

Towards a competitive and sustainable open access publishing market in Europe

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“Towards a Competitive and Sustainable OA Market in Europe - A Study of the Open Access Market and Policy Environment”

This report was commissioned within the scope of the OpenAIRE FP7 Post-Grant Open Access Pilot. It will be accompanied in its final form by a Roadmap document, developed with input from an expert workshop to be held in The Hague on 20 April 2017.

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Executive Summary

Introduction

In May 2016 the European Council of Ministers set a goal of **immediate open access (OA) to scientific publications as the default by 2020**. There is widespread agreement that making scientific publications available free of charge to the reader can advance knowledge, enable innovation, and contribute to Europe's growth and competitiveness.

Without intervention, immediate OA to just half of Europe's scientific publications will not be achieved until 2025 or later. Readers in academia have greater access, to more content, than ever before. Despite this, the majority of publications arising from public investments in research remain inaccessible to the public, and the growth of OA appears to be slowing.

This study considers **the economic factors contributing to the current state of the open access publishing market**, and evaluates the **potential for European policymakers to enhance market competition and sustainability** in parallel to increasing access.

2025
Date by which 50%
of European
articles may be
immediate OA

The state of the open access market

The scholarly publishing market is an **'intermediated market'**, with researchers acting as both producers and consumers of research, while the purchase of content is typically undertaken by academic libraries. The market for scholarly journals alone is worth some \$10 billion per year, with scientific, technical and medicine (STM) publications accounting for the vast majority of this figure.

We identify four pathways to open access for scientific articles:

c.\$10 billion
Value of the
scholarly journals
market

- **Open access archiving ('Green OA')** - the practice of archiving a version of an article for free public use in an institutional or subject repository.
- **Gold-Hybrid** – peer-reviewed articles within a subscription-based journal are made immediately open access, typically on payment of an article publication charge (or APC) to the publisher or through an offsetting agreement.
- **Gold-APC** – publication in journals that make all of their content OA via payment of an APC, and do not rely on subscriptions.
- **Gold no-APC** – publication in fully open-access journals which do not charge an APC.

The global open access market is approaching \$500 million in size, but accounts for only 5% of the journals market. The proportion of immediate open access content is substantially higher, at almost 17% of global articles in 2014. The wide discrepancy between open access's share of revenues and articles reflects both the use of non-market based mechanisms to deliver open access content, and the lower cost of open access publication.

c.\$500
million

Value of the open
access market

Competition in the open access market

Competition in the scholarly publishing market depends on two primary variables: barriers to entry and market concentration. Barriers to market entry do not arise from financial or legislative constraints, but from cultural inertia. Top-tier academic journals are non-substitutable goods for both authors and readers, and operate as mini-monopolies within a discipline or field. Career incentive structures that reward publishing in established journals with a high 'impact factor' reinforce the dominant position of large publishers. A cultural bias against open access publications in certain disciplinary and national contexts stifles growth among smaller OA publishers. Competition is further hindered by excessive market concentration, and a lack of transparency due to widespread use of non-disclosure clauses. While scholarly publishing is a global market with over 5,000 journal publishers, five commercial publishers accounted for more than 50% of all articles published in 2013.

50%

Proportion of
global scholarly
articles from the
top 5 publishers

Open access has made progress where the academic community is receptive (e.g. physics) or where research funders have issued firm mandates in the public interest (e.g. life sciences and medicine). To date, these examples remain the exception rather than the rule, and have led to the emergence of two parallel markets, rather than transformation of the subscription market. Gold-APC journals operate in a small, competitive and buyer-driven market, while the subscription market remains characterised by inelastic demand, and dominated by large commercial publishers. Cases of journals successfully transitioning, or 'flipping', from subscription to Gold-APC or Gold no-APC models remain few and far between.

Sustainability in the open access market

The failure to transition from subscriptions to open access reflects both anaemic demand for open access from the academic community, and publisher concerns that open access business models are unsustainable. Global article volumes are rising inexorably by 3-4% per annum, and most commercial and not-for-profit publishers (often owned by or affiliated to learned societies) remain financially wedded to the subscription model. This has served science and society effectively for centuries, but it has also resulted in a publishing industry with a significant legacy cost base, and profit margins of over 30% in some cases.

The commercial incentives for subscription publishers to move to APC-based open access remain weak. Mean APCs are approximately €1,500 (Gold-APC) and €2,500 (Gold-Hybrid), while average subscription revenues are double this, at €4-5,000 per article. Open access would also jeopardise licensing revenues and corporate subscriptions, estimated at some 20% of STM publishers' current income. Recent initiatives aimed at repurposing existing library subscription budgets for open access, such as the Open Access 2020 movement, assert that there is sufficient money in the system to make the transition. Publishers have also recognised the opportunity for OA to generate additional revenue streams. However, unless the gap between per article revenues under the OA and subscription models narrows significantly, or threats to the sustainability of the subscription model increase, progress towards a large-scale transition is likely to remain slow.

