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SERIES FOREWORD

The MIT Press Essential Knowledge series presents short, accessible books on need-to-know subjects in a variety of fields. Written by leading thinkers, Essential Knowledge volumes deliver concise, expert overviews of topics ranging from the cultural and historical to the scientific and technical. In our information age, opinion, rationalization, and superficial descriptions are readily available. Much harder to come by are the principled understanding and foundational knowledge needed to inform our opinions and decisions. This series of beautifully produced, pocket-sized, soft-cover books provides in-depth, authoritative material on topics of current interest in a form accessible to non-experts. Instead of condensed versions of specialist texts, these books synthesize anew important subjects for a knowledgeable audience. For those who seek to enter a subject via its fundamentals, Essential Knowledge volumes deliver the understanding and insight needed to navigate a complex world.

Bruce Tidor
Professor of Biological Engineering and Computer Science
Massachusetts Institute of Technology

I have worked full-time for a decade to foster open access (OA) to science and scholarship. During that time I have often boiled down the big message into short talks and written long articles exploring small subtopics in detail. This book is an attempt at something in between: a succinct introduction to the basics, long enough to cover the major topics in reasonable detail and short enough for busy people to read.

I want busy people to read this book. OA benefits literally everyone, for the same reasons that research itself benefits literally everyone. OA performs this service by facilitating research and making the results more widely available and useful. It benefits researchers as readers by helping them find and retrieve the information they need, and it benefits researchers as authors by helping them reach readers who can apply, cite, and build on their work. OA benefits nonresearchers by accelerating research and all the goods that depend on research, such as new medicines, useful technologies, solved problems, informed decisions, improved policies, and beautiful understanding.

But OA only does this good work insofar as we actually implement it, and the people in a position to implement it tend to be busy. I'm thinking about researchers

themselves and policymakers at stakeholder institutions such as universities, libraries, publishers, scholarly societies, funding agencies, and governments.

My honest belief from experience in the trenches is that the largest obstacle to OA is misunderstanding. The largest cause of misunderstanding is lack of familiarity, and the largest cause of unfamiliarity is preoccupation. Everyone is busy. There has been organized opposition from some publishers, but that has been a minor impediment by comparison.

The best remedy to misunderstanding is a clear statement of the basics for busy people. Only some fellow specialists will wonder, with me, whether I've been too brief with some essential subtopics. But I knew that a larger book would miss the audience of busy people. Elaboration, documentation, research findings, case studies, and finer-grained recommendations are available in the voluminous literature online (most of it OA), including my own articles (all of them OA).[1]

This book will itself be OA twelve months after it appears in print. (I'm glad you asked.) If you can't wait, everything I've said here I've said in some form or another in an OA article.

I have freely incorporated some relevant earlier writings into this book, improving on them when I could. Notes at the end of the book indicate which pieces I adapted or

incorporated into which sections. I chose this method as a solution to a pair of dilemmas. I did not want to hide the fact that I was making use of my previous work, but neither did I want to make any section into a stream of self-quotation and self-citation. I did not want to fail to benefit from my own previous work, but neither did I want to miss opportunities to clarify, update, or improve it.

This little book doesn't say much about kindred topics such as open data, open educational resources, open government, free and open-source software, or open science (combining OA texts, open data, and open-source software, and providing these sorts of openness at every stage of a research project, not just at the end in reporting results). Some of the kindred forms of scholarly openness might soon be covered by other volumes in this series.

Douglas Bennett, Len Clark, Darius Cuplinskas, Robert Darnton, Urs Gasser, Melissa Hagemann, Rick Johnson, Heather Joseph, Robert Kiley, Sue Kriegsman, Harlan Onsrud, John Palfrey, Lisbet Rausing, Stuart Shieber, David Skurnik, and Gigi Sohn.

I dedicate this book to the thousands of people in every field and country who have dedicated themselves to the realization of OA. The ones I know personally are already too numerous to thank by name in the preface to a short book, and the fact that there are more than I could thank by name—even if I tried—fills me with admiration, gratitude, and optimism.

