HARVARD
Faculty of Arts and Sciences

RADCLIFFE INSTITUTE
FOR ADVANCED STUDY
HARVARD UNIVERSITY

HARVARD DIVINITY SCHOOL

HARVARD
LIBRARY

HARVARD T.H. CHAN
SCHOOL OF PUBLIC HEALTH

Collection of Historical
Scientific Instruments
HARVARD UNIVERSITY

HARVARD
MEDICAL SCHOOL

Harvard
Semitic Museum

HARVARD COLLEGE
Freshman Seminar Program

Harvard Museum *of*
Natural History

HarvardX

Harvard
Art Museums
Fogg Museum
Busch-Reisinger Museum
Arthur M. Sackler Museum

David **Carrasco**

Professor of the Study of Latin America (FAS and HDS)

George **Church**

Professor of Genetics (HMS) & Director of PersonalGenomes.org

Emma **Dench**

Professor of Ancient and Modern and of the Classics (Department of the Classics, FAS)

Rowan **Flad**

Professor of Archaeology (Anthropology Department, FAS)

Owen **Gingerich**

Professor Emeritus of Astronomy and History of Science (FAS)

Don **Goldmann**

Professor in the Department of Immunology and Infectious Disease (HSPH)

Emilie **Hardman**

Research, Instruction & Digital Librarian, Houghton Library

John **Huth**

Professor of Science (Physics Department, FAS & Co-Director of Science, Radcliffe)

Peter **Manuelian**

Professor of Egyptology & Director of Harvard Semitic Museum (FAS)

Megan **Murray**

Professor of Global Health & Epidemiology (HMS & HSPH)

Laura **Nasrallah**

Professor of New Testament and Early Christianity (HDS)

Jacob **Olupona**

Professor of African Religious Traditions (both FAS and HDS)

John **Overholt**

Curator of Early Modern Books and Manuscripts, Houghton Library

Sara **Schechner**

Curator of Historical Scientific Instruments

Piotr **Steinkeller**

Professor of Assyriology (Department of Near Eastern Language & Civilizations, FAS)

[and more to come, thanks!]

PredictionX @ HarvardX

Annie **Valva**
Associate Director

Colin **Fredericks**
Senior Project Lead

Drew **Lichtenstein**
Project Lead

Jared **Voss**
Editor

Amanda **Justice**
Editor

Kevin **Belli**
Lead Videographer

Alex **Auerima**
Lead Videographer

Theresa **Hartmann**
Videographer

Morgan **Laforge**
Videographer

Luis **Duarte**
Academic Technologist

Dylan **Clark**
Teaching Fellow

Allyssa **Metzger**
Teaching Fellow

with special thanks to Peter **Bol** (Vice Provost for Advances in Learning), Rob **Lue** (HX Faculty Director), Michael **Kan** (HX Executive Director), Samantha **Earp** (former HX Executive Director), Jon **Alper** (HX Technical Operations Manager), Frank **White** (freelance writer), and Bill **Barthelmy** (Academic Technology for FAS)

PREDICTIONX

beyond Harvard

Howard **Cutler**, Executive Producer (WGBH, retired)

Paolo **Galluzzi**, Director, Museo Galileo, Florence

Maria **Halvorsen**, Medium/Psychic

James **Leonard**, Independent Artist

Chris **Lintott**, Professor of Astrophysics, Oxford University

Kathleen **Medina,** Astrologer

Rory **McEvoy**, Curator of Horology, Royal Observatory Greenwich

Keith **Moore**, Librarian, Royal Society

Martin **Rees**, Emeritus Professor at Cambridge, and Astronomer Royal

Simon **Schaffer**, Professor of History of Science, University of Cambridge

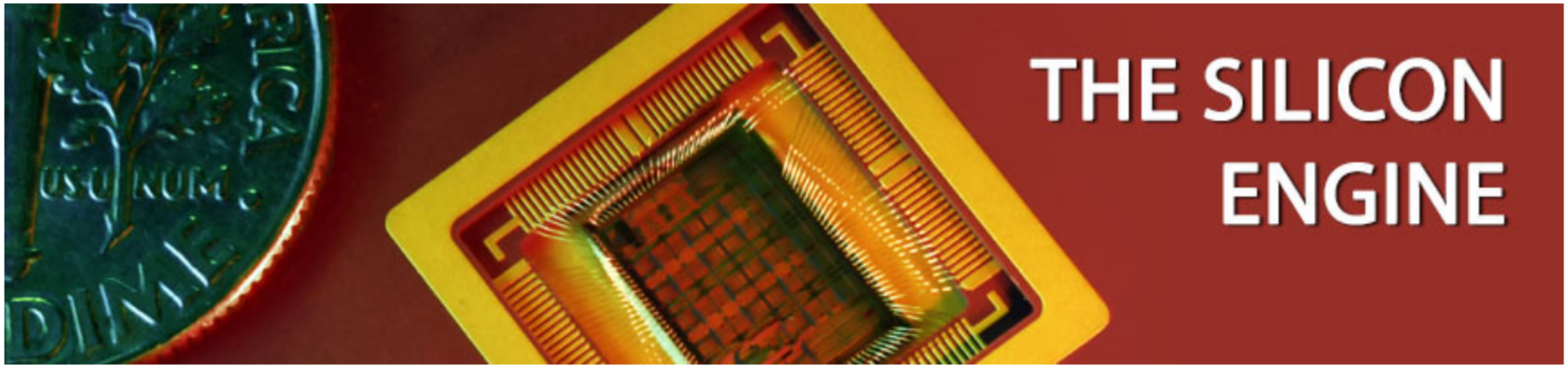
Dr. Rosalind **Stanwell-Smith**, Lecturer at the London School of Hygiene and Tropical Medicine

Dava **Sobel**, Author

Curtis **Wong**, Principal Researcher at Microsoft Research

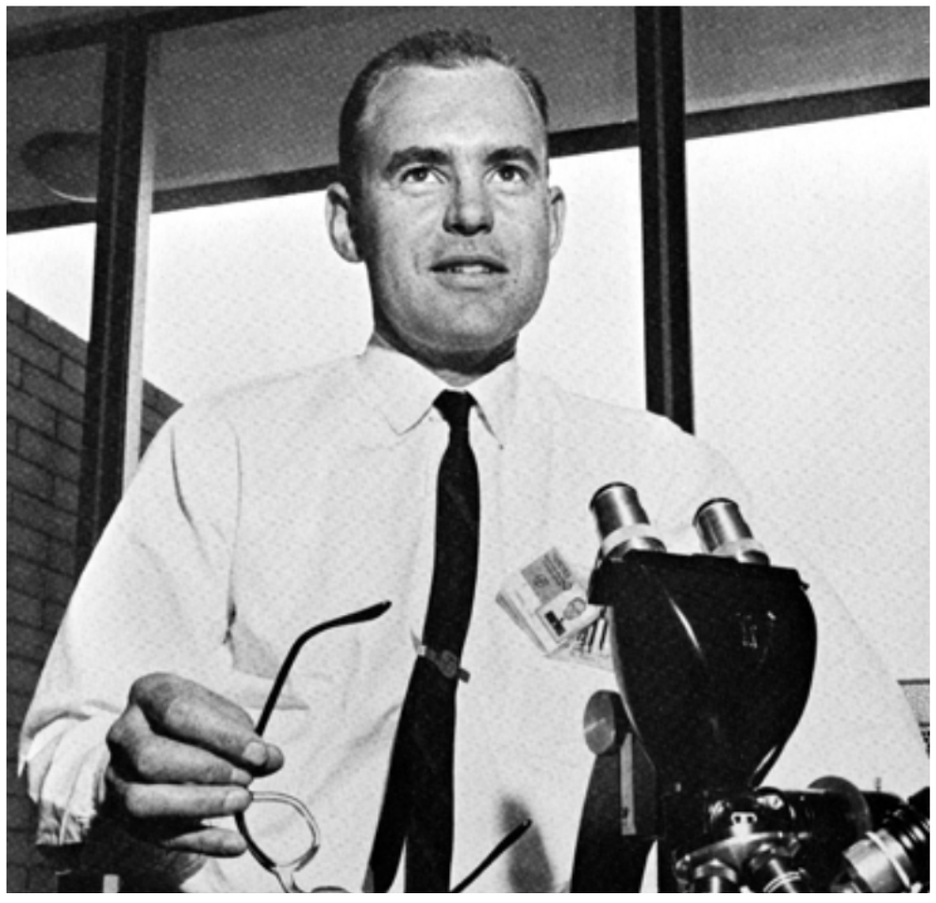
A LOOK AT THE FUTURE (OF ONLINE LEARNING?)

Alyssa A. Goodman
Harvard-Smithsonian Center for Astrophysics & Radcliffe Insitute for Advanced Study
@aagie, @PredictionX



1965: "Moore's Law" Predicts the Future of Integrated Circuits

Fairchild's Director of R & D predicts the rate of increase of transistor density on an integrated circuit and establishes a yardstick for technology progress.



Gordon Moore, Fairchild Semiconductor's Director of R&D, wrote an internal paper in which he drew a line through five points representing the number of components per integrated circuit for minimum cost per component developed between 1959 and 1964. "The Future of Integrated Electronics" attempted to predict "the development of integrated electronics for perhaps the next ten years." Extrapolating the trend to 1975 he projected that the number of components per chip would reach 65,000; a doubling every 12 months. Edited for publication as a magazine article, "Cramming more components onto integrated circuits" was published in Electronics on April 19, 1965.

At the 1975 IEEE International Electron Devices Meeting Moore, by now with Intel, noted that advances in photolithography, wafer size, process technology, and "circuit and device cleverness," especially in semiconductor memory arrays, had allowed his projection to be realized. Adding more recent data, that included a higher mix of microprocessor designs that were somewhat less dense than memories, he slowed the future rate of increase in complexity to "a doubling every two years, rather than every year."

PREDICTIONX

1 Omens, Oracles & Prophecies

2 The Rise of Theory

3 Modern Simulation

Full "Course" / Book

"Parts"

Mesopotamian Haruspicy

Egyptian Priests

Roman Augury

Chinese Oracle Bones

Yoruba Ifa

Tent Tarot

Mesoamerican Astrology

Oracle of Delphi

Christian Prophecy

Modern Mysticism & Astrology

Comets of Doom

The Path to Newton

Greek

Navigation

John Snow & Cholera

Epidemiology

& Earthquakes

Finance

Personal Genomics

The Universe

Divination Tent

The Futures of Our World

Topics & Mini-Courses

Tech Tools

Pedagogica Views

PredictionX

- HarvardX
- Harvard College Observatory
- Widener Library
- Harvard Divinity School
- Harvard Semitic Museum
- Harvard University Science C...
- Houghton Library
- Putnam Gallery Collection of ...
- Harvard Art Museums
- Radcliffe Institute for Advanc...
- Lexington Dinner Party
- Harvard Medical School
- Harvard T.H. Chan School of ...
- Medium/Mystic/Astrologer
- Royal Observatory Greenwich
- London School of Hygiene & ...
- Golden Square
- Whipple Museum of the Hist...
- Museo Galileo

18 locations
4 countries

4 Harvard schools
3 Harvard museums
3 Harvard libraries

tinyurl.com/PredictionXmap

Early Christian Divination, featuring Laura Nasrallah (HDS) at the Harvard Art Museums

Full "Course" / Book

"Parts"

