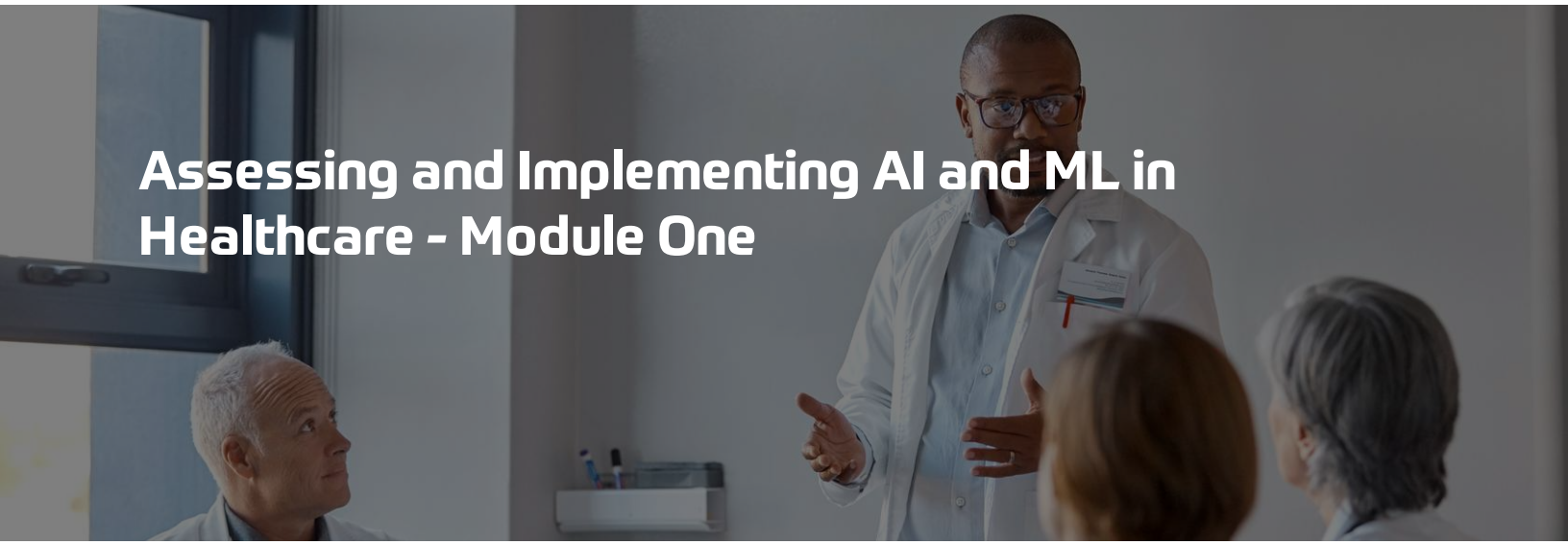


Assessing and Implementing AI and ML in Healthcare - Module One

HIMSS

Welcome to the Assessing and Implementing AI and ML in Healthcare Course!

Before proceeding with the "start module", read below for additional important information.

This course is comprised of four modules of content. In Module One, you will learn how Artificial Intelligence(AI) and Machine Learning(ML) have influenced health ecosystems. This course equips you with the tools to assess your healthcare operations and systems, fostering strategic decision-making for implementing Artificial Intelligence and Machine Learning. It's time to jump into the content!

Scroll to the top and click the "**Start Module**" button to begin.

Introduction

Navigation

- **Meet Our Expert**
- **Understanding The Essentials of AI/ML in Healthcare**
- **Who Are The Stakeholders?**
- **Benefits and Limitations of AI/ML**
- **Tradeoffs of Engagement and Implementation**

Introduction

Going through the course

As you work through the content for each module, scroll down to view all the material in each section.

Learning Outcomes

Upon completion of this course, the following four (4) learning outcomes will be achieved:

1. **Explain** the fundamental concepts of Artificial Intelligence and Machine Learning in health ecosystems.

2. **Identify** specific components of the Machine Learning Life Cycle Management Process (MLOps).

3. **Understand** the ethical implications and evaluation framework for data harmonization and the scoreboard for success.

4 **Gain** practical skills implementing AI/ML applications from use case development within a healthcare system.

Module One Learning Objectives

Let's dive into our first goal of the fundamental concepts of Artificial Intelligence and Machine Learning in health ecosystems. For this module, we will:

1 Define foundational concepts about Artificial Intelligence (AI) and Machine Learning (ML).

2 Understand the important stakeholders involved in use cases of AI across the health ecosystem.

3 Describe the benefits and limitations of AI/ML.

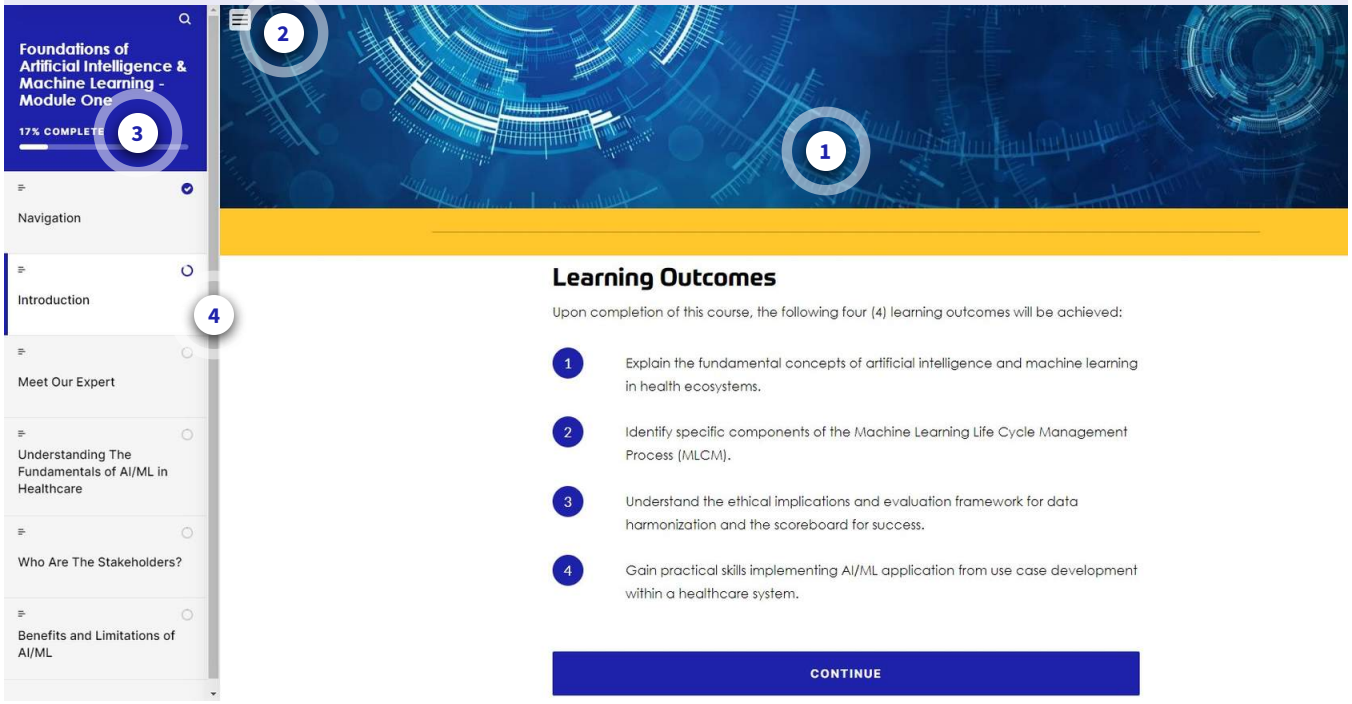
4 Recognize the tradeoff of engaging and implementing AI.