WHAT IS OPEN ACCESS?

Shifting from ink on paper to digital text suddenly allows us to make perfect copies of our work. Shifting from isolated computers to a globe-spanning network of connected computers suddenly allows us to share perfect copies of our work with a worldwide audience at essentially no cost. About thirty years ago this kind of free global sharing became something new under the sun. Before that, it would have sounded like a quixotic dream.

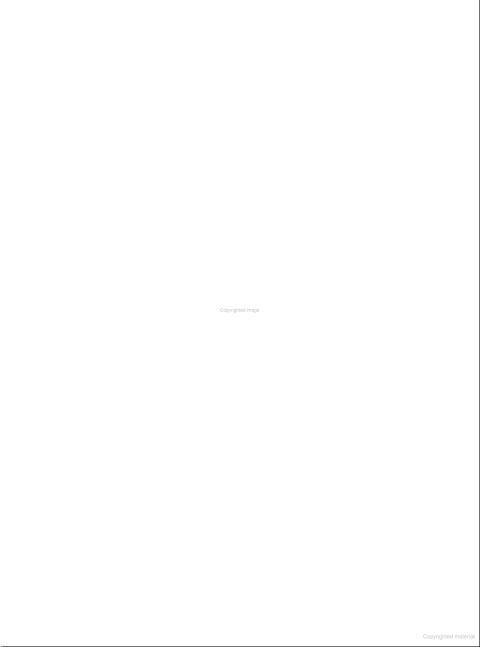Digital technologies have created more than one revolution. Let's call this one the access revolution.

Why don't more authors take advantage of the access revolution to reach more readers? The answer is pretty clear. Authors who share their works in this way aren't selling them, and even authors with purposes higher than money depend on sales to make a living. Or at least they appreciate sales.

Let's sharpen the question, then, by putting to one side authors who want to sell their work. We can even acknowledge that we're putting aside the vast majority of authors.

Imagine a tribe of authors who write serious and useful work, and who follow a centuries-old custom of giving it away without charge. I don't mean a group of rich authors who don't need money. I mean a group of authors defined by their topics, genres, purposes, incentives, and institutional circumstances, not by their wealth. In fact, very few are wealthy. For now, it doesn't matter who these authors are, how rare they are, what they write, or why they follow this peculiar custom. It's enough to know that their employers pay them salaries, freeing them to give away their work, that they write for impact rather than money, and that they score career points when they make the kind of impact they hoped to make. Suppose that selling their work would actually harm their interests by shrinking their audience, reducing their impact, and distorting their professional goals by steering them toward popular topics and away from the specialized questions on which they are experts.

If authors like that exist, at least they should take advantage of the access revolution. The dream of global free access can be a reality for them, even if most other authors hope to earn royalties and feel obliged to sit out this particular revolution.

These lucky authors are scholars, and the works they customarily write and publish without payment are peer-reviewed articles in scholarly journals. *Open access* is the name of the revolutionary kind of access these authors, unencumbered by a motive of financial gain, are free to provide to their readers.

> Open access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions.

We could call it "barrier-free" access, but that would emphasize the negative rather than the positive. In any case, we can be more specific about which access barriers OA removes.

A price tag is a significant access barrier. Most works with price tags are individually affordable. But when a scholar needs to read or consult hundreds of works for one research project, or when a library must provide access for thousands of faculty and students working on tens of thousands of topics, and when the volume of new work grows explosively every year, price barriers become insurmountable. The resulting access gaps harm authors by limiting their audience and impact, harm readers by limiting what they can retrieve and read, and thereby harm research from both directions. OA removes price barriers.

Copyright can also be a significant access barrier. If you have access to a work for reading but want to translate it into another language, distribute copies to colleagues, copy the text for mining with sophisticated software, or reformat it for reading with new technology, then you generally need the permission of the copyright holder. That makes sense when the author wants to sell the work and when the use you have in mind could undermine sales. But for research articles we're generally talking about authors from the special tribe who want to share their work as widely as possible. Even these authors, however, tend to transfer their copyrights to intermediaries—publishers—who want to sell their work. As a result, users may be hampered in their research by barriers erected to serve intermediaries rather than authors. In addition, replacing user freedom with permission-seeking harms research authors by limiting the usefulness of their work, harms research readers by limiting the uses they may make of works even when they have access, and thereby harms research from both directions. OA removes these permission barriers.

