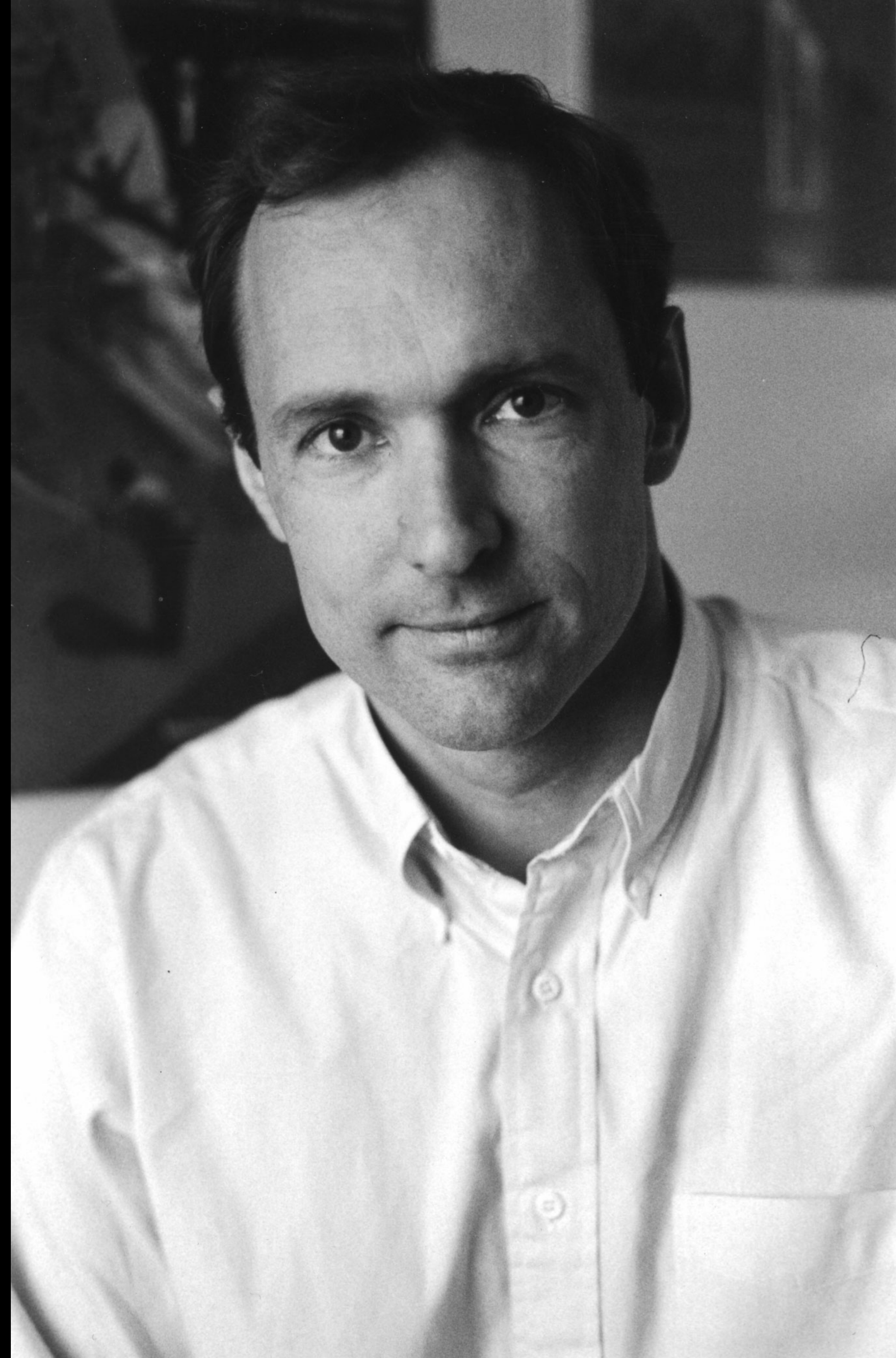


The Layers of The Web

Tim Berners- Lee



CERN DD/OC

Tim Berners-Lee, CERN/DD

Information Management: A Proposal

March 1989

Information Management: A Proposal

Abstract

This proposal concerns the management of general information about accelerators and experiments at CERN. It discusses the problems of loss of information about complex evolving systems and derives a solution based on a distributed hypertext system.

Keywords: Hypertext, Computer conferencing, Document retrieval, Information management, Project



WorldWideWeb	
Info	▷
Navigate	▷
Document	▷
Edit	▷
Links	▷
Style	▷
Print	p
Page Layout	
Windows	
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Hide	h
Quit	q

The World Wide Web project

World Wide Web

The WorldWideWeb (W3) is a wide-area hypermedia information retrieval initiative aiming to give universal access to a large universe of documents.

Everything there is online about W3 is linked directly or indirectly to this document, including an executive summary of the project, Mailing lists , Policy , November's W3 news , Frequently Asked Questions .

<u>What's out there?</u>	Pointers to the world's online information, <u>subjects</u> , <u>W3 servers</u> , etc.
<u>Help</u>	on the browser you are using
<u>Software Products</u>	A list of W3 project components and their current state. (e.g. <u>Line Mode</u> , <u>X11 Viola</u> , <u>NeXTStep</u> , <u>Servers</u> , <u>Tools</u> , <u>Mail robot</u> , <u>Library</u>)
<u>Technical</u>	Details of protocols, formats, program internals etc
<u>Bibliography</u>	Paper documentation on W3 and references.
<u>People</u>	A list of some people involved in the project.
<u>History</u>	A summary of the history of the project.
<u>How can I help ?</u>	If you would like to support the web..
<u>Getting code</u>	Getting the code by <u>anonymous FTP</u> , etc.

**Information
Management:
A Proposal**

Information

Management





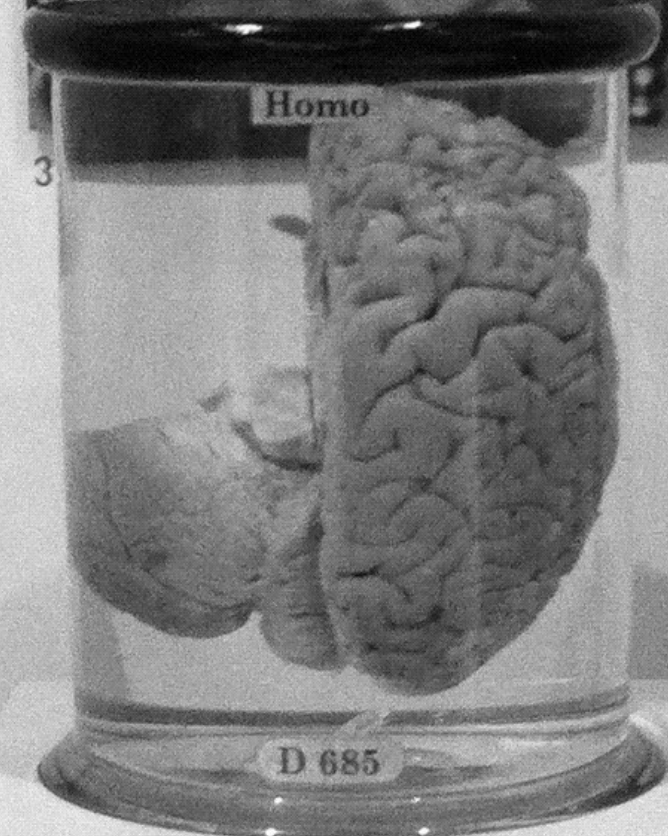
Mary Lee Woods



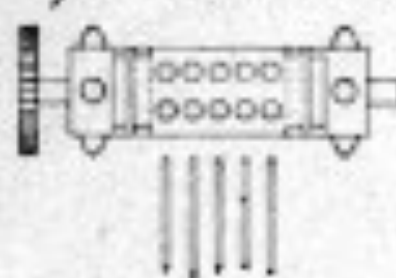


Charles Babbage

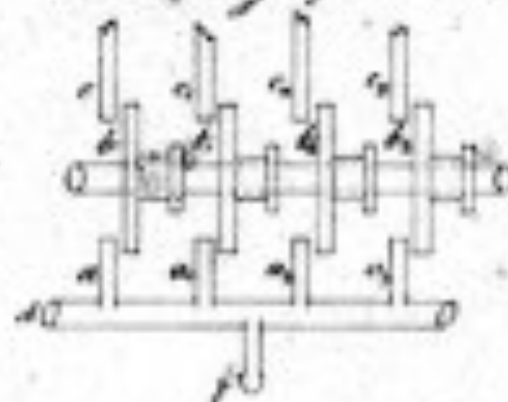
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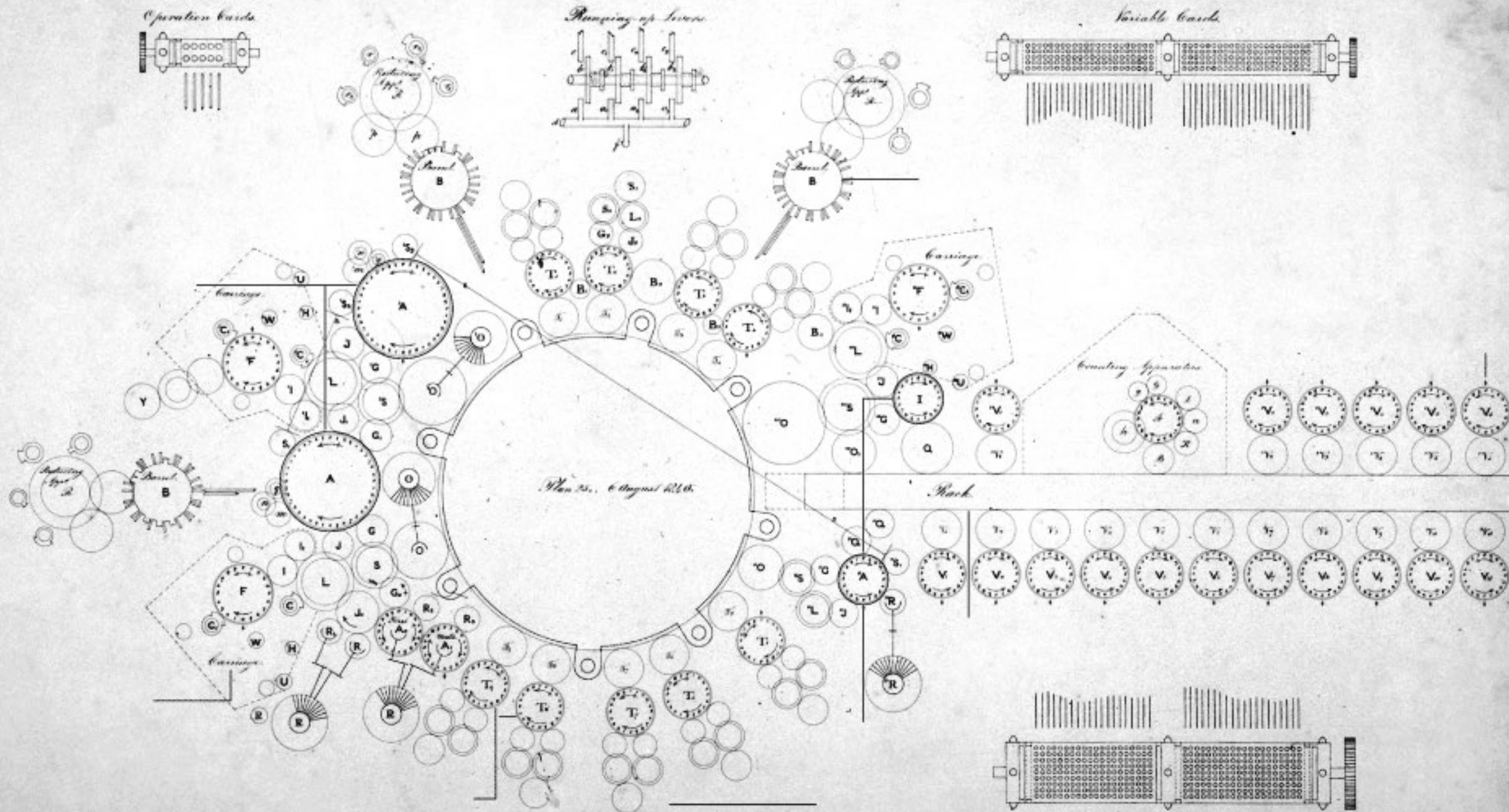
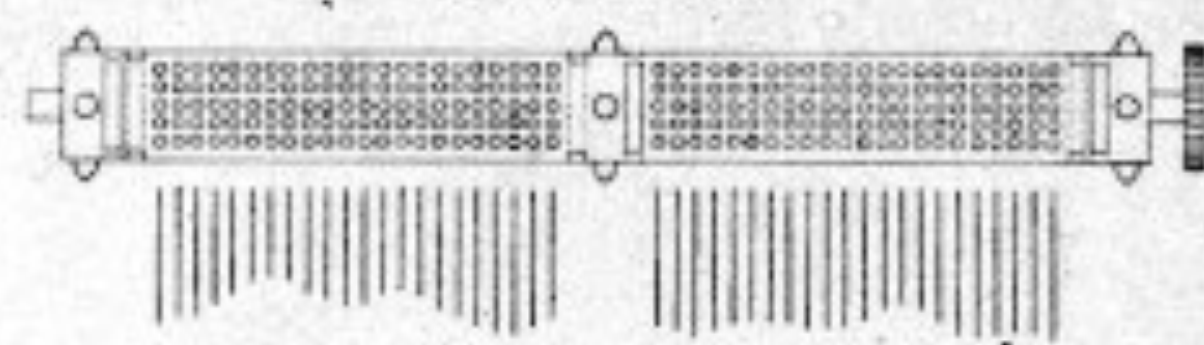
Operation cards



Pumping up levers



Variable cards



Wm. S. August 1846

Inch Feet

Number Cards

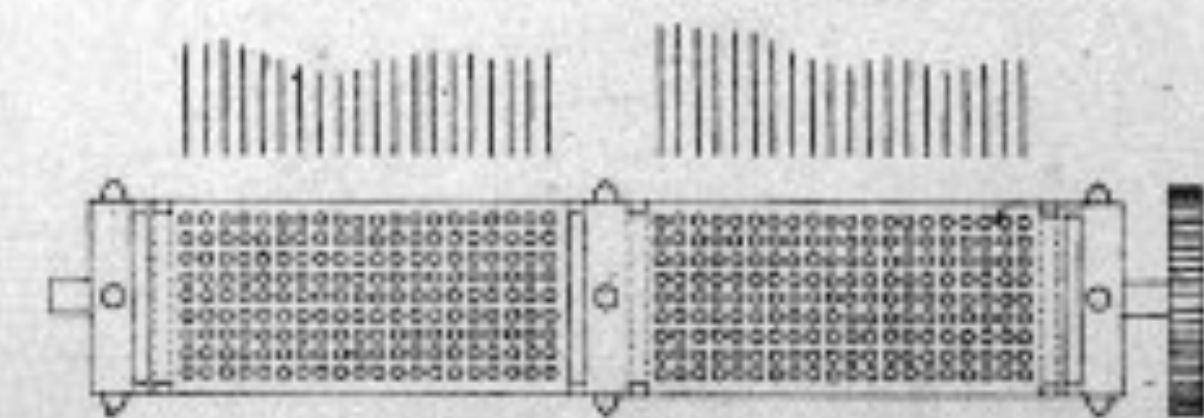


DIAGRAM BELONGING TO NOTE D

Number of Operations	Type of Operations	Variables for Data						Working Variables							
		1V_0	1V_1	1V_2	1V_3	1V_4	1V_5	0V_6	0V_7	0V_8	0V_9	${}^0V_{10}$	${}^0V_{11}$	${}^0V_{12}$	${}^0V_{13}$
		+	+	+	+	+	+	+	+	+	+	+	+	+	+
		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		m	n	d	m'	n'	d'								
1	x	m			n'		mn'								
2	x		n				$m'n$								
3															
4					d'				d'						
5															
6															
7	+						0	0				mn'			
8	+							0	0						
9	+										0	0			
10	+													mn'	
11	+														