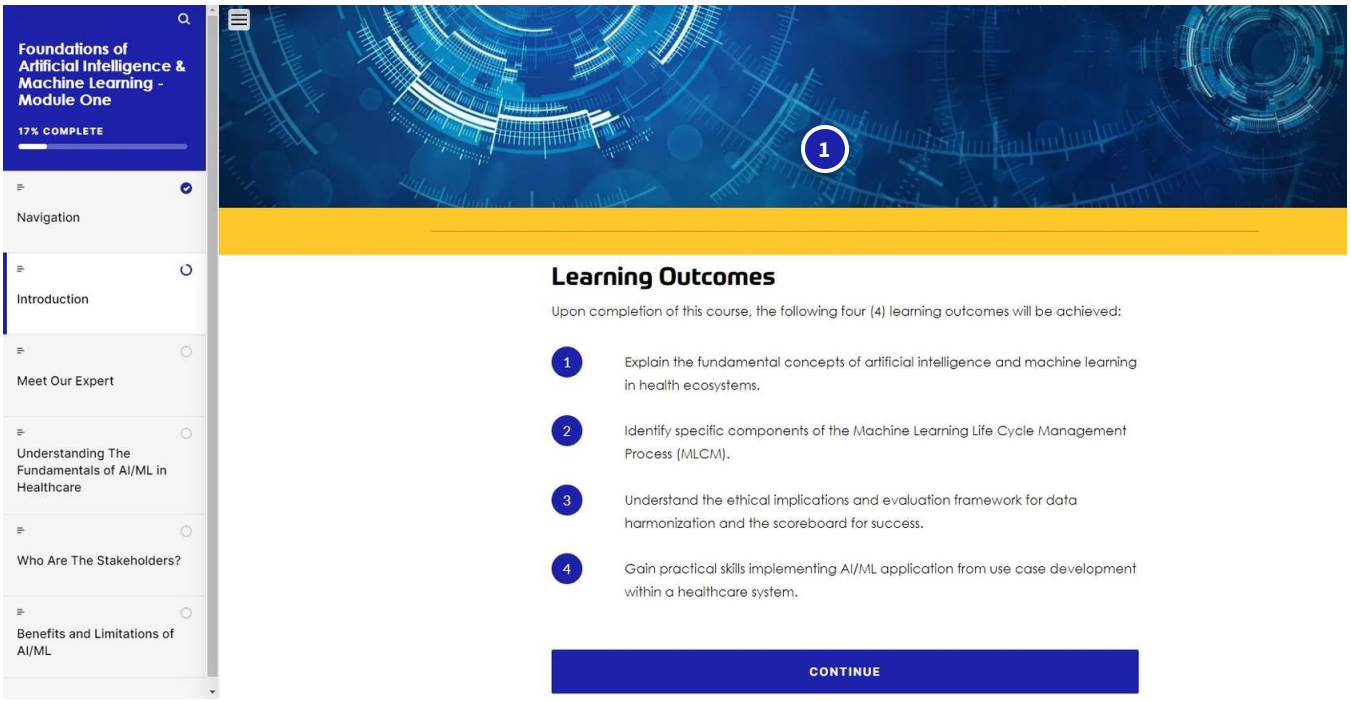
CONTINUE

Navigation

Click on the '*Play*' button to start the video.

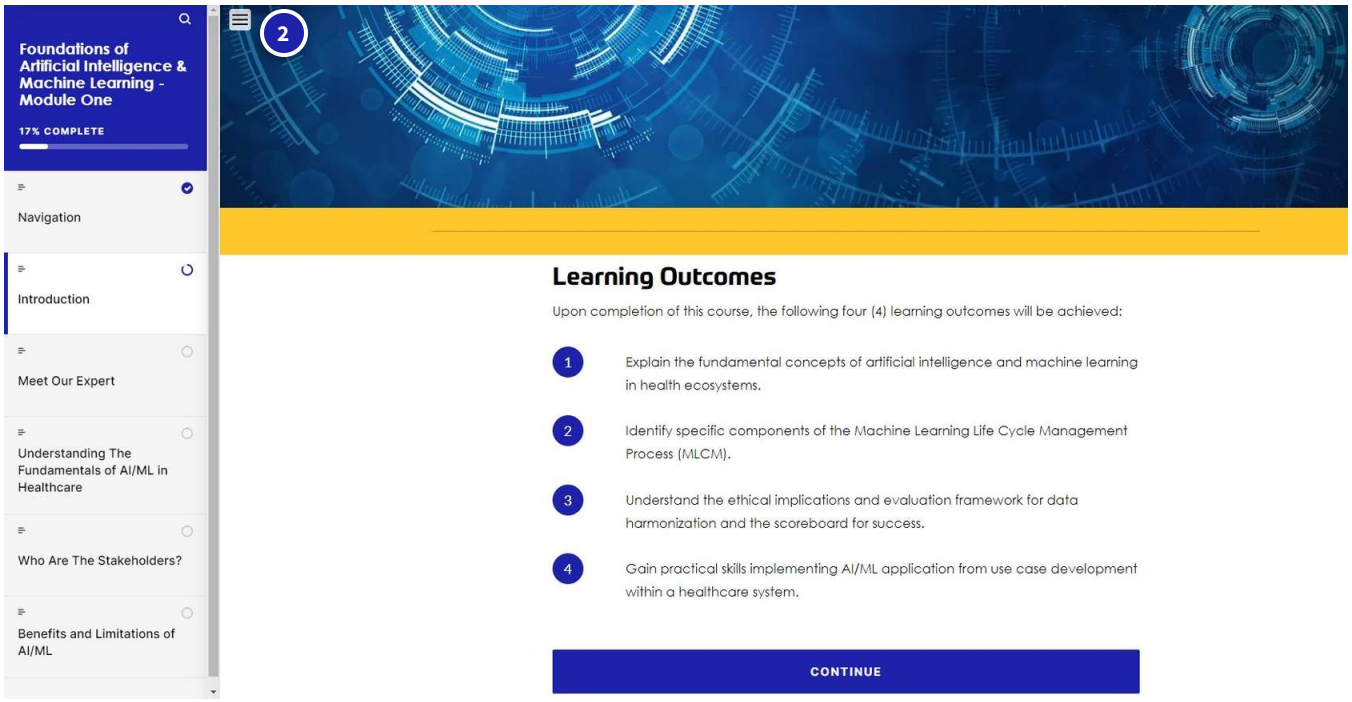
Click on each **number marker** to find out more information about the different areas to navigate through for a good learning experience.



