DESTINATION AREAS GLOBAL SPEAKER SERIES

Teaching in STEM Disciplines: Open Source Methods

@LorenaABarba
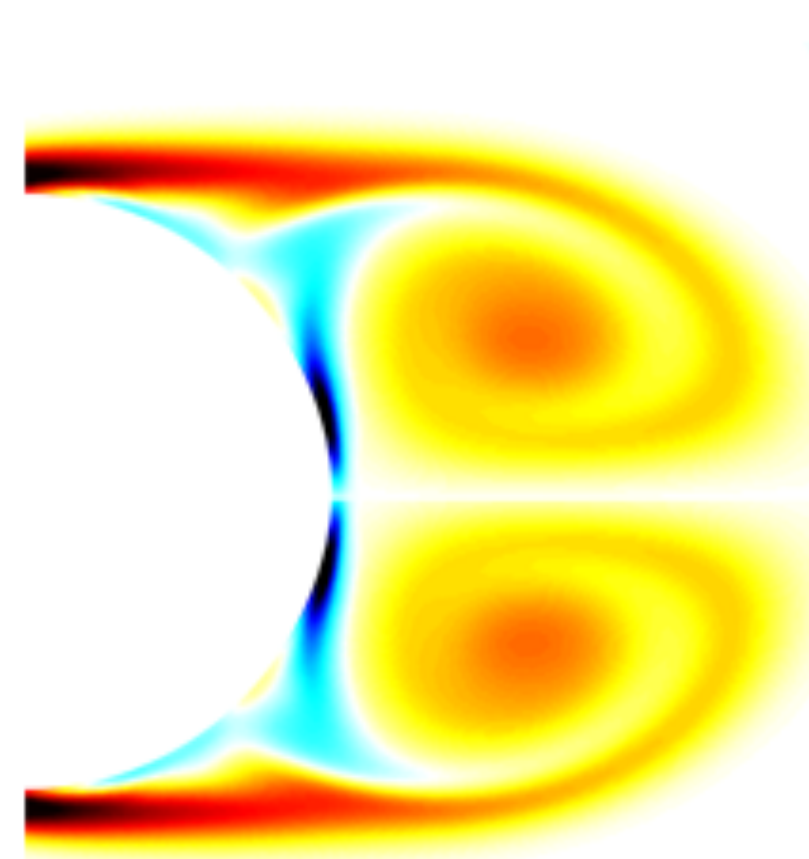
Main messages

- Open Ed movement was inspired by free & open source software (FOSS).

- Most visible are OCW and OER efforts.

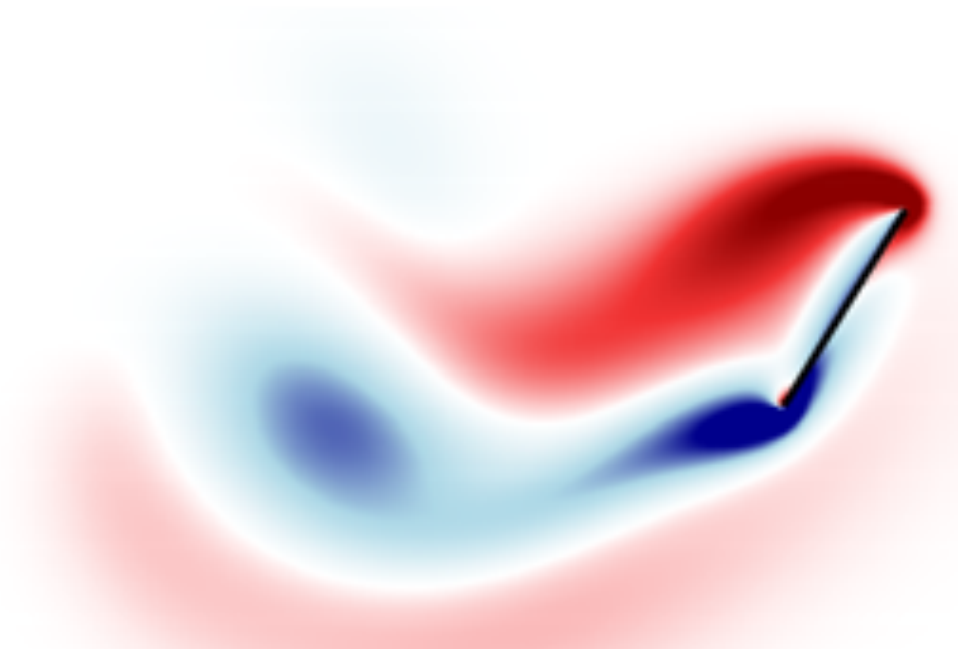- *Key features missed*: open development, networked collaboration, community, value-based framework…