€4,000-
5,000

Average cost of a
subscription article

So-called born OA publishers offer a partial answer to these questions. Free from the need to sustain legacy cost bases and high margins, new market entrants have been able to develop viable business models at much lower price points. A number of publishers have now built successful business models based on APCs, but questions remain over whether this approach can be successfully replicated in niche disciplines, and for highly selective journals.

€1,500-
2,500

Average cost of an
open access
article

Competitive forces are weak in the subscription market, but open access risks replacing barriers to access with barriers to publication. Authors in Eastern and Southern Europe are at particular risk of exclusion, since they neither qualify for fee waivers nor have access to the funds necessary to pay APCs. Shifting publishing costs towards authors rather than readers is likely to increase expenditure for the most research-intensive institutions. Intervention by research funders and redistribution of financial flows within the system could help to alleviate these problems, but the practical implementation of these measures faces considerable challenges.

Open access as a public service

Market forces alone are not sufficient to deliver widespread access to scientific information. There are clear indications that the subscription market is not functioning effectively, due to non-substitutability, excessive concentration, lack of transparency and perverse incentives. The virtual elimination of technical barriers to dissemination of scientific knowledge has coincided with growing recognition of its status as a global public good. This characterisation is consistent with the European Council's goals for open access in Europe, the use of APC price caps by some funders, and the existence of public-private partnerships delivering free or subsidised access in lower and middle-income countries. The dissemination of a public good represents a public service, albeit one which may be legitimately delivered by private actors.

A case could be made for direct regulation of the scholarly publishing market on public interest grounds. We do not advocate such an approach at this point. Scholarly publishing is a successful European export industry, operating in a global market. **Attempts at direct regulation in such a market would meet fierce resistance from the industry**, prove difficult to implement in practice and are unlikely to find support in other jurisdictions. The best pathway to change lies in strengthened incentives for open-access publication and archiving, redirection of financial flows in the system, and other measures which act on the market by influencing customer behaviour.

Open access
requires
strengthened
incentives to
change authors'
behaviour

The open access policy environment

The European Council's call for immediate open access as the default by 2020 represents a step change in the policy environment. EC policy on open access has evolved steadily in recent years, with an open access pilot under Framework Programme 7 (the EC's Research & Innovation programme for the period 2007-2013), and the inclusion of open access as a general principle of the successor programme, Horizon 2020. In 2012, the EC recommended that member states define clear open access policies.

The OA policy
environment in
Europe remains
highly
fragmented

Despite these moves, **our study finds that the open access policy environment remains highly variable across Europe.** Southern European nations are notably more likely to favour OA archiving. Countries with a significant academic publishing industry are more likely to favour Gold OA. Case studies from four European countries (Hungary, Norway, Portugal and the United Kingdom) illustrate wide discrepancies in national policy environments, availability of funding, monitoring measures, support for different OA pathways, and author attitudes.

Further challenges stem from the global nature of scholarly publishing. The European bloc's share of worldwide article output has fallen below 30% in recent years. The United States produces just under 20% of global articles, but continues to exert enormous influence on the marketplace. US legislators favour 'public access' mandates based on wider adoption of the OA archiving model. This approach is at odds with Europe's stated preference for *immediate* open access and more liberal licensing arrangements. Chinese policy has also prioritised OA archiving to date. Chinese academic culture strongly favours high-profile subscription journals, and institutional open access policies and infrastructure continue to lag behind Europe and the US. The absence of a co-ordinated global commitment to reform of the subscription market is likely to limit the effectiveness of European efforts in this regard.

US and Chinese
policies tend to
favour OA
archiving

Charting a path towards a sustainable and competitive OA market

Our study has considered the rate of progress towards two goals:

1. increasing the proportion of research that is immediate OA
2. developing a competitive and sustainable OA market.

These must be recognised as distinct objectives, which are not necessarily synergistic. A rapid increase in immediate OA may be achieved at the expense of reduced competition, while attempting to tackle the underlying cultural barriers to an effective market may limit access in the short-term.

10-15%

**Annual growth
rate in the OA
market**

Current policy interventions in Europe are not sufficient either to deliver the goal of immediate open access by 2020, or to significantly improve market competitiveness. Recent evidence indicates that growth in the open access market has slowed to 10-15% per annum, but a growth rate of 25% every year since 2014 would be needed for the majority of content to be immediate OA by 2020. As things stand, **authors lack real incentives to switch to open access publications, and there is no commercial imperative for publishers to ‘flip’ subscription journals to an open access business model.**

25%

**Growth rate
needed to deliver
immediate OA by
2020**

The roadblocks to achieving widespread open access and a competitive and sustainable market can thus be summarised as follows:

1. Weak author incentives
2. Disparate national and disciplinary contexts
3. No clear route to transition for subscription publishers
4. Lack of competition in the market
5. Suboptimal infrastructure
6. Inadequate monitoring and reporting

As part of our work we considered the findings of 20 previous studies on the transition to OA. This identified a number of favoured policy interventions which can address the identified barriers:

- Offsetting of subscriptions and open access expenditure
- Strengthening consortia and pursuing collective action
- Promotion of changes in author behaviour and incentives
- Development of repository infrastructure
- Support for Gold no-APC platforms
- Improving transparency of publication costs
- Developing mechanisms to monitor OA content

Each of the four pathways to open access (OA archiving, Gold-Hybrid, Gold-APC and Gold no-APC) also finds support, but no single measure is supported by a clear majority of stakeholders.