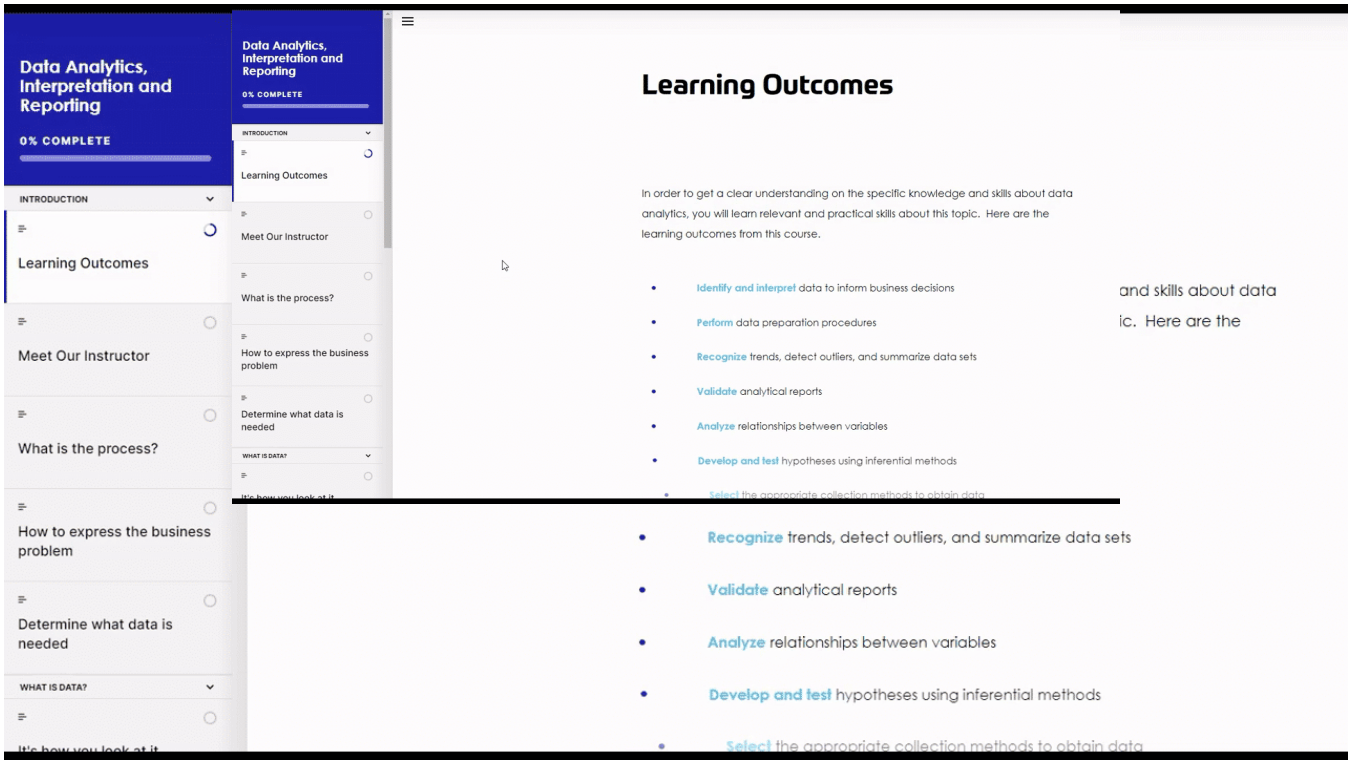


Module Content

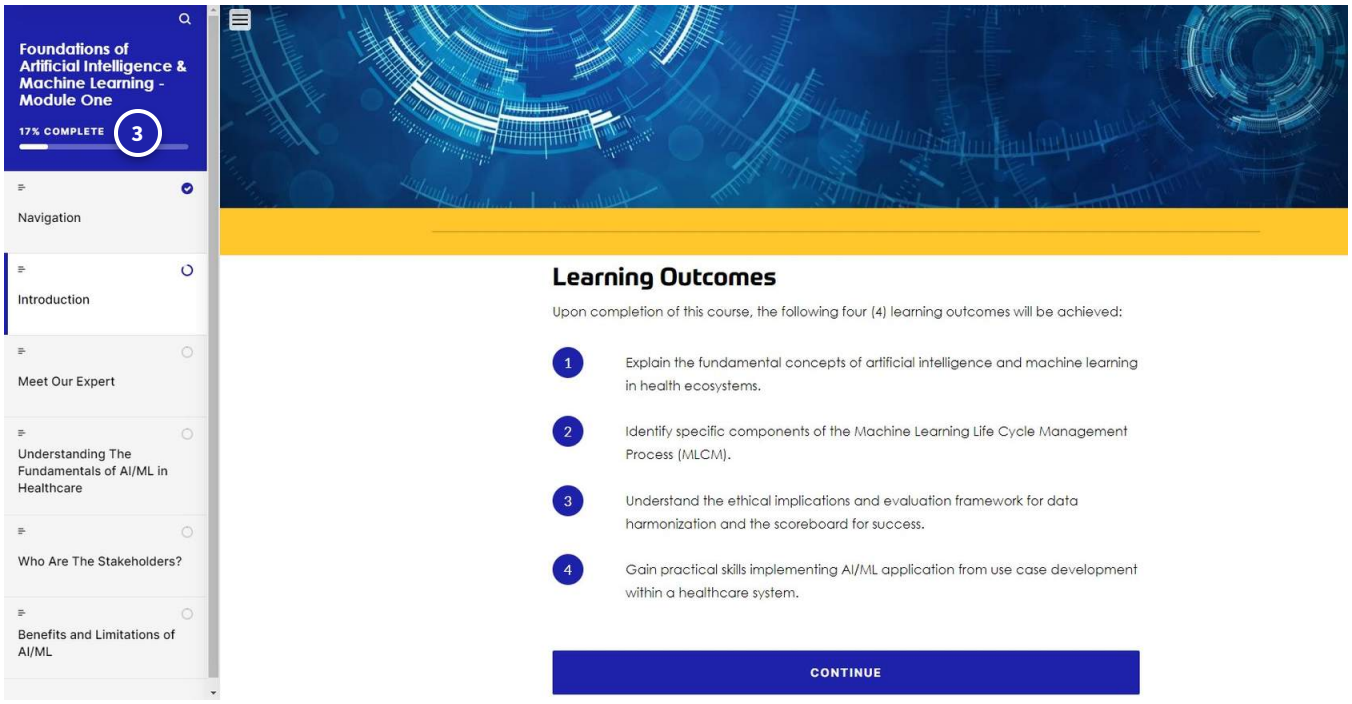
In this area, you will see the main course content for each section in a module. At the end of the sections, a 'Continue' button displays, allowing you to leave one section and go to the next section in each module.



Hamburger Icon



This icon represented by three (3) stacked vertical lines provides more viewing real estate for the learning content.



Completion Indicator

In the Table of Contents, the module percent (%) completion status displays at the top of the course. Once you have worked through all the content, the module displays **100%** complete.

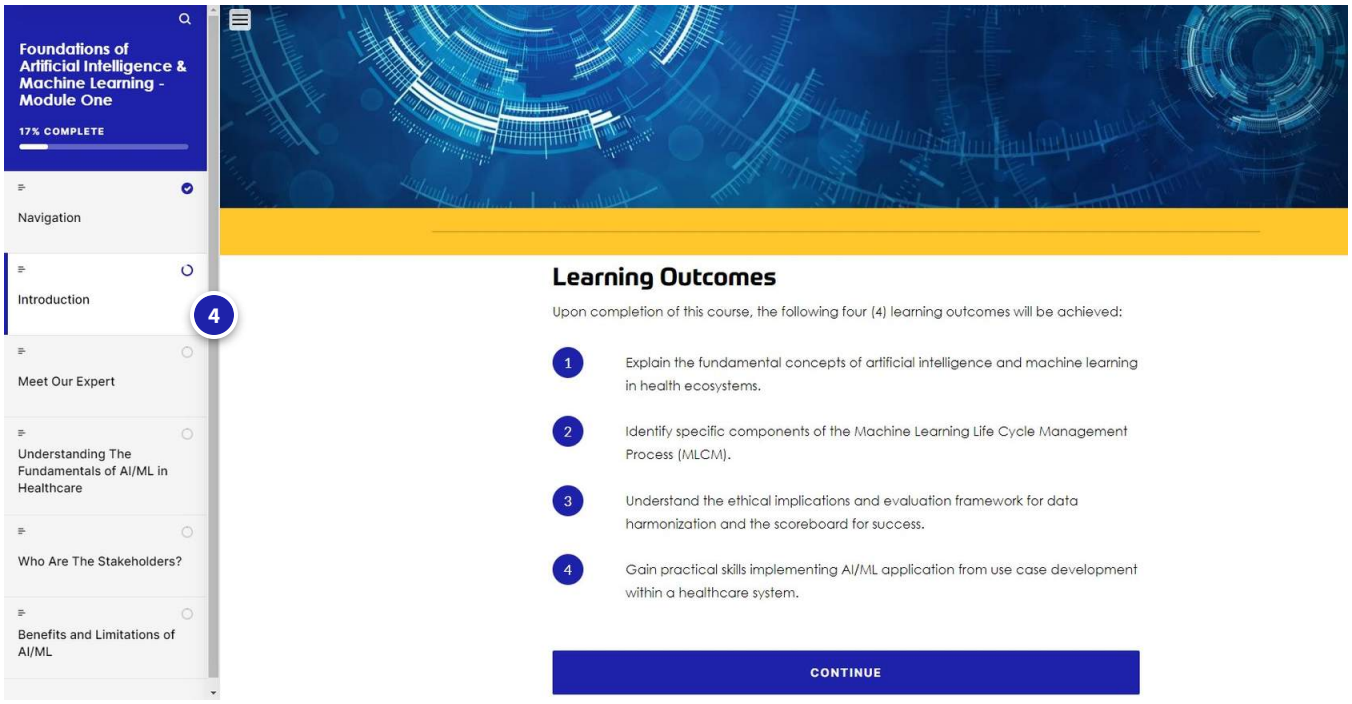


Table of Contents

This area in the module displays all the sections or lesson content. As you complete the lessons, a **colored** icon with a checkmark will display.

