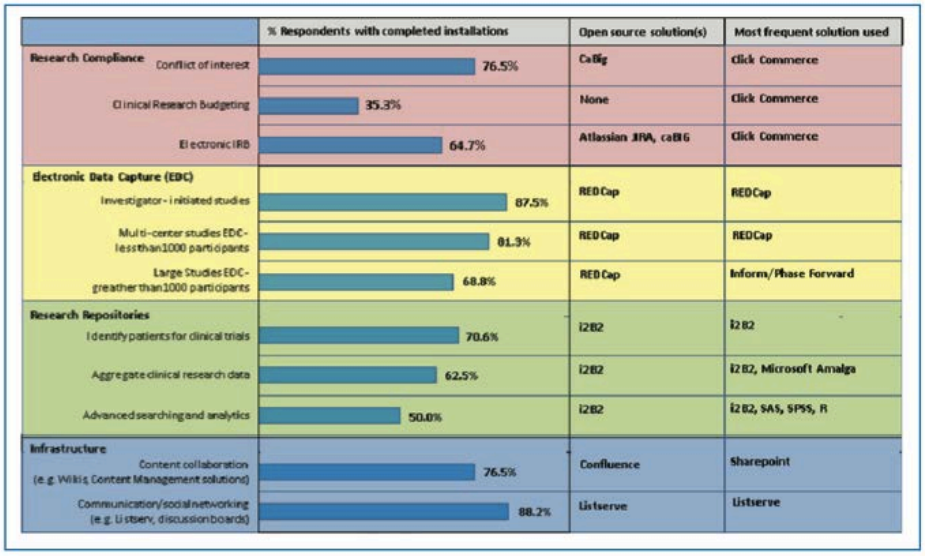


Figure 2. Percentage of respondents with completed installations, open-source solutions cited by respondents, and most commonly cited solution cited by respondents (commercial or open source) for key elements of functionality in the categories of research compliance, electronic data capture, research repositories, and infrastructure.

CRF IT Roundtable Deployment Survey

- **Conclusions:** Research IS adoption across respondent sites has increased over past 7 years. The availability of more robust and available vendor-based and "open-source" solutions, coupled with new research initiatives (e.g., CTSA) and regulatory requirements, appear to be contributing to these advances.
- This is type of survey data we need to establish baseline and inform "deployment index"
- **Let's look at some examples of related Models…**

Examples of Related Maturity, Deployment, & Adoption Models

- EMR Adoption Model examples
  - HIMSS (EMRAM)
  - Gartner
  - Epic
- Educational IT models
  - AAMC GIR
  - Educause

EMR Maturity Models – examples…

HIMSS

- **HIMSS ELECTRONIC MEDICAL RECORD ADOPTION MODEL**
  An 8-stage model that tracks healthcare organizations progress towards achieving a paperless paper

Gartner

record environment. >5000 orgs

- **GARTNER DEMAND-DRIVEN MATURITY MODEL**
- A 5-stage demand-driven maturity model

Epic

- **VENDOR SPECIFIC MODELS – E.G. Epic Stars**

History of the Acute Care EMRAM

- The acute care EMRAM was developed in 2005

- Why the structure?
  - It is the typical manner by which hospitals rollout enterprise clinical systems
- Are there any usual variations?
  - Academic Medical Centers often have CPOE live to enable education for the medical students and residents
- The first Stage 7 validation occurred in Q4 2008
  - Three years after EMRAM introduction

(from HIMSS Analytics)