About me

▸ Sharing OER via

- iTunes U, YouTube, TED-Ed

- GitHub

- self-hosted Open edX site
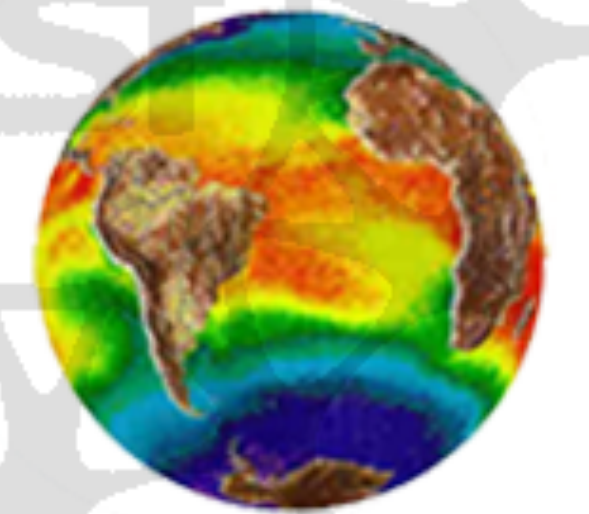
▸ Disseminating via

- Twitter & self-hosted blog

http://lorenabarba.com

Engineering Learning Platform

School of Engineering and Applied Science

https://openedx.seas.gwu.edu

Practical Numerical Methods with Python

MAE 6286

Start Date:	Duration:	Price:	
Sep 1, 2017	15 weeks	Free	**Enroll Now**

Course Description

This is a first course in numerical methods for advanced students in engineering and applied science. It was developed in 2014, both as a massive open online course (MOOC) and a regular course at the George Washington University. Similar courses have been taught at partner institutions: Southampton University (UK), Pontifical Catholic University of Chile, and Université Libre de Bruxelles. The original MOOC instance stayed online until August 2017, reaching 8,280 registered users.

🏛 Organization:	GW	
⏱ Enrollment End:	Dec 31, 2017	
☰ Effort:	15 weeks / 6 hours per week	
🎓 Subject:	Numerical Methods	

History of OER

▸ 1994: "learning object" —idea that digital materials can be made to be *reused*.

▸ 1998: "open content" —idea that principles of FOSS could be applied to content.

▸ 2001 —founding of Creative Commons —MIT OpenCourseWare launched.

WWW

OCW

1990

2000

2010
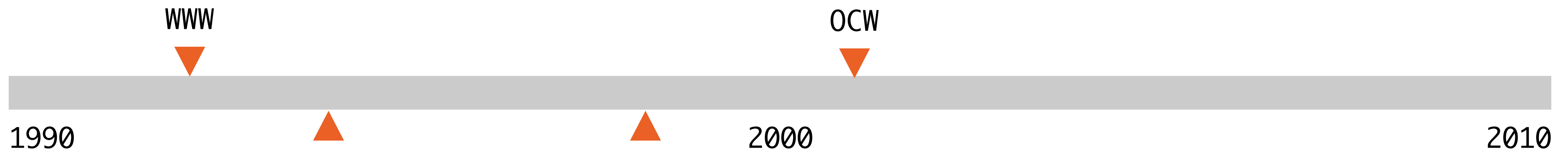
History of OER

- 2002: "open educational resources" coined — UNESCO Forum.

- Others join the OCW movement: Rice, JHU, Tufts, CMU, USU…

- 2005: The OpenCourseWare Consortium

- 2007: OECD "Giving Knowledge for Free…"