Removing price barriers means that readers are not limited by their own ability to pay, or by the budgets of the institutions where they may have library privileges. Removing permission barriers means that scholars are free to use or reuse literature for scholarly purposes. These purposes include reading and searching, but also redistributing, translating, text mining, migrating to new media,

Terminology

When we need to, we can be more specific about access vehicles and access barriers. In the jargon, OA delivered by journals is called *gold OA*, and OA delivered by repositories is called *green OA*. Work that is not open access, or that is available only for a price, is called *toll access* (TA). Over the years I've asked publishers for a neutral, nonpejorative and nonhonorific term for toll-access publishers, and *conventional publishers* is the suggestion I hear most often. While every kind of OA removes price barriers, there are many different permission barriers we could remove if we wanted to. If we remove price barriers alone, we provide *gratis OA*, and if we remove at least some permission barriers as well, we provide *libre OA*. (Also see section 3.1 on green/gold and section 3.3 on gratis/libre.)

long-term archiving, and innumerable new forms of research, analysis, and processing we haven't yet imagined. OA makes work more useful in both ways, by making it available to more people who can put it to use, and by freeing those people to use and reuse it.

OA was defined in three influential public statements: the Budapest Open Access Initiative (February 2002), the Bethesda Statement on Open Access Publishing (June 2003), and the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (October 2003).[1] I sometimes refer to their overlap or common ground as the BBB definition of OA. My definition here is the BBB definition reduced to its essential elements and refined with some post-BBB terminology (green, gold, gratis, libre) for speaking precisely about subspecies of OA. Here's how the Budapest statement defined OA:

> There are many degrees and kinds of wider and easier access to [research] literature. By "open access" to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.

Here's how the Bethesda and Berlin statements put it: For a work to be OA, the copyright holder must consent in advance to let users "copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship."

Note that all three legs of the BBB definition go beyond removing price barriers to removing permission barriers, or beyond gratis OA to libre OA. But at the same time, all three allow at least one limit on user freedom: an obligation to attribute the work to the author. The purpose of OA is to remove barriers to all legitimate scholarly uses for scholarly literature, but there's no legitimate scholarly purpose in suppressing attribution to the texts we use. (That's why my shorthand definition says that OA literature is free of "most" rather than "all" copyright and licensing restrictions.)

The basic idea of OA is simple: Make research literature available online without price barriers and without most permission barriers. Even the implementation is simple enough that the volume of peer-reviewed OA literature and the number of institutions providing it have grown at an increasing rate for more than a decade. If there are complexities, they lie in the transition from where we are now to a world in which OA is the default for new research. This is complicated because the major obstacles

are not technical, legal, or economic, but cultural. (More in chapter 9 on the future.)[2]

In principle, any kind of digital content can be OA, since any digital content can be put online without price or permission barriers. Moreover, any kind of content can be digital: texts, data, images, audio, video, multimedia, and executable code. We can have OA music and movies, news and novels, sitcoms and software—and to different degrees we already do. But the term "open access" was coined by researchers trying to remove access barriers to research. The next section explains why.

1.1   What Makes OA Possible?[3]

OA is made possible by the internet and copyright-holder consent. But why would a copyright holder consent to OA?

Two background facts suggest the answer. First, authors are the copyright holders for their work until or unless they transfer rights to someone else, such as a publisher.

Second, scholarly journals generally don't pay authors for their research articles, which frees this special tribe of authors to consent to OA without losing revenue. This fact distinguishes scholars decisively from musicians and moviemakers, and even from most other kinds of authors. This is why controversies about OA to music and movies don't carry over to OA for research articles.