Stated reason behind the EMRAM

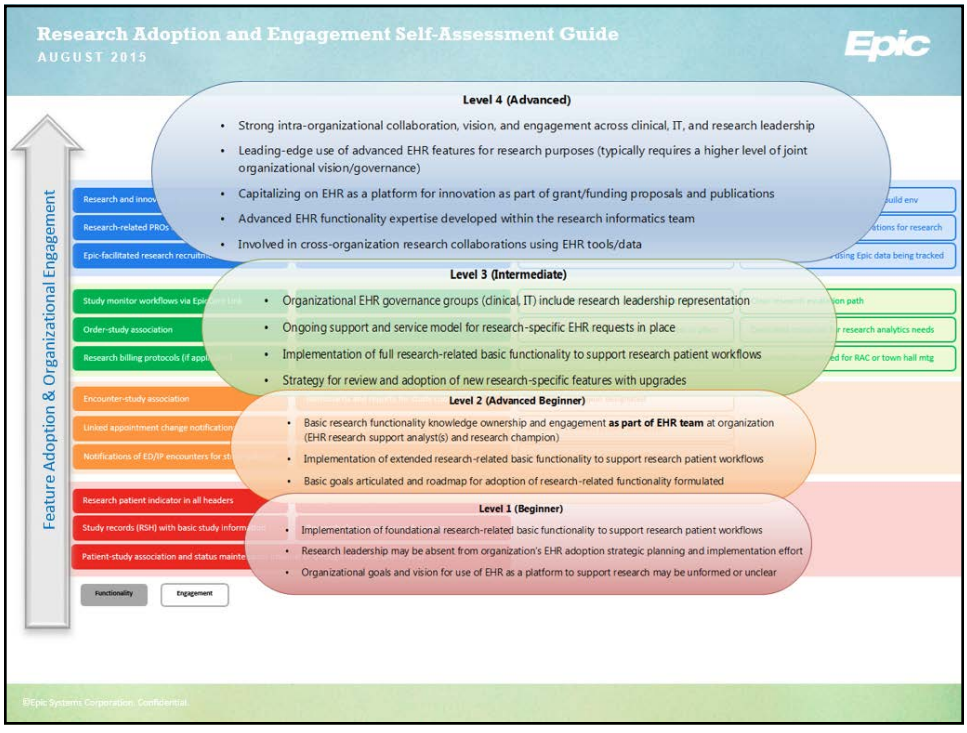
- Thought leadership
  - Quality, Safety, Efficiency improvements
- To inform government policy
  - Numerous countries and regions use HIMSS Analytics to gather data for their policy formulation
- To reflect the market
  - Where is the market heading
- To "drive the market"

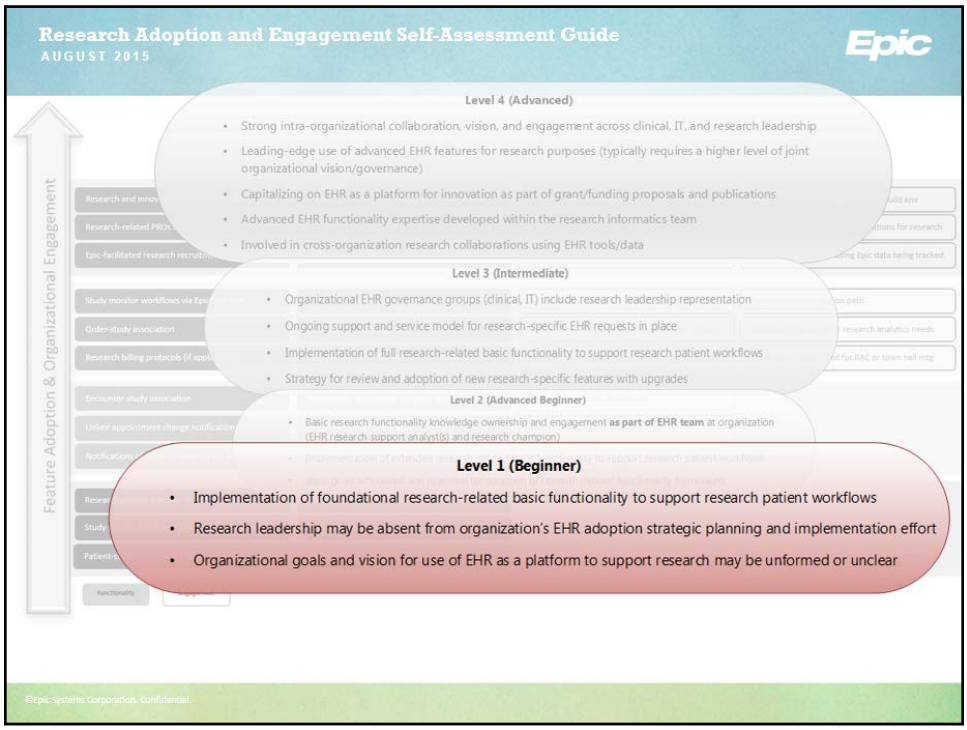
(from HIMSS Analytics)

