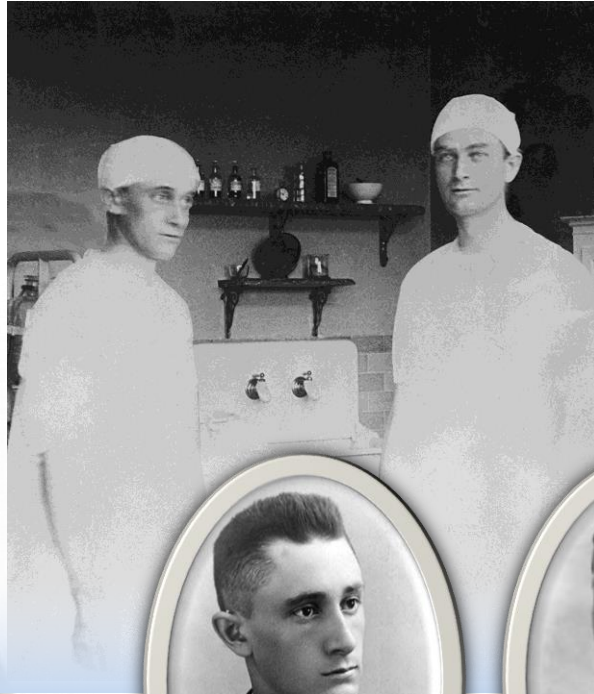




Modernizing the Mayo Clinic - Innovation and Technology to Machine Learning and Artificial Intelligence