WWW

OCW

OCW Consortium

1990

2000

2010
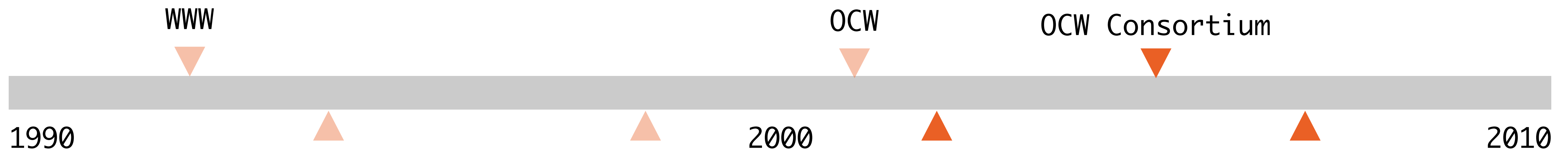
Number of original courses reported by OCW Consortium members
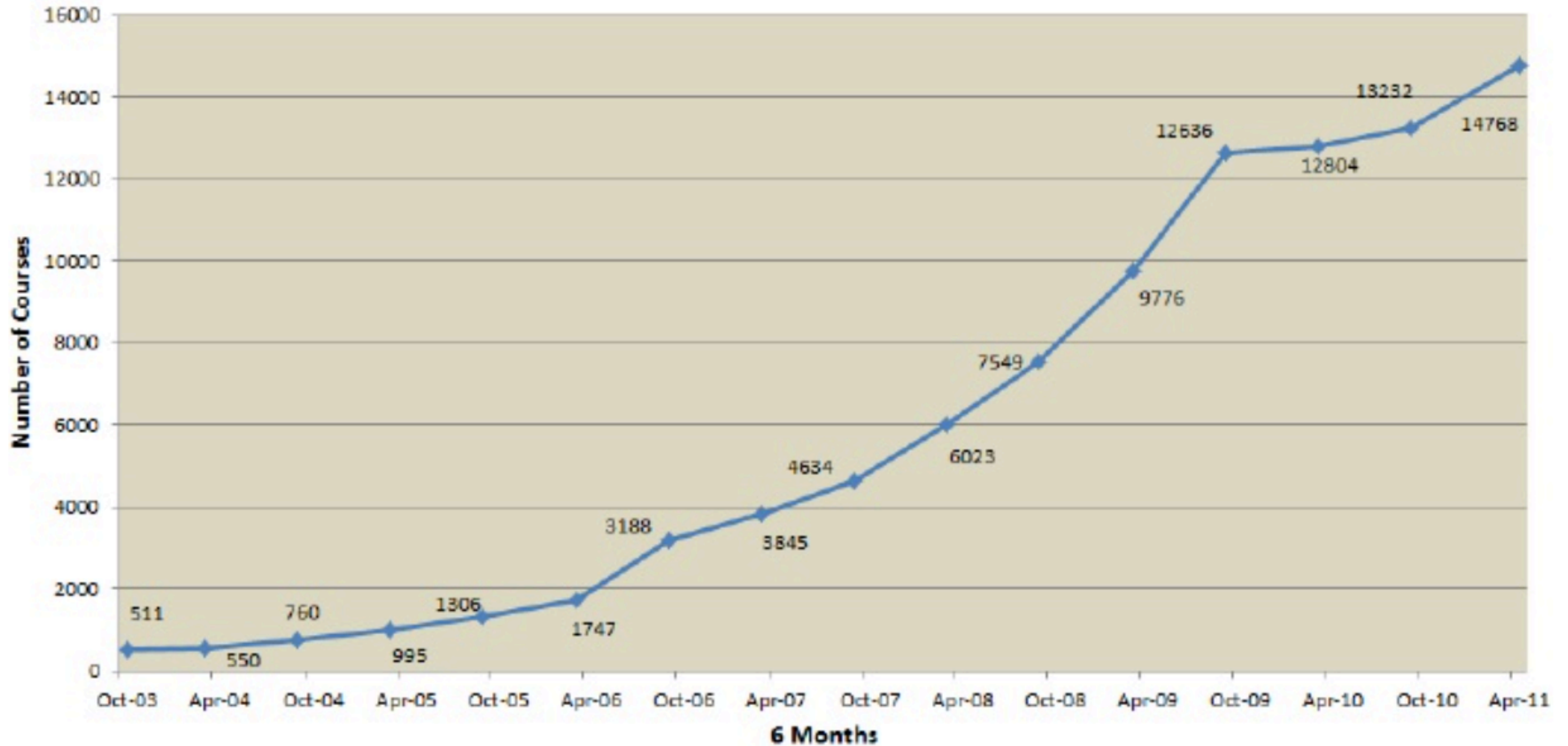
OpenCourseWare for EuroSakai Conference, Willem van Valkenburg on SlideShare (2011).

Recurring topics in OER

▸ reducing cost of textbooks for students

▸ increasing access (for worldwide learners)