Mesopotamian Haruspicy

Egyptian Priests

Roman Augury

The Path to Newton

John Snow & Cholera

Epidemiology

Personal Genomics

Chinese Oracle Bones

Mesoamerican Astrology

Oracle of Delphi

Finance

The Universe

Yoruba Ifa

Teen Tarot

Harvard Art Museums

Comets of Doom

Modern Mysticism & Astrology

The Futures of Our World

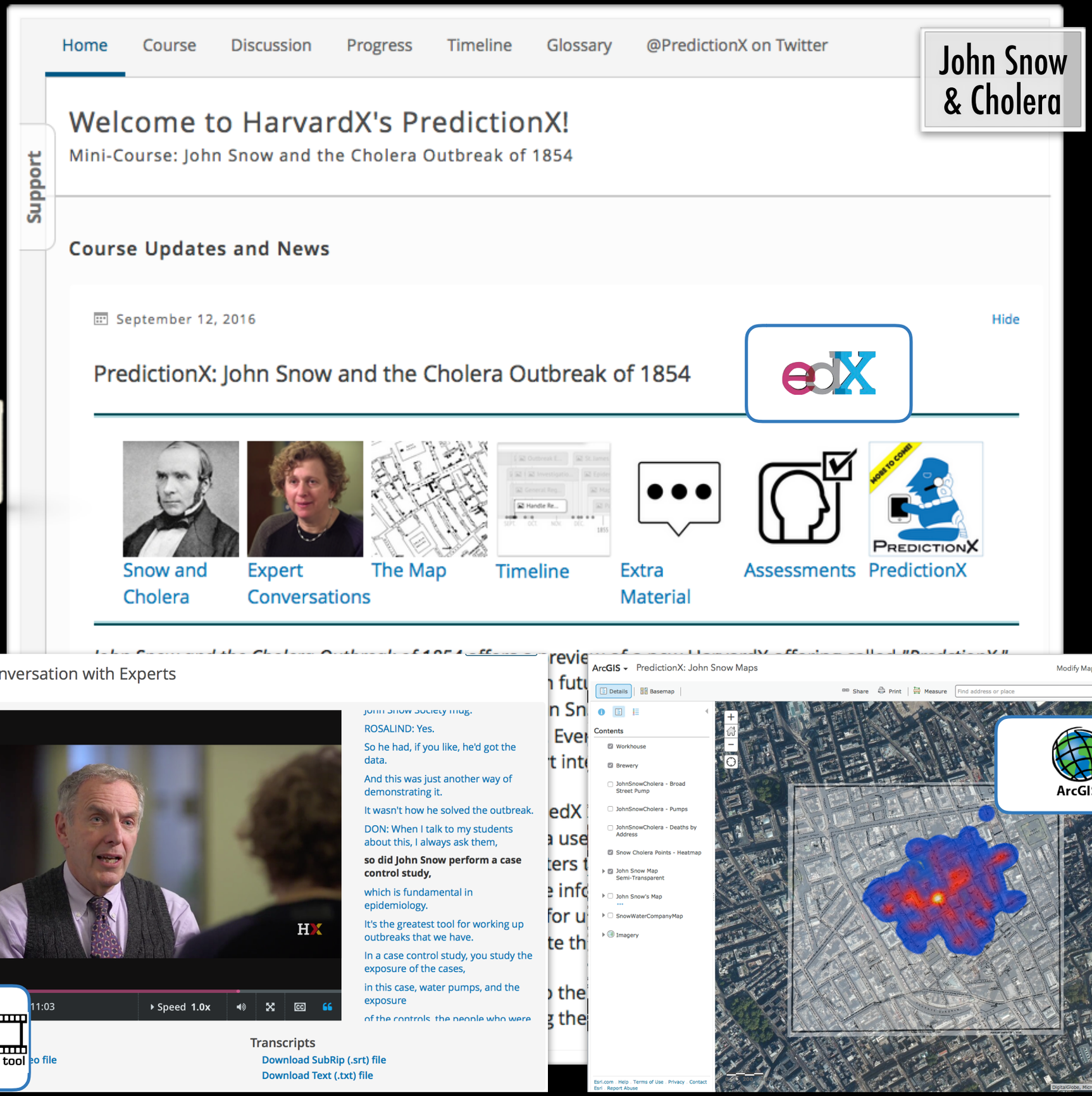
Topics & Mini-Courses

Tech Tools

Pedagogica Views

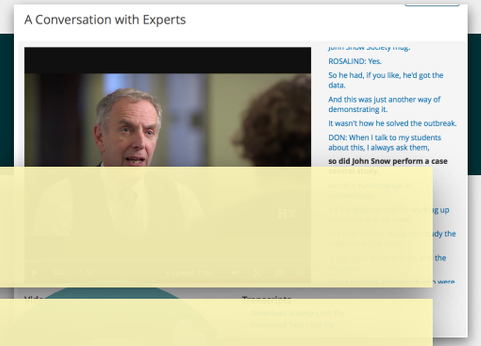
Mini-Courses

John Snow & Cholera



featuring Don Goldmann, Alyssa Goodman (host) & Rosalind Stanwell-Smith

Making use of learning #tags



Tech Tools

Pedagogica Views

1. Data collection

#before vs #during vs #after

e.g. measure planet positions to predict orbits

e.g. measure shaking in an earthquake

e.g. interview lung cancer victims

#active vs #passive

e.g. by survey

e.g. by GPS

#study vs #ad-hoc

e.g. pre-designed Framingham Nurses' Study

e.g. mining patient medical records

2. Study design

#hypothesis vs #empirical

e.g. cholera is water-borne

e.g. what could be making people sick with cholera?

#time-tracking

e.g. Cohort study, Halley's Comet

#comparative

e.g. Case-control: drug treatment vs. non-drug

3. Study goal

#description

To reduce complexity of data collected e.g. represent data with a fitted function

#probabilistic prediction

Inherently random (e.g. sports outcomes) or with randomness caused by reducible uncertainty (e.g. climate change)

#deterministic prediction

Using a tested, predictive theory that agrees with observation to within measurement error (e.g. gravity)

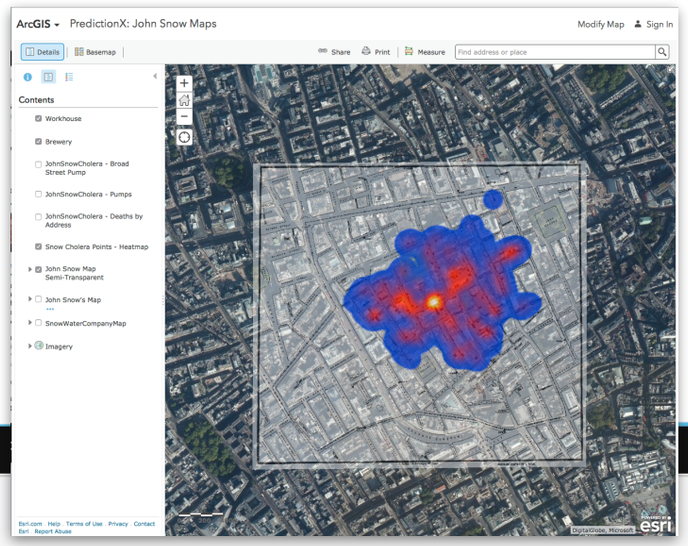
Daily Learner Enrollment

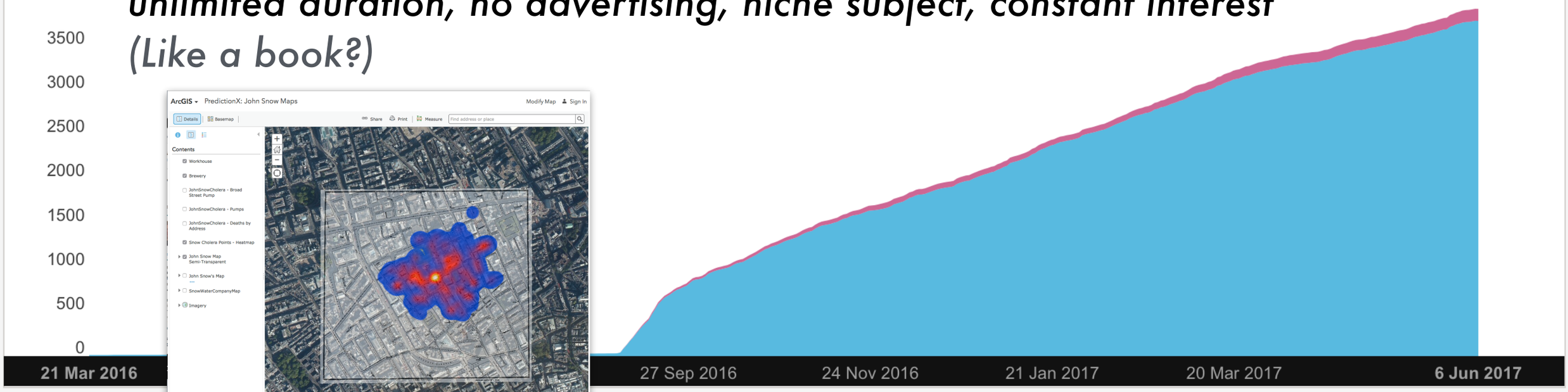
How many learners are in my course?

Enrollments

unlimited duration, no advertising, niche subject, constant interest

(Like a book?)





Enrollment Metrics

4,290	3,923	42	136
Total Enrollment	Current Enrollment	Change in Last Week	Verified Enrollment

Full "Course" / Book

"Parts"

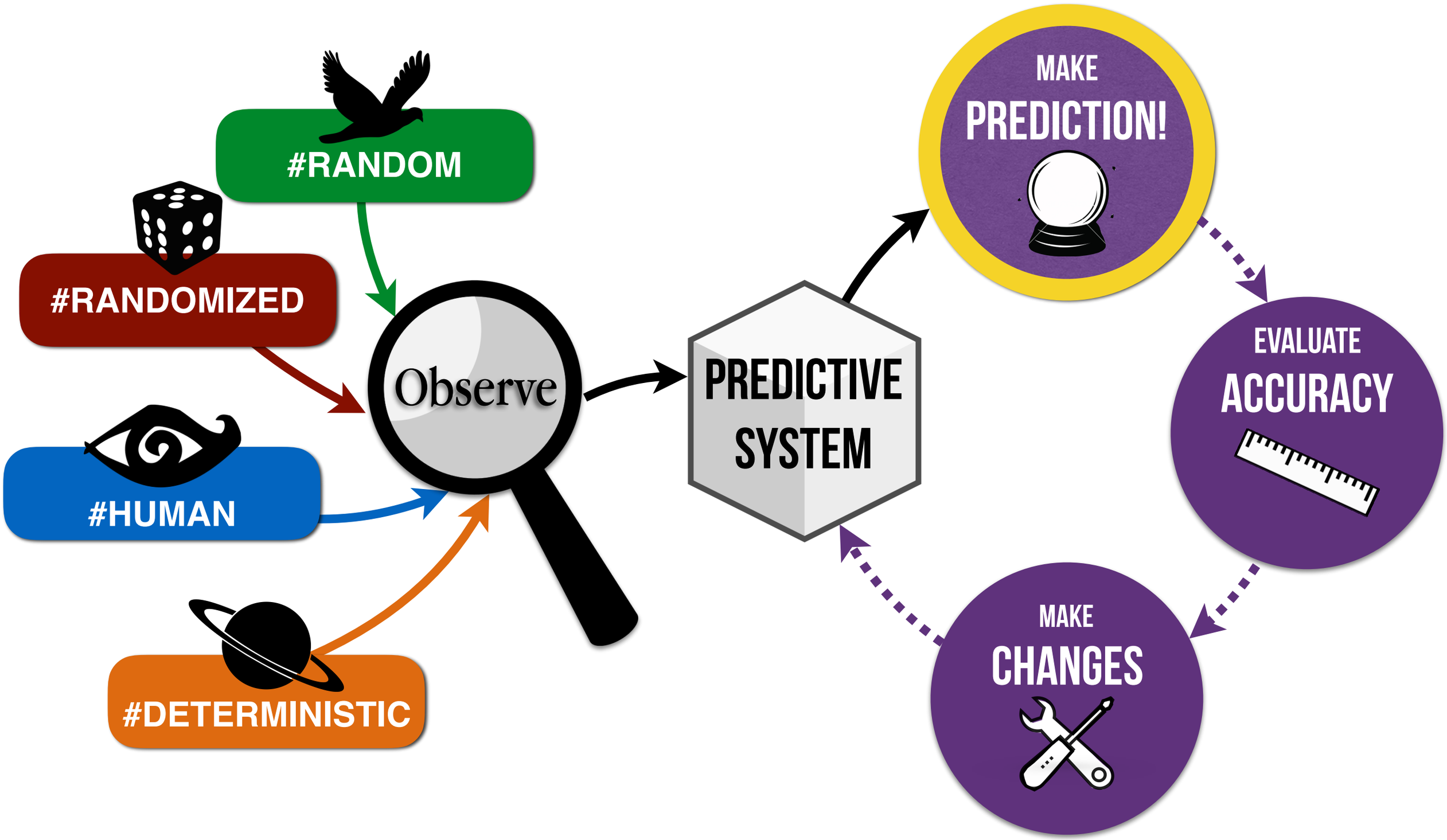
Mesopotamian Haruspicy
Egyptian Priests
Roman Augury
Chinese Oracle Bones
Yoruba Ifa
Tent Tarot
Christian Prophecy
Comets of Doom
The Path to Newton
John Snow & Cholera
Epidemiology
Personal Genomics
Finance
The Universe
The Futures of Our World