Cris Ross, CIO, Mayo Clinic

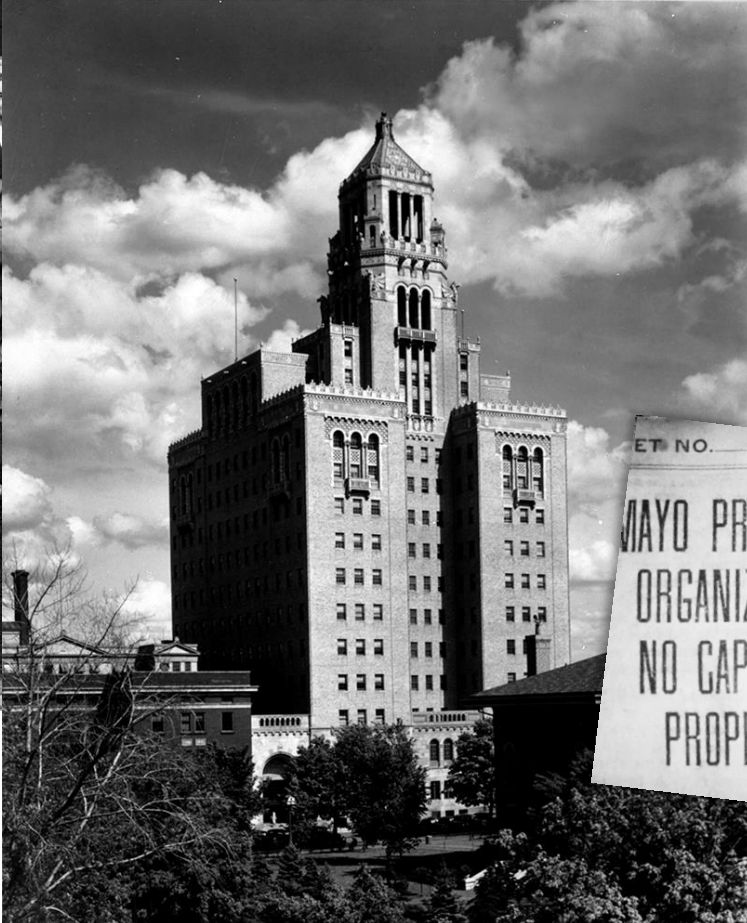
Mayo Clinic



Mayo Clinic



Mayo Clinic



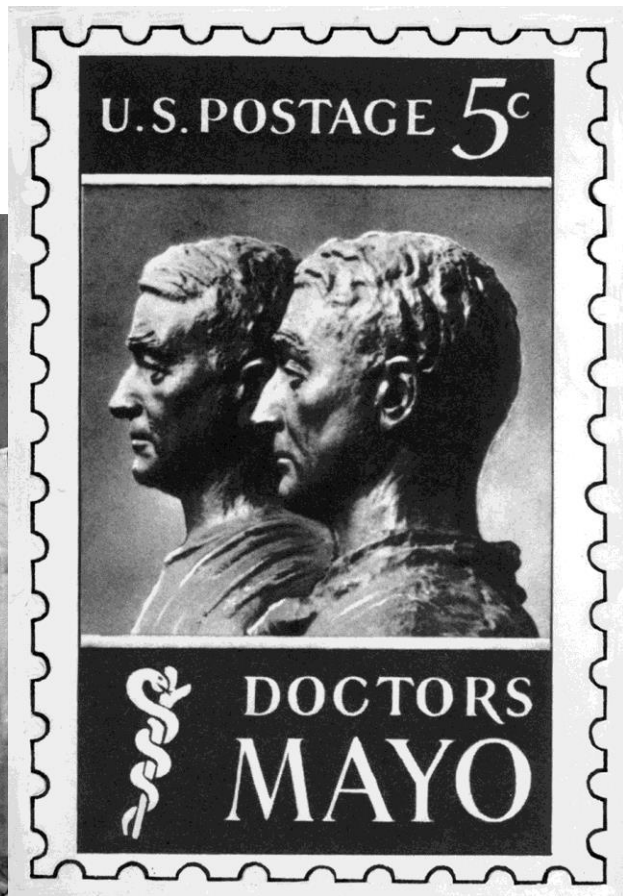
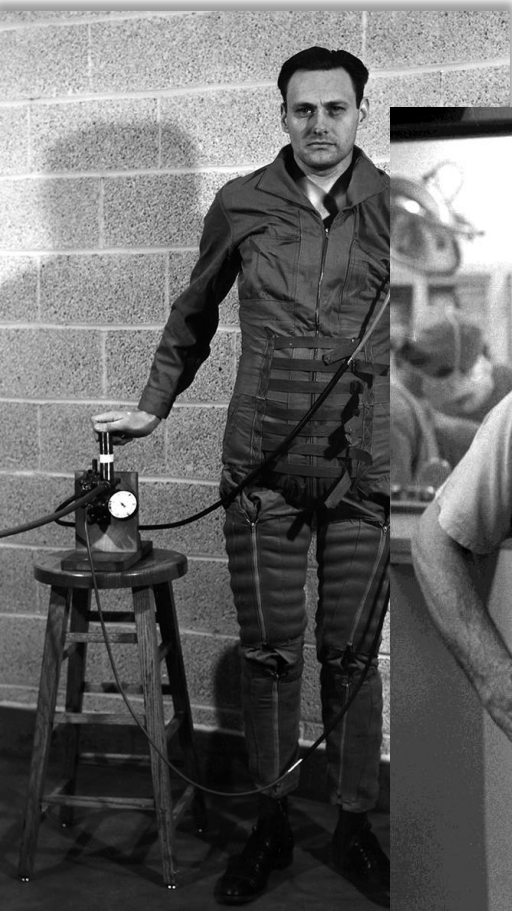
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MAYO PROPERTIES ASSOCIATION
ORGANIZED FOR HUMAN WELFARE;
NO CAPITAL STOCK; ALL CLINIC
PROPERTIES IN MAYOS' GIFT

(Continued on Page One)

Clinic

Mayo Clinic







Modern CIO lesson 1: Know your place

A world class institution needs world class IT





2012 – IT was ...

- Customer-centric
- Responsive
- Individualized
- Best of breed
- Siloed
- Proprietary
- Diversified
- Imperfect

Themes of our Call to Action

□ Sustainability □ Innovation □ Capability □ Execution

Guideposts



Technology Strategy: Recommendations from the Technology Strategy and Architecture Task Force

Richard Elman, MD, Chair of the Technology Strategy and Architecture Task Force
Dawn Milliner, MD, Chief Medical Information Officer
Christopher Ross, Chief Information Officer

August 2014

IT Service Delivery Model for Mayo Clinic

Development of the Future-State version 2

Michael J. Ryan
1/19/2015



Strategic Workforce Readiness

Ensuring Future Success

September 2014

Our Five IT Imperatives

1. Maintain service while we change
2. Secure the enterprise
3. Implement shared enterprise systems
4. Build platforms guided by architecture
5. Transform the IT organization