▸ copyright and licenses

▸ altruism & public good
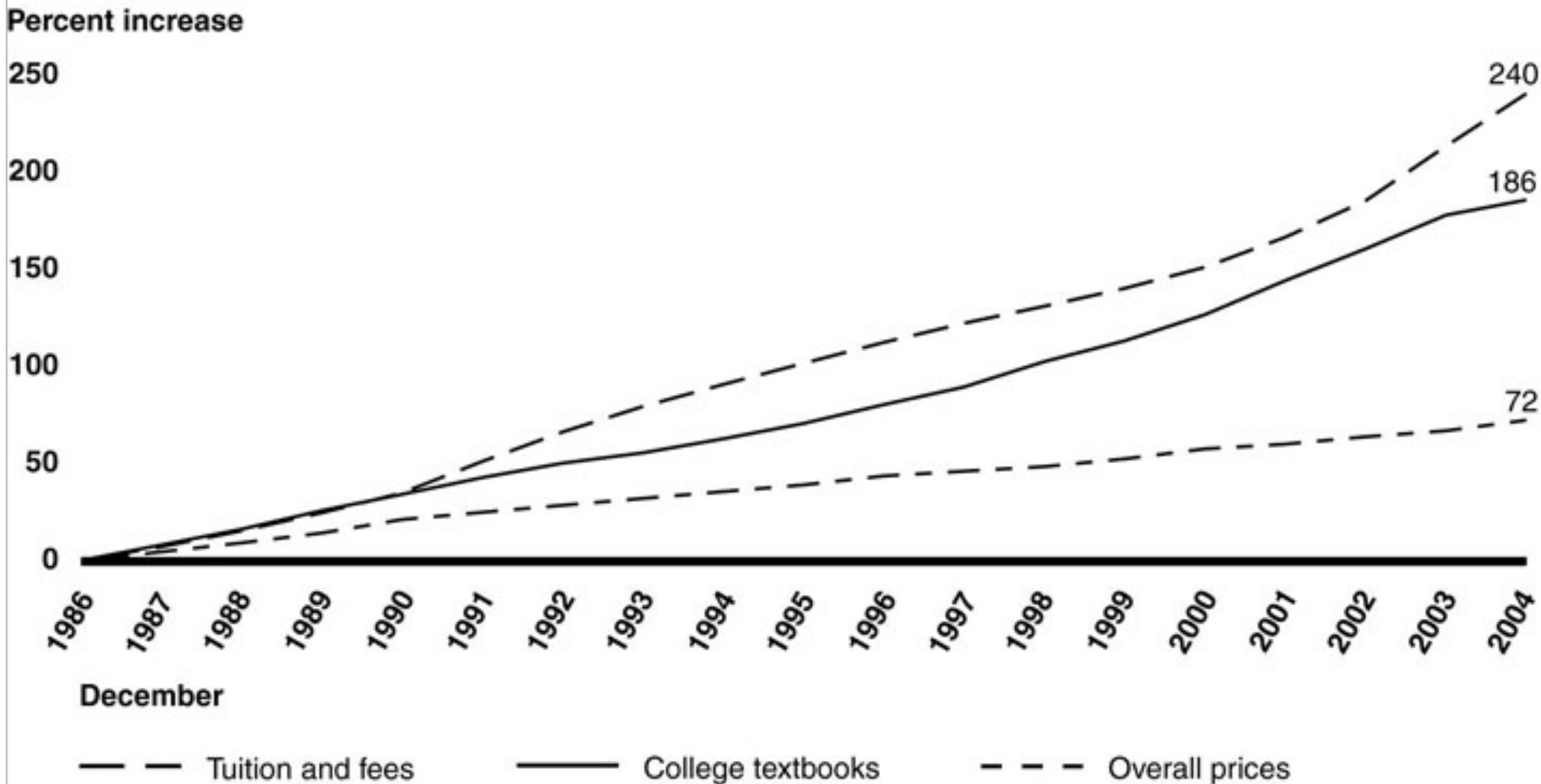
Annual Increase in College Textbook Prices, College Tuition and Fees, and Overall Price Inflation, 1986–2004 (US Government Accountability Office).

"A crisis of access"

‣ 800% rise in textbook costs over 30 years

‣ $1,200 average spend per student/year

‣ $4.3 billion earnings in higher-ed materials for publishers

https://www.universitybusiness.com/article/college-textbook-forecast-radical-change-ahead

Little change in status quo

‣ 3,000 faculty surveyed on 2016

‣ 58% faculty not aware of OER

‣ 5.3% of courses using open textbooks

http://www.onlinelearningsurvey.com/oer.html

Barriers

‣ 49% "not enough resources for my subject"

‣ 48% "too hard to find what I need"

‣ 45% "no comprehensive catalog"

http://www.onlinelearningsurvey.com/oer.html

What did OER miss from FOSS?

▸ developing in the open

▸ collaborating/contributing

▸ community around OS projects

▸ culture & value-based framework

FOSS: developing in the open

‣ The OER narrative is often about: creation vs. adoption, author vs. user

‣ MIT OCW was never open for contributions.

‣ Rice's Connexions *intended* to be open for contributions, but this feature faded...