Topics & Mini-Courses

Tech Tools

Pedagogical Views

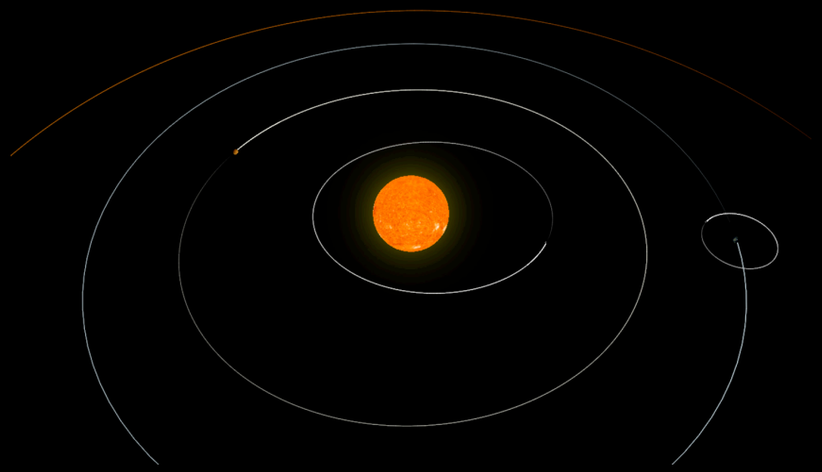
A Framework for Predictive Systems



Pedagogical Views

https://openclipart.org/

#DETERMINISTIC



Celestial Motion

#RANDOMIZED

Ifa

#HUMAN

Egyptian “Bobble Head”

#RANDOM

Comets of Doom

#HUMAN

Ancient Egyptian Divination, featuring Peter der Manuelian (FAS & Semitic Museum)

Full "Course" / Book

"Parts"

Mesopotamian Haruspicy

Egyptian Priests

Roman Augury

Chinese Oracle Bones

Yoruba Ifa

Tent Tarot

Mesoamerican Astrology

Oracle of Delphi

Christian Prophecy

Modern Mysticism & Astrology

Comets of Doom

The Path to Newton

Greek

Navigation

John Snow & Cholera

Epidemiology

& Earthquakes

Finance

Personal Genomics

The Universe

Divination Tent

The Futures of Our World

Topics & Mini-Courses

Tech Tools

Pedagogica Views

Tech Tools

Established

ArcGIS®

OmniGraffle

WorldWide Telescope

New

Take A Sweater

HarvardX video annotation tool

The TIMELINE CONSORTIUM

Distribution

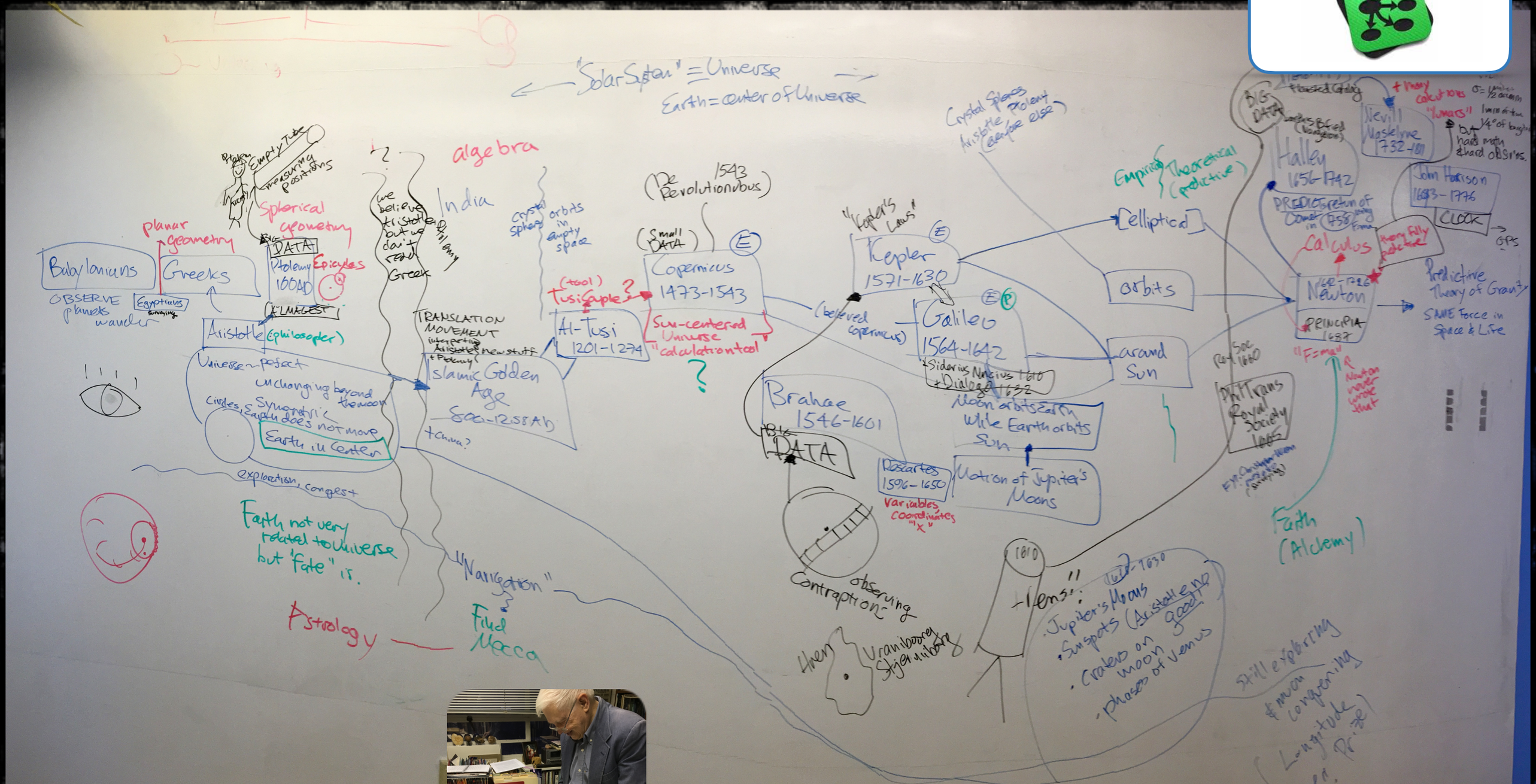
edX

YouTube CHANNEL

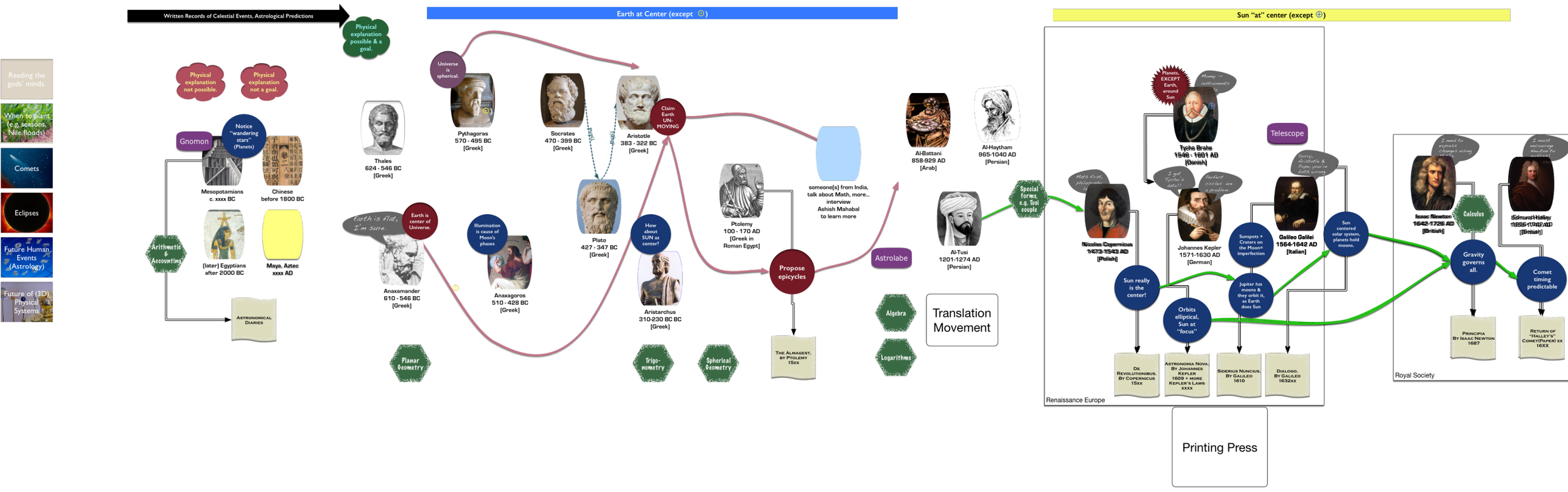
HarvardDART

The "Path to Newton" (& Longitude)