US EMR Adoption Model℠

Stage	Cumulative Capabilities	2011 Q2	2014 Q1
Stage 7	Complete EMR, CCDA transactions; Data Analytics to Improve Care	1.1%	3.1%
Stage 6	Physician documentation (structured templates), full CDSS, full R-PACS	4.0%	13.3%
Stage 5	Closed Loop Medication Administration = Bar Code Enablement	6.1%	24.2%
Stage 4	CPOE, or e-Prescribing, Clinical Decision Support (clinical protocols)	12.3%	15.7%
Stage 3	Clinical documentation, CDSS (error checking)	46.3%	27.7%
Stage 2	CDR, Controlled Medical Vocabulary, CDS, HIE capable	13.7%	7.2%
Stage 1	Ancillaries - Lab, Rad, Pharmacy - All Installed	6.6%	3.2%
Stage 0	All Three Ancillaries Not Installed	10.0%	5.6%
		N = 5439	N = 5449

Data from HIMSS Analytics® Database © 2012 HIMSS Analytics




Research Adoption and Engagement Self-Assessment Guide
AUGUST 2015
Epic
Feature Adoption & Organizational Engagement
Level 4 (Advanced)
• Strong intra-organizational collaboration, vision, and engagement across clinical, IT, and research leadership
• Leading-edge use of advanced EHR features for research purposes (typically requires a higher level of joint organizational vision/governance)
• Capitalizing on EHR as a platform for innovation as part of grant/funding proposals and publications
• Advanced EHR functionality expertise developed within the research informatics team
• Involved in cross-organization research collaborations using EHR tools/data
Level 3 (Intermediate)
• Organizational EHR governance groups (clinical, IT) include research leadership representation
• Ongoing support and service model for research-specific EHR requests in place
• Implementation of full research-related basic functionality to support research patient workflows
• Strategy for review and adoption of new research-specific features with upgrades
Level 2 (Advanced Beginner)