In order to have the best experience working through the content for this course, these are the browsers that acceptable and supported:

***For Windows*: Google Chrome (latest version), Firefox (latest version), Microsoft Edge (Chromium-based, latest version)**

For *Mac*: Google Chrome (latest version), Safari, Firefox (latest version)

CONTINUE

Meet Our Expert

Brian Anderson, MD

Co-Founder & Chief Executive Officer

Coalition for Health AI (CHAI)

Internationally recognized expert and author in digital health and Health AI

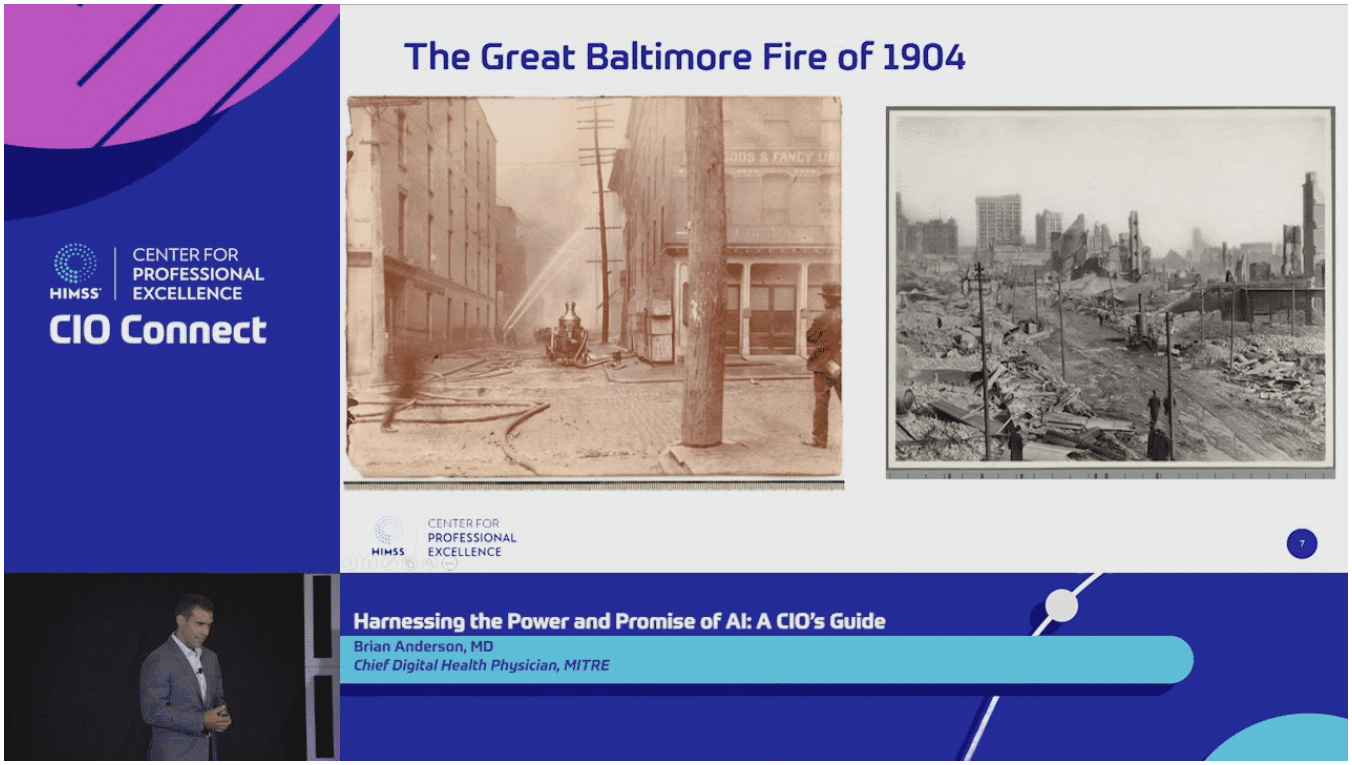
Dr. Brian Anderson, co-founder of the Coalition for Health AI (CHAI) in 2021, serves as its CEO. CHAI is dedicated to establishing consensus-driven guidelines and best practices for Responsible AI in Health, while also facilitating independent testing and validation of AI for safety and efficacy.

Before heading CHAI, Dr. Anderson served as MITRE's Chief Digital Health Physician, spearheading research and development in digital health alongside industry partners and the U.S. Government. He led critical initiatives during the COVID-19 pandemic, collaborating with the White House COVID Task Force and Operation Warp Speed. Additionally, he led MITRE's significant R&D endeavor in Oncology, pioneering mCODE development and utilizing AI for enhanced clinical trial design.

Dr. Anderson, a renowned digital health expert, is a sought-after speaker on topics including digital health innovation, health standards, clinical decision support systems, and interoperability. Before joining MITRE, he led the Informatics and Network Medicine Division at athenahealth and contributed to various national and international health IT committees alongside organizations such as the Office of the National Coordinator (ONC), the National Institutes of Health (NIH), and the Organization for Economic Cooperation and Development (OECD).