Both facts are critical, but the second is nearly unknown outside the academic world. It's not a new fact of academic life, arising from a recent economic downturn in the publishing industry. Nor is it a case of corporate exploitation of unworldly academics. Scholarly journals haven't paid authors for their articles since the first scholarly journals, the *Philosophical Transactions* of the Royal Society of London and the *Journal des sçavans*, launched in London and Paris in 1665.[4]

The academic custom to write research articles for impact rather than money may be a lucky accident that could have been otherwise. Or it may be a wise adaptation that would eventually evolve in any culture with a serious research subculture. (The optimist in me wants to believe the latter, but the evolution of copyright law taunts that optimism.) This peculiar custom does more than insulate cutting-edge research from the market and free scholars to consent to OA without losing revenue. It also supports academic freedom and the kinds of serious inquiry that advance knowledge. It frees researchers to challenge conventional wisdom and defend unpopular ideas, which are essential to academic freedom. At the same time it frees them to microspecialize and defend ideas of immediate interest to just a handful people in the world, which are essential to pushing the frontiers of knowledge.

This custom doesn't guarantee that truth-seeking won't be derailed by profit-seeking, and it doesn't guarantee

that we'll eventually fill the smallest gaps in our collaborative understanding of the world. It doesn't even guarantee that scholars won't sometimes play for the crowd and detour into fad thinking. But it removes a major distraction by allowing them, if they wish, to focus on what is likely to be true rather than what is likely to sell. It's a payment structure we need for good research itself, not just for good access to research, and it's the key to the legal and economic lock that would otherwise shackle steps toward OA.

Creative people who live by royalties, such as novelists, musicians, and moviemakers, may consider this scholarly tradition a burden and sacrifice for scholars. We might even agree, provided we don't overlook a few facts. First, it's a sacrifice that scholars have been making for nearly 350 years. OA to research articles doesn't depend on asking royalty-earning authors to give up their royalties. Second, academics have salaries from universities, freeing them to dive deeply into their research topics and publish specialized articles without market appeal. Many musicians and moviemakers might envy that freedom to disregard sales and popular taste. Third, academics receive other, less tangible rewards from their institutions—like promotion and tenure—when their research is recognized by others, accepted, cited, applied, and built upon.

It's no accident that faculty who advance knowledge in their fields also advance their careers. Academics are pas-

sionate about certain topics, ideas, questions, inquiries, or disciplines. They feel lucky to have jobs in which they may pursue these passions and even luckier to be rewarded for pursuing them. Some focus single-mindedly on carrying an honest pebble to the pile of knowledge (as John Lange put it), having an impact on their field, or scooping others working on the same questions. Others focus strategically on building the case for promotion and tenure. But the two paths converge, which is not a fortuitous fact of nature but an engineered fact of life in the academy. As incentives for productivity, these intangible career benefits may be stronger for the average researcher than royalties are for the average novelist or musician. (In both domains, bountiful royalties for superstars tell us nothing about effective payment models for the long tail of less stellar professionals.)

There's no sense in which research would be more free, efficient, or effective if academics took a more "business-like" position, behaved more like musicians and movie-makers, abandoned their insulation from the market, and tied their income to the popularity of their ideas. Nonacademics who urge academics to come to their senses and demand royalties even for journal articles may be more naive about nonprofit research than academics are about for-profit business.[5]

We can take this a step further. Scholars can afford to ignore sales because they have salaries and research grants

to take the place of royalties. But why do universities pay salaries and why do funding agencies award grants? They do it to advance research and the range of public interests served by research. They don't do it to earn profits from the results. They are all nonprofit. They certainly don't do it to make scholarly writings into gifts to enrich publishers, especially when conventional publishers erect access barriers at the expense of research. Universities and funding agencies pay researchers to make their research into gifts to the public in the widest sense.

Public and private funding agencies are essentially public and private charities, funding research they regard as useful or beneficial. Universities have a public purpose as well, even when they are private institutions. We support the public institutions with public funds, and we support the private ones with tax exemptions for their property and tax deductions for their donors.