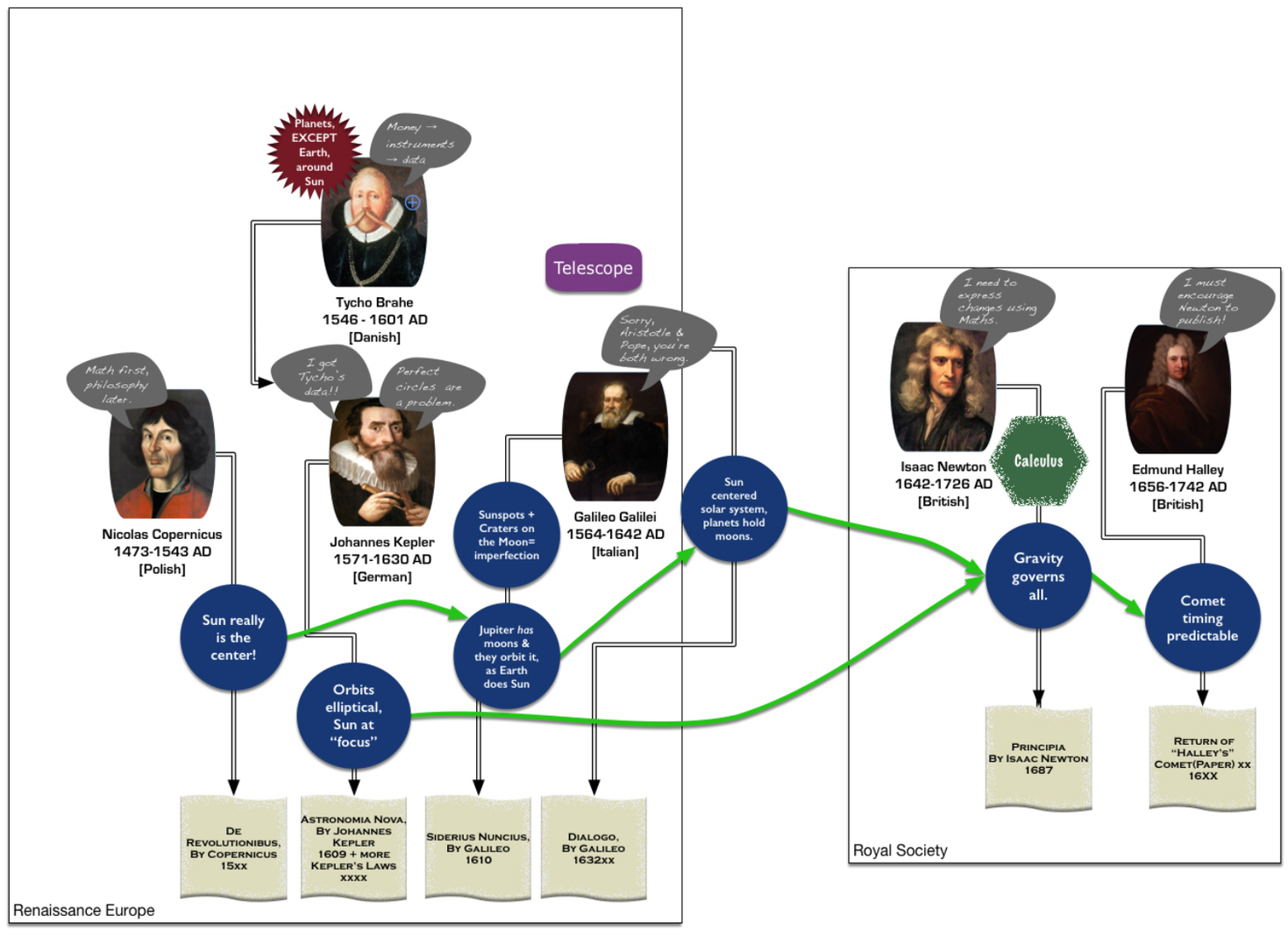
OmniGraffle



[OmniGraffe Demo]



[OmniGraffe Demo]



https://dl.dropboxusercontent.com/u/1104751/Path_to_Newton/renaissance/renaissance.html

PredictionX Tech

Established

ArcGIS®

OmniGraffle

WorldWide Telescope

New

Take A Sweater

HarvardX video annotation tool

The TIMELINE CONSORTIUM

Distribution

edX

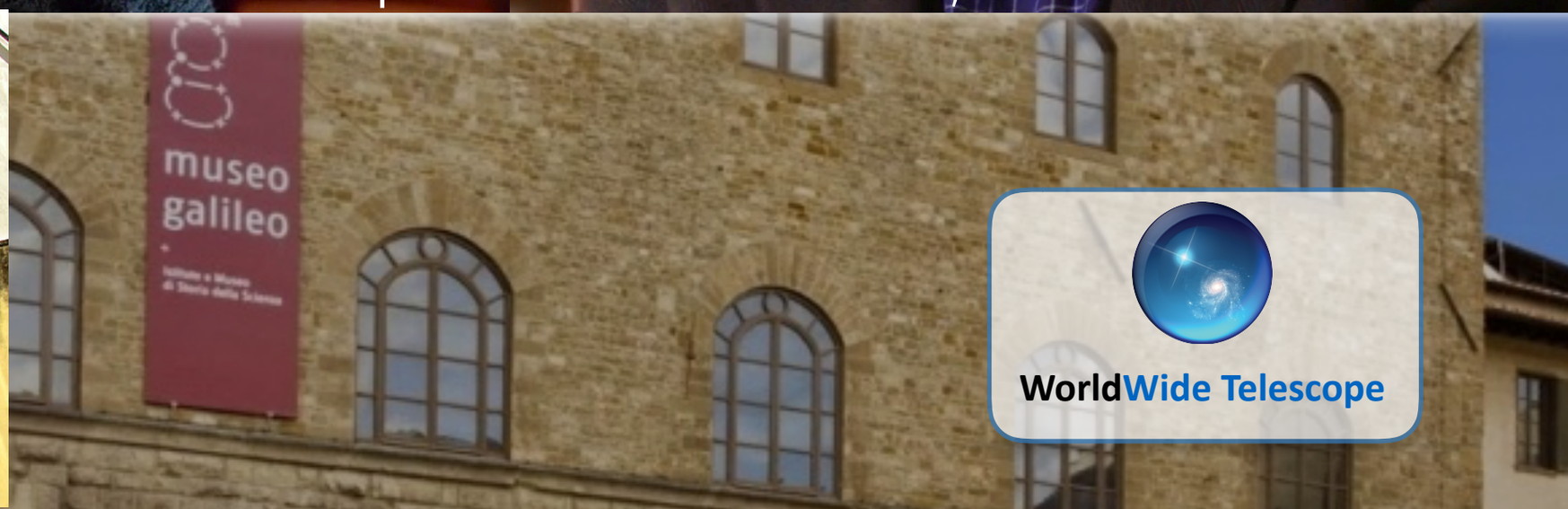
YouTube CHANNEL

HarvardDART

BRINGING **GALILEO** TO WORLDWIDE TELESCOPE.
& **WORLDWIDE TELESCOPE** TO GALILEO.
BY WAY OF HARVARDX

Alyssa Goodman, host of PredictionX & astronomer for WorldWide Telescope

Paolo Galluzzi, Director of the Museo Galileo



WorldWide Telescope

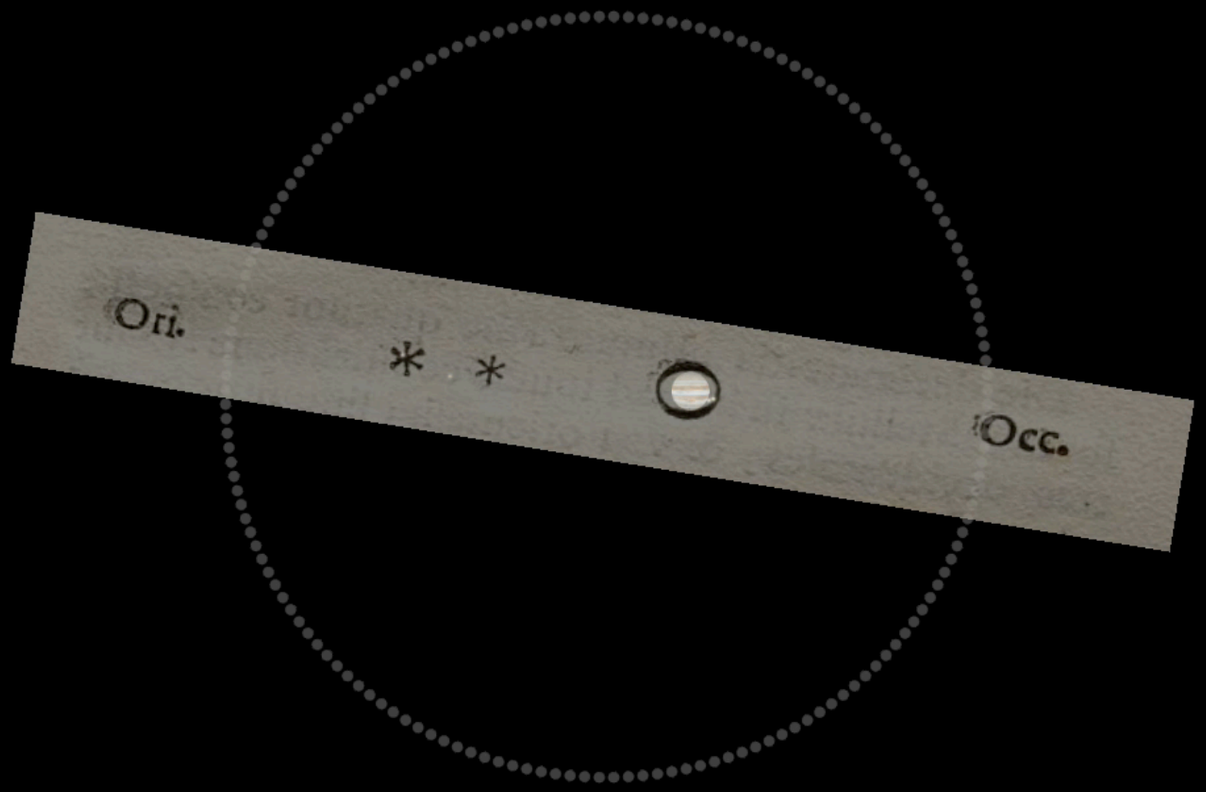
GALILEO'S "NEW ORDER"

Created by Alyssa Goodman, Curtis Wong and Pat Udomprasert,
with advice from Owen Gingerich and David Malin

Galileo's New Order, A WorldWide Telescope Tour by Goodman, Wong & Udomprasert 2010
Microsoft Research WWT Software (~now "OpenWWT"): Wong (inventor), Fay (architect), et al.

1610

January 11, 1610



Galileo's New Order, A WorldWide Telescope Tour by Goodman, Wong & Udomprasert 2010
Microsoft Research WWT Software (~now "OpenWWT"): Wong (inventor), Fay (architect), et al.