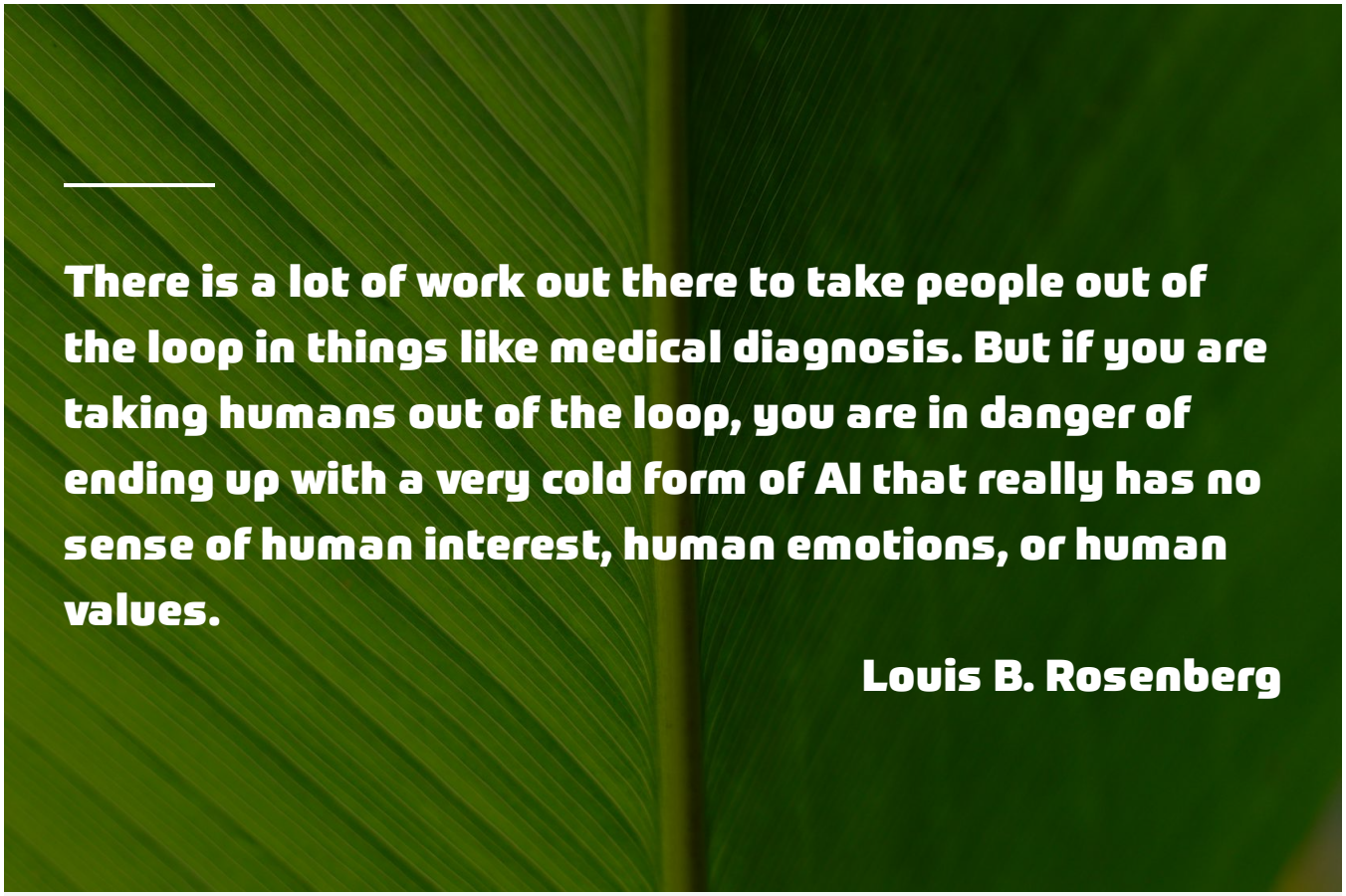
A Realistic Perspective

Listen as Dr. Anderson shares a real perspective on how artificial intelligence is being implemented in healthcare to move forward with frameworks that make sense.


CENTER FOR
PROFESSIONAL
EXCELLENCE
CIO Connect
The Great Baltimore Fire of 1904
CENTER FOR
PROFESSIONAL
EXCELLENCE
7
Harnessing the Power and Promise of AI: A CIO's Guide
Brian Anderson, MD
Chief Digital Health Physician, MITRE

CONTINUE

Understanding The Essentials of AI/ML in Healthcare



Let's dive into our first goal of the fundamental concepts of artificial intelligence and machine learning in health ecosystems.

Artificial Intelligence or Augmented Intelligence?

To figure out the appropriate use cases for using AI, it's important to understand the essentials of the concepts.

The goal of artificial intelligence is to simulate humanistic intelligence in machines, empowering them to carry out complex tasks and decision-making processes autonomously.

The goal of augmented intelligence is to improve decision-making without taking humans out of the equation.

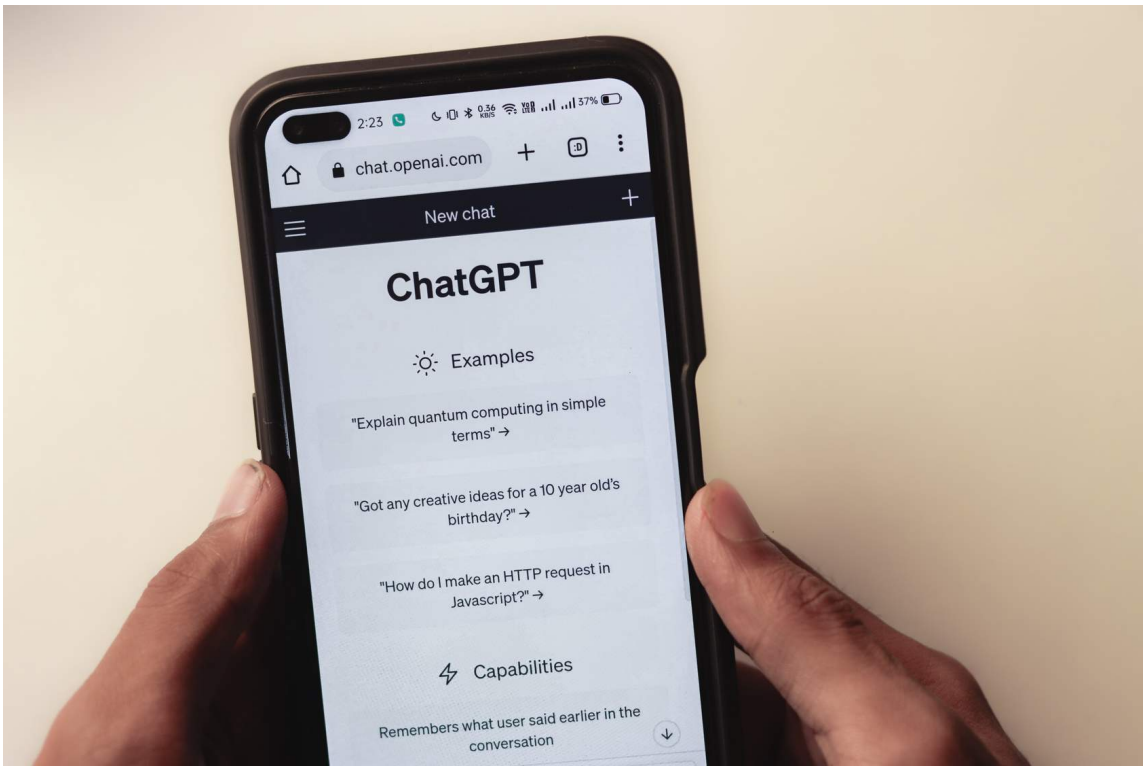
Artificial Intelligence	**A field that combines computer science and robust data sets to enable problem-solving. It is the collection of computer systems simulating human intelligence.**

Augmented Intelligence

A design pattern for a human-centered partnership model of people and artificial intelligence (AI) working together.

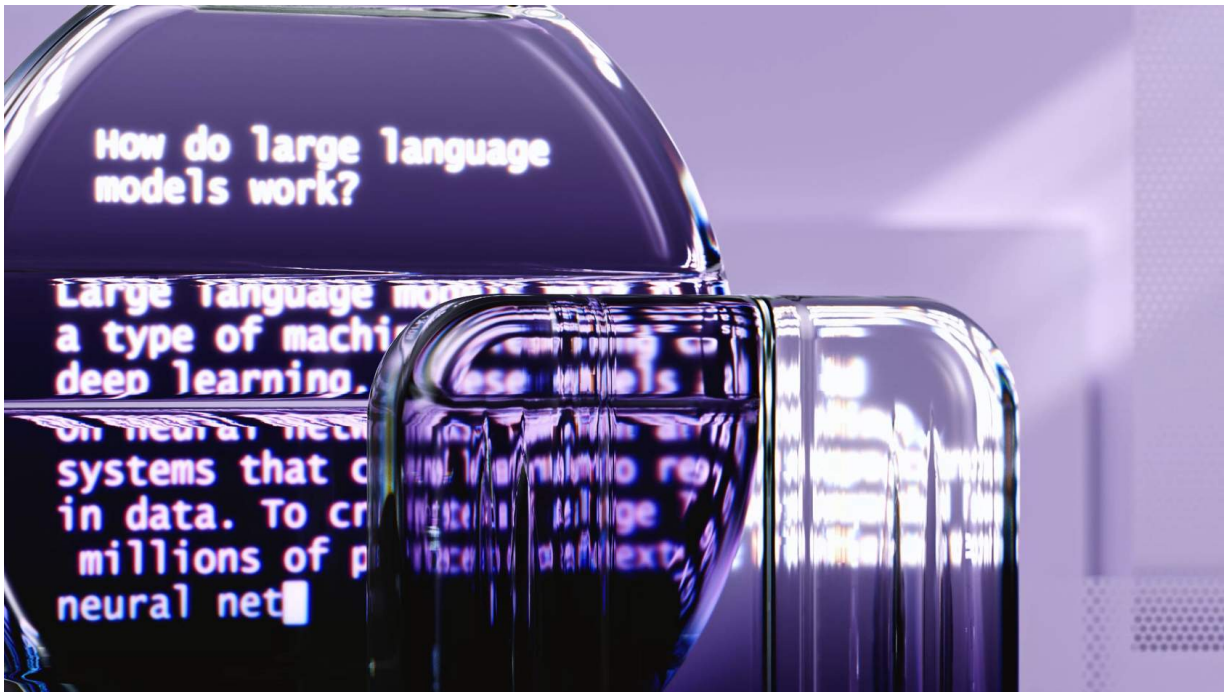
NATURAL LANGUAGE PROCESSING | LARGE LANGUAGE MODEL | DATA PRODUCTS

Natural language processing (NLP) - a type of AI that enables computers to understand spoken and written human language. NLP enables features such as text and speech recognition on devices. Examples of NLP are improved searches, Siri, Alexa, chatbots, autocorrect, social media analytics, speech recognition, spell check, and more.