Plummer Project – Epic Implementation

- All Epic products except Lab and Transplant
- 23 Hospitals, 3,715 beds, 112 clinics, 1.3 M patients/yr., 4,500 MDs, 2,400 residents/fellows, 57,100 Allied Health staff, 4 go-lives
- 10 years of data, 210 interfaces, 179 APIs
- Twelve major subsidiary projects, 24 others
 - OnBase (Electronic Content Management)
 - Cardinal Health Inventory Management System (Supply+)
 - ScImage (CV PACS)
 - M*Modal (Dictation, Transcription, and Speech Recognition)
 - OBIX (Electronic Fetal Monitoring System)
 - Experian (Real-Time Eligibility)
 - Sailpoint (Identity Management Program)
 - Optum 360 eCAC, CAC, Pro, CDI (Computer Assisted Coding and Clinical Documentation Improvement)
 - Optum 360 (Claims)
 - Visage (OB Ultrasound and Radiology PACS)
 - Vergence (Single Sign-On)
 - SoftLab (Lab)

Modern CIO lesson 2: table stakes don't win

Stable enterprise core is table stakes

Absence might break us ...

...presence won't make us

High level milestones – advancing Mayo Clinic technology

Advance information and knowledge for practice as a strategic asset

CMIO role created
IKM business plan
approved

Technology call to action

New Technology leadership
CIO Assessment
Strategy and Architecture Taskforce
IT Transformation launched
CISO role created
CTO role created