• Basic research functionality knowledge ownership and engagement as part of EHR team at organization (EHR research support analyst(s) and research champion)
Level 1 (Beginner)
• Implementation of foundational research-related basic functionality to support research patient workflows
• Research leadership may be absent from organization's EHR adoption strategic planning and implementation effort
• Organizational goals and vision for use of EHR as a platform to support research may be unformed or unclear
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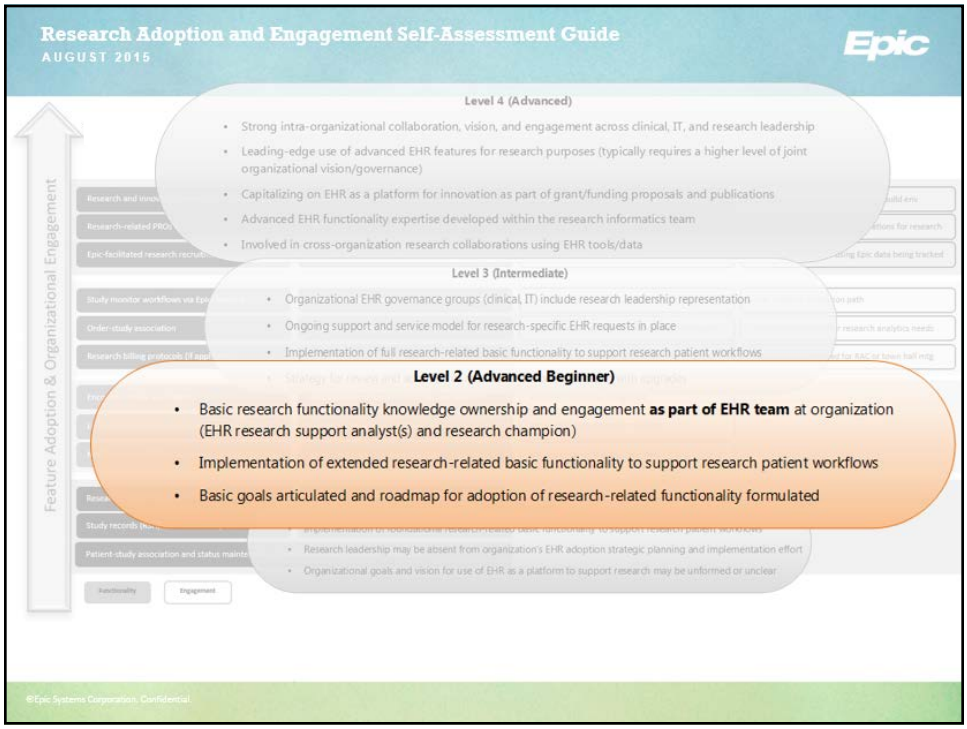
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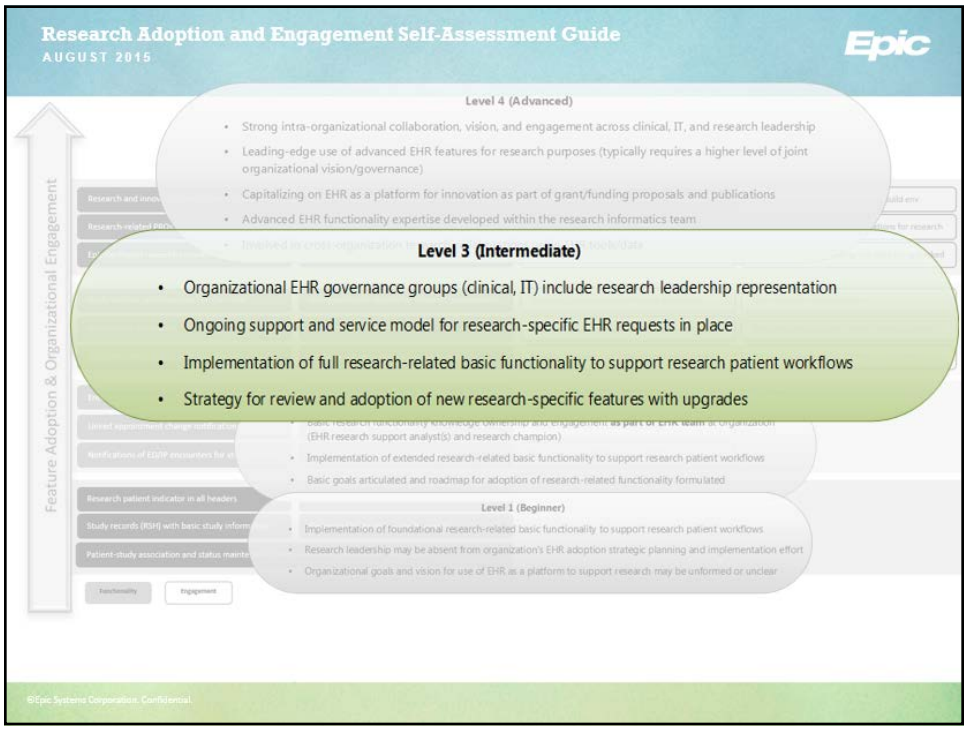
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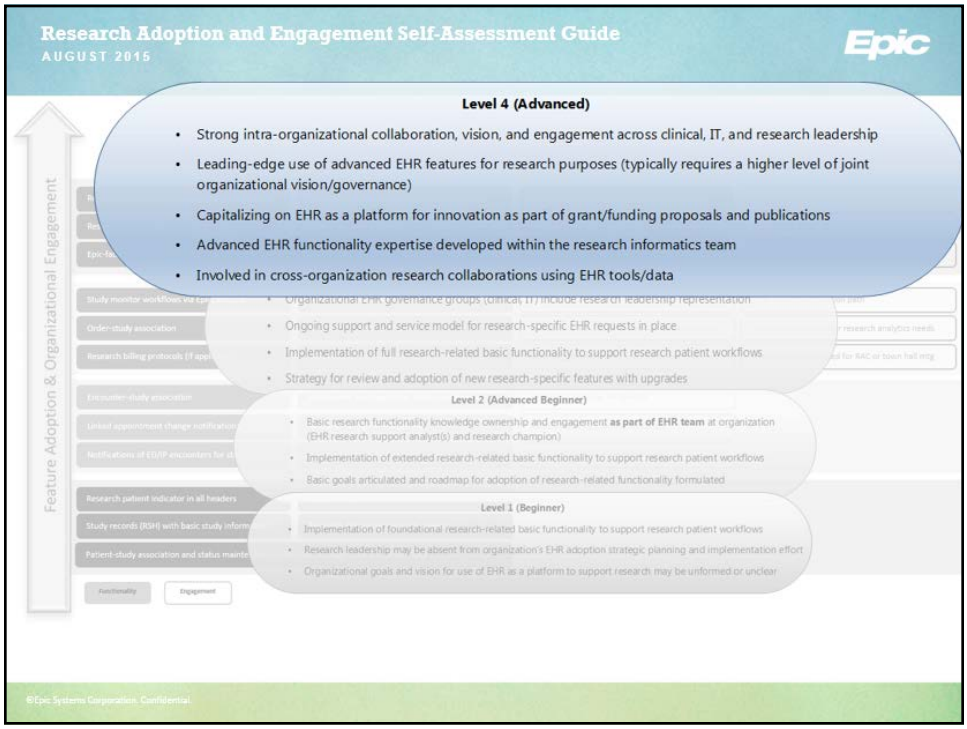
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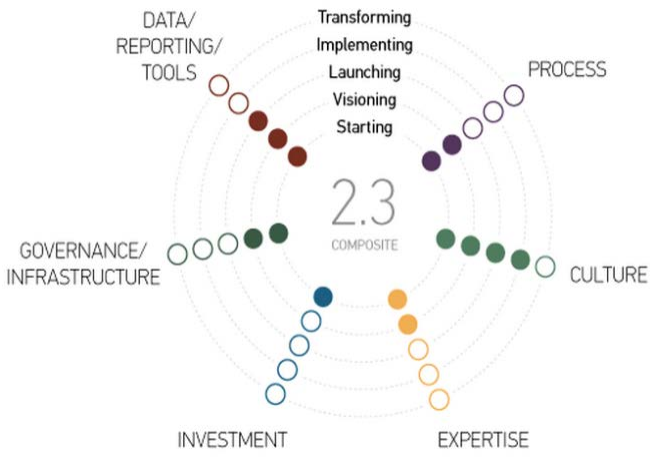
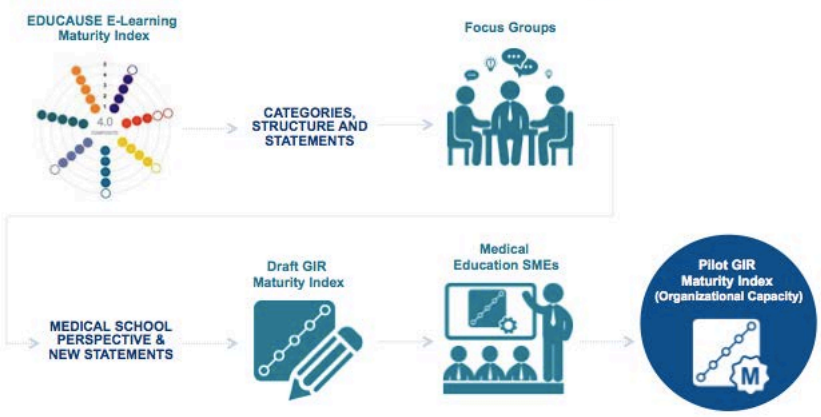
EDUCAUSE Maturity Index