NATURAL LANGUAGE PROCESSING | **LARGE LANGUAGE MODEL** | DATA PRODUCTS

A large language model (LLM) is an AI model that has been trained on large amounts of text so that it can understand language and generate human-like text to convey ideas and concepts. Examples are Google's BERT, Claude, Cohere, and Falcon 40B to name a few.



NATURAL LANGUAGE PROCESSING | LARGE LANGUAGE MODEL | DATA PRODUCTS

These are any products or features utilizing data to facilitate goals. It is very different from data-as-a-service (DAAS) which uses technology and is an innovative way of selling external data. Data products involve collecting, analyzing, and using data to provide insight, information, or functionality to help address specific needs or business challenges.
Types of data products in healthcare are electronic health records (EHR), administrative data, claims data, patient/disease registries, health surveys, and clinical trial data.

The Health Ecosystem

Ms. Lee Kim, JD CISSP/US FHIMSS

Senior Principal, Cybersecurity and Privacy

HIMSS

Lee Kim is the Senior Principal, Cybersecurity and Privacy at the Healthcare Information and Management Systems Society (HIMSS) North America. Lee's roles include subject matter expert, public policy professional, and analyst. She is a member of the U.S. DHS Analytic Exchange Program and the National Cybersecurity Training & Education Center (NCyTE) National Visiting Committee.

Lee is an AV Preeminent peer review-rated attorney in healthcare and intellectual property law.

Listen as **Anne Snowden, HIMSS Chief Research Officer** provides perspectives on the landscape of artificial intelligence in healthcare, illustrating how the health systems she

collaborates with effectively leverage this technology to address both clinical and operational challenges. Click the '**Play**' button.

BRIGHTCOVE

How providers are capitalizing on AI and machine learning

Anne Snowdon, chief research officer at HIMSS, discusses the promise of artificial intelligence in healthcare - and describes how the health systems she works with are using it to clinical and operational challenges.

VIEW ON BRIGHTCOVE >

Emergence of ChatGPT in Healthcare

Click the image to 'zoom' for a closer look!

Analytics Tell Stories

Take a look at the analytics gathered from *HIMSS Analytics* showing data regarding the explosion of ChatGPT since November 2023.

As you see, researching publications has great value in showing an eruption of interest on the topic of generative AI.

A Deeper Dive on Essentials

This article series delves into the realm of generative AI, providing invaluable insights to empower you with a deeper understanding of the topic. The knowledge gained not

only furnishes you with additional reasons but also enhances your capability to engage in insightful conversations and make informed decisions regarding AI.

Click on the **blue button** below to find out more! To access the article, it will open in a new tab. To **return** to the **course**, simply click on the **course tab** located at the **top** of your browser window.

HIMSS Physician Committee Article Series

RESOURCE ARTICLES

Knowledge Check

These knowledge checks help reinforce your foundational learning about AI/ML. Read each question and choose your answer, once you've made your selection, click the **Submit** button to see the results for each question.

When you are finished, click the **Continue** button to see the results for each question.

Augmented Intelligence is designed to replace any human capability.

- ○ True
- ○ False

SUBMIT

_____ is not an application of AI.

- Database Management System
- Digital Assistants
- Natural language processing
- Virtual Reality

SUBMIT

Scenario: As a healthcare IT professional and leader, you are tasked with developing a strategic plan for looking at what is the best course of

action for implementing AI in your organization.

Looking at the list of questions, which questions should be discussed or considered? (Select all that apply)

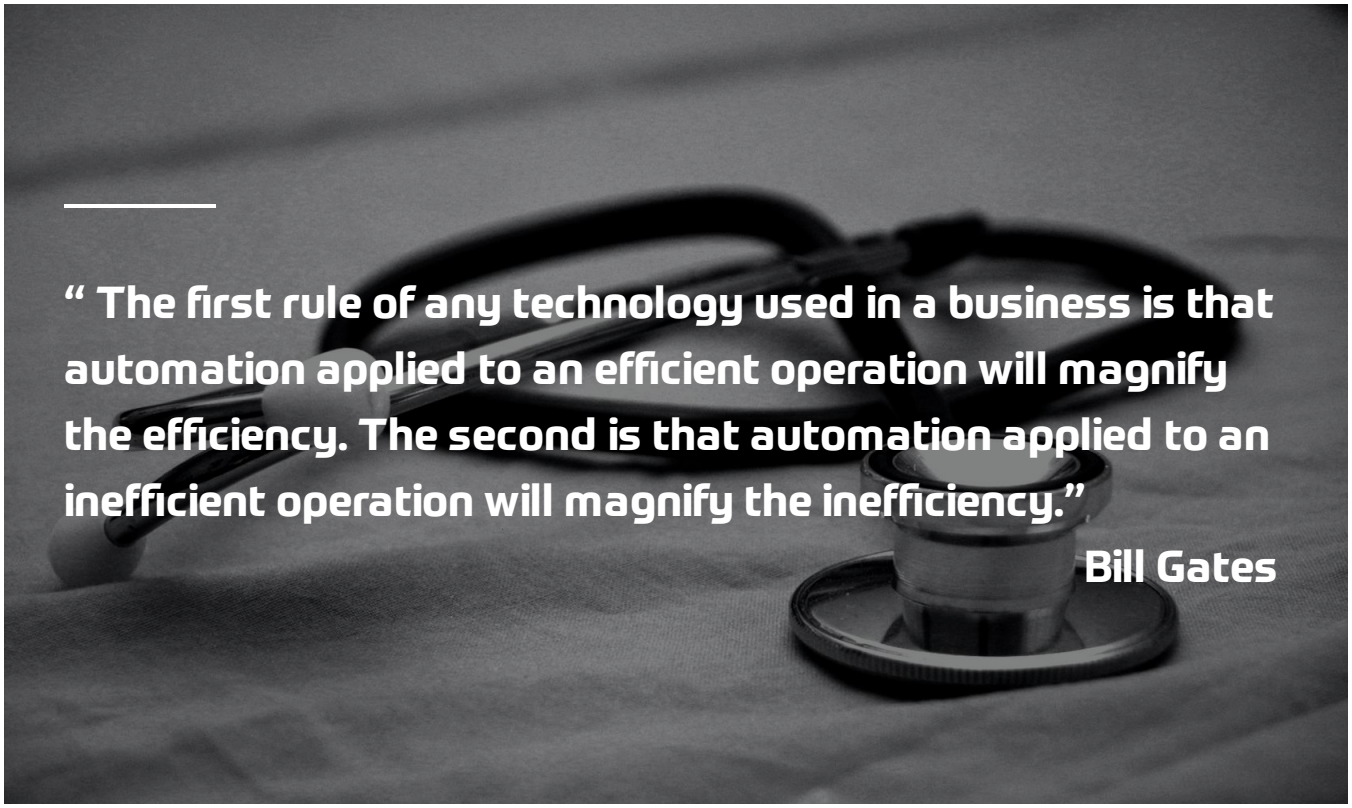
- [ ] What existing processes and tools could be replaced with AI?
- [ ] Do we have the cloud and data infrastructure necessary to enable AI/ML solutions?
- [ ] We are in denial about AI, how do we move forward?
- [ ] What specific use cases would an AI implementation help us handle?