Algebra and Trigonometry

Biology

Biology for AP® Courses

Astronomy

Anatomy and Physiology

Calculus

American Government

Principles of Economics

Concepts of Biology

College Algebra

Chemistry

Chemistry Atoms First

Elementary Algebra

Intermediate Algebra

College Physics for AP® Courses

Microbiology

Principles of Microeconomics

Principles of Macroeconomics

Principles of Macroeconomics for AP® Courses

Principles of Microeconomics

College Physics for AP® Courses

Precalculus

Psychology

Introduction to Sociology 2e.

Introductory Statistics

University Physics

U.S. History

Prealgebra

We create huge amounts of OER, but there is very little reuse...

— Stephen Downes,
VI International Seminar of the
UNESCO chair in e-Learning (June2010)

https://youtu.be/AQCvj6m4obM

Openness is about the possibilities of communicating with other people. It's not about *stuff*, what you do with stuff. It's about what you do with each other

— Stephen Downes, 2017

https://youtu.be/FPHYAFcUziA
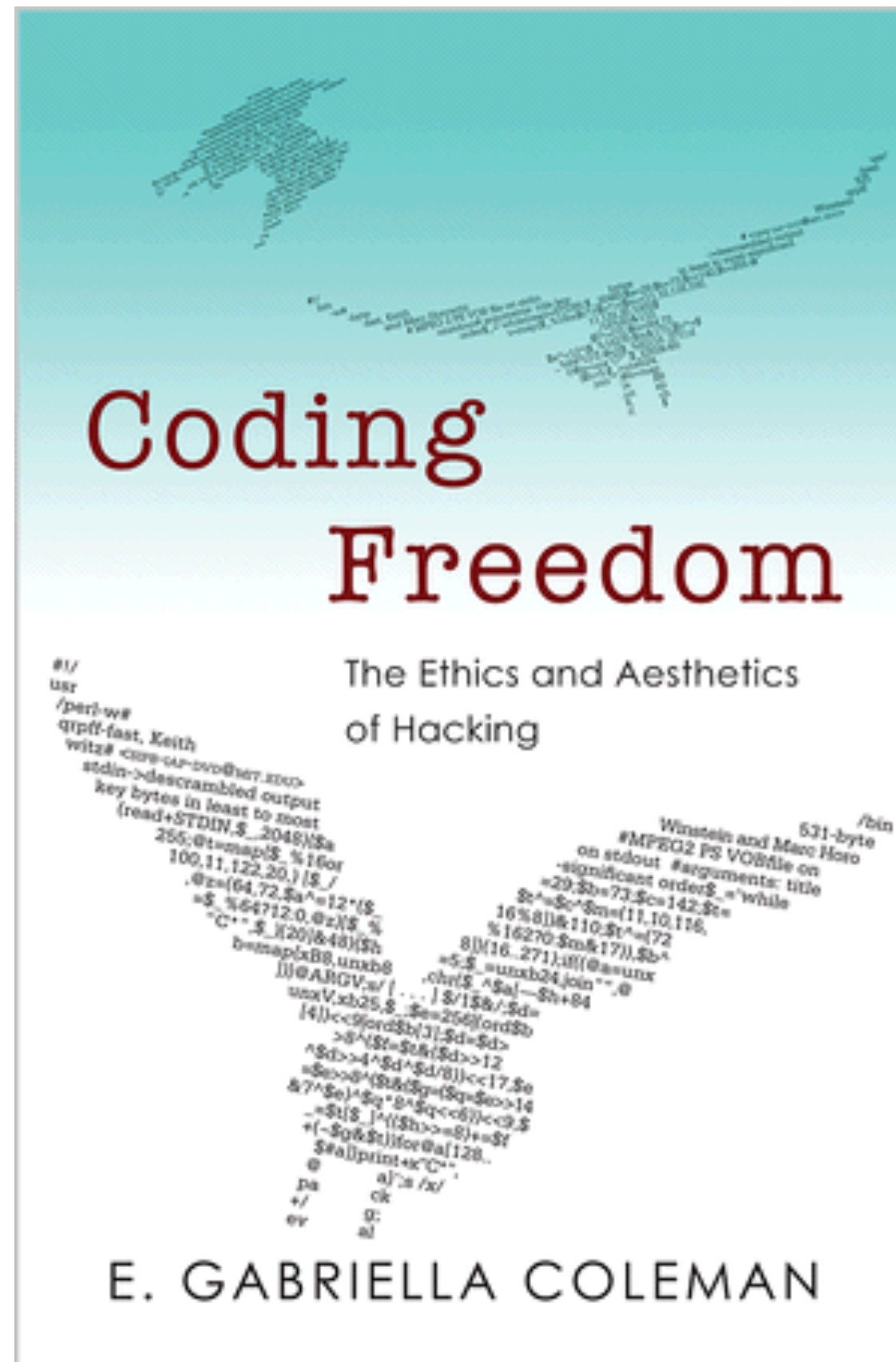
Open-Source Software projects build institutions that have very strong ethical **commitments**...