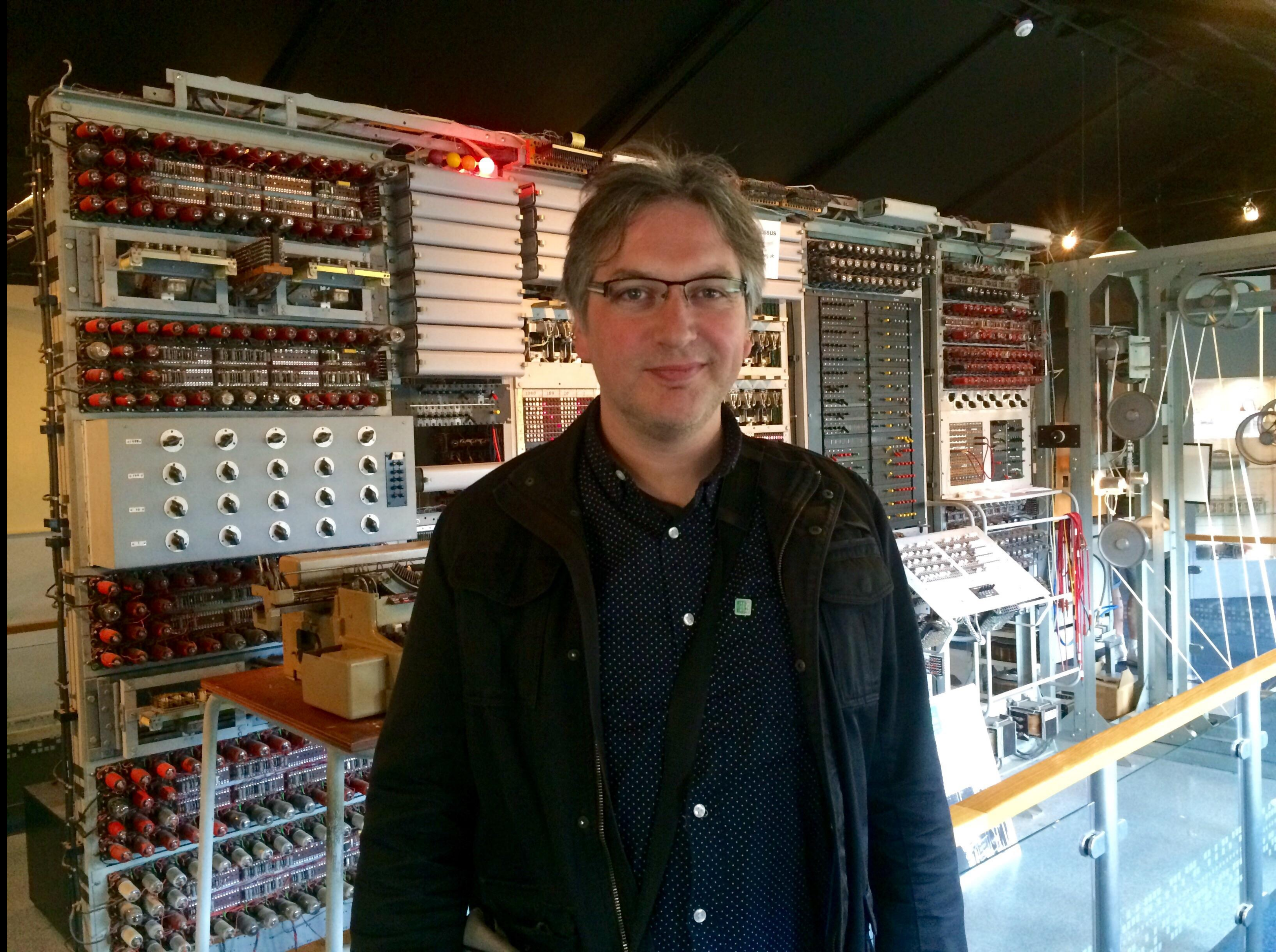
$$\frac{d'm - dm'}{mn' - m'n} = y$$

Ada Lovelace



Alan Turing





Vannevar Bush



As We
May Think

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JULY 1945

THE

Atlantic



THE ATLANTIC REPORT — ON THE WORLD TODAY

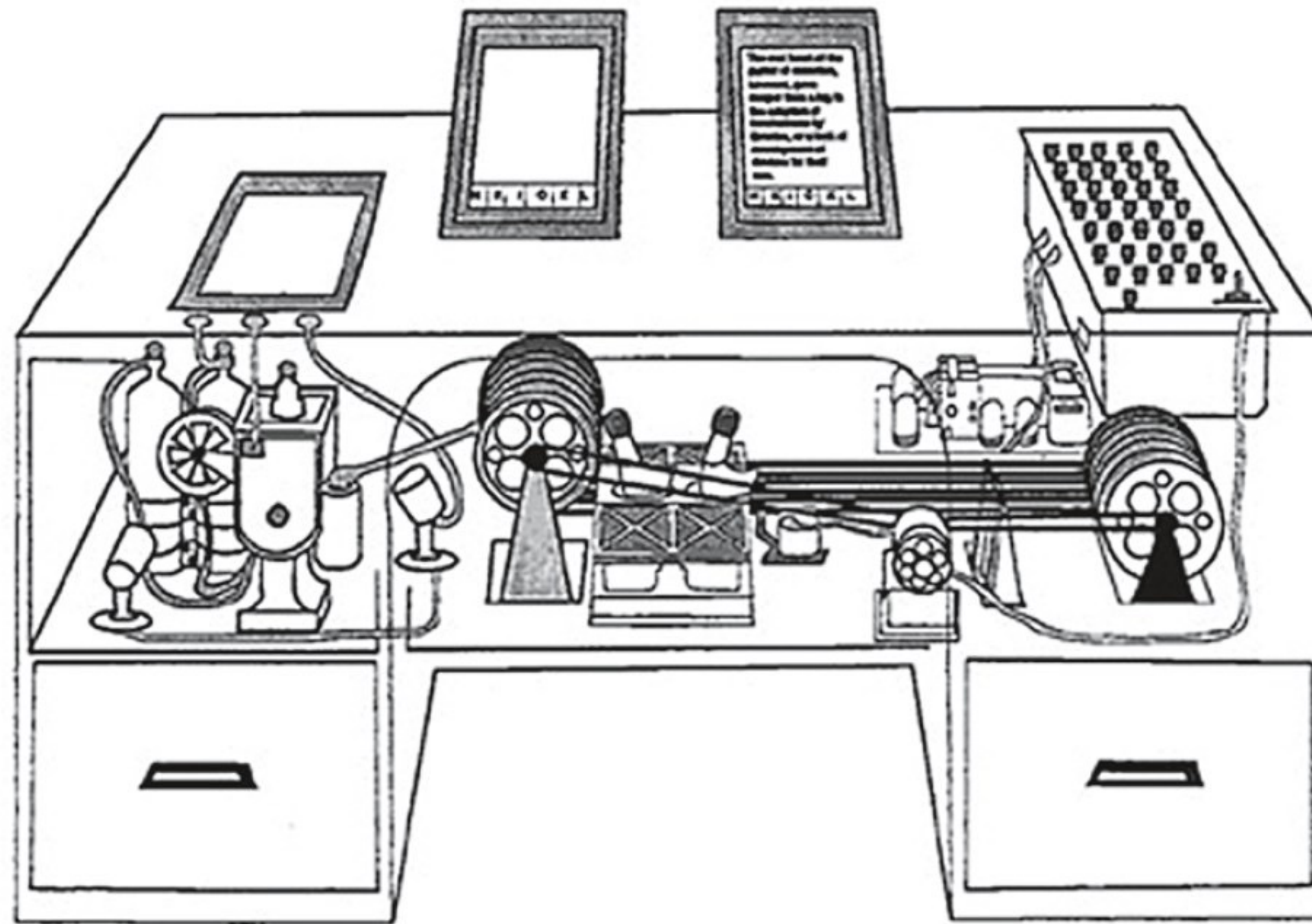
Hearing Is Believing	DIXON WECTER	37
<i>Swing, Kaltenborn, Thomas, Pearson, Winchell, Heatter</i>		
Japan's Secret Weapon	EDGAR L. JONES	44
Horace Walpole Reread. <i>Books and Men</i>	WILMARTH S. LEWIS	48
On Anodynes. <i>A Poem</i>	SIMPSON SASSERATH	51
Mrs. Razor. <i>A Story</i>	JAMES STILL	52
Trial by Fury. <i>A Poem</i>	DILYS BENNETT LAING	53
For the Record: Buchenwald	LT. COL. CHARLES R. CODMAN	54
Forgive Me, Stranger. <i>A Poem</i>	WINFIELD TOWNLEY SCOTT	56
Ships and Subsidies. <i>Replies to Lewis W. Douglas</i> BASIL HARRIS — J. F. GEHAN — ADMIRAL E. S. LAND		57
New York Summer. <i>A Poem</i>	CORA CARTER	61
Birds of Midway	CAPTAIN T. MCKEAN DOWNS	62
The Balkans Join Up	STOYAN CHRISTOWE	66
Come You Home a Hero. <i>A Story</i>	LT. LAURENCE CRITCHELL	71
A Presiding Spirit	H. M. TOMLINSON	76
The Meetinghouse. <i>A Story</i>	JESSAMYN WEST	78
Keeping the Country at Work	PAUL G. HOFFMAN	84
Should Jews Return to Germany?	PAUL W. MASSING & MAXWELL MILLER	87
The Egg and I. <i>The Atlantic Serial</i>	BETTY MACDONALD	91
<u>A SCIENTIST LOOKS AT TOMORROW</u>		
As We May Think	VANNEVAR BUSH	101
Accent on Living: Elliot Paul — Jack Pope — Florida Watts Smyth — "The Bookman" — Arthur W. Bell		109
Atlantic Bookshelf: The Peripatetic Reviewer, by Edward Weeks — Short Reviews		125

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?**



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SPACEWAR

Fanatic Life and Symbolic Death Among the Computer Bums by Stewart Brand

THE FIRST "INTERGALACTIC SPACEWAR OLYMPICS" WILL BE HELD HERE, WEDNESDAY IN OCTOBER, 1974. FIRST PRIZE WILL BE A YEAR'S SUBSCRIPTION TO "ROLLING STONE." THE PALA EVENT WILL BE REPORTED BY STONE SPORTS REPORTER STEWART BRAND & PHOTOGRAPHER BY ANNE LICHTENITZ. (SEE PAGE 51)

Ready or not, computers are coming to the people. That's good news, maybe the best since psychoanalysis. It's the track of the "Computers—Threat or Menace?" school of liberal criticism but surprisingly in line with the romantic fantasies of the forefathers of the science such as Norbert Wiener, Warren McCulloch, J.C.R. Licklider, John von Neumann and Vannevar Bush.

The trend owes its health to an odd array of influences. The youthful fervor and firm dis-establishmentarianism of the freaks who design computer science, an astonishingly enlightened research program from the very top of the Defense Department, an unexpected market-banking movement by the manufacturers of small calculating machines, and an impressive midnight phenomenon known as Spasowar.

Reliably, at any nighttime session (i.e. non-business hours) in North America hundreds of computer technicians are effectively out of their bodies, locked in life-or-death space combat computer-projects onto cathode ray tube display screens, far hours at a time, running their eyes, combing their fingers in frenzied mashing of control buttons, joyously slaying their friends and waging their employers' valuable computer time. Something basic is going on.

rudimentary Spasowar consists of two humans, two sets of control buttons or joysticks, one TV-like display and one computer. Two spacecraft are displayed in motion on the screen, controllable for thrust, raw pitch and the long of torpedoes. Whenever a spacecraft and torpedo meet, they disappear in an attractive explosion. That's the original version invented in 1962 at MIT by Steve Russell. (More on him in a moment.)

October 17, 8 PM, at Stanford's Artificial Intelligence (AI) Laboratory, moonlit and remote in the foothills above Palo Alto, California. Two dozen of us are jammed in a semi-dark control room just off the main hall containing AI's PDP-10 computer. AI's Head System Programmer and most avid Spasowar nut, Ralph Goring, has a display screen which says only:

THIS CONSOLE AVAILABLE
He logs in on the keyboard with his initials. Click clackclickclick.

LI, RAO
CSD FALL PRINC. SATURDAY 11
AM IN FLIGHT PAIR
He utters further announcements, including one about the "First Intergalactic Spasowar Olympics" at 8 PM, with "Click ('rue"), clackclickclick ("Space War Rites") click ("do it").

R SWR
WELCOME TO STANFORD
How many more? MAXIMUM IS 5
Stewart Brand, 33, is a graduate of Stanford (biology) from 1958 to 1957 he edited the Whole Earth Catalog.

Click 1 (Five players. This is for the first familiarization battle in the Spasowar Olympics, initiated by me and sponsored (here & prior) by RICK AND STONE. Friends, I would be able to explain every computer-technical term that comes by. Fortunately you don't need them to get the gist of what's happening.)

KEYBOARD BUSTOUT? (EAM BUCKLAKI) TYPE Y OR N.

Y (Click Y)

THE STANDARD GAME IS:
1. CONSOLE, 2. TORPEDO TUBES, (NORMAL) 3. MISSILES, 4. PARTIAL DAMAGE, 5. REVERSE, 6. EJECTOR SUN, 7. SHIP HEAD IN STANDARD POSITION, 8. TYPE Y TO GET A STANDARD GAME, 9. Ralph warns other players, "No."

Click N
How many more? MAXIMUM IS 5
CHOOSE FROM ZERO TO 4.

Click 4
PARTIAL DAMAGE?

Click N
DIPLOMA KISS?

Click Y
Two torpedoes first?

Click Y
HYPERFAC?

Click N
RANDOM STARTING POSITIONS?

Click Y
Immediately the screen goes dark and then displays five different spacecraft, each with a dot indicating torpedo tubes are loaded, five scores, each at zero, a convincing starfield, and four space mines orbiting around a central sun, toward which the spacecraft are starting to fall at a tortoise accelerating rate.

Players seize the five sets of control buttons, find their spacecraft persona on the screen, and simultaneously turn and fire toward any nearby still-helpless spacecraft, but the thrust button to initiate orbit before being disrupted by the killer sun, and evade or shoot down any incoming enemy torpedoes or attacking mines. After two torpedoes are fired, each ship has a three-second " reloading" time. First torpedoes last nine seconds and then disappear.

At kills are made the screen starts to change. +1 for a successful kill, -1 for being killed, -1 for being lone survivor of a battle. Personalities begin to establish themselves in the maneuvering space: The pilot of the ship called *Panacea* is a dead shot but panics easily in cross fire. *Roundback* tries to avoid early dodging and routinely fires two torpedoes "around the universe" till the screen, so they reappear suddenly unexpected from the opposite side. *Broke* dives for the sun and a fast orbit, has excellent agility in weaving and facing toward toward. *Panacea* flies slowly a lot, signaling out individual opponents. *Flackback* is slow and maintains an uneasy field-sense of the

while battlety, impressive to surprise attack.
A game is over when only one or no survivors are displayed. The screen then blanks out, counts down 5-4-3-2-1, crosses in two different directions, the most hot-hot-hot scene I've been around since Harry Frankfurt Acid Tests... and really it's just a second night at the AI Project, at any suitably hairy computer research project. Something basic.

These are heads, most of them. Half or more of computer science is heads. But that's not it. The rest of the consciousness is laid low and back those days, showing none of this kind of mad, then?

The Hackers
I'm guessing that Alan Kay at Xerox Research Center (more on them shortly) has a line on it, defining the standard Computer Bum.
"About as straight as you'll expect bureaucrats to look. It's that kind of fanaticism. A true hacker is not a group person. He's a person who loves to stay up all night, he and the machine in a low-hate relationship... They're kids who tended to be brilliant but not very interested in conventional goals. And computing is just a fabulous place for that, because it's a place where you don't have to be a Ph.D. or anything else. It's a place where you can still be an artisan. People are willing to pay you if you're any good at all, and you have plenty of time for screwing around."

The hackers are the technicians of this science. "It's a term of deprecation and also the ultimate compliment." They are the ones who translate human demands into code that the machines can understand and act on. They are legion. Fanatics with a potent new toy. A mobile new-found elite, with its own apparel, language and character, its own legends and humor. These magnificent men with their flying machines, wearing a leading edge of technology which has an odd softness to it, obscure or routine so much as the starkness or demands of what's possible.

A young scientist travels where the young take it. The water computer research directors have learned that not trading their young programmers with more responsibility can lead immediately to no research. AI is one of perhaps several dozen computer research centers that are flourishing with their young, some of them with no more formal education than they got at the local Free School. I'm talking to Leo Earnest, the guy who went for beer. He's tall, swarthy, has a black and white striped beard, looks like a Sikh athlete. He's telling me about what the people build here besides refinements of Spasowar. There's a speech recognition project. There's the hand-eye project, in which the computer is learning to see and visually correct its robotic functions. There's work on symbolic computation and grammatical inference. Work with artistic children, "trying to get them to relate to computers first, and then later to people. This seems to be successful in part because many of these children think of themselves as machines. You can encourage them to interact in a game with the machine."

Another window on the interests of

into orbit around the central point. *Broke*, at bottom left, deflates *Panacea* in simple combat, then assumes flank attack on *Panacea* (top right), who has caught *Roundback* (top left) and *Flackback* (top right) head to head. As kills are made the displayed numbers keep score.

multi display back, computer music programs, the color video image maker. Five intense hours, much frenzy and skilled concerted action, a 15-foot screen in two different directions, the most hot-hot-hot scene I've been around since Harry Frankfurt Acid Tests... and really it's just a second night at the AI Project, at any suitably hairy computer research project. Something basic.

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Bruce Baumgart, winner of the First Man Free-For-All at the First Intergalactic Spasowar Olympics, brandishing control buttons in triumph



AI and of the hackers is a posted print-out of the file of AI's system programs, some 200 elaborate routines available. *Sounding Hand Eye Monitor... Go Game... DTP Back Brown Balancing... Comparison Portion of Song... Retriever Selected AP News Stories... Display Back... Mail Doctor... New TV Editor... Fortune Cookie Program... Another Display Back... Kalah Game... Oh Where, Oh Where Has My Little Job Gone... Paranoiac Model... Pruning Program... The Wonderful News Program... Old Spasowar... New Spasowar... Send Everyone a Message... Old Version of Daemon... Tell Everyone the System Is Going Down... Music Compiler Sort Of... New Music Compiler...*

A distinction exists between low-level and high-level computer research, between preoccupations of support group (hackers) and of research group. The distinction blurs often. Leo Earnest, sometimes it's hard to tell the difference between recreation and work, happily. We try to judge people not on how much time they waste but on what they accomplish over fairly long periods of time, like a half year to a year." He adds that Spasowar players "are more from the support groups than the research groups. The research group tend to get their kicks out of research."