We'd have less knowledge, less academic freedom, and less OA if researchers worked for royalties and made their research articles into commodities rather than gifts. It should be no surprise, then, that more and more funding agencies and universities are adopting strong OA policies. Their mission to advance research leads them directly to logic of OA: With a few exceptions, such as classified research, research that is worth funding or facilitating is worth sharing with everyone who can make use of it. (See chapter 4 on OA policies.)

Newcomers to OA often assume that OA helps readers and hurts authors, and that the reader side of the scholarly soul must beg the author side to make the necessary sacrifice. But OA benefits authors as well as readers. Authors want access to readers at least as much as readers want access to authors. All authors want to cultivate a larger audience and greater impact. Authors who work for royalties have reason to compromise and settle for the smaller audience of paying customers. But authors who aren't paid for their writing have no reason to compromise.

It takes nothing away from a disinterested desire to advance knowledge to recognize that scholarly publication is accompanied by a strong interest in impact and career building. The result is a mix of interested and disinterested motives. The reasons to make work OA are essentially the same as the reasons to publish. Authors who make their work OA are always serving others but not always acting from altruism. In fact, the idea that OA depends on author altruism slows down OA progress by hiding the role of author self-interest.

Another aspect of author self-interest emerges from the well-documented phenomenon that OA articles are cited more often than non-OA articles, even when they are published in the same issue of the same journal. There's growing evidence that OA articles are downloaded more often as well, and that journals converting to OA see a rise in their submissions and citation impact.[6]

There are many hypotheses to explain the correlation between OA and increased citations, but it's likely that ongoing studies will show that much of the correlation is simply due to the larger audience and heightened visibility provided by OA itself. When you enlarge the audience for an article, you also enlarge the subset of the audience that will later cite it, including professionals in the same field at institutions unable to afford subscription access. OA enlarges the potential audience, including the potential professional audience, far beyond that for even the most prestigious and popular subscription journals.

In any case, these studies bring a welcome note of author self-interest to the case for OA. OA is not a sacrifice for authors who write for impact rather than money. It increases a work's visibility, retrievability, audience, usage, and citations, which all convert to career building. For publishing scholars, it would be a bargain even if it were costly, difficult, and time-consuming. But as we'll see, it's not costly, not difficult, and not time-consuming.

My colleague Stevan Harnad frequently compares research articles to advertisements. They advertise the author's research. Try telling advertisers that they're making a needless sacrifice by allowing people to read their ads without having to pay for the privilege. Advertisers give away their ads and even pay to place them where they might be seen. They do this to benefit themselves, and

scholars have the same interest in sharing their message as widely as possible.[7]

Because any content can be digital, and any digital content can be OA, OA needn't be limited to royalty-free literature like research articles. Research articles are just ripe examples of low-hanging fruit. OA could extend to royalty-producing work like monographs, textbooks, novels, news, music, and movies. But as soon as we cross the line into OA for royalty-producing work, authors will either lose revenue or fear that they will lose revenue. Either way, they'll be harder to persuade. But instead of concluding that royalty-producing work is off limits to OA, we should merely conclude that it's higher-hanging fruit. In many cases we can still persuade royalty-earning authors to consent to OA. (See section 5.3 on OA for books.)

Authors of scholarly research articles aren't the only players who work without pay in the production of research literature. In general, scholarly journals don't pay editors or referees either. In general, editors and referees are paid salaries by universities to free them, like authors, to donate their time and labor to ensure the quality of new work appearing in scholarly journals. An important consequence follows. All the key players in peer review can consent to OA without losing revenue. OA needn't dispense with peer review or favor unrefereed manuscripts over refereed articles. We can aim for the prize of OA to peer-reviewed scholarship. (See section 5.1 on peer review.)

Of course, conventional publishers are not as free as authors, editors, and referees to forgo revenue. This is a central fact in the transition to OA, and it explains why the interests of scholars and conventional publishers diverge more in the digital age than they diverged earlier. But not all publishers are conventional, and not all conventional publishers will carry print-era business models into the digital age.