Building a GIR Ed Tech Maturity Index



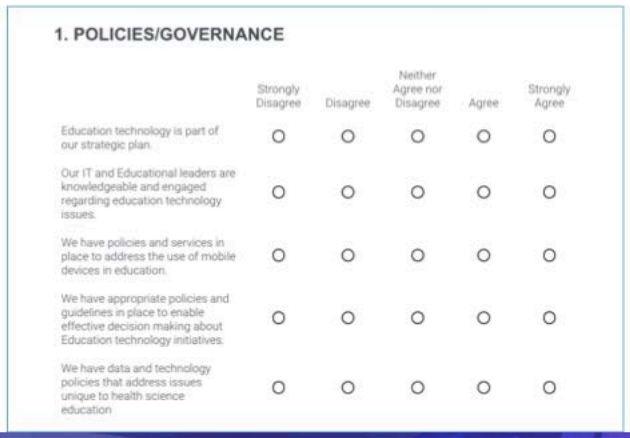
2015 Information Technology in Academic Medicine Conference

AAMC

Ed Tech Maturity Index Categories

- **Policies and Governance**
- **Outcomes Assessment** (ability to track)
- **Ongoing Evaluation and Training**
- **Readiness** (sustainability and buy-in)
- **Priority**
- **Investment in Faculty/Staff** (motivation and ability to support ed tech)
- **Synergy** (reliability and organizational support)
- **Alignment with Accreditation** (GIR added category)

Ed Tech Maturity Index Screenshot



1. POLICIES/GOVERNANCE

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Education technology is part of our strategic plan.	O	O	O	O	O
Our IT and Educational leaders are knowledgeable and engaged regarding education technology issues.	O	O	O	O	O
We have policies and services in place to address the use of mobile devices in education.	O	O	O	O	O
We have appropriate policies and guidelines in place to enable effective decision making about Education technology initiatives.	O	O	O	O	O
We have data and technology policies that address issues unique to health science education	O	O	O	O	O

2015 Information Technology in Academic Medicine Conference
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Efforts over past two years…

STEP 1:	STEP 2:	STEP 3:
Explore and learn from other models Over past 2+ years	Elicit input from experts Last year's Effort	Conduct surveys, develop initial version of models to pilot Since then…

Focus on Research IT/Informatics, and built two models:

- 1. Maturity model/index
- 2. Deployment/Adoption model/index
- Review "straw man"…

1. Research IT/Informatics Maturity Index

Level	Capabilities
Level 5: **Optimizing/Transforming**	Focus on process improvement; Research IT *Valued* across organization
Level 4: **Quantitatively managed**	Processes fully in effect, measured and controlled; Research IT *Embedded*
Level 3: **Defined/Launching**	Processes characterized for the organization and are proactive (Projects tailor their processes from organization's standards); Research IT *Enabled*
Level 2: **Managed/Visioning**	Processes characterized for projects and is often reactive; Research IT *Recognized*
Level 1: **Initial/Starting**	Processes unpredictable, poorly controlled and reactive; RIT *Tolerated*
Level 0: **Absent**	No Research IT processes or leadership; Research IT *Under-appreciated*