His account of the invention of

Spasowar is not only intriguing history, it's the most sophisticated analysis of good game design I've ever run across—elegant work. But that's in retrospect; back then it was just kids messing up all night.
"We had this brand new PDP-1," Steve Russell recalls. "It was the first mini-computer, ridiculously inexpensive for its time. And it was just sitting there. It had a cathode raytube that worked right, which was rare, and a paper tape reader and a cathode ray tube display. [There had been CRT displays before, but primarily in the Air Defense System.] Somebody had built some little pattern-generating programs which made interesting patterns like a kaleidoscope. Not a very good demonstration. Here was this display that could do all sorts of good things! So we started talking about it. Agreeing what would be interesting displays. We decided that probably you could make a two-dimensional maneuvering sort of thing, and decided that naturally the obvious thing to do was space-ships."
Naturally?
"I had just finished reading 'Doc' Smith's Letterman series. He was some sort of scientist but he wrote this really dashing brand of science fiction. The details were very good and it had an excellent pace. His heroes had a strong tendency to get pursued by the villain across the galaxy and have to invent their way out of their problem while they were being pursued. That sort of action was the thing that intrigued Spasowar. He had some very glowing descriptions of spaceship encounters and space fleet maneuvers."
"Doc" Smith?
"The Bible looked upon the Navies, every weapon of war. But, as Costigan had expected, Norad's vessel was completely ready for any emergency. And, unlike her sister-ship, she was manned by scientists well-versed in the fundamental theory of the weapons with which they fought. Beams, rods and lasers of energy flamed and flared, plasma and pencils out, glashed and stabbed, defensive screens glowed redly or flashed suddenly into intensely brilliant, convulsing incandescence. Critson spazily struggled valiantly against violent curtains of annihilations. Material projectiles and torpedoes were launched under full-beam control, only to be exploded harmlessly in mid-space, to be blasted into nothingness or to disappear innocuously against impenetrable polyatomic screens."
—Populansary (1948)

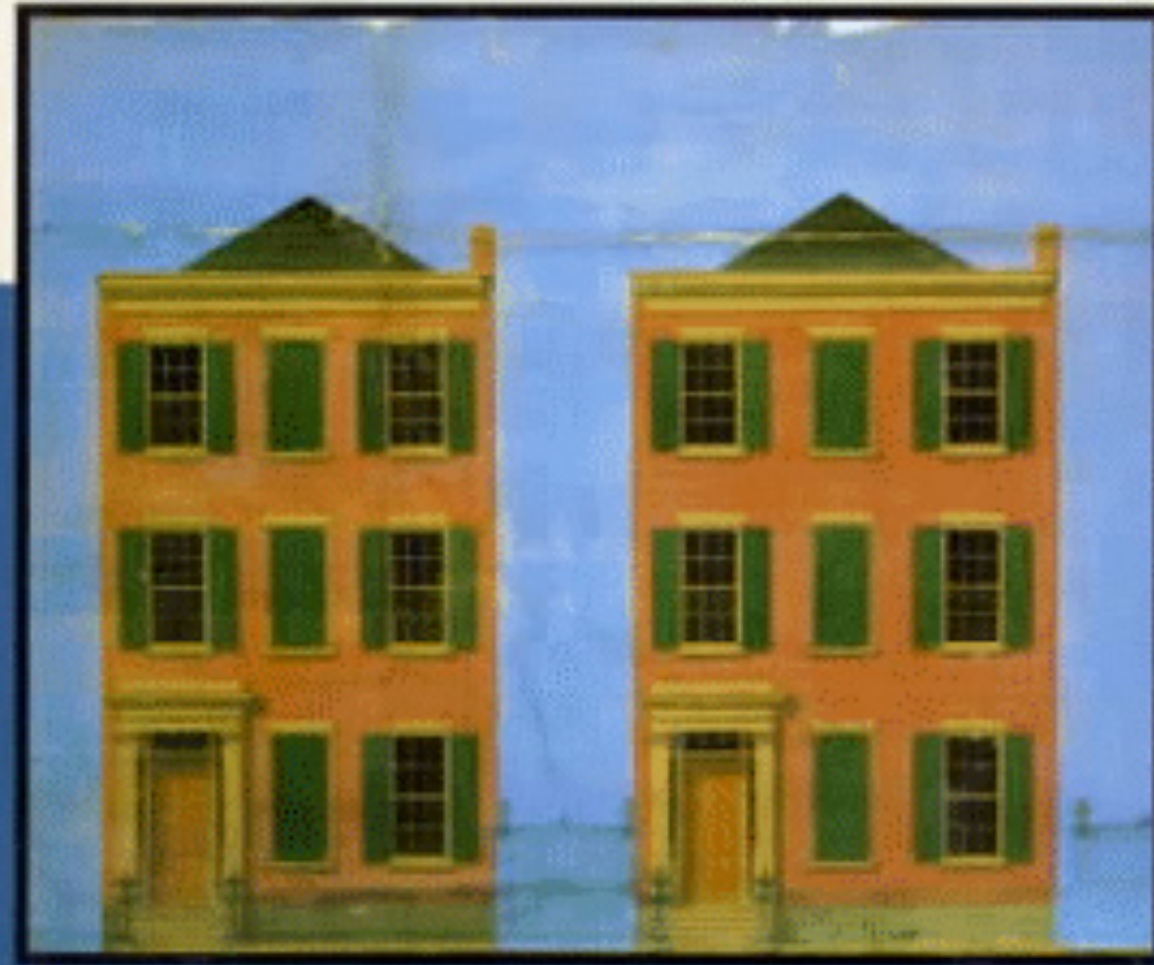
Steve Russell: "By parking a world which people weren't familiar with, we could alter a number of parameters of the world in the interests of making a good game and of making it possible to get it onto a computer. We made a great deal of compromises from some of our original grand plans in order to make it work well."
"One of the important things in Spasowar is the pace. It's relatively fast-paced, and that makes it an interesting game. It seems to be a reasonable compromise between action—pushing buttons—and thought. Thought does help you, and there are some tactical considerations, but just plain fast reflexes also help."
"It was quite interesting to fiddle with the parameters, which of course I

—Continued on Next Page



HOW BUILDINGS LEARN

What happens after they're built



New Orleans, 1857



The same two buildings, 1993

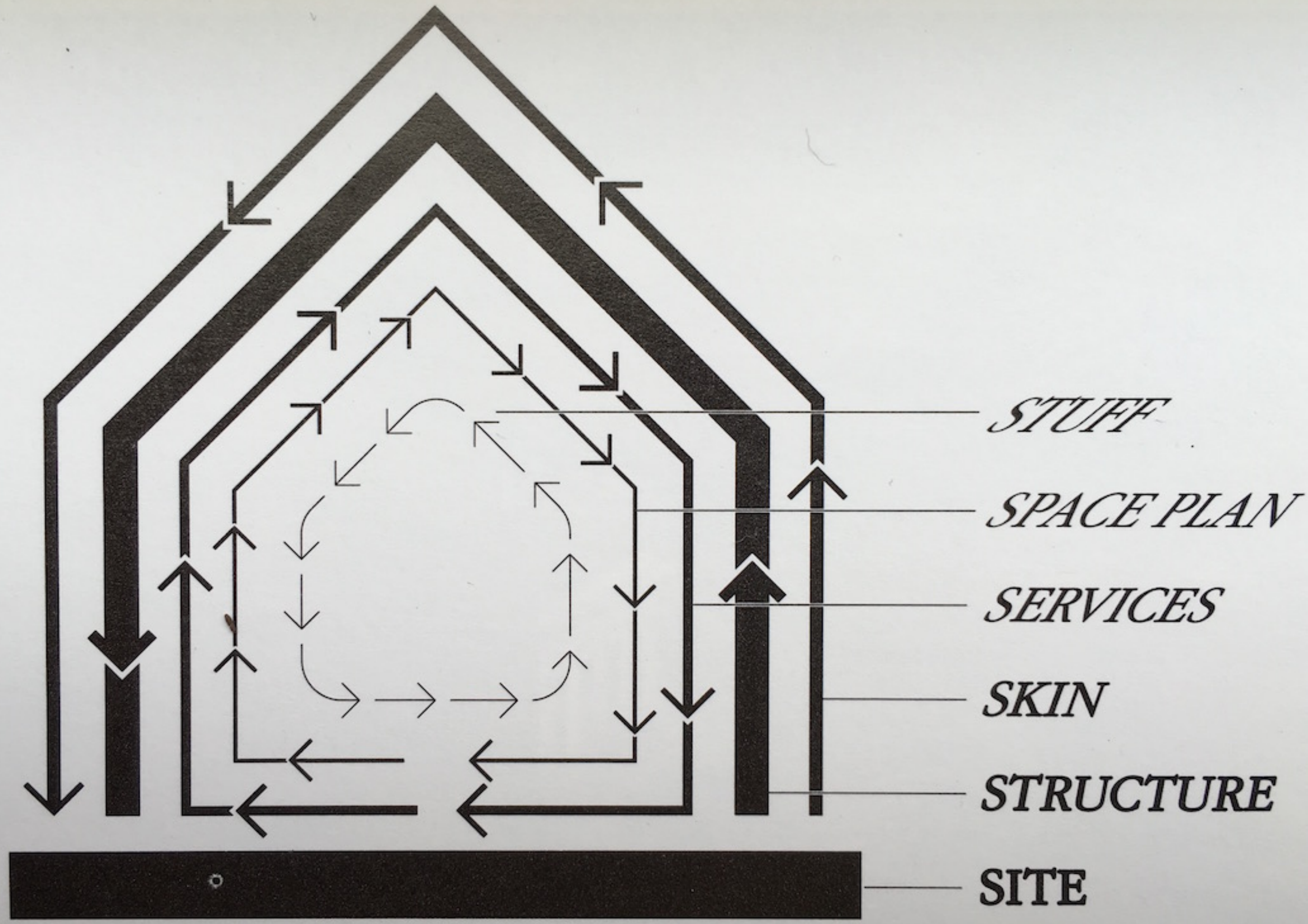
STEWART BRAND

Creator of *THE WHOLE EARTH CATALOG*

EDITOR OF *THE WHOLE EARTH CATALOG*

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SPACE PLAN

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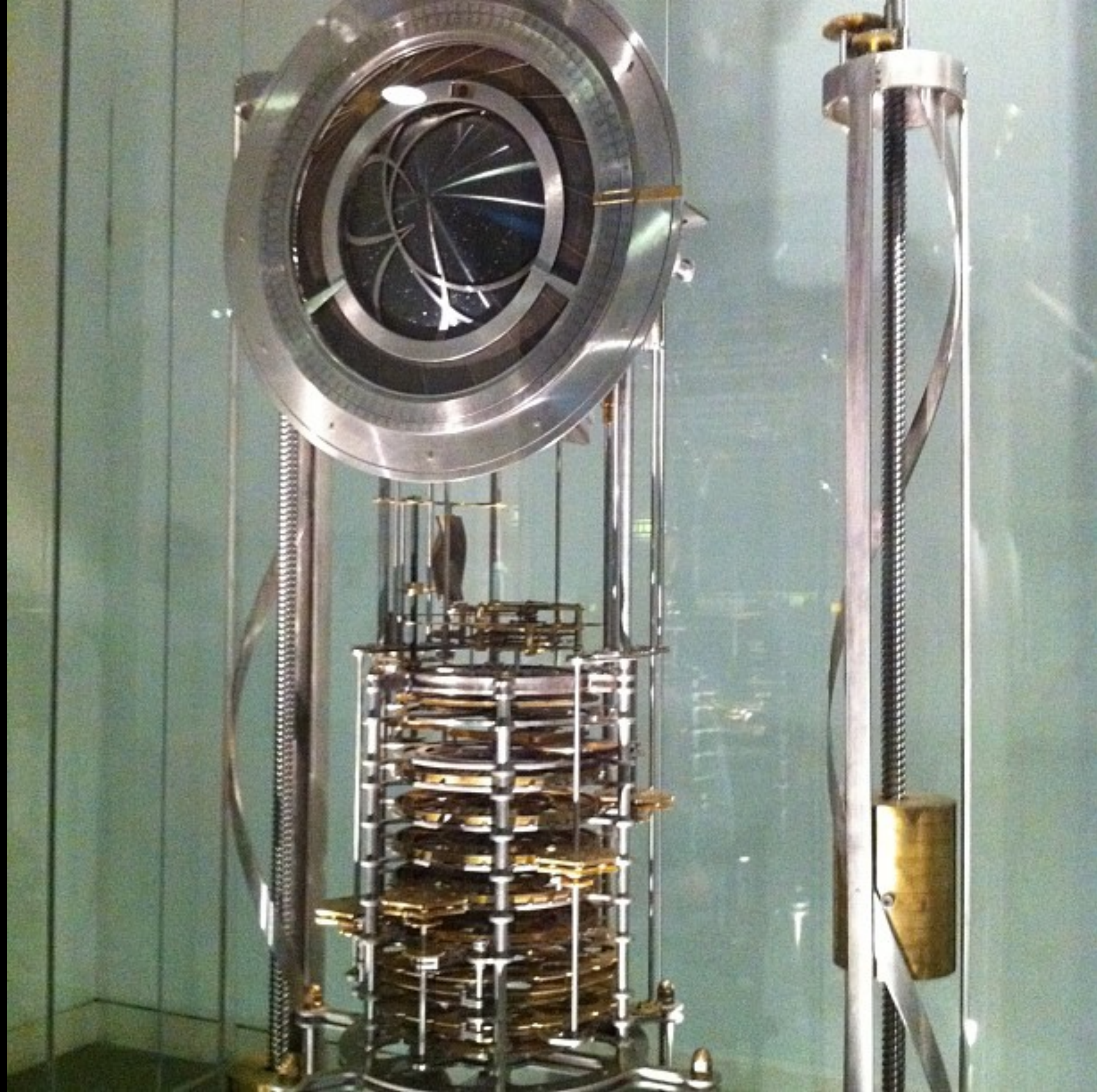
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LONG NOW

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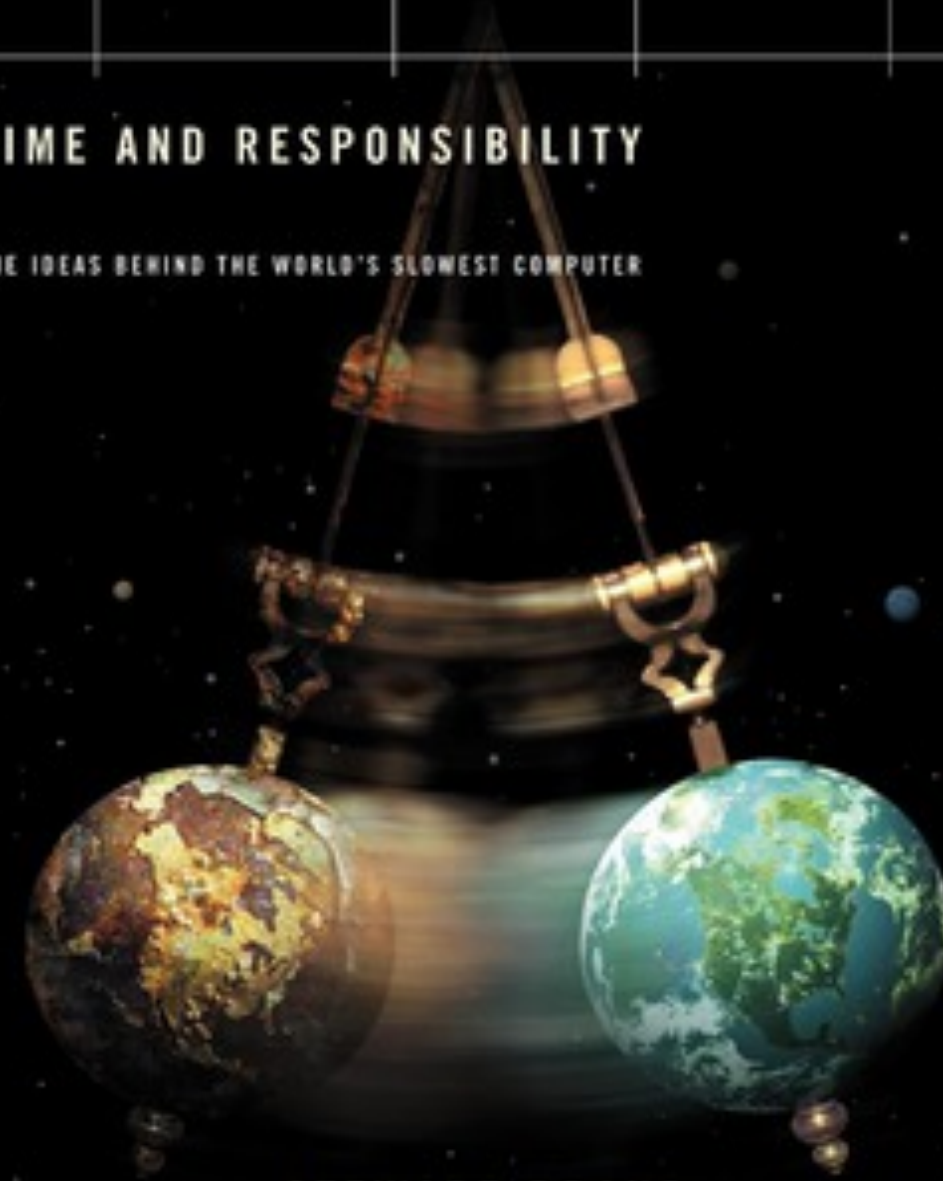