Academic publishers are not monolithic. Some new ones were born OA and some older ones have completely converted to OA. Many provide OA to some of their work but not all of it. Some are experimenting with OA, and some are watching the experiments of others. Most allow green OA (through repositories) and a growing number offer at least some kind of gold OA (through journals). Some are supportive, some undecided, some opposed. Among the opposed, some have merely decided not to provide OA themselves, while others lobby actively against policies to encourage or require OA. Some oppose gold but not green OA, while others oppose green but not gold OA.

OA gains nothing and loses potential allies by blurring these distinctions. This variety reminds us (to paraphrase Tim O'Reilly) that OA doesn't threaten publishing; it only threatens existing publishers who do not adapt.[8]

A growing number of journal publishers have chosen business models allowing them to dispense with subscription revenue and offer OA. They have expenses but they also have revenue to cover their expenses. In fact, some

revenue. While OA to unrefereed preprints is useful and widespread, the OA movement isn't limited to unrefereed preprints and, if anything, focuses on OA to peer-reviewed articles. (More in section 5.1 on peer review.)

2. OA isn't an attempt to reform, violate, or abolish copyright. It's compatible with copyright law as it is. OA would benefit from the right kinds of copyright reforms, and many dedicated people are working on them. But it needn't wait for reforms and hasn't waited. OA literature avoids copyright problems in exactly the same way that conventional toll-access literature does. For older works, it takes advantage of the public domain, and for newer works, it rests on copyright-holder consent. (More in chapter 4 on policies and chapter 6 on copyright.)

3. OA isn't an attempt to deprive royalty-earning authors of income. The OA movement focuses on research articles precisely because they don't pay royalties. In any case, inside and outside that focus, OA for copyrighted work depends on copyright-holder consent. Hence, royalty-earning authors have nothing to fear but persuasion that the benefits of OA might outweigh the risks to royalties. (More in section 5.3 on OA for books.)

4. OA isn't an attempt to deny the reality of costs. No serious OA advocate has ever argued that OA literature is costless to produce, although many argue that it is less expensive to produce than conventionally published literature, even less expensive than born-digital toll-access

Terminology

We could talk about vigilante OA, infringing OA, piratical OA, or OA without consent. That sort of OA could violate copyrights and deprive royalty-earning authors of royalties against their will. But we could also talk about vigilante publishing, infringing publishing, piratical publishing, or publishing without consent. Both happen. However, we generally reserve the term "publishing" for lawful publishing, and tack on special adjectives to describe unlawful variations on the theme. Likewise, I'll reserve the term "open access" for lawful OA that carries the consent of the relevant rightsholder.

literature. The question is not whether research literature can be made costless, but whether there are better ways to pay the bills than charging readers and creating access barriers. (More in chapter 7 on economics.)

5. OA isn't an attempt to reduce authors' rights over their work. On the contrary, OA depends on author decisions and requires authors to exercise more rights or control over their work than they are allowed to exercise

under traditional publishing contracts. One OA strategy is for authors to retain some of the rights they formerly gave publishers, including the right to authorize OA. Another OA strategy is for publishers to permit more uses than they formerly permitted, including permission for authors to make OA copies of their work. By contrast, traditional journal-publishing contracts demand that authors transfer all rights to publishers, and author rights or control cannot sink lower than that. (See chapters 4 on policies and 6 on copyright.)

6. OA isn't an attempt to reduce academic freedom. Academic authors remain free to submit their work to the journals or publishers of their choice. Policies requiring OA do so conditionally, for example, for researchers who choose to apply for a certain kind of grant. In addition, these policies generally build in exceptions, waiver options, or both. Since 2008 most university OA policies have been adopted by faculty deeply concerned to preserve and even enhance their prerogatives. (See chapter 4 on OA policies.)

