

# Images are Information

## Medical Imaging and Imaging Analytics

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# Vocabulary

- Information Science
- Informatics
- Document
- Search
- Retrieval
- Information Object
- Lexicon
- Computer Human Interaction- HCI
- Image
- Array
- Matrix
- Pixel
- Voxel
- Preprocessing
- Processing
- Render
- Cloud
- Data
- Big Data
- Server
- High Performance Computing (HPC)
- Virtual Server
- Sandbox



# Information Science

Discipline:

Management of *information* in any form

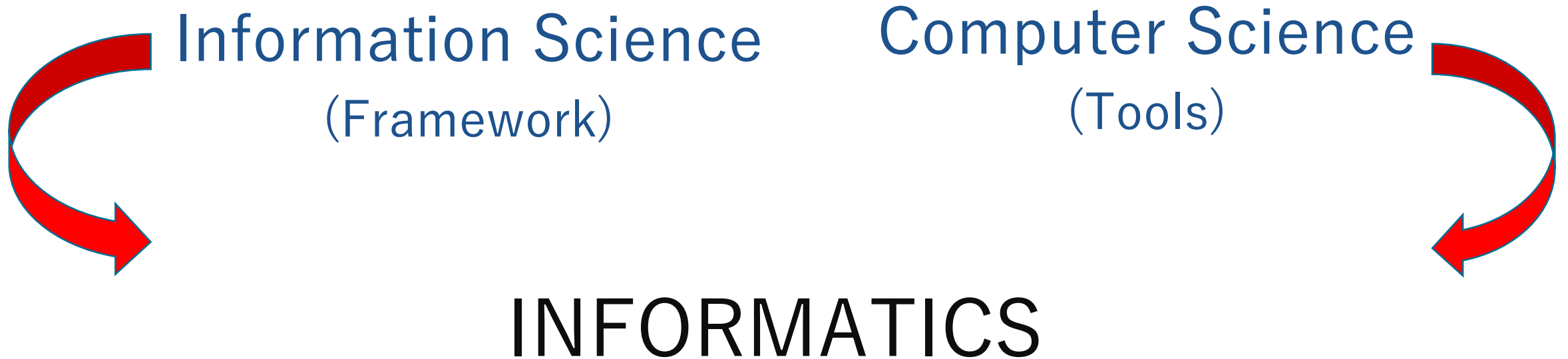
Study how Humans interact and obtain information

Information Seeking Behavior = Search Behavior = Foraging

Document = Object = Artefact



# Informatics





# Document

*“transfer of information through time requires the existence of some storage medium, which is designated as a document”*

*“any physical or symbolic sign, preserved or recorded ,intended to represent, to reconstruct or to demonstrate a physical or conceptual”*  
(Briet, 1951,p.7)



# Domain Specific Lexicon (aka Lingo)

Document

Artefact  
(artifact)

Information Object

Image



# Αν Επεντ □ Ρελατεδ Τασκ Παραδιγμ

- Α νεω μετηοδολογψ φορ στυδψινγ ινφορματιον βεηαπιορ ις
- βεινγ δεπελοπεδ το ινπεστιγατε τηε βιολογιχ υνδερπιννινγς οφ
- σεαρχη βεηαπιορ. Τηερε αρε μανψ ματυρε βεηαπιοραλ μοδελς
- βυτ φεω ιφ ανψ, τηατ διρεχτλψ εξαμινε πηψσιολογιχ προχεσσες
- ωιτηιν τηε ηυμαν βραιν ωηιλε τηεσε βεηαπιορς αρε οχχυρρινγ. Ουρ
- γοαλ ις το εξπλορε νεω τεχηνολογιες τηατ αρε υσεδ φορ τηε στυδψ
- οφ βραιν φυνχτιον. Ιν τηις παπερ ωε ωιλλ διςχυσσ δεπελοπμεντ οφ α
- φυνχτιοναλ μαγνετιχ ιμαγινγ (φMRI) μετηοδολογψ ινχλυδινγ τηε
- δεπελοπμεντ οφ α σπεχιαλιζεδ τασκ σετ, δατα πρε–προχεσσινγ ανδ
- στατιστιχαλ παραμετριχ δατα αναλψσις.





# BREAK



# Object? Document?

Object	Document?
Star in the Sky	No
Photo of Star	Yes
Stone in river	No
Stone in museum	Yes
Animal in the wild	No
Animal in Zoo	Yes





When I say imaging what am I referring to?

Medical Imaging

IMAGE → INFORMATION  
OBJECT



# Two types of Images

## ANALOG IMAGES

Exist on something → Surface Film, display or projection

Levels of Brightness or colors

Continuous

Humans Perceive → Visual System



# Two types of Images

## DIGITAL IMAGES

Array Numbers or values

Pixels and Voxels

Not human perceivable

Require Processing      Rendering

# QUESTIONS





Τι με φορ Λυνχη?