Research IT Process

- Policies
- Leadership
- Governance
- Prioritization
- Supportive culture
- Integration of research and care
- No separate email/network, etc./shared services
- Dedicated infrastructure/resources
- Expertise available, involved, leading
- Regulatory compliance
- Processes for supporting high quality research

1. Research IT/Informatics Maturity Index

Level	Capabilities	Example: Governance
Level 5: **Optimizing/Transforming**	Focus on process improvement; Research IT *Valued* across organization	Processes ensure Research IT prioritized along/equals Health IT
Level 4: **Quantitatively managed**	Processes fully in effect, measured and controlled; Research IT *Embedded*	*Appointed leader for Research IT with strategic authority*
Level 3: **Defined/Launching**	Processes characterized for the organization and are proactive (Projects tailor their processes from organization's standards); Research IT *Enabled*	*IT governance formally recognizes research needs and accounts for advances*
Level 2: **Managed/Visioning**	Processes characterized for projects and is often reactive; Research IT *Recognized*	*Org leaders consider and support research IT regularly, informally*
Level 1: **Initial/Starting**	Processes unpredictable, poorly controlled and reactive; RIT *Tolerated*	*Org leaders support in ad hoc manner*
Level 0: **Absent**	No Research IT processes or leadership; Research IT *Under-appreciated*	*No governance for research IT exists*

2. Research IT Deployment/Adoption Index

Level	Capabilities
Level 5 **Optimized/Integrated**	Performance measured; regular assessments, widespread use, satisfaction; outcomes documented and improved
Level 4 **Managed/Performing**	All systems installed; managed capabilities with predictable results; measured performance indicators
Level 3 **Defined**	Most systems installed; standardized capabilities; documented procedures
Level 2 **Repeatable**	Disparate, not all systems; established but mostly informal capabilities
Level 1 **Ad Hoc/ Basic**	Some Basic Research IT systems installed; Limited/ad hoc functionality; largely improvised solutions
Level 0 **Absent**	No Research IT systems installed; paper-based or fully distributed

Research IT Systems

- Data repository/ Warehouse
- Research EDC
- CRMS
- Grants management
- Collaboration/workflow tools
- Research lab systems
- eIRB system
- Data storage capacity
- Query capability
- Recruitment tools
- EHR Research Functionality
- Security capabilities
- Genomics/Translational tools
- Biospecimen management
- High-performance computing
- Patient/participant-facing tools
- Standards-based
- Data sharing capabilities
- Analytical and statistical tools

2. Research IT Deployment/Adoption Index		
Level	Capabilities	Example: Research Electronic Data Capture
Level 5 **Optimized/Integrated**	Performance measured; regular assessments, widespread use, satisfaction; outcomes documented and improved	EDC best practices followed, research enabled, improved by use
Level 4 **Managed/Performing**	All systems installed; managed capabilities with predictable results; measured performance indicators	EDC system supported, managed, used by all who need them
Level 3 **Defined**	Most systems installed; standardized capabilities; documented procedures	Standardized EDC systems, formal usage
Level 2 **Repeatable**	Disparate, not all systems; established but mostly informal capabilities	EDC systems available and informally used
Level 1 **Ad Hoc/ Basic**	Some Basic Research IT systems installed; Limited/ad hoc functionality; largely improvised solutions	Some use of independent EDC solutions
Level 0 **Absent**	No Research IT systems installed; paper-based or fully distributed	No EDC systems in place