7. OA isn't an attempt to relax rules against plagiarism. All the public definitions of OA support author attribution, even construed as a "restriction" on users. All the major open licenses require author attribution. Moreover, plagiarism is typically punished by the plagiarist's institution rather than by courts, that is, by social norms rather than by law. Hence, even when attribution is not legally

required, plagiarism is still a punishable offense and no OA policy anywhere interferes with those punishments. In any case, if making literature digital and online makes plagiarism easier to commit, then OA makes plagiarism easier to detect. Not all plagiarists are smart, but the smart ones will not steal from OA sources indexed in every search engine. In this sense, OA deters plagiarism.[11]

8. OA isn't an attempt to punish or undermine conventional publishers. OA is an attempt to advance the interests of research, researchers, and research institutions. The goal is constructive, not destructive. If OA does eventually harm toll-access publishers, it will be in the way that personal computers harmed typewriter manufacturers. The harm was not the goal, but a side effect of developing something better. Moreover, OA doesn't challenge publishers or publishing per se, just one business model for publishing, and it's far easier for conventional publishers to adapt to OA than for typewriter manufacturers to adapt to computers. In fact, most toll-access publishers are already adapting, by allowing author-initiated OA, providing some OA themselves, or experimenting with OA. (See section 3.1 on green OA and chapter 8 on casualties.)[12]

9. OA doesn't require boycotting any kind of literature or publisher. It doesn't require boycotting toll-access research any more than free online journalism requires boycotting priced online journalism. OA doesn't require us to

strike toll-access literature from our personal reading lists, course syllabi, or libraries. Some scholars who support OA decide to submit new work only to OA journals, or to donate their time as editors or referees only to OA journals, in effect boycotting toll-access journals as authors, editors, and referees. But this choice is not forced by the definition of OA, by a commitment to OA, or by any OA policy, and most scholars who support OA continue to work with toll-access journals. In any case, even those scholars who do boycott toll-access journals as authors, editors, or referees don't boycott them as readers. (Here we needn't get into the complexity that some toll-access journals effectively create involuntary reader boycotts by pricing their journals out of reach of readers who want access.)

10. OA isn't primarily about bringing access to lay readers. If anything, the OA movement focuses on bringing access to professional researchers whose careers depend on access. But there's no need to decide which users are primary and which are secondary. The publishing lobby sometimes argues that the primary beneficiaries of OA are lay readers, perhaps to avoid acknowledging how many professional researchers lack access, or perhaps to set up the patronizing counter-argument that lay people don't care to read research literature and wouldn't understand it if they tried. OA is about bringing access to everyone with an internet connection who wants access, regardless of their professions or purposes. There's no doubt that if

MOTIVATION

2.1 OA as Solving Problems[1]

There are lamentably many problems for which OA is part
of the solution. Here are fifteen ways in which the current
system of disseminating peer-reviewed research is deeply
dysfunctional for researchers and their institutions, even
if highly profitable for the largest conventional publishers.
I've limited the list to those for which OA offers some hope
of relief.

  1. We are in the midst of a pricing crisis for scholarly
journals. For four decades, subscription prices have risen
significantly faster than inflation and significantly faster
than library budgets. Subscription prices have risen about
twice as fast as the price of healthcare, for most people the
very index of skyrocketing, unsustainable prices. We're
long past the era of damage control and into the era of
damage.[2]

2. When most peer-reviewed research journals are toll access, a pricing crisis entails an access crisis. Before the rise of OA, all peer-reviewed journals were toll access, and even today about three-quarters of peer-reviewed journals are toll access.[3] When subscribers respond to skyrocketing prices by canceling subscriptions, access decreases. Cancellations mitigate one problem and aggravate another. A study by the Research Information Network in late 2009 found that 40 percent of surveyed researchers had trouble accessing journal literature at least once a week, and two-thirds at least once a month. About 60 percent said that access limitations hindered their research, and 18 percent said the hindrance was significant.[4]

3. Even the wealthiest academic libraries in the world suffer serious access gaps. When the Harvard Faculty of Arts and Sciences voted unanimously for a strong OA policy in February 2008, Professor Stuart Shieber explained that cumulative price increases had forced the Harvard library to undertake "serious cancellation efforts" for budgetary reasons.[5]

Access gaps are worse at other affluent institutions, and worse still in the developing world. In 2008, Harvard subscribed to 98,900 serials and Yale to 73,900. The best-funded research library in India, at the Indian Institute of Science, subscribed to 10,600. Several sub-Saharan African university libraries subscribed to zero, offering their