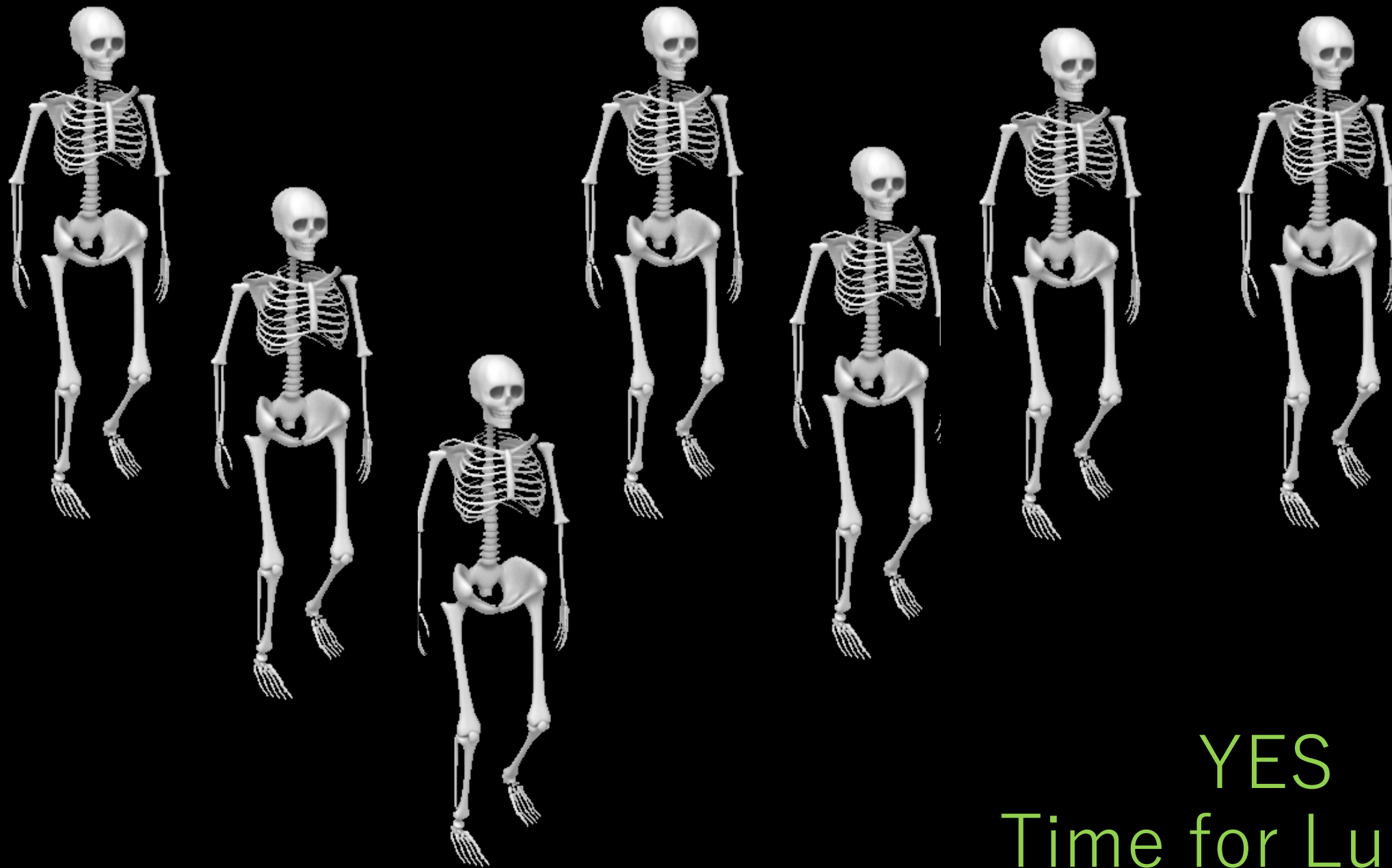
Τι με φορ γολχη;