IT Transformation 1.0 to 2.0

Technology strategy defined

Technology strategy approved
Technology modernization

Strategy realignment
AI assessment

Network renewal funded

Architecture transition complete

EHR Taskforce EHR selection

Initiate EHR transition

Epic selected, construction begins
Data center sale, cloud strategy

WI MN

RST

AZ/FL

Initiate Platform construction

UDP in use

API in use
Identity in use
Innovation Sandbox open

Accelerate innovation

2011

2012

2013

2014

2015

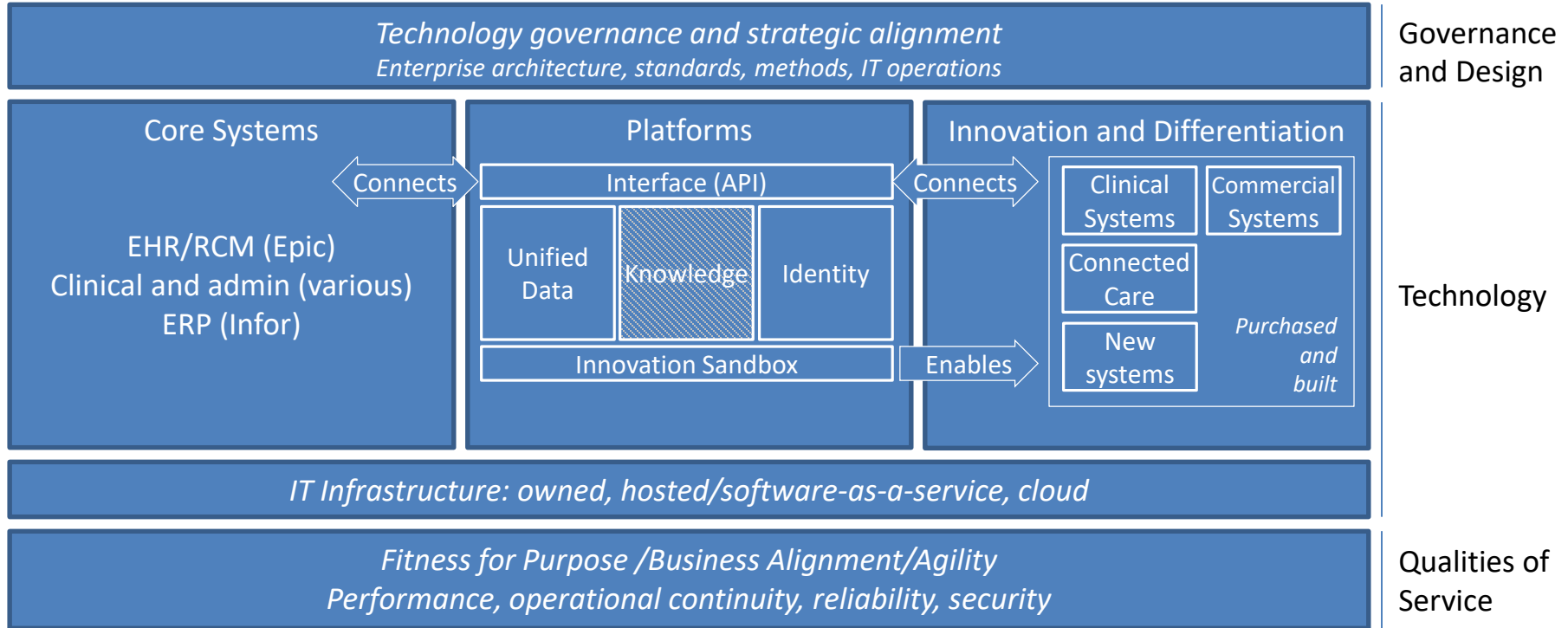
2016

2017

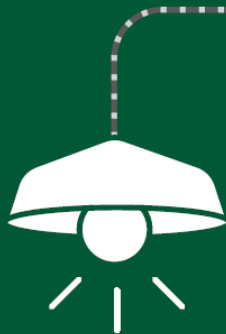
2018

2019

Enterprise Architecture blueprint



INNOVATION
SANDBOX



Putting it all together

idmp



IDENTITY
MANAGEMENT
PLATFORM



udp

+

Epic

UNIFIED DATA
PLATFORM



api



APPLICATION
PROGRAMMING
INTERFACE



IT Transformation Programs

IT Transformation is a strategic initiative to improve the delivery of services at the same or lower cost; enable the redirection of resources from “run” to “grow and transform” initiatives; and increase the value IT brings to the business.

1. Service Management

implementation of industry standard ITIL processes and ServiceNow software

2. Application LifeCycle Management

implementation of standard process for software management in Microsoft TFS

3. Project & Portfolio Management

implementation of standard processes within Clarity

4. Customer Relationship Management

implementation of processes, tools, and metrics to optimize customer relationships

5. Strategic Workforce Readiness

strategies to be used to drive workforce and organizational transformation

Why do this?

“The companies that are most successful at **applying technology and unlocking the value of information** to innovate their business models, products, and services **will dominate their industry in the future.**

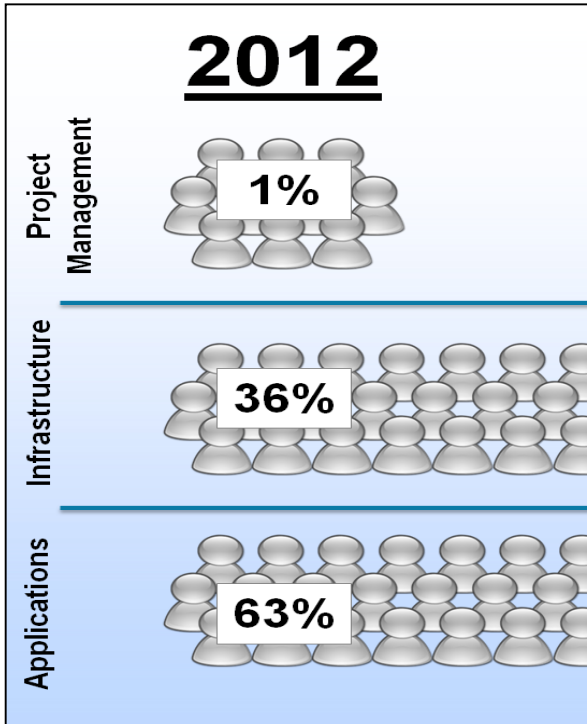
By **reducing technology complexity and realigning talent**, among other things, world-class IT organizations deliver services at 22% lower cost with greater effectiveness and require 9% fewer FTEs.

In many cases, **the most efficient IT organizations also lead in effectiveness.**”