(1) freedom of access
(2) transparency
(3) governance

Open-source licenses:

People can coordinate their work freely, within the confines of copyright law, while making access and wide distribution a priority.

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People can **coordinate** their work freely, within the confines of copyright law, while making access and wide distribution a priority.
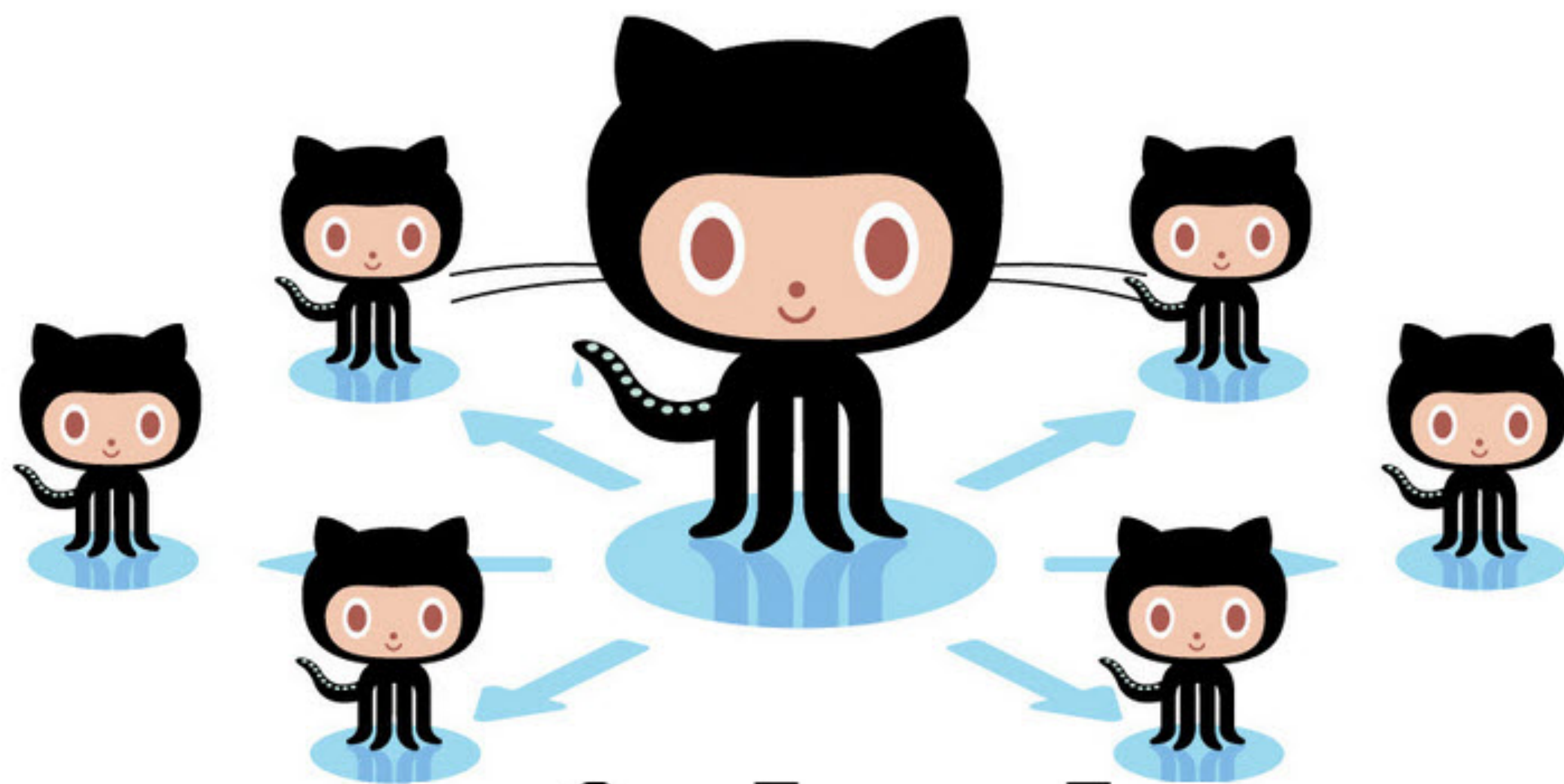
github
SOCIAL CODING

Commitment-based culture of collaboration

I'm reviewing this PR.