THE CLOCK OF THE LONG NOW

TIME AND RESPONSIBILITY

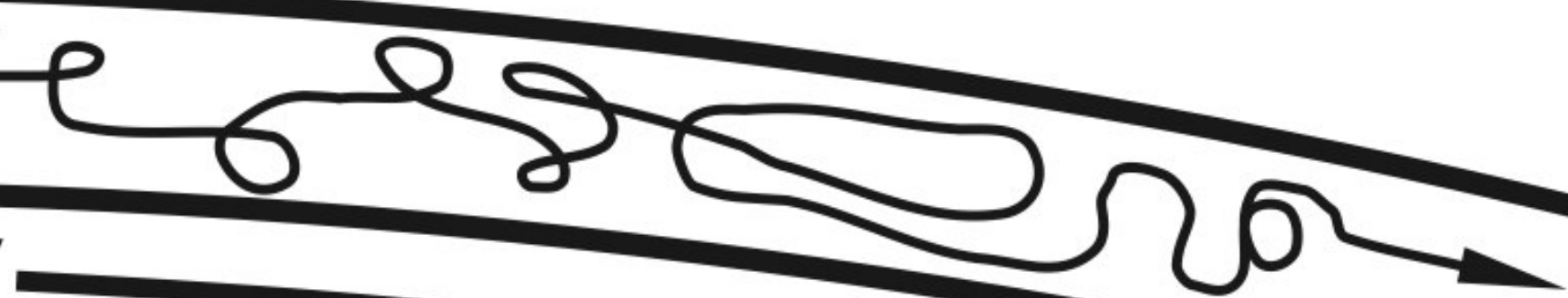
THE IDEAS BEHIND THE WORLD'S SLOWEST COMPUTER



STEWART BRAND
AUTHOR OF *THE MEDIA LAB*

THE IDEAS BEHIND THE WORLD'S SLOWEST COMPUTER
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pace layers

FASHION 

COMMERCE 

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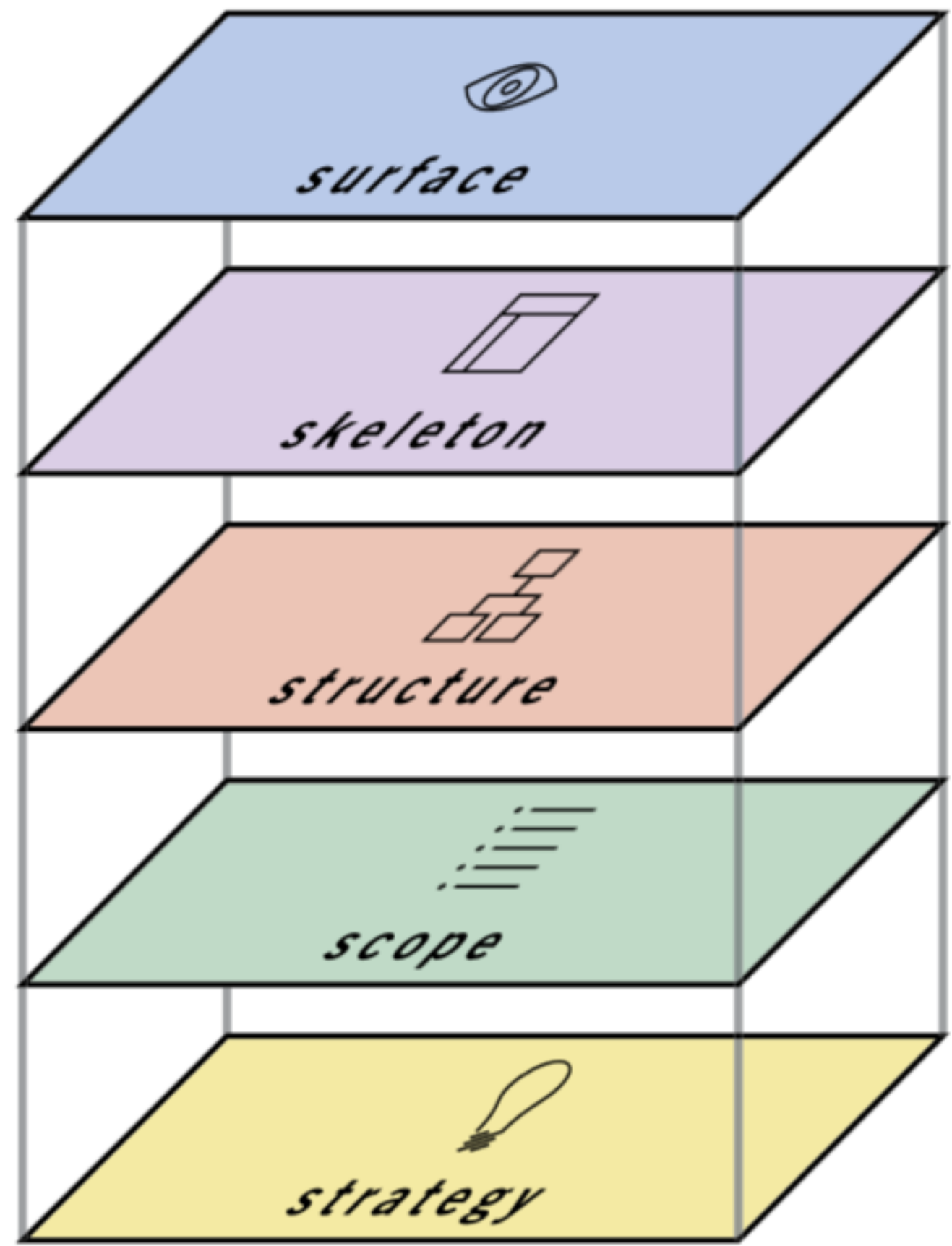
THE ELEMENTS OF USER EXPERIENCE



USER-CENTERED DESIGN FOR THE WEB

Jesse James Garrett





Concrete

↑

↓

Abstract

SURFACE

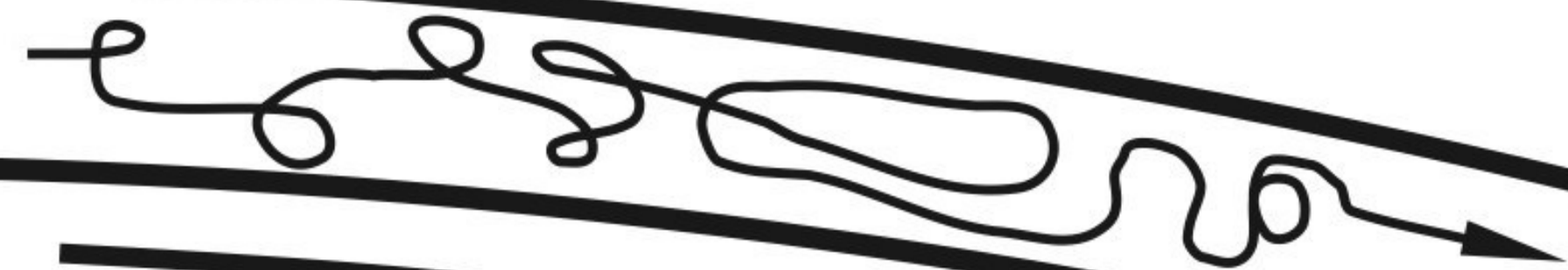
SKELETON

STRUCTURE

SCOPE

STRATEGY

JS+



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HTML



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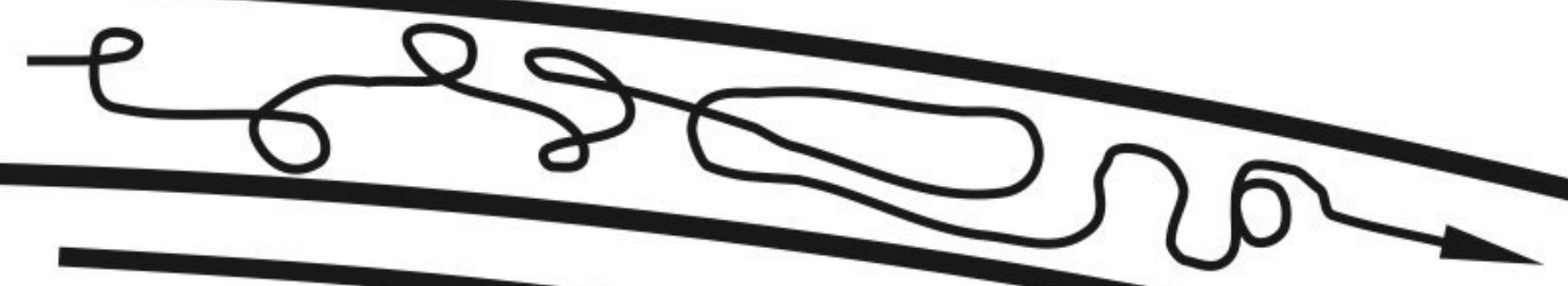