PredictionX Tech

Established

- ArcGIS (esri)
- OmniGraffle

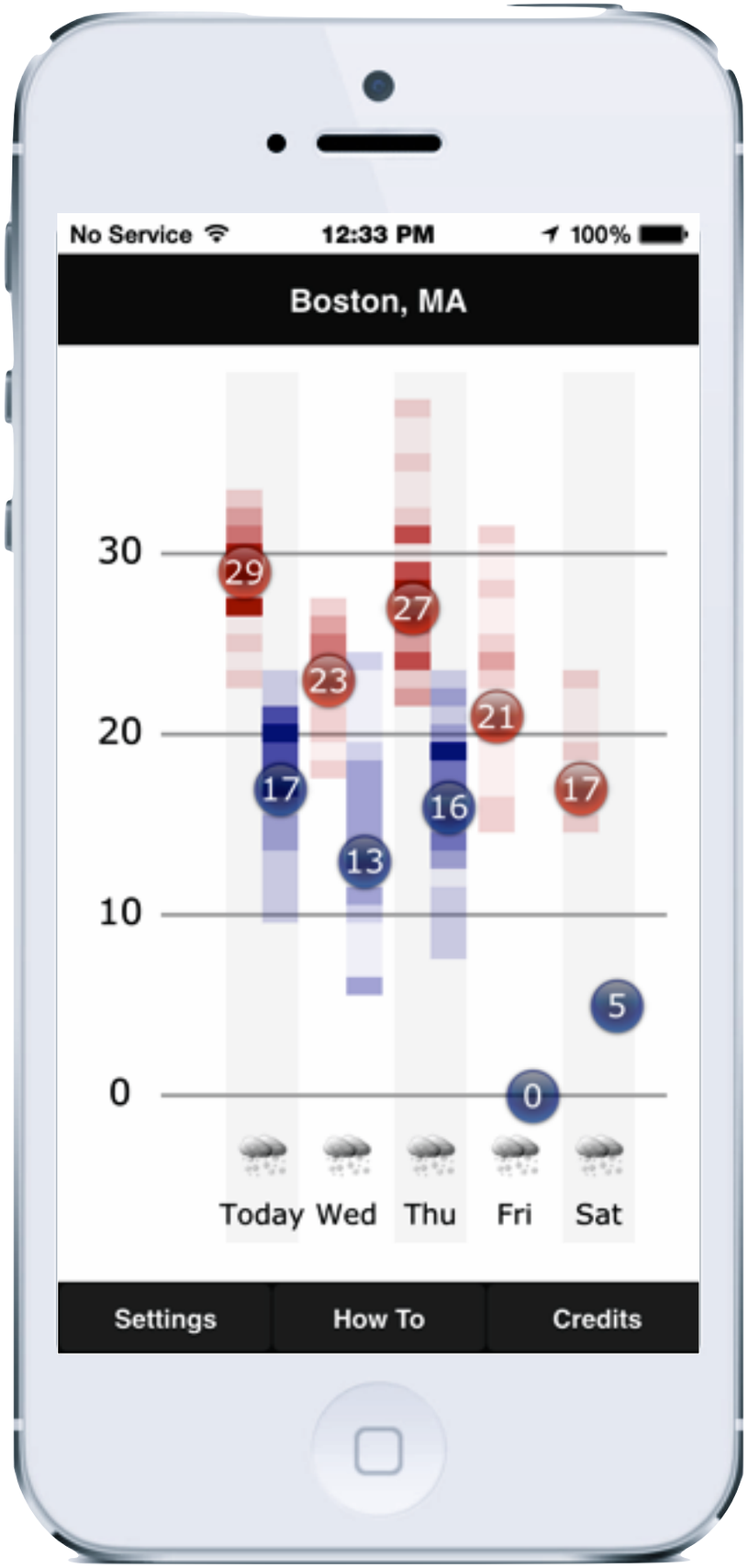
New

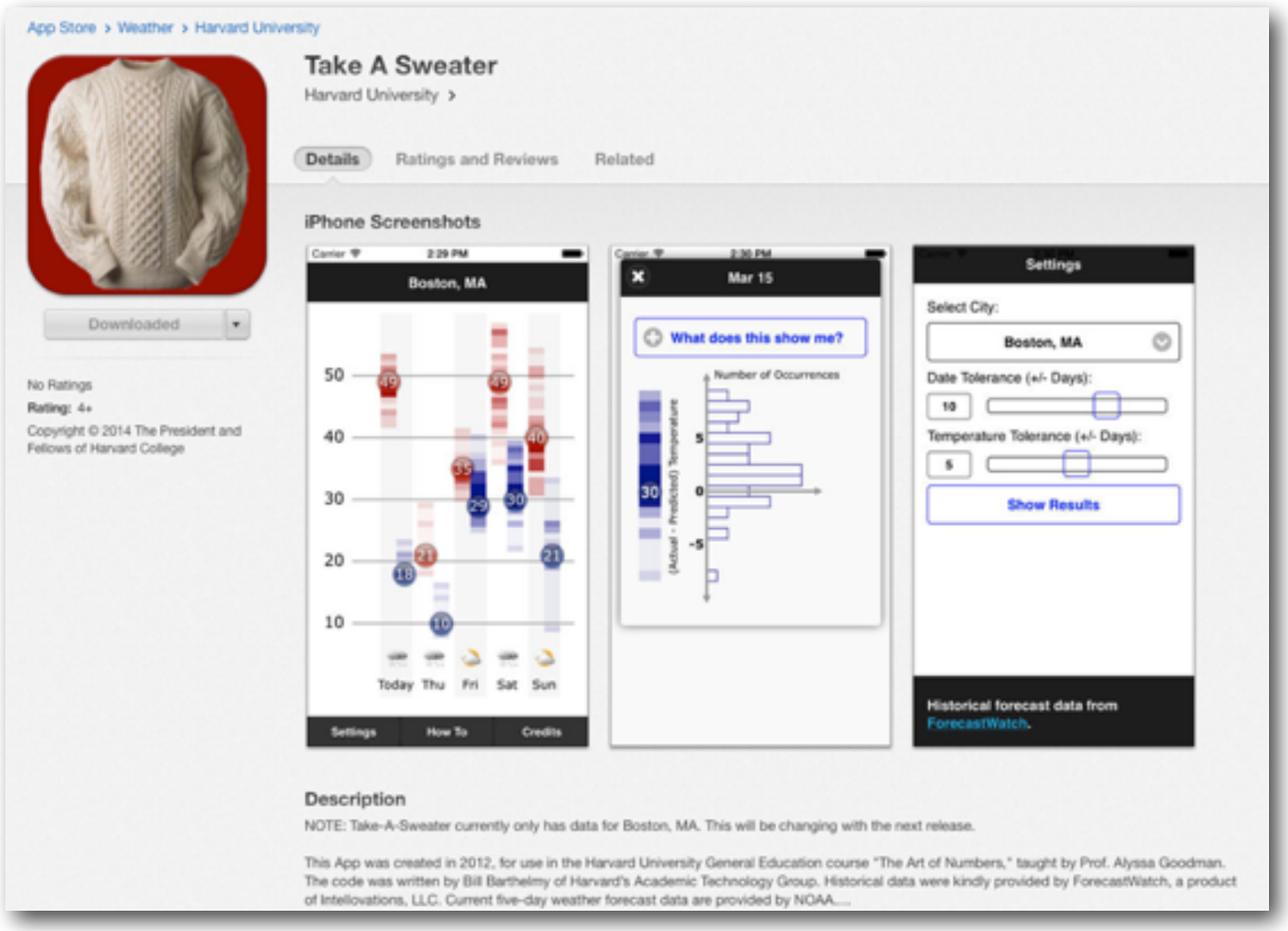
- Take A Sweater
- HarvardX video annotation tool
- WorldWide Telescope
- The TIMELINE CONSORTIUM

Distribution

- edX
- YouTube CHANNEL
- HarvardDART

“Take A Sweater”





takeasweater.com, and “TakeASweater” in the Apple App Store

with thanks to Eric **Floehr** of Forecast Watch and Bill **Barthelmy** of HUIT Academic Technology at FAS

PREDICTIONX TECH

ESTABLISHED	NEW	DISTRIBUTION
ArcGIS	Take A Sweater	edX
OmniGraffle	HarvardX video annotation tool	YouTube CHANNEL
WorldWide Telescope	The TIMELINE CONSORTIUM	HarvardDART

Home | Course | Discussion | Progress | Timeline | Glossary | @PredictionX on Twitter

Support

Welcome to HarvardX's PredictionX!

Mini-Course: John Snow and the Cholera Outbreak of 1854

Course Updates and News

September 12, 2016 — Hide

PredictionX: John Snow and the Cholera Outbreak of 1854

Snow and Cholera

Expert Conversations

The Map

Timeline

Extra Material

Assessments

PredictionX

John Snow and the Cholera Outbreak of 1854 offers a preview of a new HarvardX offering called *"PredctionX,"* which looks at how humans have predicted their own futures throughout recorded time. Here, we explore how a deadly outbreak of cholera in London, and John Snow's investigation of its cause, gave rise to the modern field of epidemiology. It's a fascinating story. Even if you've heard it before, you may find new facts and details here that we've uncovered through expert interviews and map analysis. We hope you enjoy it.

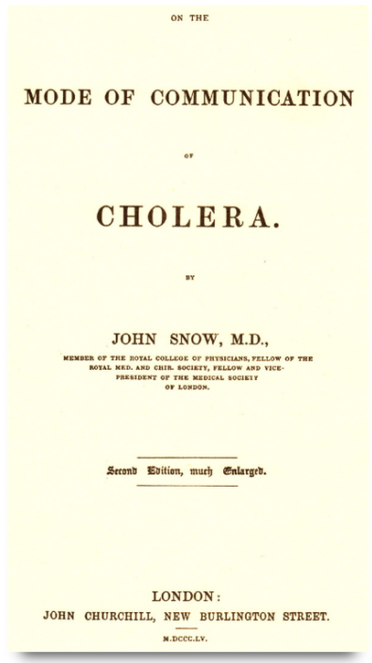
The full set of *PredctionX* offerings, to be released on edX in installments during 2016 and 2017, will begin with the story of how preists in Ancient Mesopotamia used sheep entrails to fortell the future, and will end by explaining how modern-day scientists use computers to predict the future of our world's climate, economy, health, and place in the Universe. For more information, check out the sneak peek of the rest of PredictionX at the end of this course and stay tuned for updates at #PredictionX on twitter, and here on edX. Twenty-five faculty are working together to create this course, from across Harvard, and beyond.

You can click on the icons in the bar above to jump to the different parts of this course. Once you are in the course, you will can navigate to course material using the vertical menu that is standard in all edX courses.

The TIMELINE CONSORTIUM

tionX Mini-Course: John Snow and the Cholera Outbreak of 1854 — Help — AlyssaGoodman

sion | Progress | Timeline | Glossary | @PredictionX on Twitter | Instructor


ON THE

MODE OF COMMUNICATION

OF

CHOLERA.

BY

JOHN SNOW, M.D.,

MEMBER OF THE ROYAL COLLEGE OF PHYSICIANS, FELLOW OF THE ROYAL MED. AND CHIR. SOCIETY, FELLOW AND VICE-PRESIDENT OF THE MEDICAL SOCIETY OF LONDON.

Second Edition, much Enlarged.

LONDON:
JOHN CHURCHILL, NEW BURLINGTON STREET.
M.DCCC.LV.

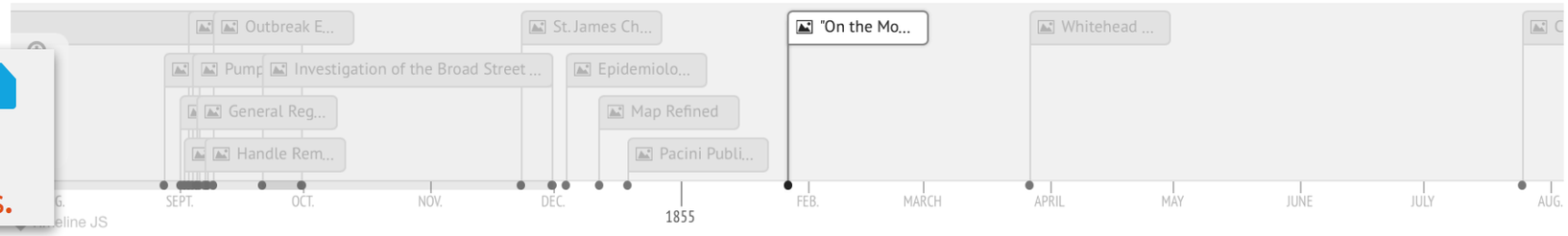
PACINI PUBLISHES FINDING OF CHOLERA BACTERIUM

JANUARY 27, 1855

"ON THE MODE OF COMMUNICATION OF CHOLERA'" PUBLISHED

Snow's write up includes details from both the water company study and the isolated outbreak on Broad Street.