Project contribution policy:
"Log an issue for any question or problem."

Why Open Education?

Pedagogy of openness—open teaching & learning practices actively promote rich networks, lively communities, and fertile connections.

Openness

…serves a pedagogical purpose: learning is richer by open sharing.

Coordination

…in the model of open-source culture, to create value together, fostering innovation & leadership.
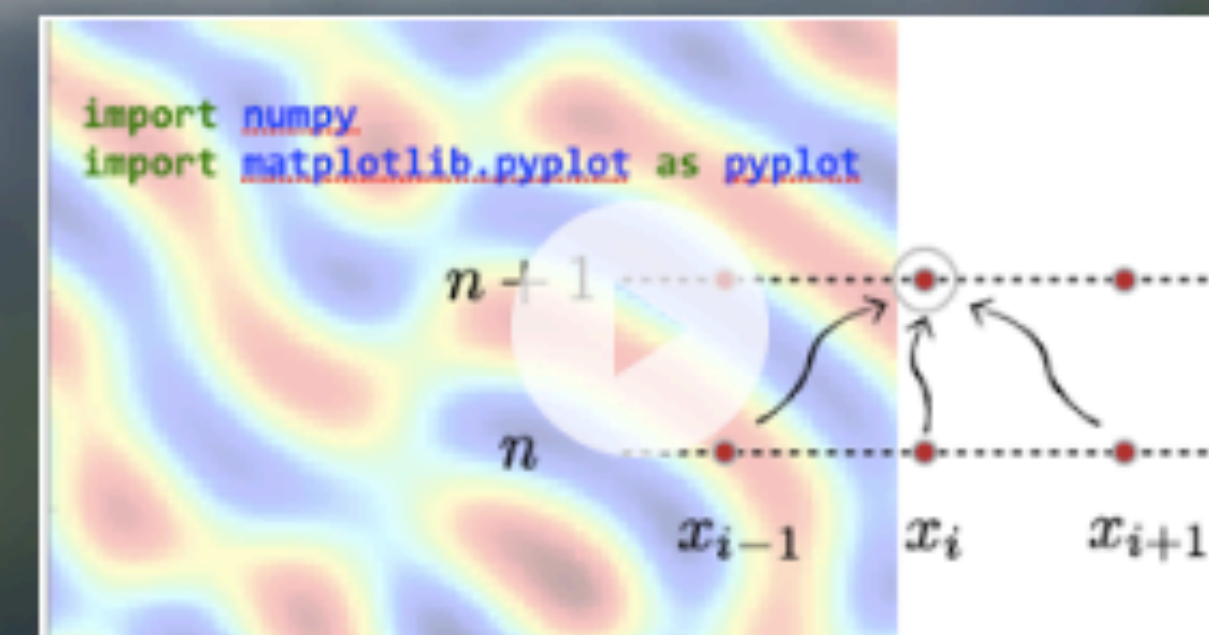
Practical Numerical Methods with Python

MAE 6286


```python
import numpy
import matplotlib.pyplot as pyplot
```

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numerical-mooc / **numerical-mooc**   👁 Unwatch - 37   ★ Star 58   ⑂ Fork 440

Home

Edit   New Page

labarba edited this page a day ago · 23 revisions

Welcome to the numerical-mooc wiki!

This repository is the core of the **"Practical Numerical Methods with Python** course.

Module 0: Getting Started.

How is this course going to work?

1. What to expect from the instructors
2. What is expected of you
3. The idea of connected courses

Module 1: The phugoid model.