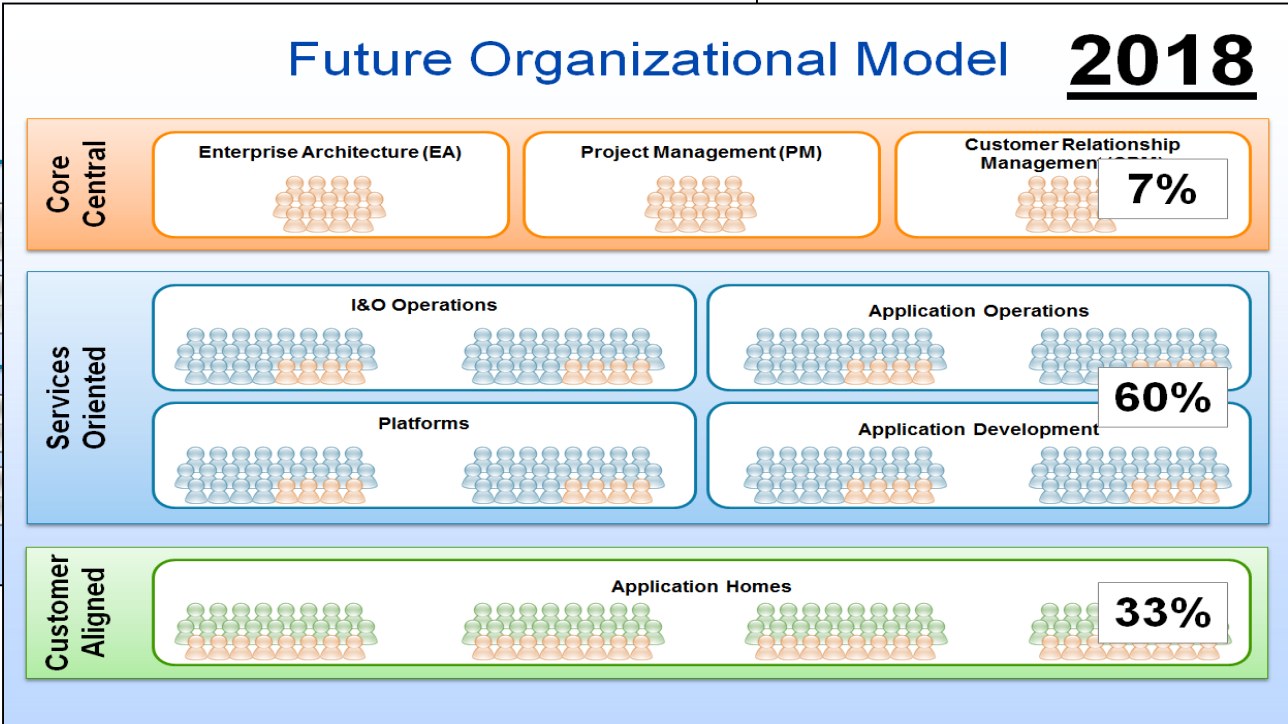
Source: The world-class performance advantage: How leading IT organizations outperform their peers
by Erik Dorr and Scott Holland, The Hackett Group, May 2014

Organizational Redesign

2012



Future Organizational Model **2018**



Who led all this?



Modern CIO lesson 3: change is constant

- Our particular recipe for change
 - Vision and aspiration
 - Burning platforms
 - Leadership coalition for change
 - Hearts and minds of the team
 - Avoid the trap of tradeoffs

“Same or better service at lower cost”

Modern CIO lesson 4: anticipate what's next

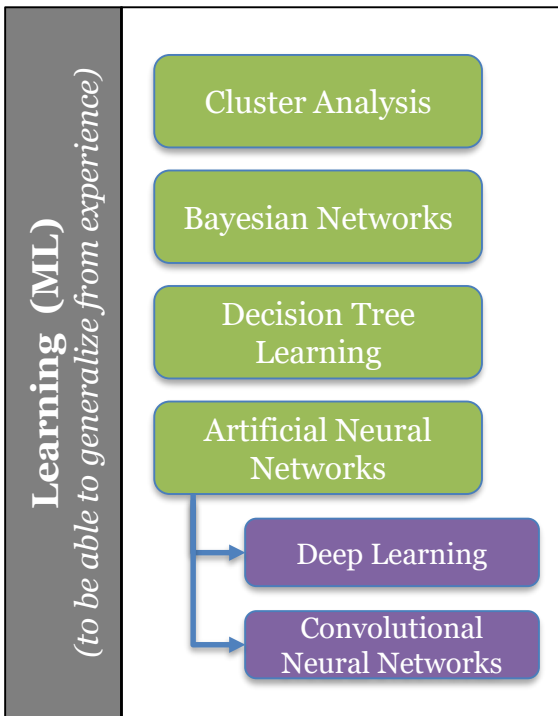
- From automation to digitization
 - Automation is physical, digitization is virtual
- From transactions and record keeping to insight creation
 - Data liquidity, data/decision science, AI/cognitive
- From products to services
 - Software submerging, only services will matter
 - Corporate data centers will disappear
- Workforce of the future
 - Synthesis, abstraction, narrative

What did our plans anticipate?