WHITEHEAD FINISHES HIS REPORT FOR THE CHOLERA INQUIRY COMMITTEE



Timeline JS

Easy-to-make, beautiful timelines.

timeline.knightlab.com

Geographic Region Picker

selected region(s) is (are) highlighted

toggleable map picker/view

region

Africa | South America | Europe

400 500 600 700 800 900 1000 1100 1200

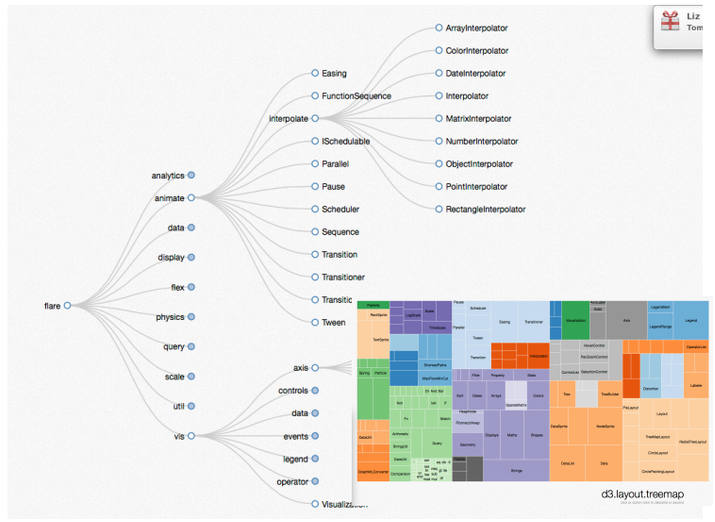
card

The TIMELINE CONSORTIUM

Dynamic Hyperlinked Parallel Timelines, shown as scrolling bands for (several) Region-Topic-Provider Combinations (scroll direction is time & scale is zoomable)

Topic Picker

(interfaces could be selectable, and toggleable, options shown here are dendrogram-style or treemap)



Content Providers

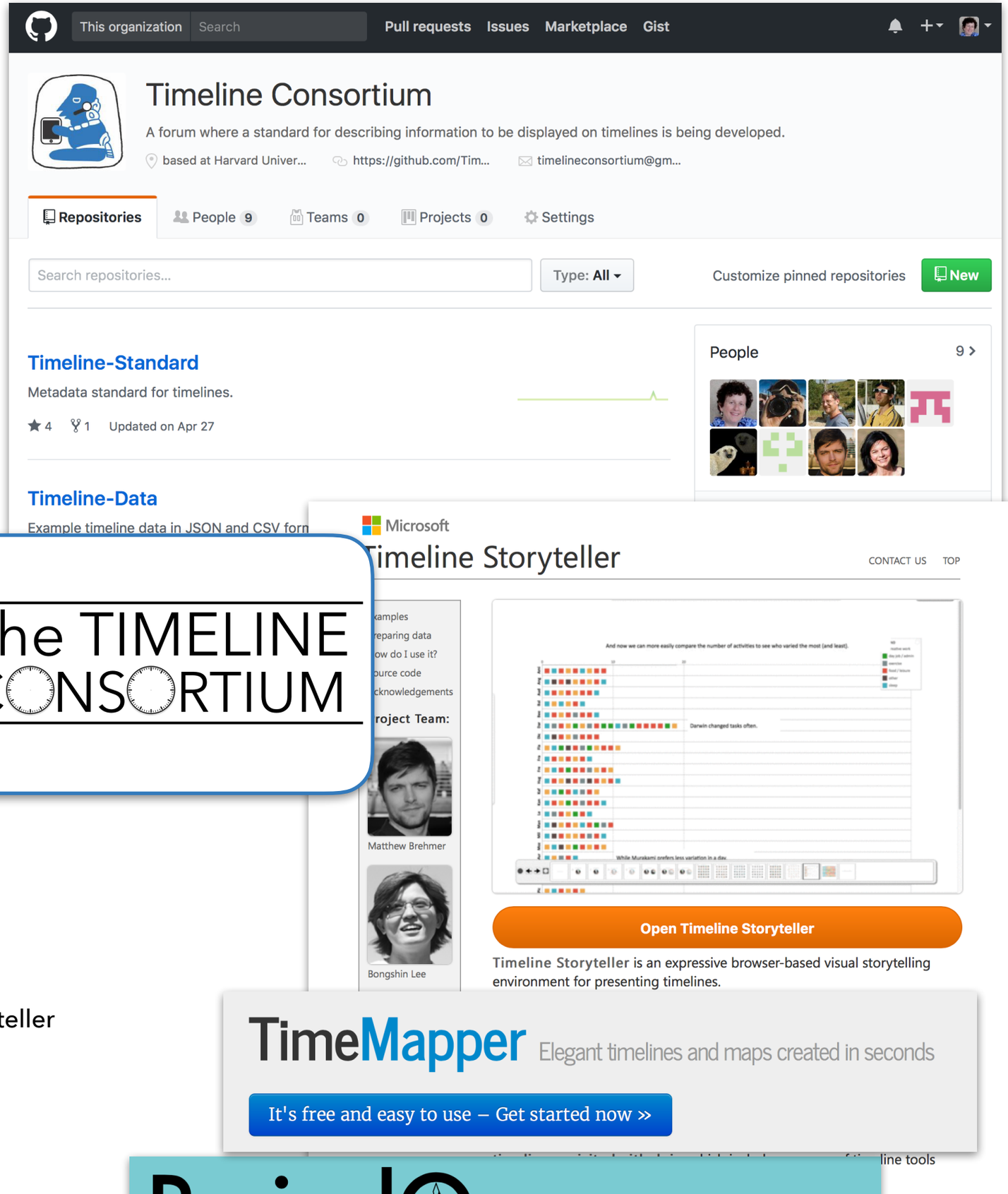
(in the long view, these would be any who comply with location and time metadata standards)

- ✓ Wikipedia
- HarvardX
- NY Public Library
- NY Times
- more…

Adam **Rabinowitz**, University of **Texas** -- **period.do**
Alyssa **Goodman**, **Harvard** University -- **PredictionX**
Amy **Brand**, **MIT Press**
Annie **Valva**, **Harvard** University -- **HarvardX**
Bonnie **Burns**, **Harvard** University -- **Map Collection**
Braden **MacDonald**, **OpenCraft**
Christine **Fernsebner Eslao**, **Harvard** University -- **Libraries**
Colin **Fredericks**, **Harvard** University -- **HarvardX**
Douglas **Burke**, **Smithsonian** Center for Astrophysics
Drew **Lichtenstein**, **Harvard** University -- **HarvardX**
Gustavo **Durand**, Harvard University -- **DataVerse**
Hugh **Truslow**, **Harvard** University -- **Libraries**
Jeffrey **Schnapp**, **Harvard** University -- **metaLAB**
Jennifer Scheper Hughes, **Radcliffe** (**History**)
Johanna **Fulda**, **Cumul8**
Jon Alper, **Harvard** University -- **HarvardX**
Josh **Greenberg**, **Sloan** Foundation
Julian **Gautier**, **Harvard** University -- **DataVerse**
Kelly **O'Neill, Harvard** University -- **History** Department
Luis **Duarte**, **Harvard** University -- **HarvardX**
Matt **Brehmer**, **Microsoft Research** -- Timeline Curator & Storyteller
Merce **Crosas**, Harvard University -- **DataVerse**
Suzanne **Wones**, Harvard University -- **Libraries**
Xavier **Antoviaque**, **OpenCraft**
Tony **Ageh**, **New York Public Libraries**

HarvardX

timelinestoryteller.com



Not logged in Talk Contributions Create account Log in

Article Talk | Read View source View history | Search Wikipedia

WIKIPEDIA
The Free Encyclopedia

Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
Wikipedia store

Interaction
Help
About Wikipedia
Community portal
Recent changes
Contact page

Tools
What links here
Related changes
Upload file
Special pages
Permanent link
Page information
Wikidata item
Cite this page

Print/export

Harvard University

From Wikipedia, the free encyclopedia

Coordinates: 42°22′28″N 71°07′01″W

"Harvard" redirects here. For other uses, see Harvard (disambiguation).

Harvard University is a private Ivy League research university in Cambridge, Massachusetts, established in 1636, whose history, influence, and wealth have made it one of the world's most prestigious universities.[7]

Established originally by the Massachusetts legislature and soon thereafter named for John Harvard (its first benefactor), Harvard is the United States' oldest institution of higher learning,[8] and the Harvard Corporation (formally, the *President and Fellows of Harvard College*) is its first chartered corporation. Although never formally affiliated with any denomination, the early College primarily trained Congregationalist and Unitarian clergy. Its curriculum and student body were gradually secularized during the 18th century, and by the 19th century Harvard had emerged as the central cultural establishment among Boston elites.[9][10] Following the American Civil War, President Charles W. Eliot's long tenure (1869–1909) transformed the college and affiliated professional schools into a modern research university; Harvard was a founding member of the Association of American Universities in 1900.[11] James Bryant Conant led the university through the Great Depression and World War II and began to reform the curriculum and liberalize admissions after the war. The undergraduate college became coeducational after its 1977 merger with Radcliffe College.

The university is organized into eleven separate academic units—ten faculties and the Radcliffe Institute for Advanced Study—with campuses throughout the Boston metropolitan area:[12] its 209-acre (85 ha) main campus is centered on Harvard Yard in Cambridge, approximately 3 miles (5 km) northwest of Boston; the business school

Harvard University

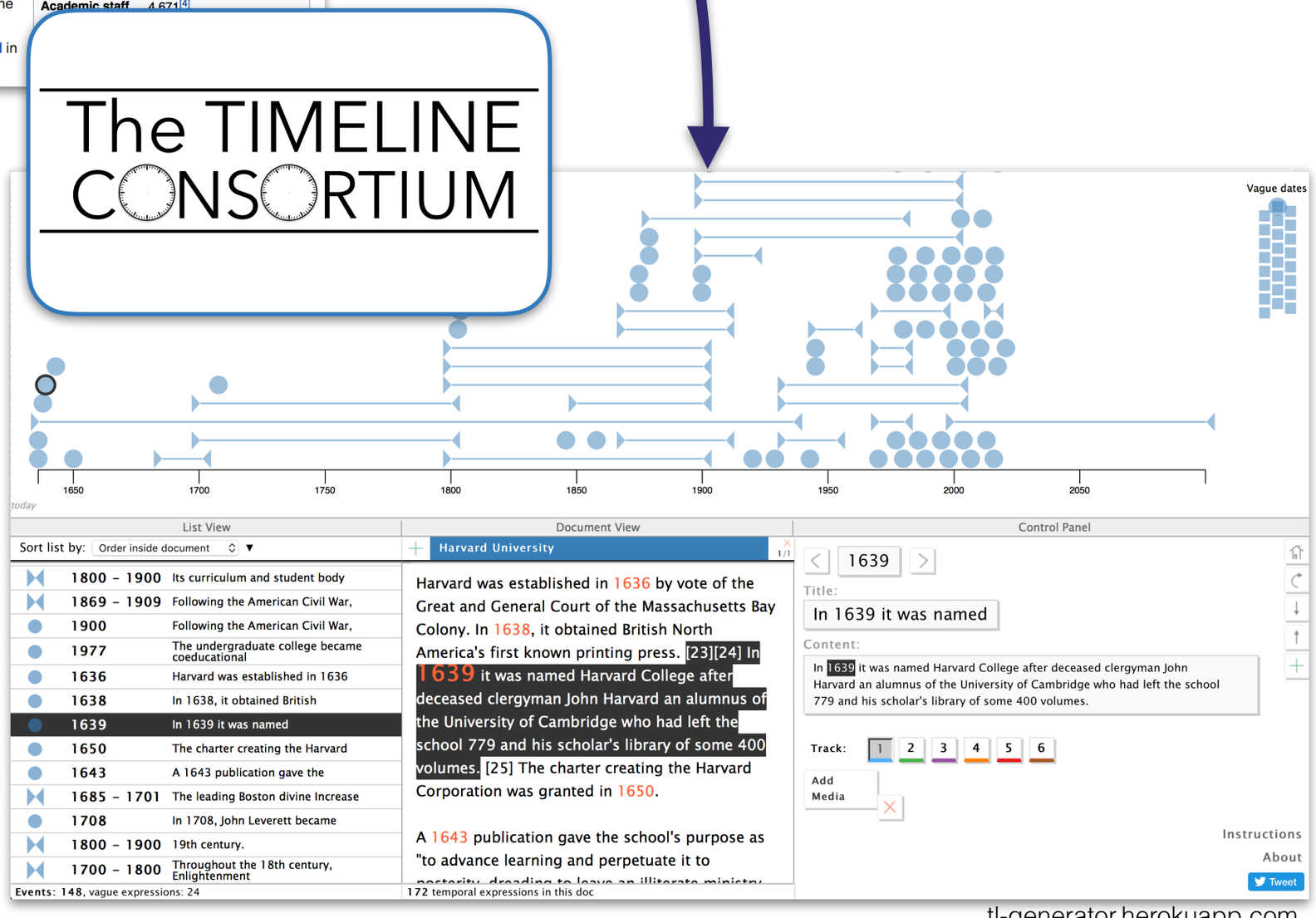
Latin: *Universitas Harvardiana*

Former names	Harvard College
Motto	*Veritas*[1]
Motto in English	Truth
Type	Private research
Established	1636[2]
Endowment	$34.541 billion (2016)[3]
President	Drew Gilpin Faust
Academic staff	4,671[4]