1. Phugoid motion
2. Phugoid oscillation
3. Full phugoid model
4. Bonus! Second-order and multi-step methods

▼ Pages ⑥

Home

HOWTO: Install JSAnimation for IPython Notebook

Practical Numerical Methods with Python

The idea of connected courses

What is expected of you

What to expect from the instructors
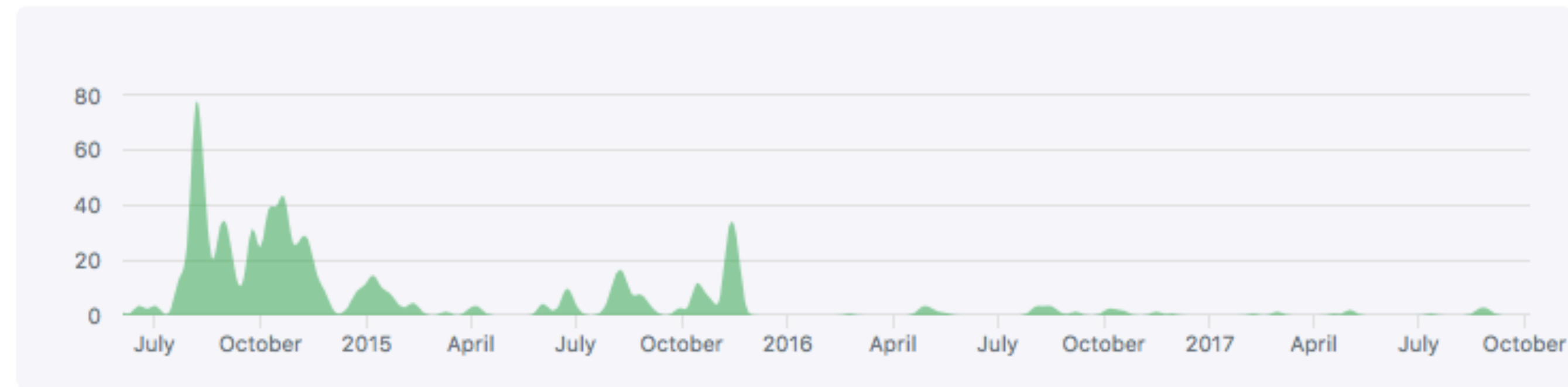
+ Add a custom sidebar

Clone this wiki locally

https://github.com/numeri 🗐

🖥 Clone in Desktop

#numericalmooc

Jun 22, 2014 – Oct 24, 2017

Contributions: **Commits** ▾

Contributions to master, excluding merge commits

	gforsyth	#1
	387 commits 539,550 ++ 487,256 --	

	labarba	#2
	324 commits 14,019 ++ 26,694 --	

	bknaepen	#3
	40 commits 93,958 ++ 93,100 --	

	IanHawke	#4
	40 commits 1,366 ++ 16,512 --	

	piyueh	#5
	23 commits 8,412 ++ 3,882 --	

	ketch	#6
	15 commits 2,361 ++ 739 --	

GitHub reports that the repository has 21 contributors. The main ones are myself and my co-author student, of course, but other instructors have made contributions...

A new genre of OER

A set of open-source tools for interactive and exploratory computing.

Computable content

Educational content made powerfully interactive via compute engines in the learning platform

The course of the future — and the technology behind it

Jupyter Notebooks powering Berkeley's data science curriculum

`http://data.berkeley.edu/news/coursefuture`

DATA   + FOLLOW THIS TOPIC

Embracing Jupyter Notebooks at O'Reilly

O'Reilly Media is using our Atlas platform to make Jupyter Notebooks a first class authoring environment for our publishing program.

By Andrew Odewahn. May 7, 2015

Embracing Jupyter Notebooks at O'Reilly

O'Reilly Media is thrilled to announce that we're making IPython Notebooks a first-class authoring environment for our publishing program, on par with Word or our Atlas platform. As part of our move to embrace the platform, we're also experimenting on beta.oreilly.com with new ways for readers to experience this content, like these examples:
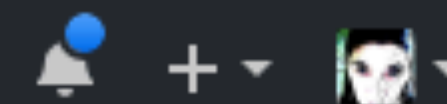
- Data visualization with Seaborn

Colored floor (source: Kamilla Oliveira via Flickr)

Demo:

http://go.gwu.edu/engcomp2lesson4

jupyter / **jupyter**

👁 Watch ▾ | 244   ★ Star | 2,646   ⑂ Fork | 591

<> Code   ⊙ Issues 74   ⑂ Pull requests 0   ▦ Projects 0   📖 Wiki   📊 Insights

A gallery of interesting Jupyter Notebooks

Edit   New Page

Andres Soto Villaverde edited this page 15 days ago · 42 revisions

This page is a curated collection of Jupyter/IPython notebooks that are notable. Feel free to add new content here, but please try to only include links to notebooks that include interesting visual or technical content; this should *not* simply be a dump of a Google search on every ipynb file out there.

Important contribution instructions: If you add new content, please ensure that for any notebook you link to, the link is to the rendered version using nbviewer, rather than the raw file. Simply paste the notebook URL in the nbviewer box and copy the resulting URL of the rendered version. This will make it much easier for visitors to be able to immediately access the new content.

Note that Matt Davis has conveniently written a set of bookmarklets and extensions to make it a one-click affair to load a Notebook URL into your browser of choice, directly opening into nbviewer.

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Jupyter

- Home
- A gallery of interesting Jupyter Notebooks
- Jupyter kernels
- Jupyter Notebook Server API

The Journal of Open Source Education

An **educator-friendly** journal for publishing computational learning modules and educational software.

Notice: We are not yet accepting submissions. Please follow our development on GitHub or Twitter.

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Learn more »

http://jose.theoj.org