HTTP



TCP/IP ▶

JS+



HTTP →

TCP/IP ▶

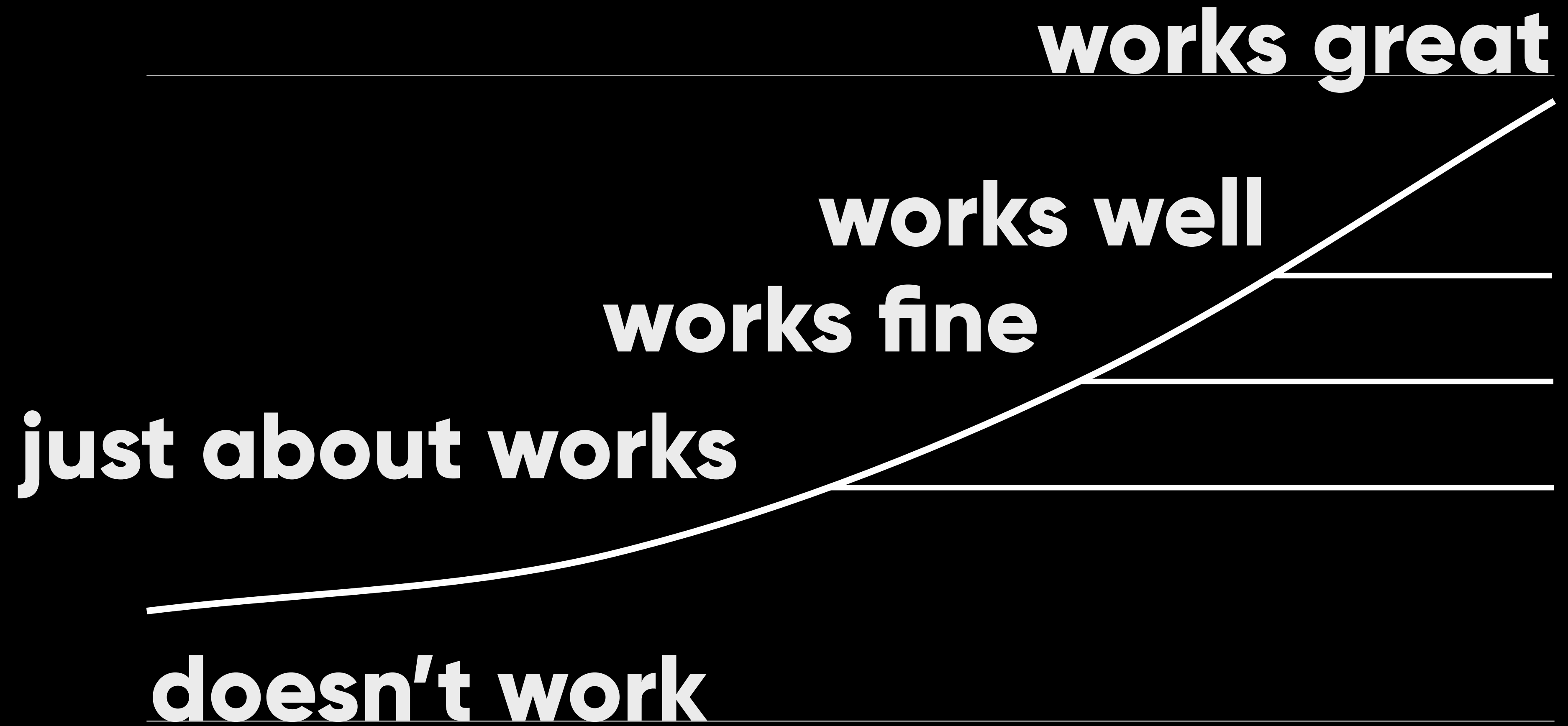
JavaScript

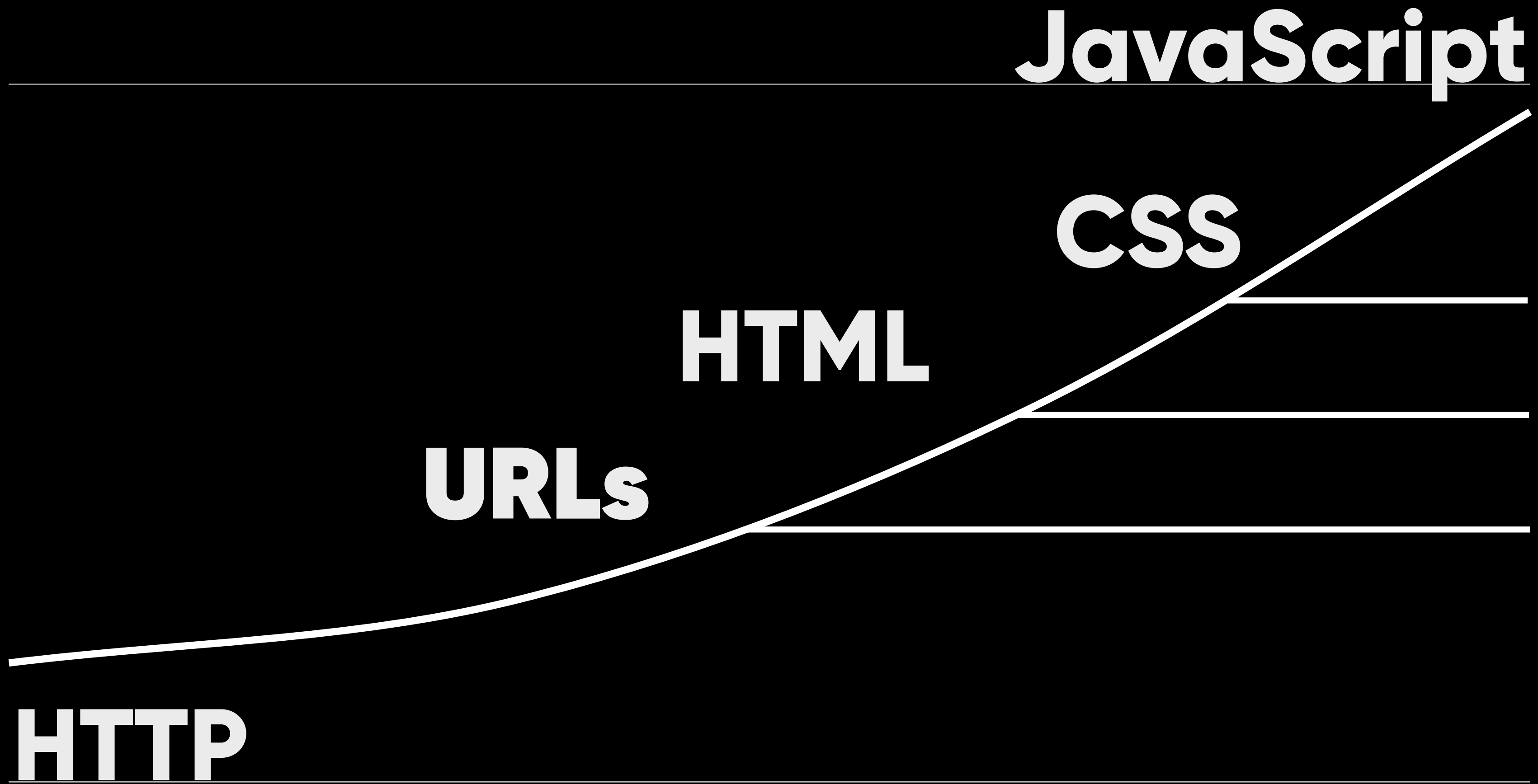


HTTP

works great

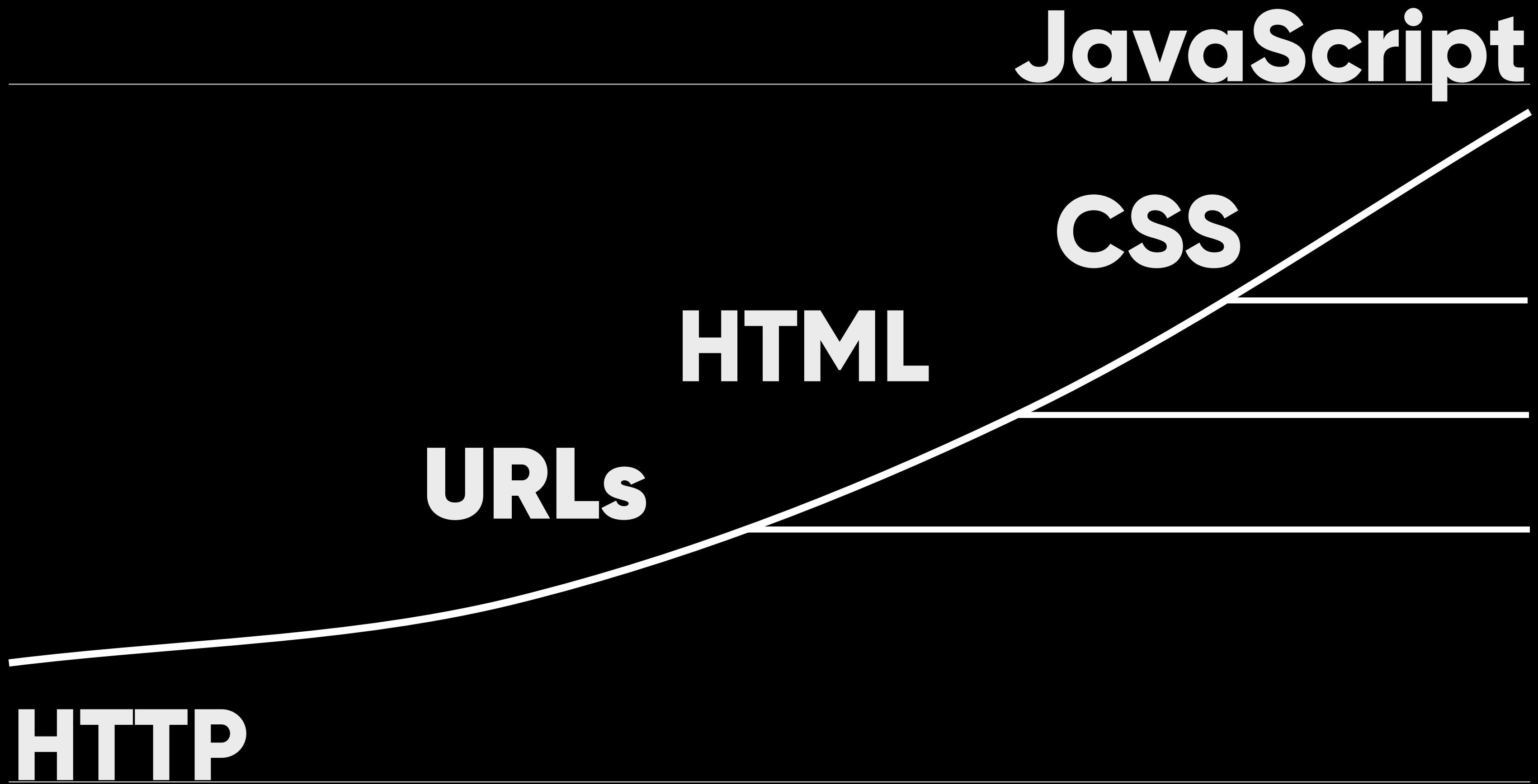
doesn't work





How well does it work?

How well does it fail?

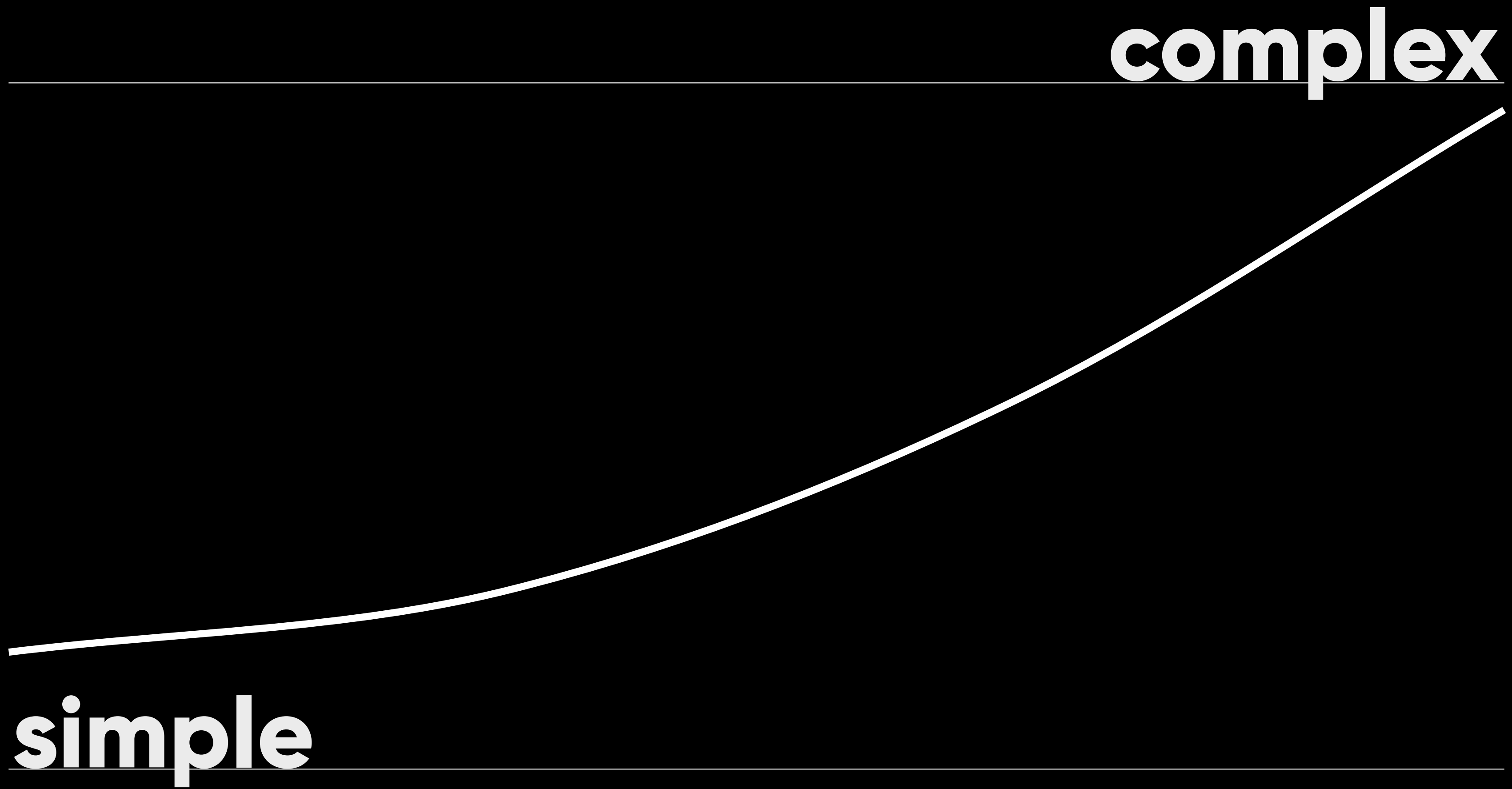


“Choose the least powerful language suitable for a given purpose.”

–Principle of Least Power

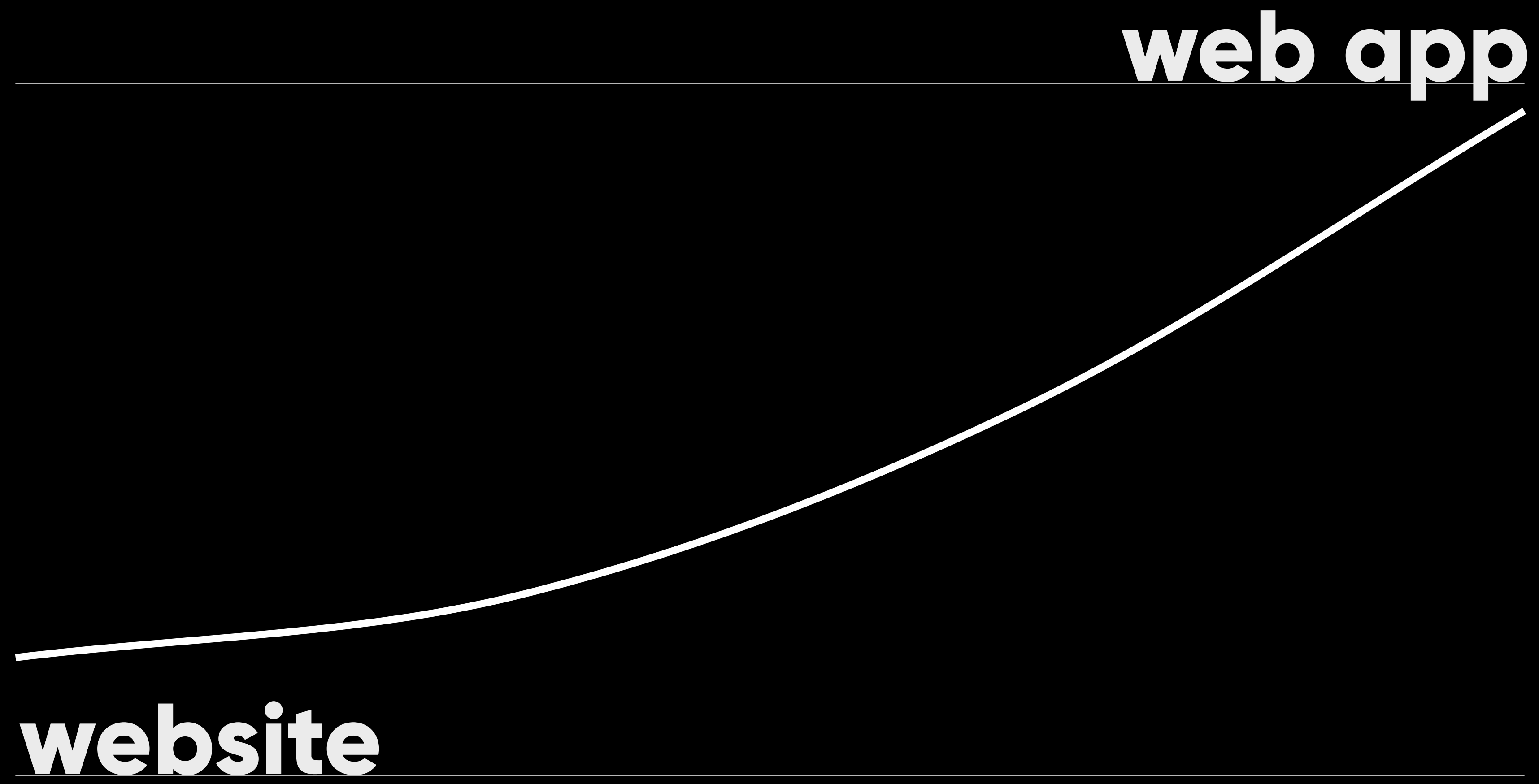
complex

simple



web app

website



progressive web app

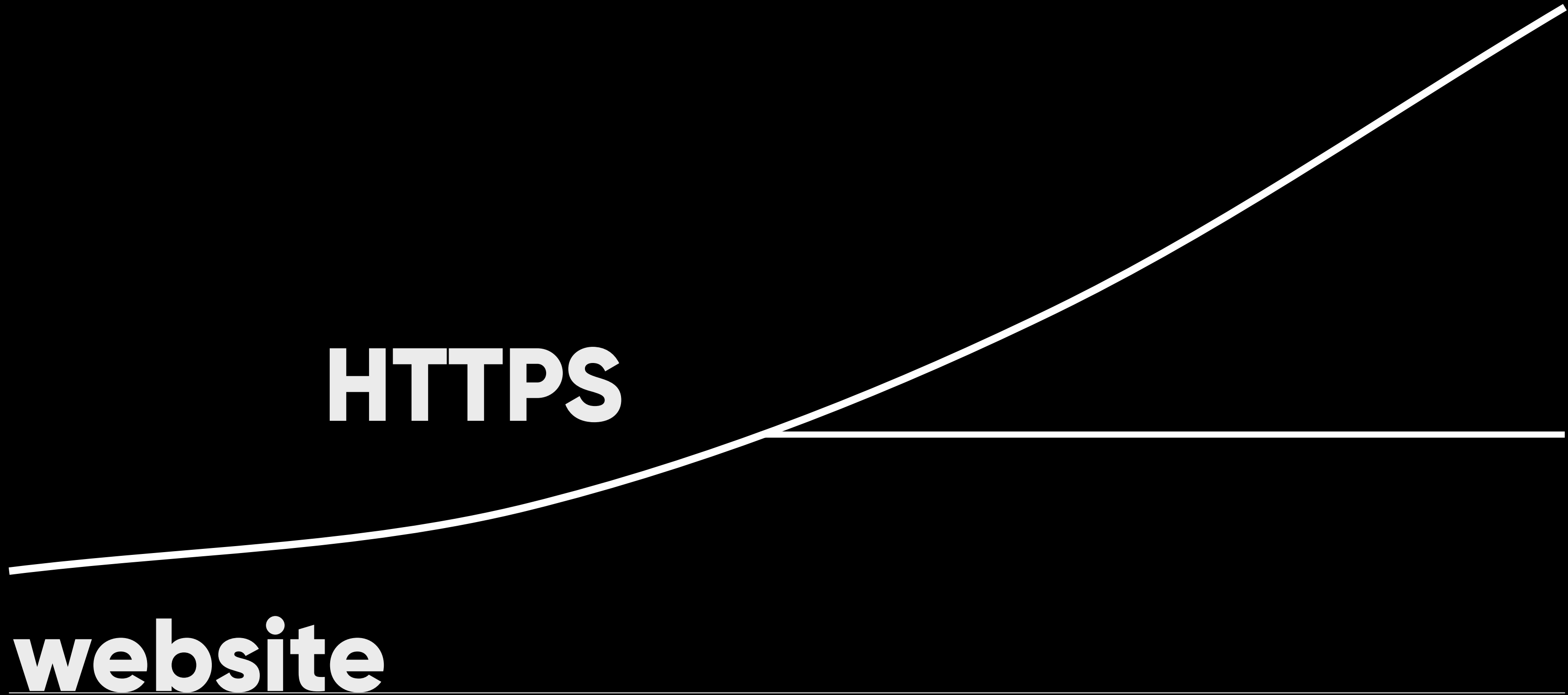
website



progressive web app

HTTPS

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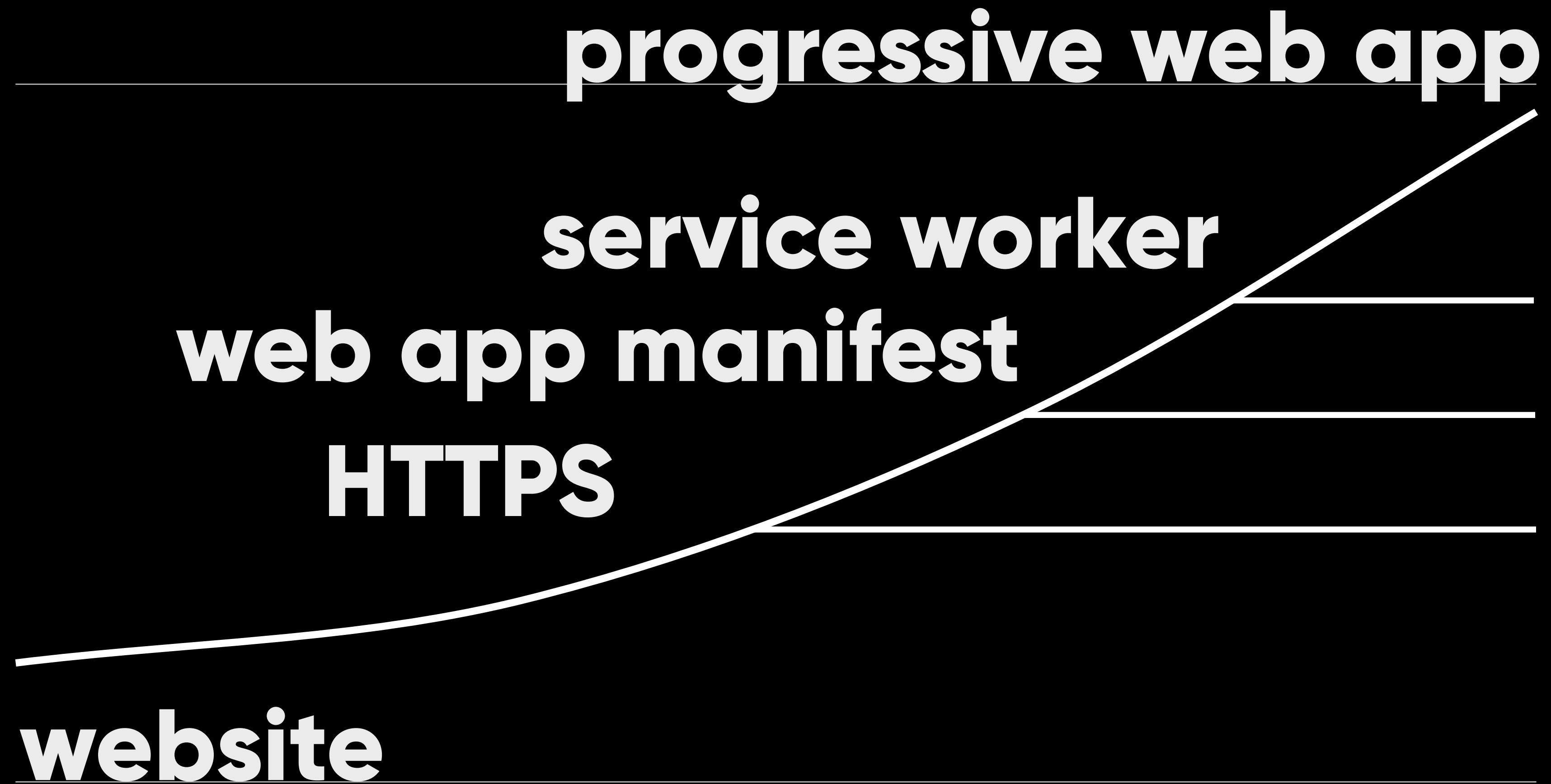
progressive web app