- Knowledge management
 - Deep analytics
 - Machine learning / AI
 - Digitization broadly
-
- Unified Data Platform: Hadoop as a transactional engine
 - API Platform: One ESB, FHIR, Standard web service
 - Innovation Sandbox

Machine learning

A very incomplete but instructive map of ML terminology

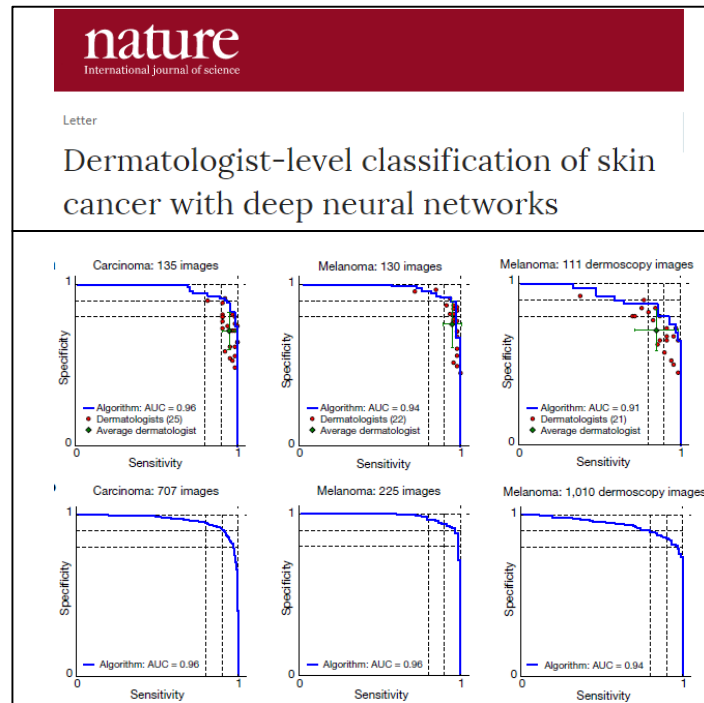
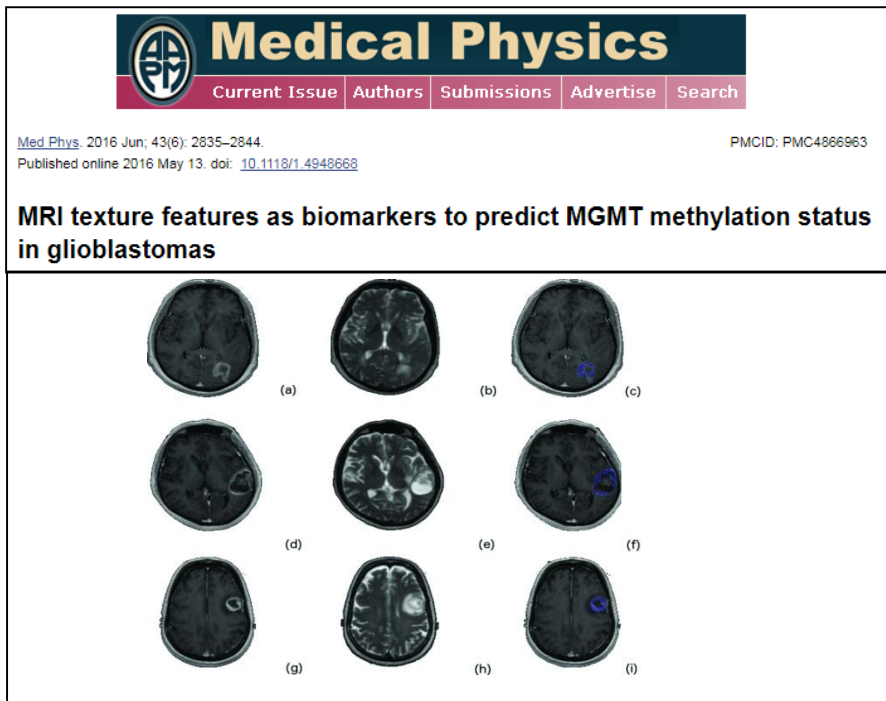


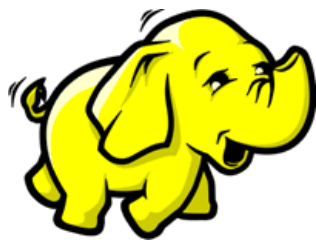
From standard statistical methods

Huge data sets and powerful computing applied to generate algorithms

- Deep Learning: Many learning processes, including natural language processing, speech recognition
- Convolutional Neural Networks: Analyzing visual imagery, inspired by biological processes

Two examples of CNN for radiology





Winning attributes

- Data depth and liquidity
- Modern architecture
- Services-aligned (SaaS, IaaS, PaaS, Healthcare-as-a-Service?)
- Skilled and aligned workforce
- Innovation culture
- Partnership and monetization models
- Positioning on the value chain

Modern CIO lesson 5: current paradoxes of success

- Cede control to gain influence
- Accelerate change to create permanence
- Standardize to innovate and differentiate

MAYO
CLINIC