SUBMIT

CONTINUE

Lesson 5 of 7

Who Are The Stakeholders?



Understanding The Important Stakeholders Involved in AI

The use of AI in the health ecosystem involves a diverse set of stakeholders, each playing a crucial role in the development, implementation, and utilization of AI technology.

Introduction

Stakeholders include a wide range of parties, such as employees, government agencies, communities, and more. In various contexts, stakeholders may have different levels of influence and interests. In the health ecosystem, this role is an integral part of clinical, administrative, business solutions, and much more. Stakeholders may have different levels of influence and interest. Recognizing and understanding the needs and expectations of stakeholders is crucial in the health ecosystem.

Let's explore the pivotal roles of stakeholders in shaping the landscape of AI/ML in healthcare.

Click on the **START** button or **arrow** to advance in learning about some of the important stakeholders.

1

Healthcare Providers

A healthcare provider is a person or entity that provides medical care or treatment. Healthcare providers include doctors, nurse practitioners, midwives, radiologists, labs, hospitals, urgent care clinics, medical supply companies, and other professionals, facilities, and businesses that provide such services.

2

Patients

Any recipient of healthcare services that are performed by health care professionals.

3

Pharma and Biotech Companies

Both biotechnology and pharmaceutical companies have similarities and are distinct from each other.

Biotechnology companies use living organisms to manufacture products or solve problems.

Pharmaceutical companies research, develop and market medicines made primarily from artificial sources.

Tech Companies

Technology companies focus on the manufacturing, support, R & D of computing, telecommunication, and consumer electronic-based technology-intensive products and services. These include digital, software, optics, new energy, cloud storage, and e-commerce.

5

Research & Academia

Healthcare research comes in three main areas - experimental, clinical, and epidemiological. Clinical and epidemiological studies are subclassified as interventional and noninterventional.

Academia is combining research and medical education providing the best possible clinical care.

6

Government Agencies & Compliance Experts

Government entities or institutions with global reach possess the authority and power to establish and enforce laws, regulations, and policies. They are also responsible for safeguarding the rights and interests of citizens.

Compliance experts have extensive knowledge and experience with compliance programs.

Summary

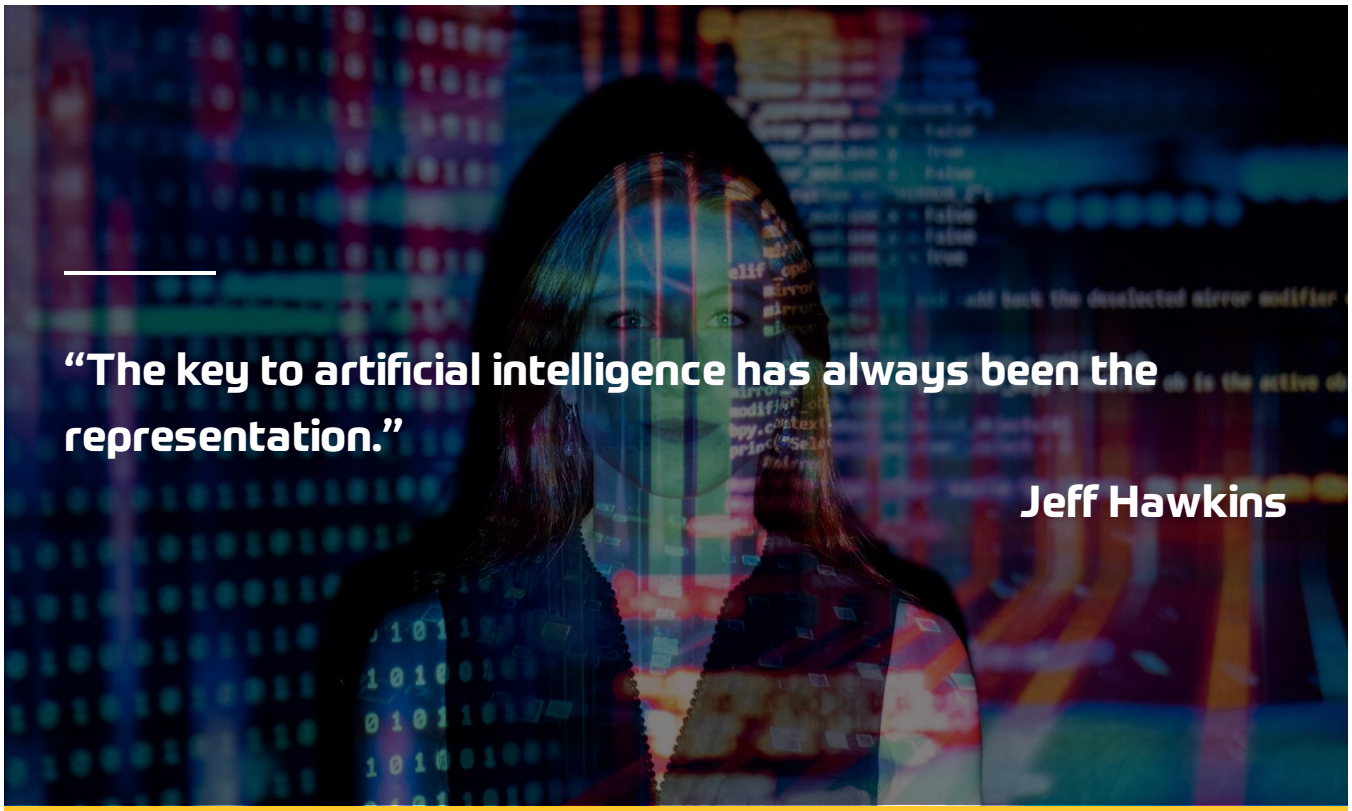
As you see, stakeholders range from various individuals, groups, or entities that have an interest, concern, or investment in healthcare. These roles are pivotal in Artificial Intelligence conversations, planning, and implementation in the health ecosystem.

Can Stakeholders Stop Learning from Generative AI?

Listen as Sumit Rana, Executive VP at Epic R & D, discusses how generative AI is helping physician communities with progress notes, patient responses, and more. Click the '**Play**' button.

CONTINUE

Benefits and Limitations of AI/ML



Benefits

In the ever-evolving landscape of healthcare, the integration of AI/ML emerges as a transformative force, offering a multitude of benefits that can revolutionize patient care, streamline operations, and finance, and drive advancements. Here is a list of benefits for AI/ML implementations. Click on each '+' to see the information.

Automation

AI and ML can automate repetitive tasks, increasing efficiency and reducing the need for human intervention.

Data analytics

Excelling at analyzing large datasets, identifying patterns, and extracting valuable insights leading to data-driven decision making.

Personalization

Customized recommendations for user experience through understanding behaviors and preferences in health ecosystems.

Predictions

Looking at future trends and outcomes based on historical data, sound forecasting could occur for planning, financial forecasting, and risk management.

Improved efficiency

Contribute to faster and more accurate diagnostics, personalized treatment plans, drug discovery, and ultimately improving patient outcomes.

Natural Language Processing (NLP)

Understand and process human language, enabling applications, for example, chatbots and language translation.

Fraud detection and security

Detecting abnormal occurrences and patterns associated with fraudulent activities, enhancing cybersecurity measures.

Cost reduction

Automation and efficient improvements leading to cost savings to minimize errors, streamline processes, and optimize resource utilization.

Limitations

While the integration of AI/ML holds immense promise in healthcare, it is crucial to acknowledge the inherent challenges and limitations associated with their

implementation. Furthermore, the complex and dynamic nature of healthcare systems poses challenges in achieving universal standardization, hindering seamless integration. Acknowledging these limitations is essential to foster responsible and effective implementation, ensuring the potential of AI/ML in healthcare is realized without compromising ethical standards and patient outcomes.

Here is a list of limitations for AI/ML implementations. Click on each '+' to see the information.

Lack of understanding and interpretation

Operating as “black boxes”, making it hard to understand how to reach specific decisions, concern about transparency and interpretation.