web app manifest

HTTPS

website



 A BOOK APART

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26

Jeremy Keith

GOING OFFLINE

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JS

CSS

HTML

URLs

HTTP

TCP/IP

JS

CSS

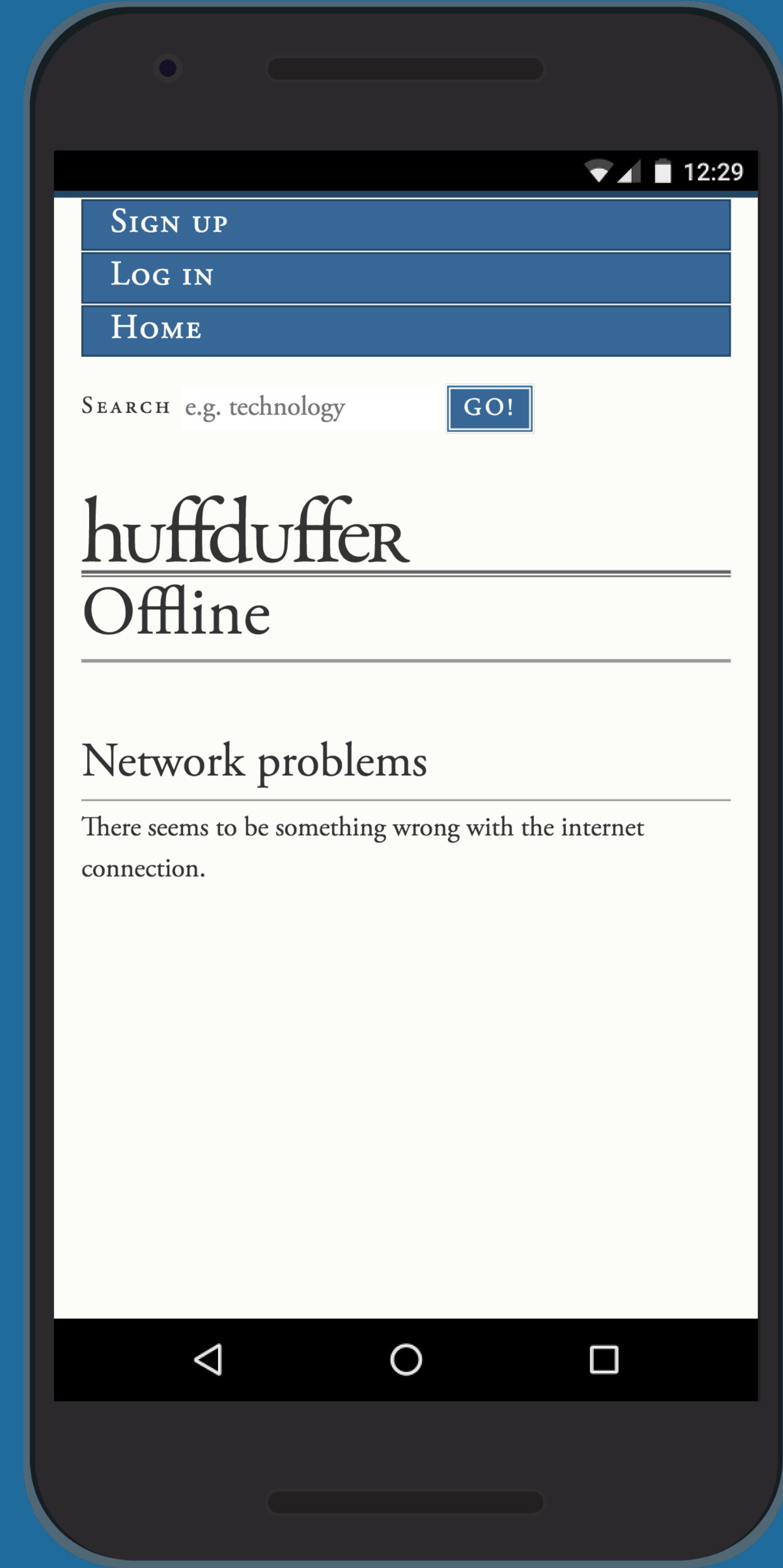
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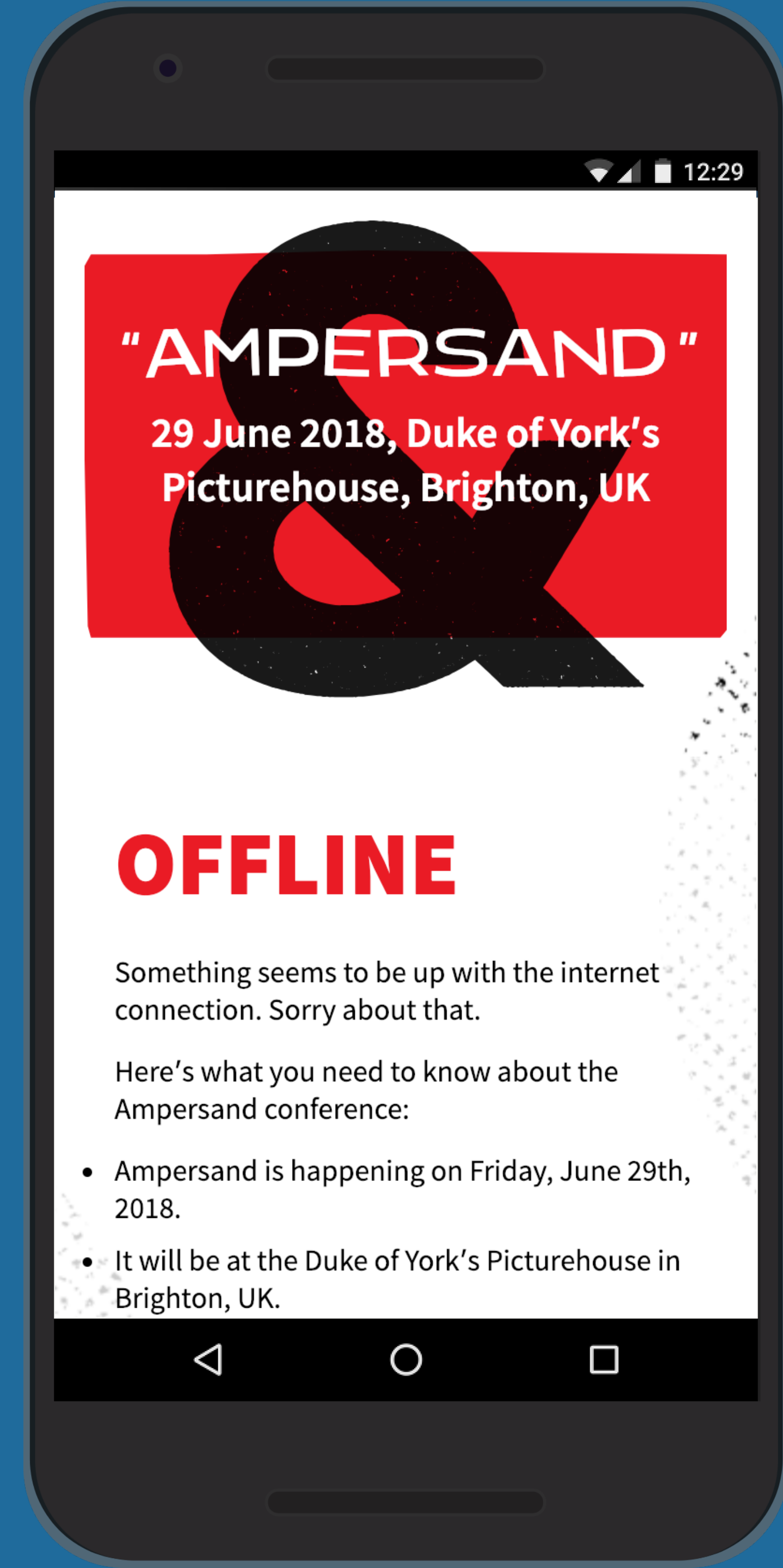
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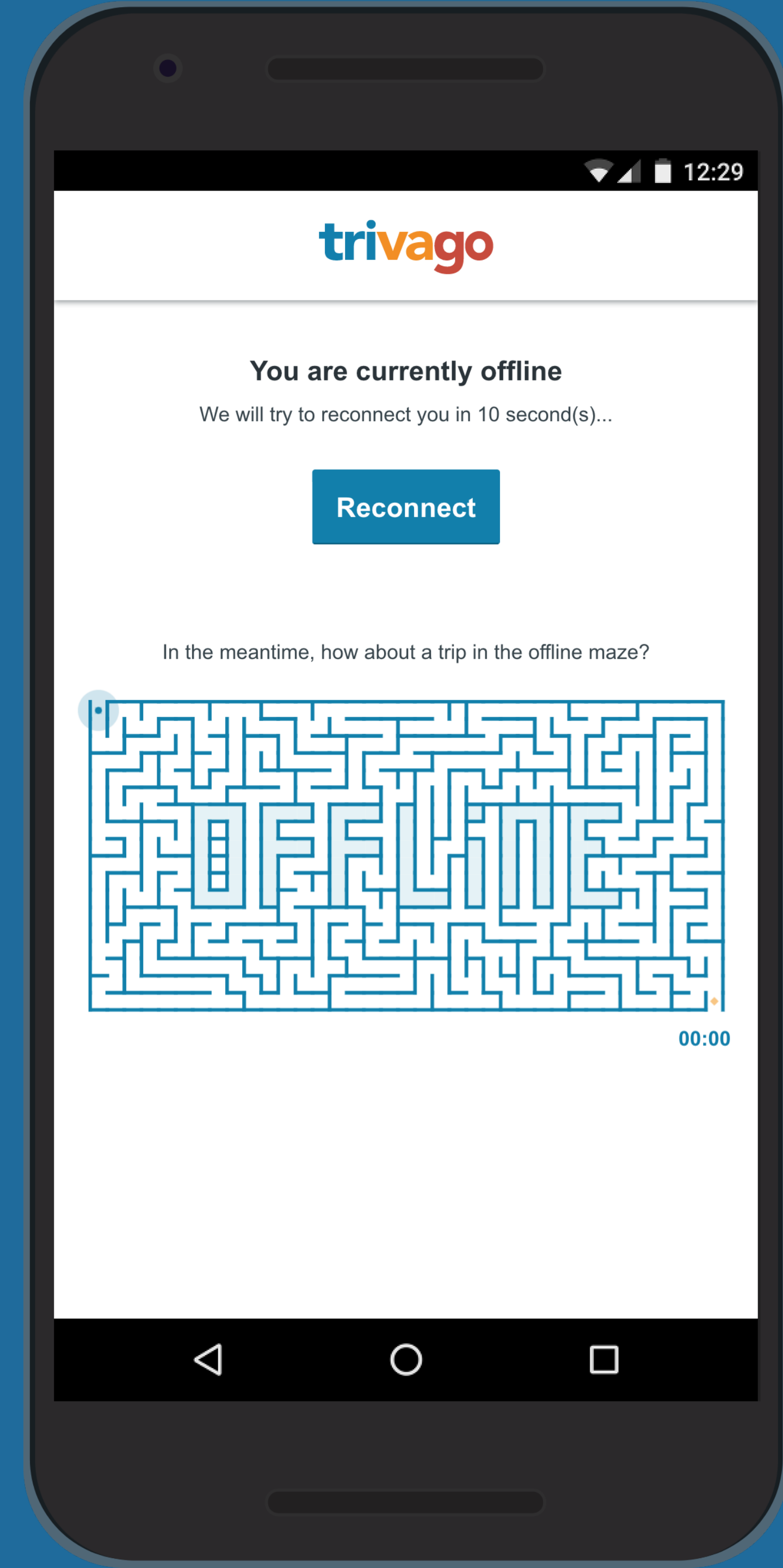
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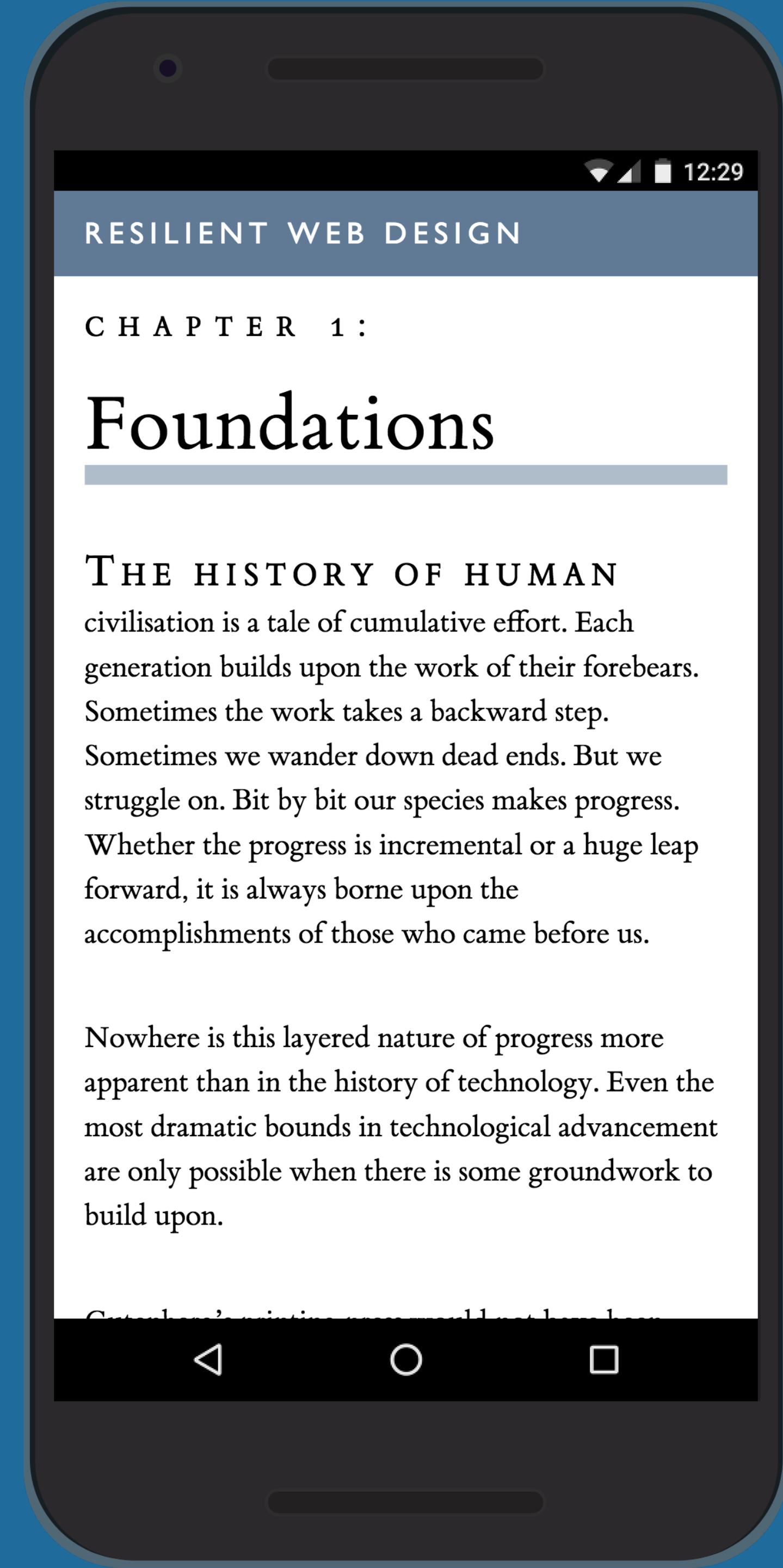