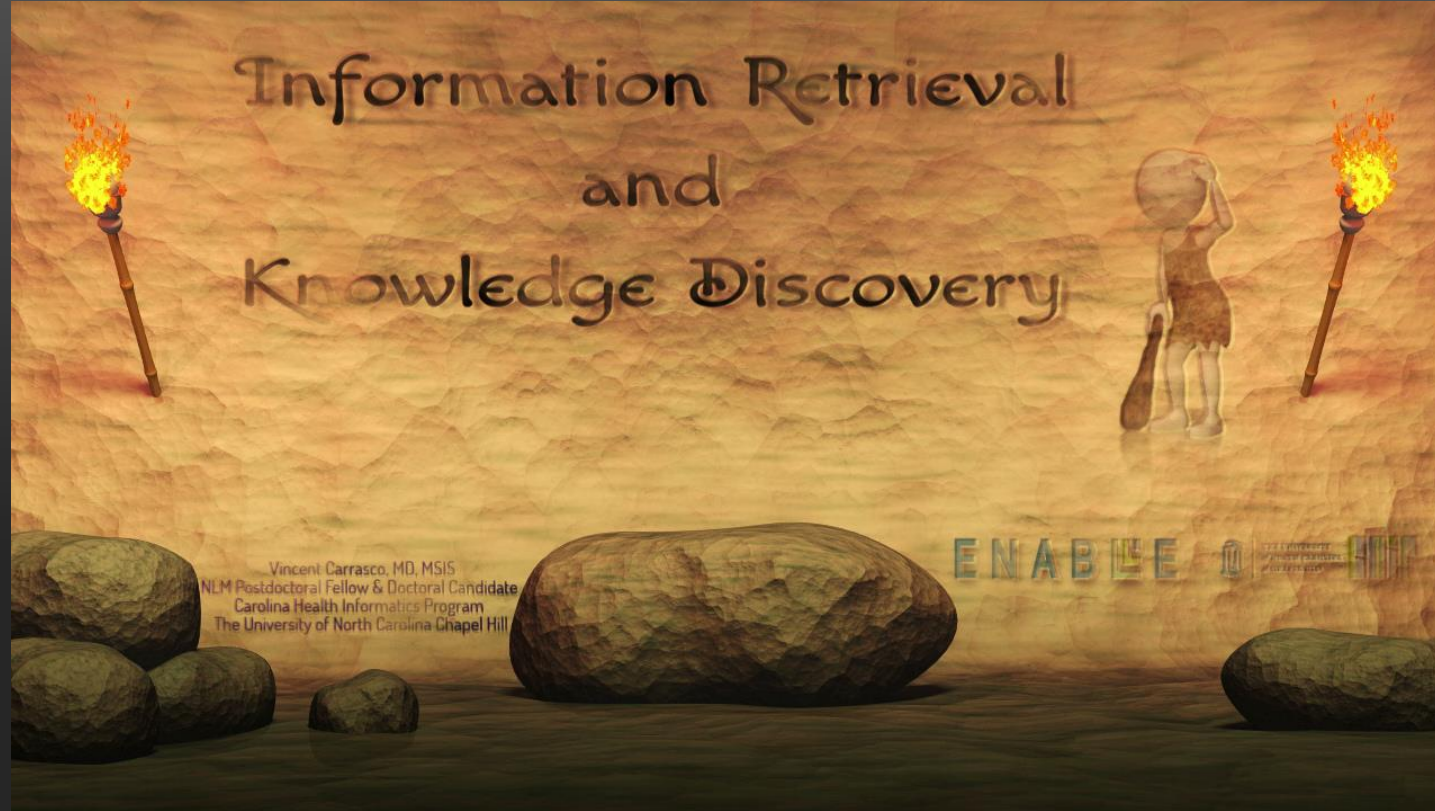
Are we there yet?

Are we there yet?





YES  
Time for Lunch!



## Information Retrieval

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# Vocabulary

- Search
- Retrieval
- Document
- Content
- Indexing
- Metadata
- Archiving
- Database
- Warehouse
- Search Engine
- Queries
- Knowledge discovery



Biology

Chemistry

Physics

- > 75 clinical trails
- 11 Systematic reviews

*(Insel, 2003), (Davies, 2006), (Bastian, 2010), (Purcell, 2012; Google/Manhattan Research, 2012), (Metzger, 2012)*



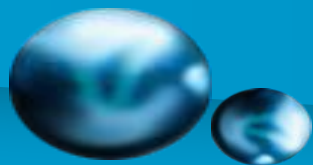
# Physicians Search

- 2x time online vs print
- 85% daily
- ~6 per day 94% use Google
- 30% click on first sponsored site



# Consumers Health Information Search

Health topic	% searching
Specific disease or medical problem	66%
Certain medical treatment or procedure	56%
Doctors or other health professionals	44%
Hospitals or other medical facilities	36%
Health insurance – private or government	33%
Food safety or recalls	29%
Environmental health hazards	22%
Pregnancy and childbirth	19%
Medical test results	16%



# Medical Imaging Informatics

manages the acquisition, storage, retrieval and use of imaging information in health care Applied science- not our focus