Data dependency

Due to the reliance on large and high-quality data sets, biased or incomplete data can lead to biased model predictions and inaccurate results.

Ethical concerns

Ensuring fairness and avoiding discrimination in AI as well as bias and privacy.

Overfitting

Undesirable machine learning behavior due to ML model giving accurate predictions for training data but not for new data.

Security risks

The potential for adverse attacks manipulating input data to deceive AI models.

Job displacement

Job loss due to AI and ML model implementations.

Resource intensiveness

Using sophisticated ML models that require a lot of resources including powerful hardware and energy sources.

Unable to handle unforeseen scenarios

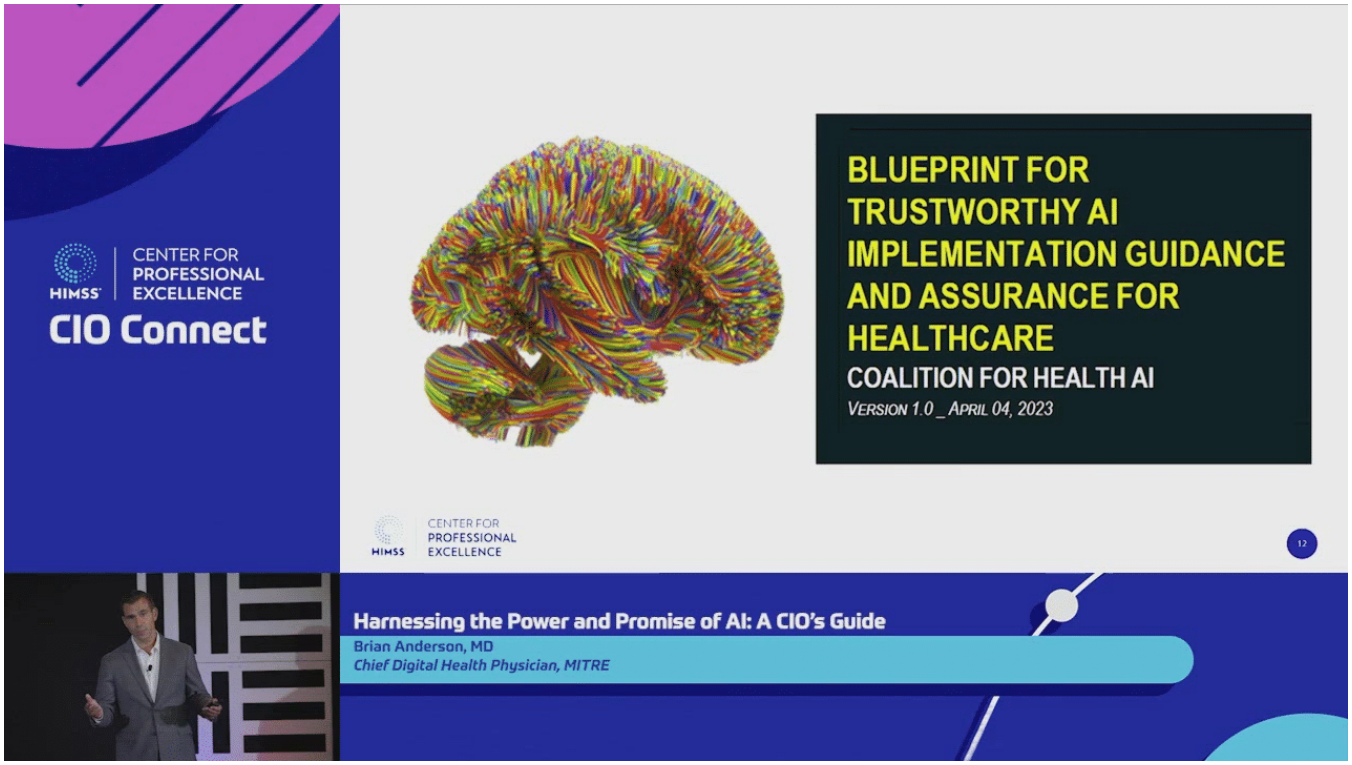
Systems may struggle to adapt to unexpected or unprecedented situations due to relying on pre-existing patterns in data.

Use Case That Is Striking Balances

Listen as Rachini Moosavi, Chief Analytics Officer at UNC Health, shares the experiences from UNC but also gives you some hard capabilities that are empowering the staff at UNC to not have tunnel vision but be a leader with this technology. Click the '**Play**' button.

CONTINUE

Tradeoffs of Engagement and Implementation



Resource

Click on the link to download the *CHAI Blueprint for AI Implementation.*

Source: CHAI. (2024). https://www.coalitionforhealthai.org/updates/april-4th-2023

PDF **blueprint-for-trustworthy-ai_V1.0.pdf**
755.9 KB

Recognizing Trade-offs

When looking at the health ecosystem landscape, tradeoffs can look different depending on the situational decision; however quality and quantity should remain a

focal point in addressing gaps, workflows, financial health, and clinical settings. Here is a list of possible tradeoffs to consider when implementing AI/ML.

1. **Data Privacy and Security**: Balancing the utilization of sensitive data for AI applications with the imperative to uphold stringent data privacy and security measures.

2. **Cost vs. Benefit**: Evaluating the financial investments required for AI implementation against the expected benefits and returns, considering both short-term and long-term impacts.

3. **Interoperability and Standardization**: Managing the tension between the flexibility of AI systems and the need for interoperability and standardized data formats to ensure seamless collaboration within diverse healthcare systems.

4. **Workflow Integration and Acceptance**: Navigating the integration of AI into existing workflows while considering user acceptance, minimizing disruptions, and ensuring a smooth transition for healthcare professionals.

5. **Regulatory Compliance**: Adhering to established healthcare regulations and standards while adapting to the evolving landscape of AI technologies, ensuring compliance with ethical and legal requirements.

6. **Explainability vs. Performance**: Balancing the need for transparent and understandable AI decision-making processes with the pursuit of high-performance models that may be more complex and less interpretable.

7. **Clinical Authentication and Evidence**: Weighing the potential benefits of AI-driven clinical decisions against the necessity for robust authentication and evidence-based practices in healthcare.

8 **Limited Generalization**: Acknowledging the challenge of limited generalization, where AI models may not perform equally well across diverse populations or under varying conditions.

9 **Human-AI Collaboration**: Defining the roles of humans and AI in collaborative healthcare settings, ensuring effective communication, and leveraging the strengths of both to optimize patient care.

10 **Continuous Monitoring and Maintenance**: Balancing the ongoing need for monitoring and maintenance of AI systems to ensure their reliability and effectiveness over time against resource constraints and potential disruptions.

In the generative model and large language models, developing a framework for interpreting the results and accuracy of the results is hugely important and consequential.

Real-world Performance: Human-centric

Listen as Sunil Dadan, EVP and CIDO at Atlantic Health, provides insight from challenges and advice when evaluating and engaging with AI/ML implementations. Click the '**Play**' button.

Resource

Click on the link to download the article*: Artificial intelligence in healthcare: An essential guide for health leaders*

Source: Chen M, Decary M. Artificial intelligence in healthcare: An essential guide for health leaders. Healthcare Management Forum. 2020;33(1):10-18. doi:10.1177/0840470419873123

PDF

artificial-intelligence-in-healthcare-an-essential-guide-for-health-leaders.pdf

324.1 KB

Knowledge Check

As you've learned different tradeoffs can occur for situations that come up in the health ecosystem. Specifically looking at implementing artificial intelligence, review the question below and pick the correct answer.

Artificial Intelligence implementation has to be strategic with careful consideration of many factors. What tradeoffs should be thought about in the process? (select **all** the answers that apply)

- [ ] Data Privacy and Security
- [ ] Cost vs. Benefits
- [ ] Building Expansion
- [ ] Ethics and Bias

- [ ] Interoperability and Standardization

SUBMIT

Congratulations! You have completed the content for Module One of the AI/ML course, click the 'Continue' button to exit this module and continue working through the course.

CONTINUE