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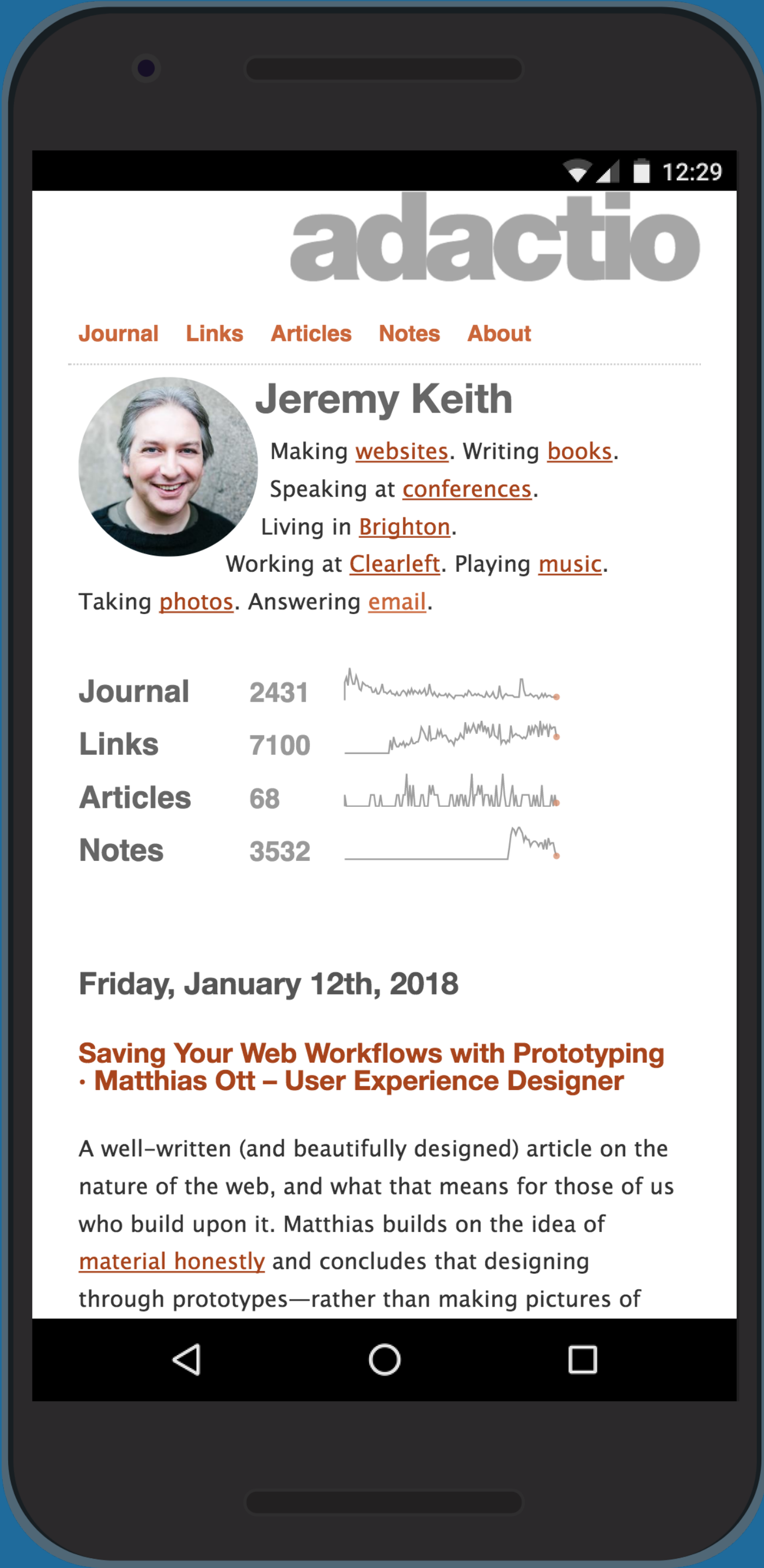
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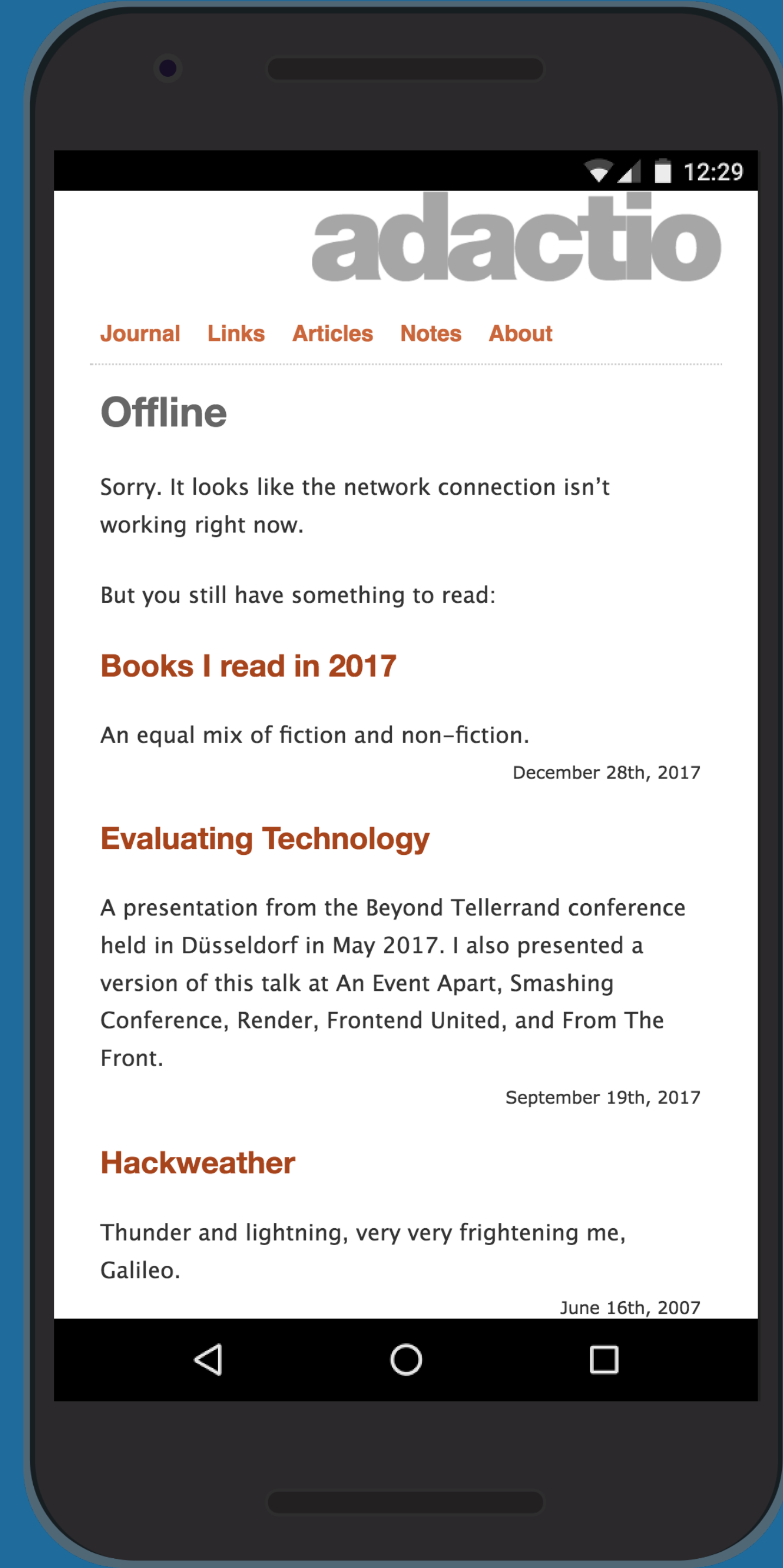
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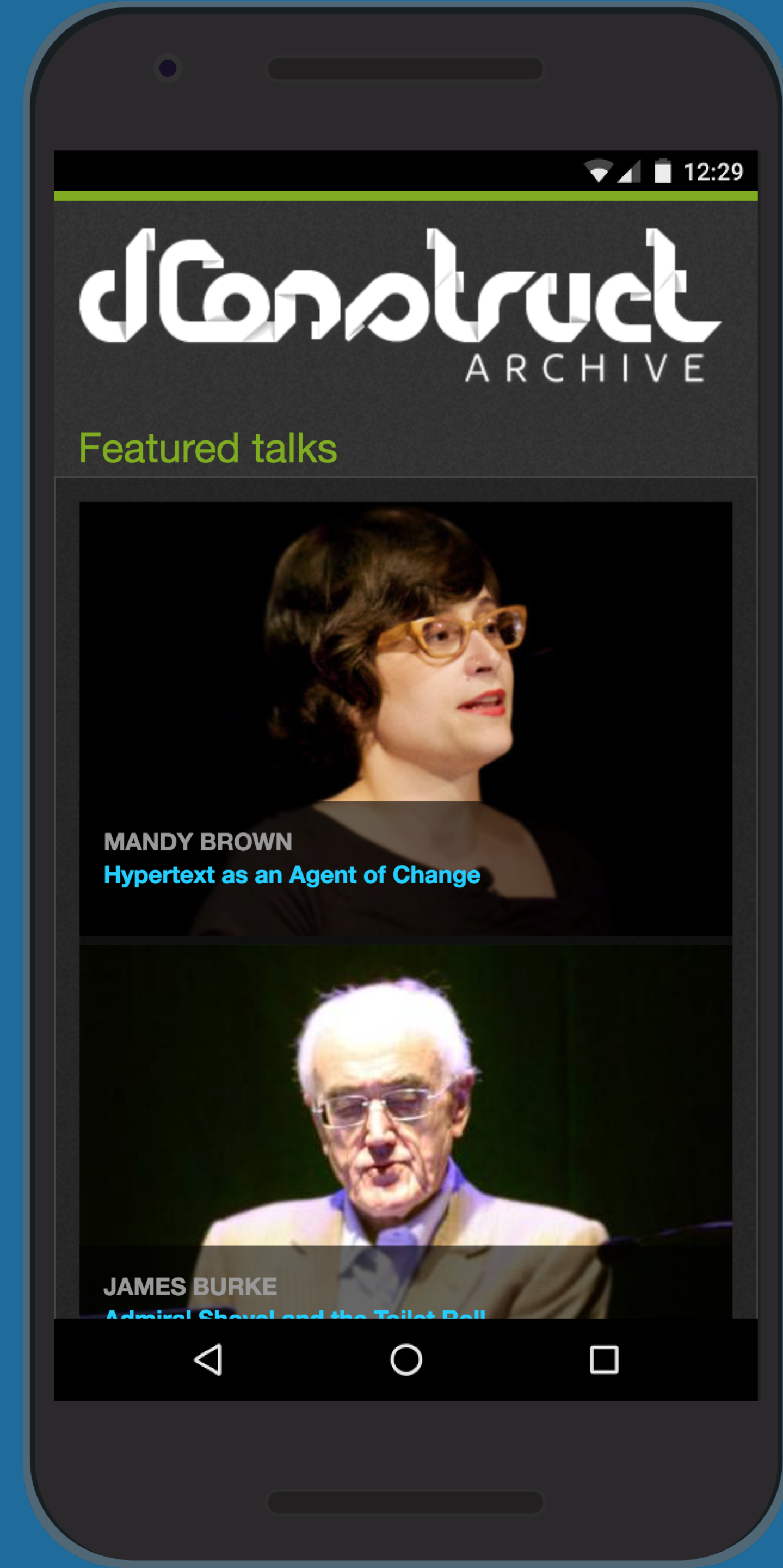
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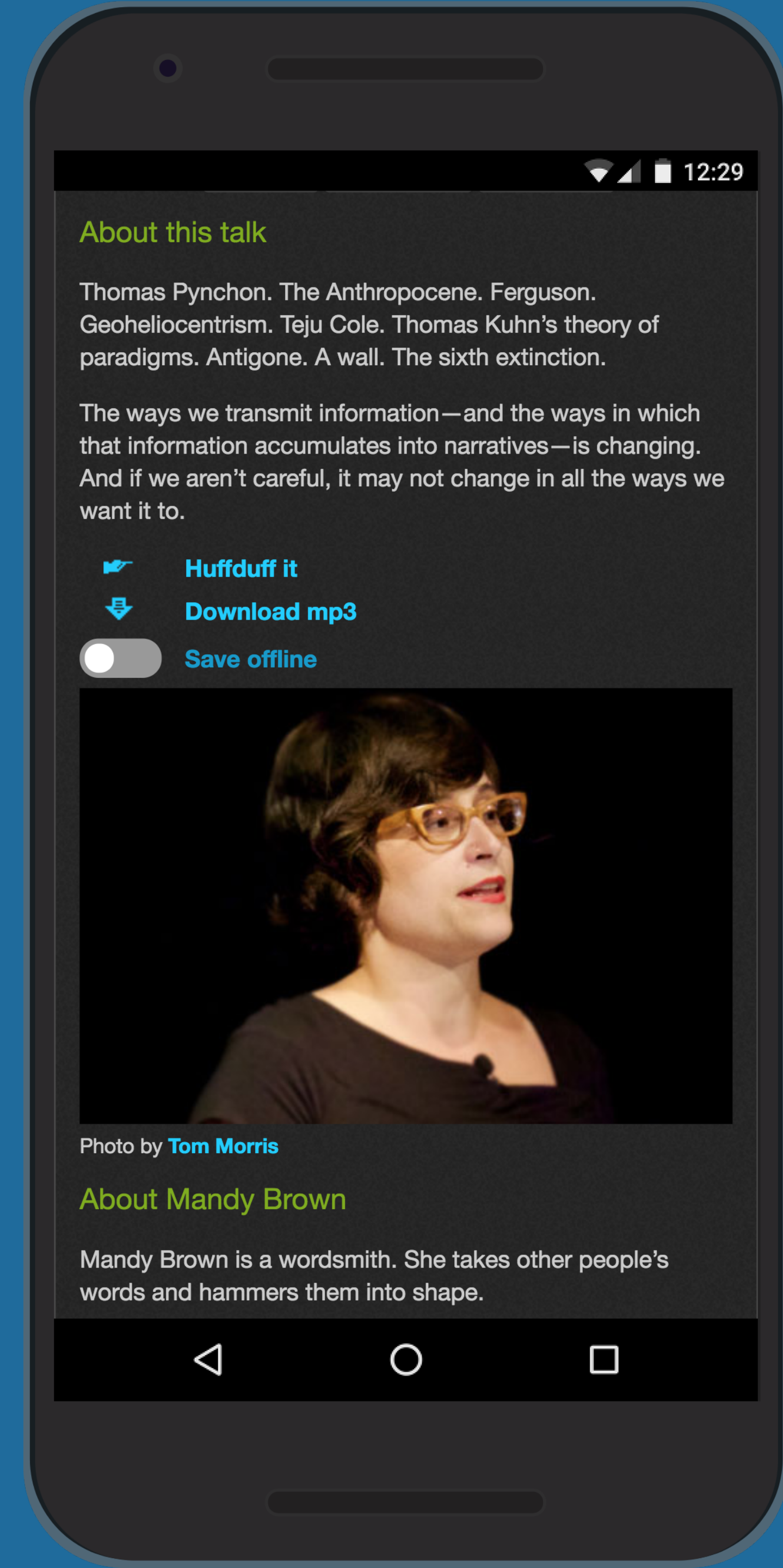
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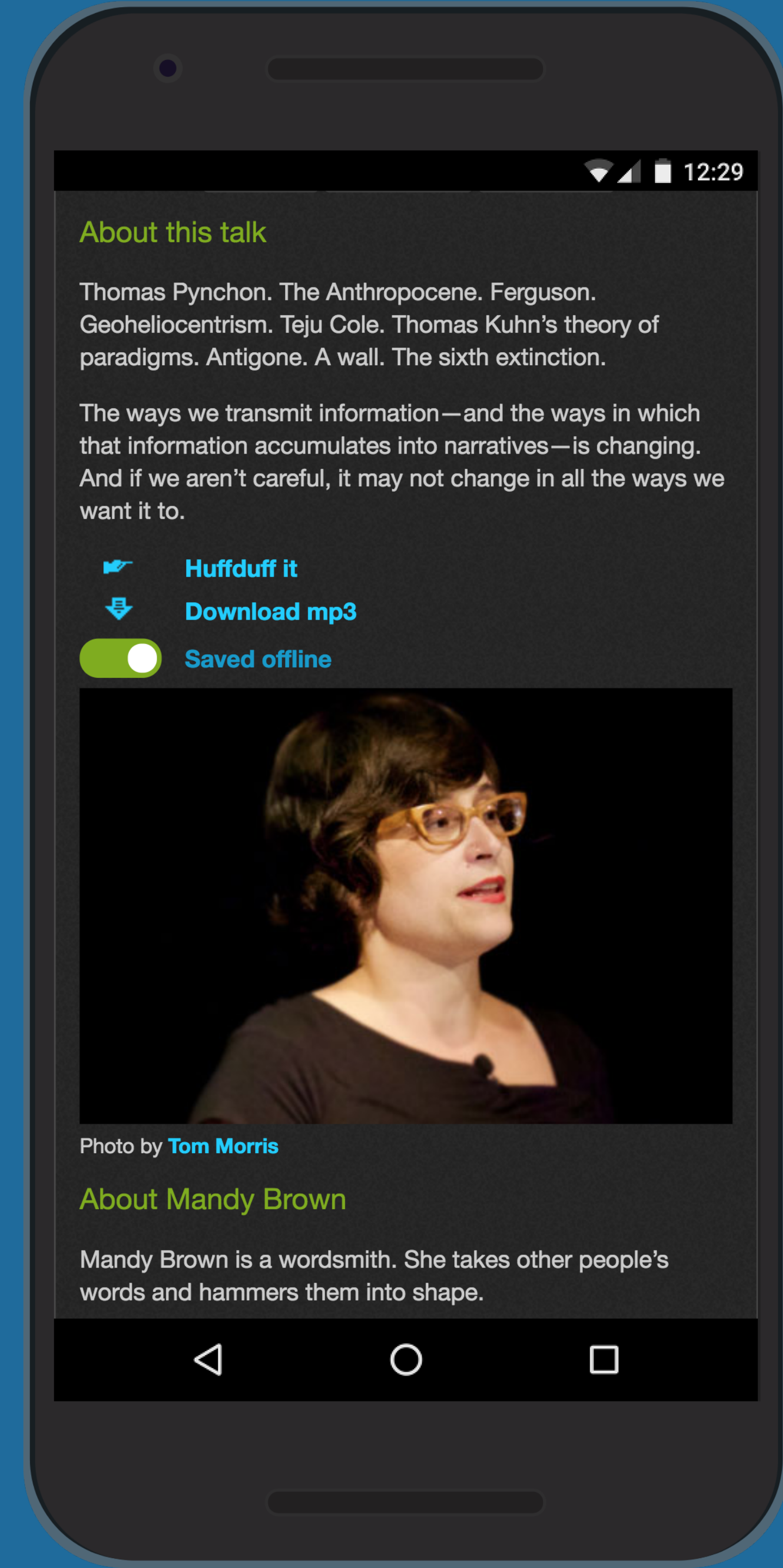
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dconstruct.org