## Medical Imaging Informatics Research

Improving processes - usability

## Imaging and Neuroimaging Research

Tool for exploring how people think, make decisions

Imaging as a window into human physiology and pathophysiology



# History Information, Informatics

## Cybernetics

“transdisciplinary approach for exploring regulatory systems—their structures, constraints, and possibilities. Norbert Wiener defined *cybernetics* in 1948 as “the scientific study of control and communication in the animal and the machine”





# Cybernetics

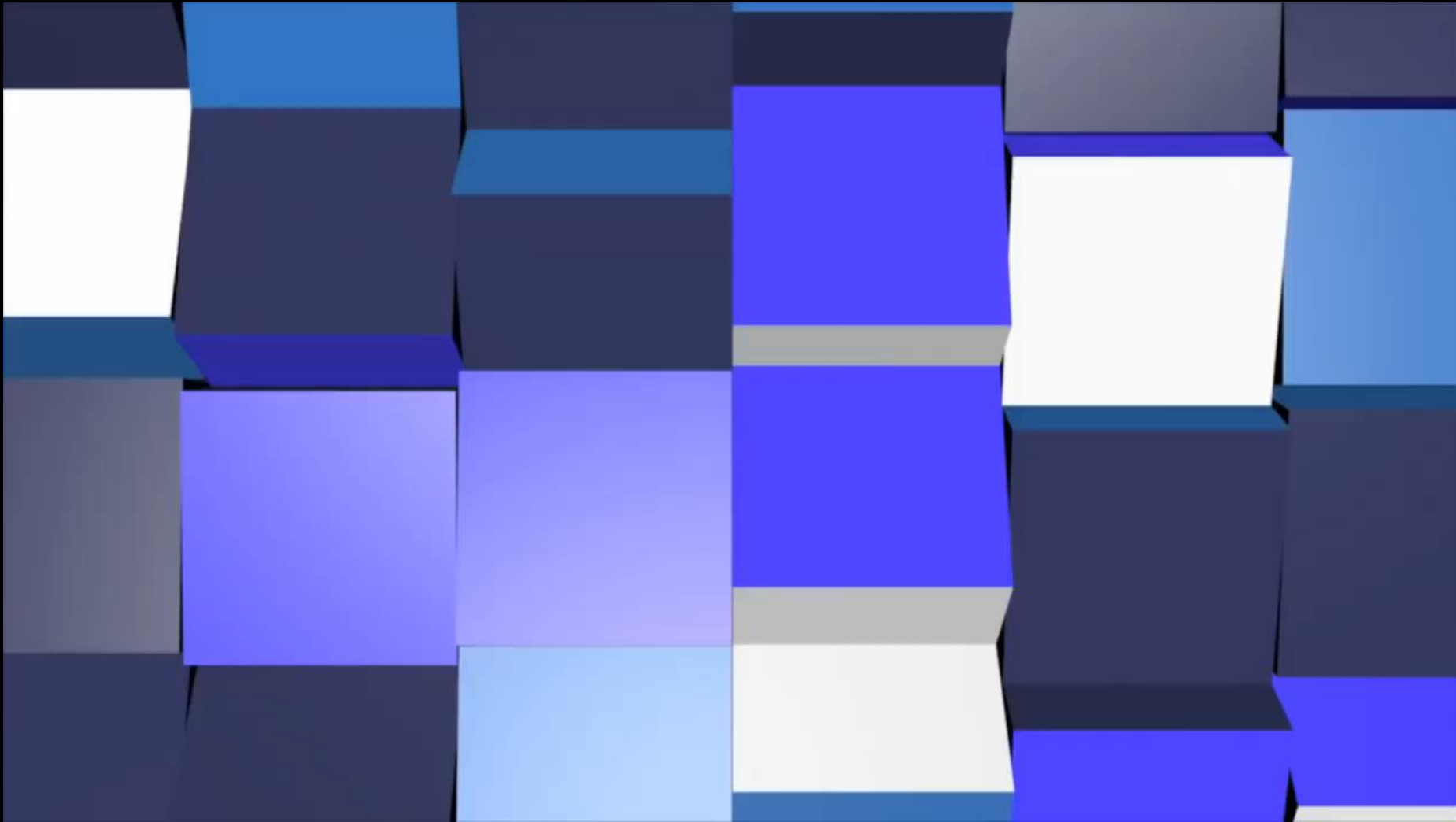
**2016**

**WHAT IS  
CYBERNETICS ?**

16 info-capsules in 10 information rich slides



# Alan Turing





# ENIAC



# Lingo Documents

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- What is an artifact? definition and meaning. (n.d.). Retrieved May 13, 2018, from <http://www.businessdictionary.com/definition/artifact.html>
- What is Imaging Informatics | ABII. (2018). [Organization]. Retrieved May 13, 2018, from <https://www.abii.org/About-Imaging-Informatics.aspx>



# References and Videos: Introduction

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# Questions?