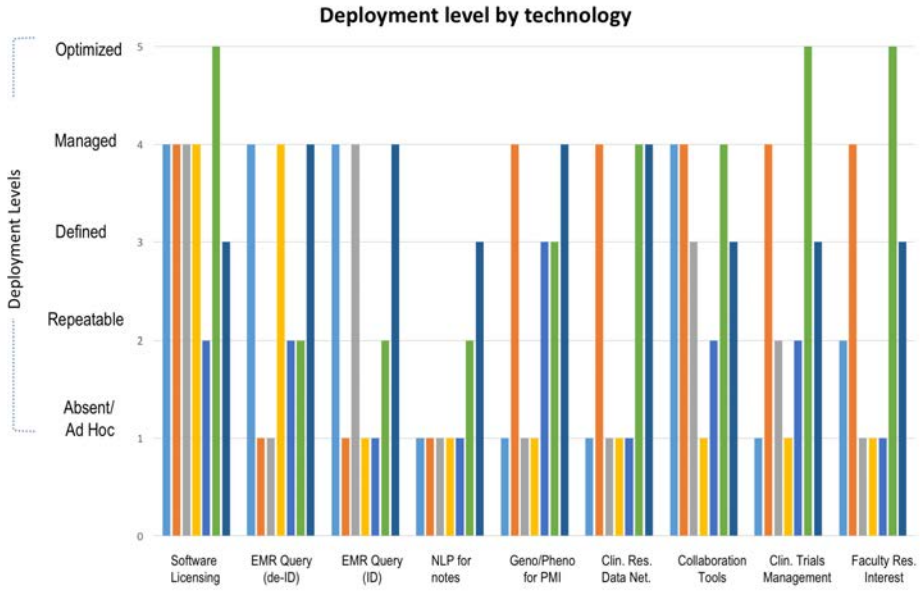
Last year's exercise, informed…

Ideal	Gaps	Refine
• What should these contain?	• What are the gaps in the models/ indices? • What's in place today that we should include? • What's coming that we should anticipate/reflect?	• Next steps • Validation • Iterative refinement

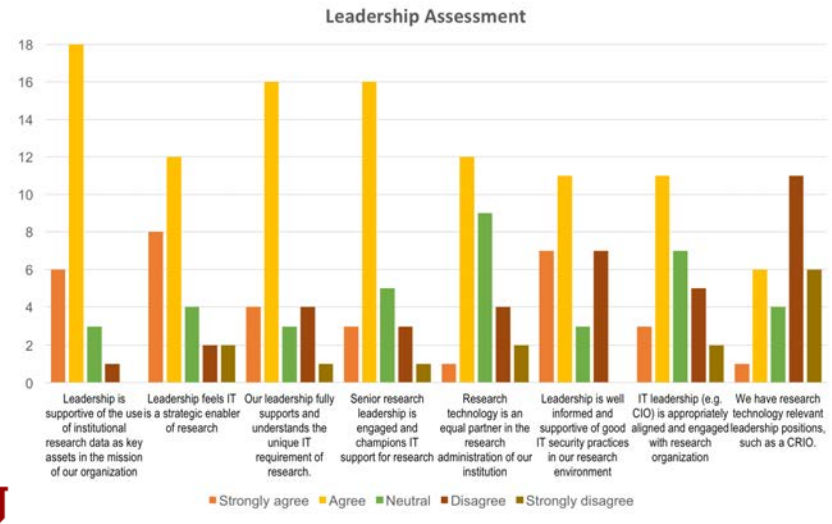
Outcome of that effort…

- Expert/Stakeholder input solicited
- React to and inform the current draft models
- Models expanded - start of validation
- Start to answer (expand) current questions:
  - Areas we're missing?
  - Scoring? Components? Overall? Both?
  - Objective measures development?
  - Relevance/Impact/Use cases/Utility of a tools like this from your perspective?
  - Audiences for this?
  - Who should complete these locally?
  - Validation of this instrument
  - Readiness to go beyond qualitative - and achieve consistency

Deployment Index Results by Institution at 2017 AAMC meeting



Example Maturity index results for the Leadership category showing counts of responses



Summary

- Research IT/Informatics has evolved into mature operational endeavor
- Ability to measure, monitor, and benchmark needed
- This effort will lead us toward that goal
- Next steps/Discussion…

Thanks!