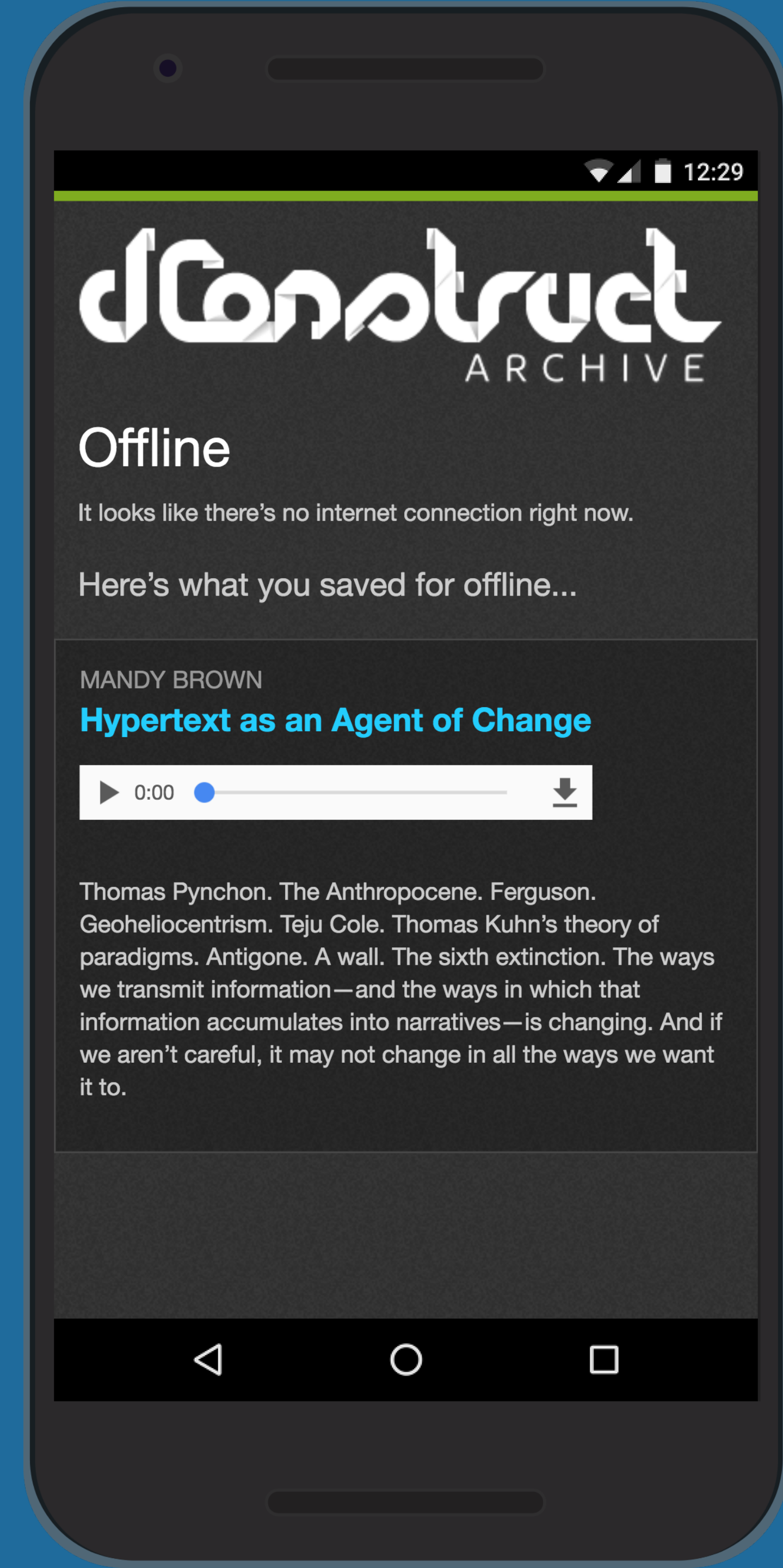
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background sync

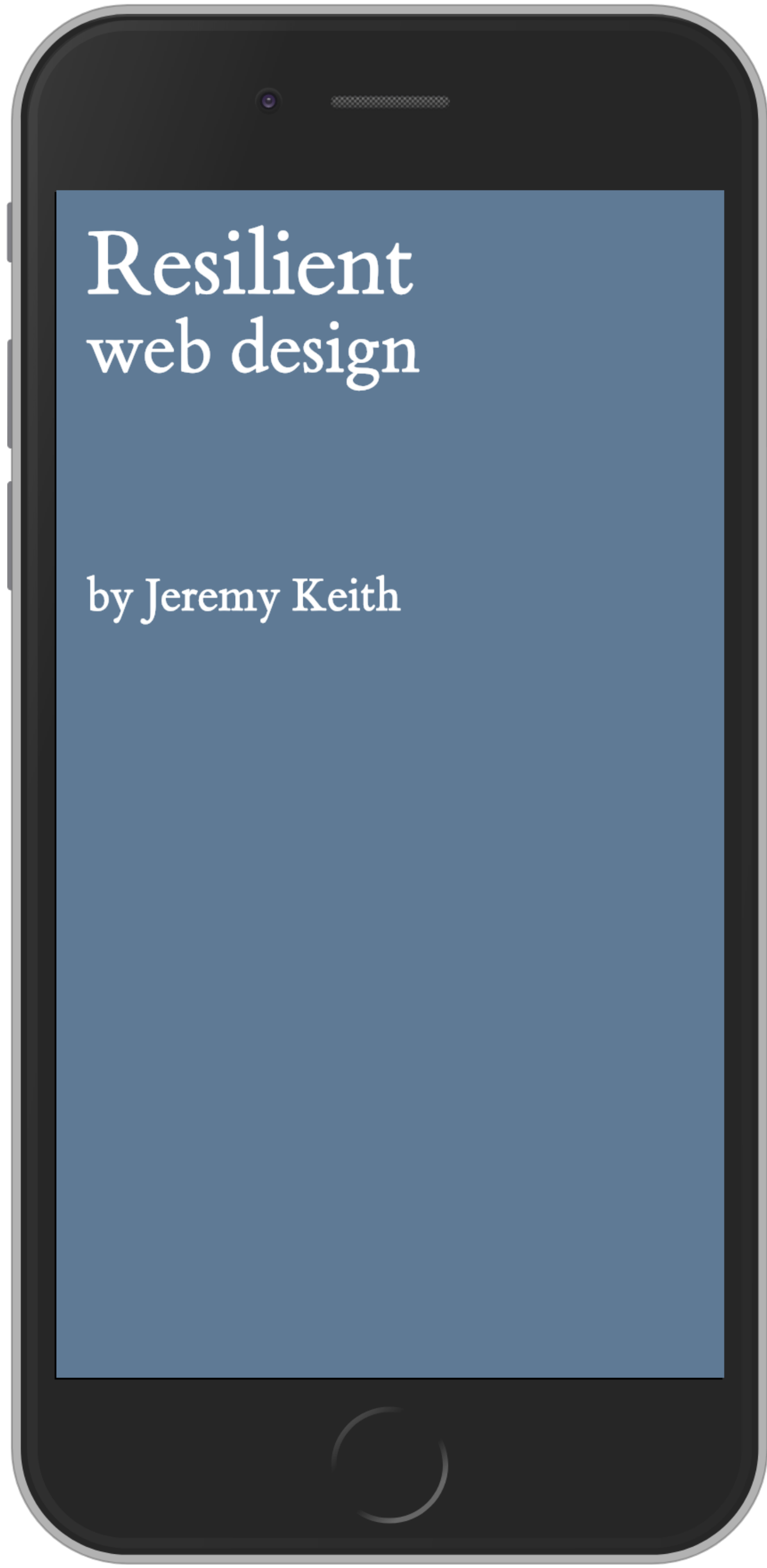
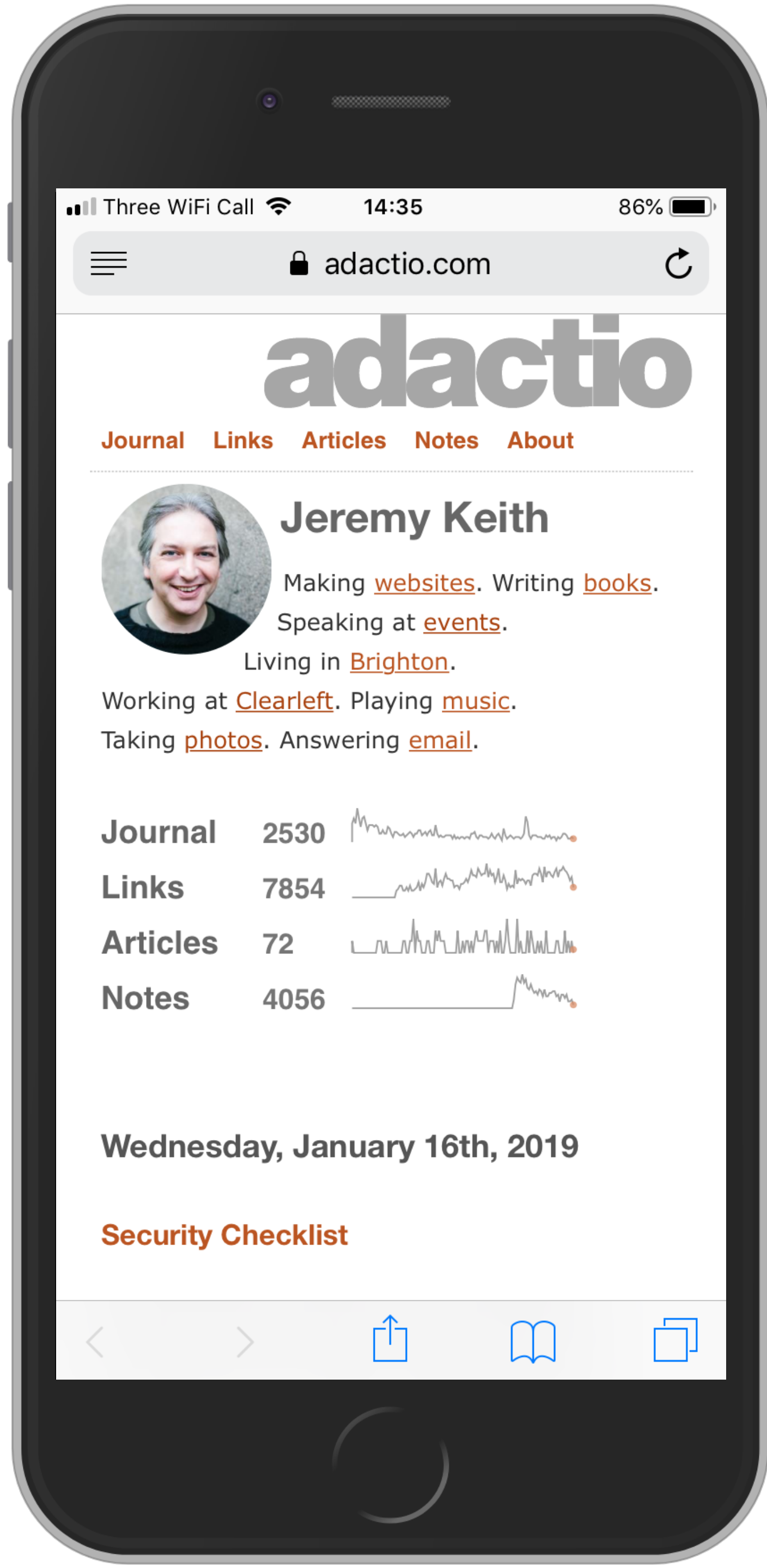
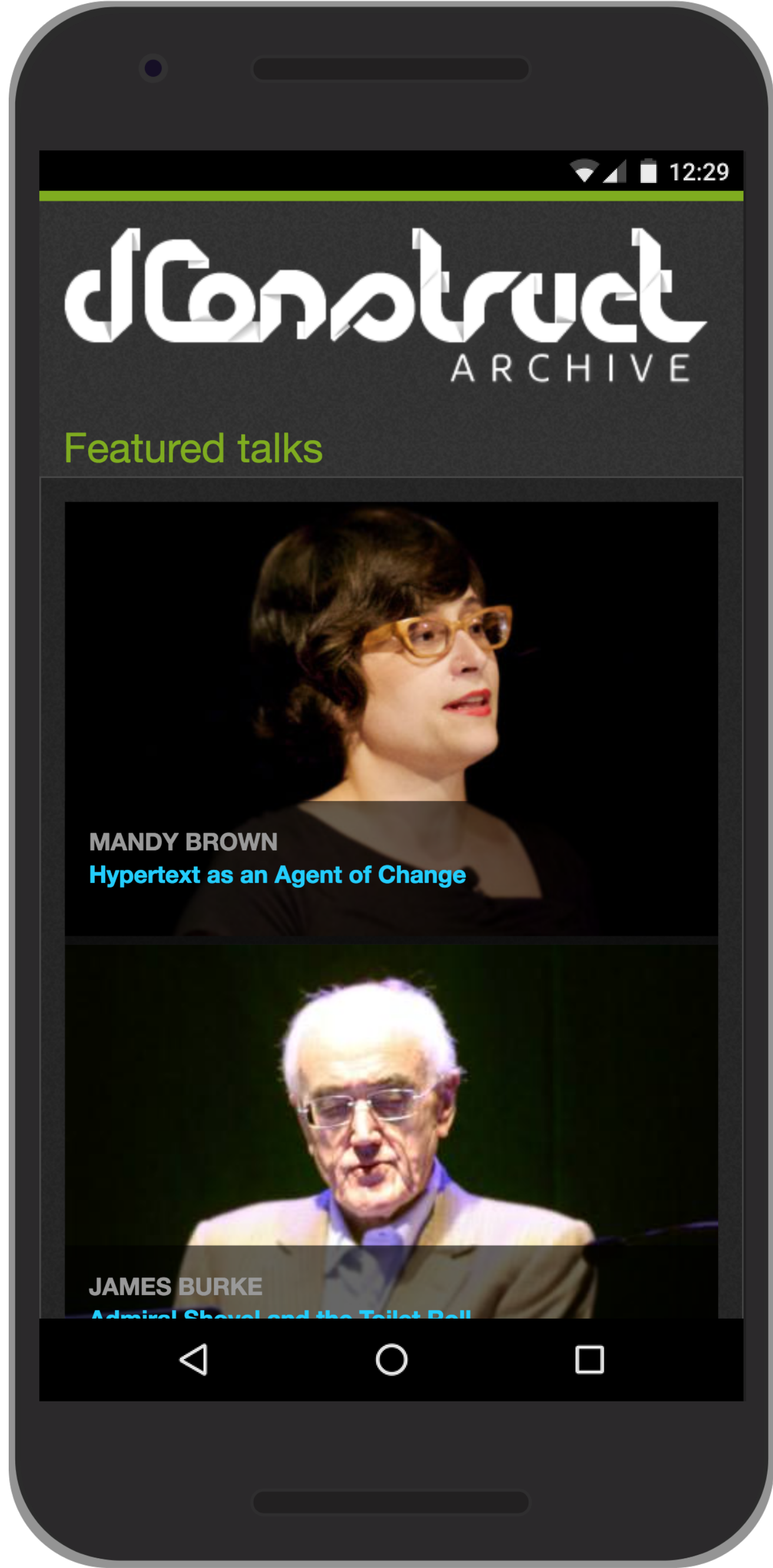
push notifications

add to home screen

offline

caching

service worker



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Wednesday, November 6th, 2019

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[9:13am](#)

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Resilient web design

by [Jeremy Keith](#)

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The World Wide Web project

World Wide Web

The WorldWideWeb (W3) is a wide-area hypermedia information retrieval initiative aiming to give universal access to a large universe of documents.

Everything there is online about W3 is linked directly or indirectly to this document, including an executive summary of the project, Mailing lists , Policy , November's W3 news , Frequently Asked Questions .

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<u>Technical</u>	Details of protocols, formats, program internals etc
<u>Bibliography</u>	Paper documentation on W3 and references.
<u>People</u>	A list of some people involved in the project.
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Thank you