en.wikipedia.org/wiki/Harvard_University

TimeLineCurator

The TIMELINE CONSORTIUM



tl-generator.herokuapp.com

Timeline JS

Easy-to-make, beautiful timelines.

timeline.knightlab.com

PredictionX Tech

Established

esri ArcGIS®

OmniGraffle

WorldWide Telescope

New

Take A Sweater

HarvardX video annotation tool

The TIMELINE CONSORTIUM

Distribution

edX

YouTube CHANNEL

HarvardDART

YouTube Search

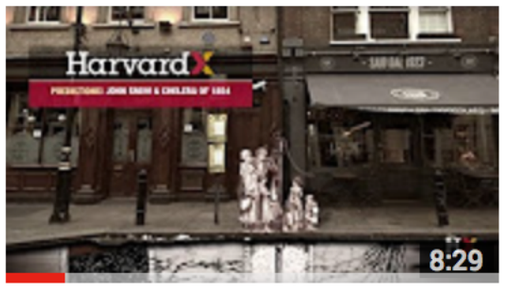
Free online content from Harvard University

HarvardX

HarvardX

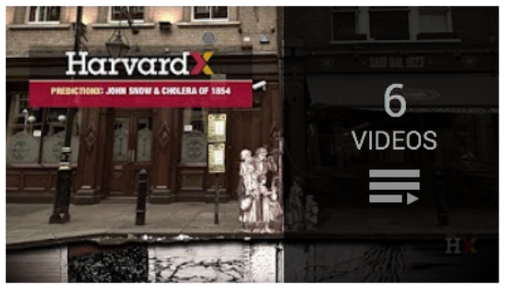
Subscribed 402

Home Videos Playlists Channels About john snow



PredictionX: John Snow and the Cholera Outbreak of 1854 (HarvardX)

HarvardX
1 month ago • 195 views
In 1854, cholera struck Broad Street in London. One scientist, John Snow, thought he could finally prove how this elusive killer spread....
CC



PredictionX (HarvardX)

HarvardX
Updated 2 days ago

PredictionX: John Snow and the Cholera Outbreak of 1854 (HarvardX)	8:29
PredictionX: The Oracle of Delphi (HarvardX)	3:48

View full playlist (6 videos)

YouTube CHANNEL

Infectious Diseases Introduction

carbolic acid atomizer, behind me,

developed in the 1870s by Joseph Lister, the surgeon.

His appreciation that post-surgical gangrene was due to poor hygiene

came a decade or two after John Snow, in London,

established that transmission of cholera was due to contaminated water.

And at about the same time, in the late 19th century,

that Robert Koch established modern medical microbiology and the causes

of TB, cholera, and anthrax.

In this section of the course, we consider the continuing impact

HarvardDART

Video

Download video file

Transcripts

Download SubRip (.srt) file

Download Text (.txt) file

"Infectious Diseases Introduction" created by HarvardX, licensed under the HarvardX license.

Digital Assets for Reuse in Teaching

HarvardDART

Supported by the Office of the Vice Provost for Advances in Learning, Harvard University, Cambridge, MA 02138

Copyright © 2017 The President and Fellows of Harvard College | Privacy | Accessibility | Report Copyright Infringement

PredictionX Tech

Established

ArcGIS®

OmniGraffle

WorldWide Telescope

New

Take A Sweater

HarvardX video annotation tool

The TIMELINE CONSORTIUM

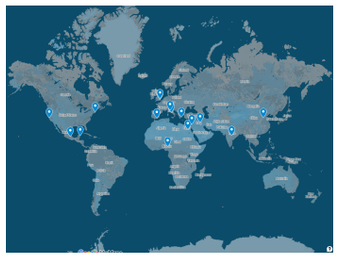
Distribution

edX

YouTube CHANNEL

HarvardDART

PREDICTIONX



How many access options?

Random access (maps, timelines)

v. sequential (textbook-style)

#?

Best approach to tagging & indexing

e.g. study design graphic

edX

Hacking edX

slider, clickable image maps,

diviner's guide cover

Linking out vs. ingest

e.g. Galileo, Louvre

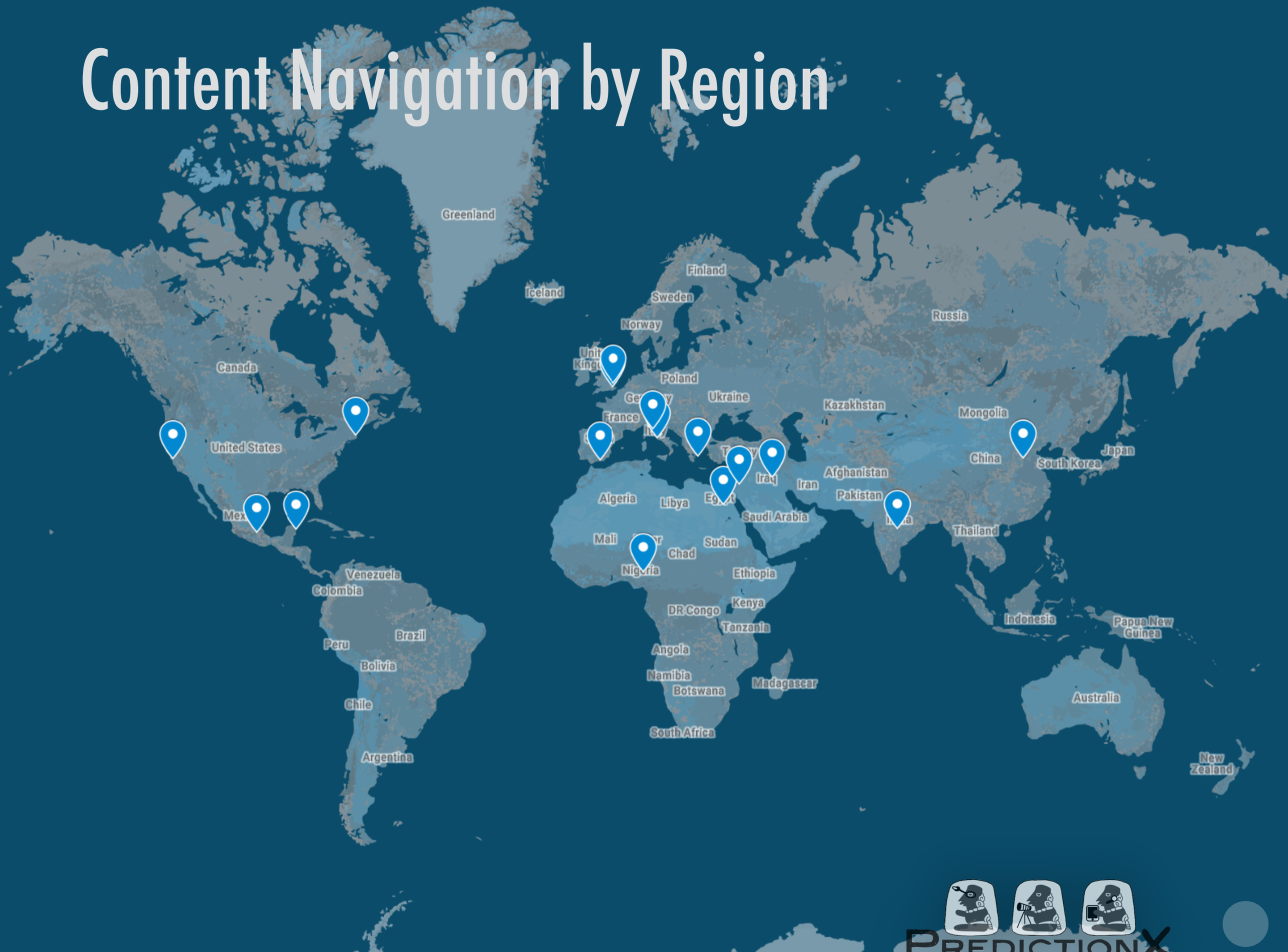
Pedagogy & Evaluation

golden threads?

Mission creep!

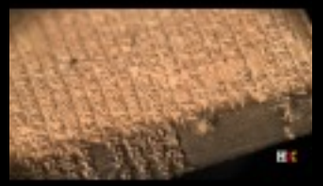
how best to distribute/integrate ed-tech efforts at Harvard

Content Navigation by Region



PredictionX

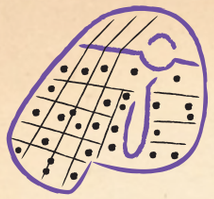
income
housing
water



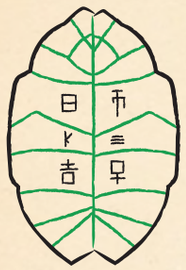
DIVINER'S GUIDE

PREDICTIONX

THE PAST & PRESENT OF THE FUTURE



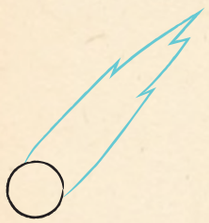
HARUSPICY



ORACLE BONES

ORACLE OF DELPHI

ASTRAGALI



COMETS

EGYPTIAN GODS

IFA

AUGURY

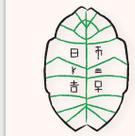
CASTING LOTS

AZTEC RITUALS

TAROT

ASTROLOGY

TASSEOGRAPHY



Egyptian Diviners

Bookmark this page

Description

How To: Egyptian Divination

How to seek a prediction: Seek out a priest, or wait for one to arrive, likely by boat

(Sample) Equipment: special statue, possibly with a movable head for "nodding"

Personnel: Priest trained in decreeing oracles

Oracles appear relatively late in the long span of Egyptian history. The first representations of a sacred boat containing an oracular statue of the god Amun date to the early New Kingdom (reign of Amenhotep I, around 1525 BCE). While there are some earlier textual references, neither the Old Kingdom (Pyramid Age, around 2686–2181 BCE), nor the Middle Kingdom (age of great Egyptian literature, around 2055–1650 BCE), seem to place much reliance on decrees from oracles. It is the New Kingdom, and the following Third Intermediate Period (about 1069–664 BCE) and Late Period (about 664–332 BCE) where we find the most frequent mention of oracular decisions, both royal and “private.”

There was no single god responsible for all oracular decrees. The Egyptians appealed to many forms of the god Amun, Amun-Re, and other deities, state and local; even the deified king Amenhotep I was consulted by many residents of Thebes. Throughout Egyptian history we see an ebb-and-flow in perceptions of the divine nature of the pharaoh. At times the populace relied upon the king and the pharaonic court system, at other times direct appeals to the god(s) for assistance were far more common. Methods included approaching the statue of the god, borne in his sacred bark upon the shoulders of priests, during festival processions. Or, people could submit “yay or nay” inscriptions to the deity for a

museo galileo

Search

Introduction

VirtualMuseum

Objects

Description of all objects of the Museum alphabetically ordered.

Videos by thematic area

Multimedia reconstructing the context and issues of reference of the objects that allow the exploration of collections by subject.

Videos alphabetically ordered

Rooms

Museum Virtual Tour, including about 1000 instruments.

Biographies

Biographical data of quoted names, in alphabetical order, including those of all object Inventors/Makers.

Glossary

Glossary index (including all "In Depth" entries), presented in alphabetical order.

Museo Galileo's Catalogue

Is now possible to download the complete catalogue in PDF format (download 46 Mb)

credits

e.g., catalogue.museogalileo.it/room/RoomVII3d.html

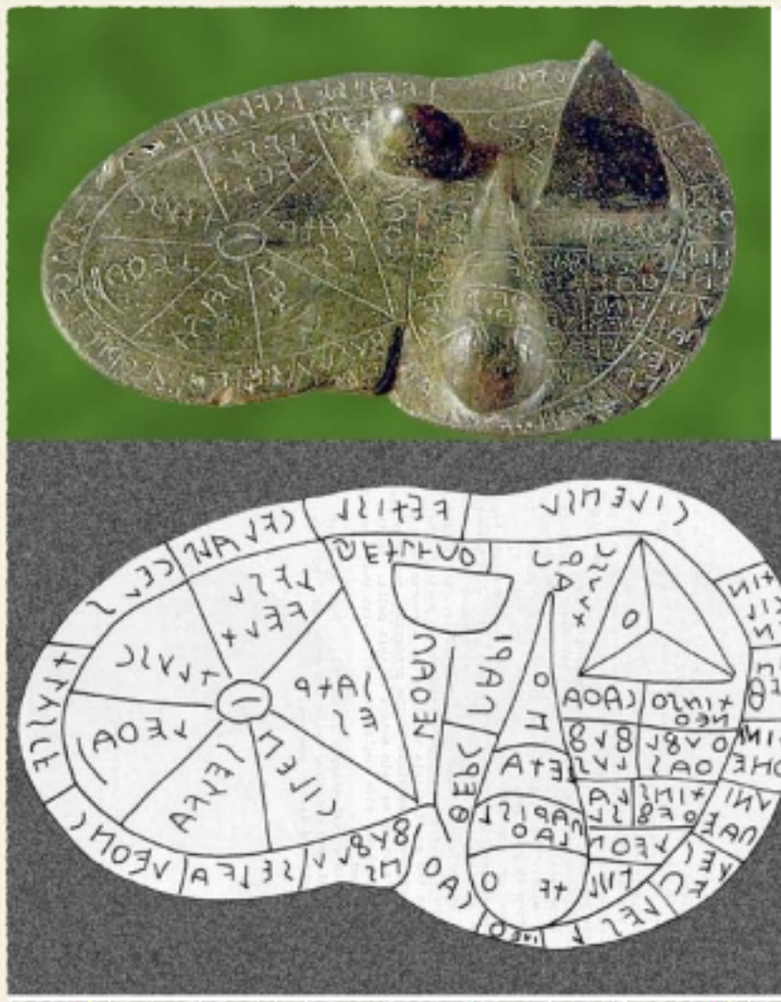
© 2010-2015 Museo Galileo - Institute and Museum of the History of Science · Piazza dei Giudici 1 · 50122 Florence · ITALY

The Bārûtu

(or, *What do sheeps' livers have to do with Isaac Newton?*)

Models of divinatory livers
19th-18th century BC
Palace of Mari
(from the Louvre collection)

ETRUSCAN LIVER OF PIACENZA



http://www.louvre.fr/en/oeuvre-notices/model-liver-divination

Modèles de foies divinatoires
© 1982 RMN / Christian Jean

Golden Threads

Pedagogical Views

Our Need to Know

Human beings have an inherent curiosity about future events. We want to know what's going to happen to us, to our homes and loved ones, to our world and beyond. This can drive us to learn more about our universe, but it can also leave us open to manipulation by others. When you see the Crystal Ball Mind icon, nearby material will illuminate humanity's fascination with the future and the way in which we react to predictions.

Key Questions:

- Where does our desire to know the future come from?
- How do we react to predictions?

Cognitive Biases

Sometimes the incredible, complex human mind can make equally complex errors. We pay attention to irrelevant details; we see patterns where they don't exist; we even reject information that contradicts our beliefs. Cognitive biases are the ways in which our mental shortcuts and heuristics get in our way. When you see the Tipped Scales icon, nearby material will point out the thought patterns that lead us to less accurate predictions, including over-generalization, confirmation bias, illusions of control, and the gambler's fallacy.

Key Questions:

- When does human nature get in the way of making an accurate prediction or recognizing a bad one?
- How has bias shaped our predictions and our response to them?

Subjective Analysis

To be widely accepted, predictions must be more than accurate – they must be appealing. Human beings judge predictions on more than just an objective basis. We apply skepticism, question believability, and look for the utility value in the things we hear. When you see the Heart-and-Mind icon, nearby material will speak to our emotional evaluation of predictions and the things that human beings choose to value.

Key Questions:

- How do human beings choose what predictions to value?
- What determines how strongly we act on a prediction?

Objective Analysis

When you see the Microscope icon, nearby material will delve into objective measurements of a prediction's accuracy, such as reliability, convergence, and quantified uncertainty.

Key Questions:

- What do we do to validate a prediction or theory?
- How do we measure accuracy?

The Observation/Theory Cycle

The Cycle icon refers to humans' unceasing endeavor to create theories that explain the patterns they observe around them. Sometimes individuals who create the theories also seek to test them, but other times, they love their theories so much that they leave the testing to future generations.

Key Question:

- How do human beings formalize the patterns that we see in our observations?

Who's Making the Prediction?

Every culture agrees that predictions are best made by experts. However, different traditions disagree on what makes one an expert. Some prognosticators are highly trained, while others are chosen (or cursed) by the gods. Many traditions require both divine blessing and worldly preparation. When you see the Yin-Yang icon, nearby material will explore prediction as an intuitive or teachable process, and investigate the nature of both diviners and those who interpret their predictions.

Key Questions:

- Why are certain individuals uniquely qualified to make certain predictions?

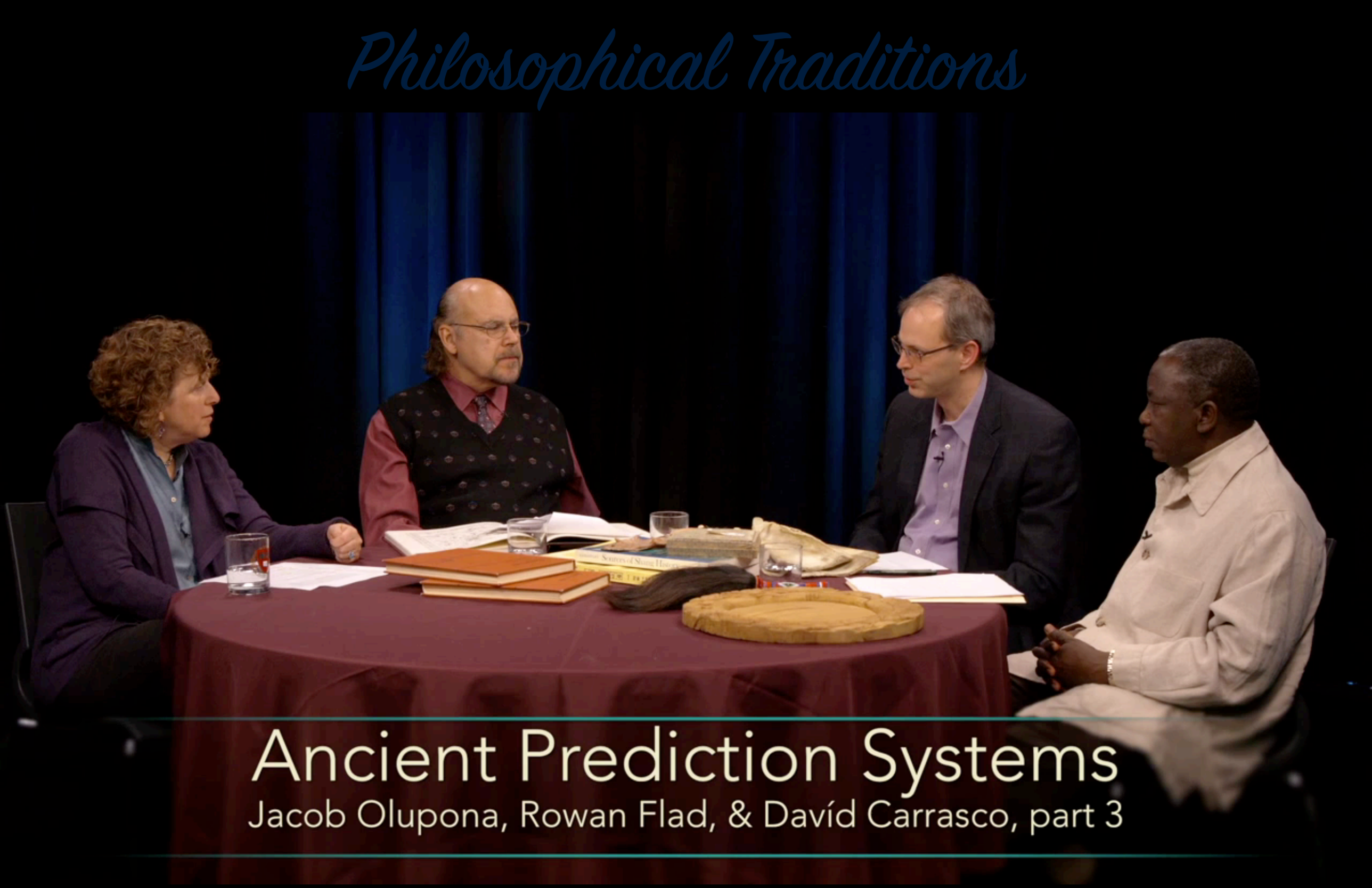
The Hidden Nature of our Universe

Every prediction is made in context. Whether this context is our planet's climate, an economic market, the orbits of comets, or our own social networks, the rules of these systems are at the heart of our ability to understand them. The nature of our universe is at the very heart of prediction. When you see the "cracked eye" icon, nearby material will deal with concepts such as free will, determinism, and probability; natural or supernatural laws; the invisible hand of the market; and the root source of uncertainty.

Key Questions:

- What properties of our universe make it possible to predict the future?
- What makes it difficult to predict the future?

extra slides



Ancient Prediction Systems, featuring David Carrasco (HDS), Rowan Flad (FAS) & Jacob Olupona (HDS)

“Prediction” Freshman Seminars, 2015

James Leonard, artist

Sara Schechner
Collection of Historical Scientific Insturments

Emilie Hardman,
Houghton LIbrary

Chinese Oracle Bones, featuring Prof. Rowan Flad (FAS)

PREDICTIONX