**There is no
‘silver bullet’ to
deliver
immediate OA**

Suggestions for a roadmap to open access

There is a strong case for intervention by policy makers to promote OA, and to address current market failures. However, there is little consensus on the most appropriate pathway to immediate open access. Varying disciplinary and national contexts mean that a balanced programme of support is needed, recognising the distinct strengths and weaknesses of each pathway. Efforts to deliver short-term increases in access must be complemented by measures which can lead to a more competitive and sustainable market.

Six roadblocks
must be removed
to make the
transition to OA

This report forms the starting point for a roadmap to a competitive and sustainable open access market in Europe. We consider that the overall aim of this roadmap should be to address the six roadblocks we have identified to a competitive and sustainable open access market, as follows:

1. **Author incentives** - Create incentives and remove disincentives for authors to adopt OA publishing and archiving.
2. **Publisher incentives** - Provide subscription publishers with a viable route to flip their business models to open access.
3. **Competition** - Improve transparency in the market, with the goal of making the costs of publishing and accessing scientific research as open as the research itself.
4. **Pluralism** - Support diversity of approach, reflecting the varying disciplinary and national contexts across Europe.
5. **Infrastructure** - Develop robust infrastructure, built on common, open standards, to allow open access to scale rapidly and efficiently.
6. **Monitoring** - Implement effective mechanisms to monitor policy compliance, the proportion of open access content, and the sustainability of different stakeholders in the scholarly communications process.

Concrete actions which can be taken to deliver these goals, and their implications for the different pathways to open access, are outlined in the roadmap accompanying the final version of this report.

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1. Introduction

Europe has set a goal of making immediate open access to scientific publications the default by 2020. This study assesses the current state of the open access publishing market, and evaluates the range of policy options available to increase access and enhance competition and sustainability in the market.

1.1 Background

In May 2016, the European Council of Ministers set a goal of making immediate open access to scientific peer-reviewed publications the default by the year 2020. Improving access to publications, across all scholarly disciplines, represents a central part of the move to open science, alongside measures to improve access to research data. Open science in turn has the potential to accelerate the advancement of knowledge, enable growth and innovation at all levels of society, and contribute to Europe's growth and competitiveness.¹

The fundamental technologies required to deliver this vision have been in place since the dawn of the internet age. Their impact has been felt across countless industries, from news media to music, retail to transportation. Yet while scientific publications made the transition from print to predominantly digital delivery methods in the early part of this century, the subscription-based business model on which they rely has proven remarkably resilient. The move to open access has already resulted in a significant minority of content becoming publicly available, whilst creating opportunities for new players to enter the market. To date, though, it has not displaced the subscription-model as the dominant mode of scholarly communication, nor has it reversed a longstanding trend towards market concentration in the hands of a few commercial publishers. Even now, the majority of publications arising from public investments in research are held behind a paywall, accessible only to those with subscriptions to the content.

This model of scientific communication has served society well for centuries, providing a sustainable basis for the validation and dissemination of scientific findings. Since the late 1990s and early 2000s, however, concerns have been growing that the market for scientific publications has become characterised by strategic barriers to entry and experimentation.² The volume of literature published has continued to grow year-on-year. Partly in response to this increase, the prices charged to academic libraries, the primary customers for scientific publications, have also risen steadily - even as the variable cost of increased readership falls ever closer to zero. Today, readers in academia have greater access,

¹ The Council of the European Union. (2016). [The transition towards an Open Science system - Council conclusions](#)

² European Commission. (2006). [Study on the economic and technical evolution of the scientific publication markets in Europe](#)

to more content, than ever before. Yet the opportunity afforded by modern technology to extend access to all readers remains largely unrealised.

1.2 Terms of reference

This study considers the economic factors contributing to the current state of the open-access publishing market, and evaluates the potential for European policymakers to enhance market competition and sustainability in parallel to increasing access. It was commissioned within the scope of the OpenAIRE FP7 Post-Grant Open Access Pilot, and it will be accompanied by a Roadmap document developed with inputs from an expert workshop to be held in The Hague on 20 April 2017. In accordance with the project brief, the study aims to:

- Explore the current status of the OA publishing market
- Analyse existing OA publishing business models
- Evaluate how different national and international policies are complementing each other as a means to achieve a transition to OA
- Evaluate the impact of the Framework Programme 7 Post-grant OA pilot and its implications for future similar initiatives and the transition to OA.
- Provide a roadmap leading to a sustainable and competitive market

The transition to open access concerns all kinds of academic research outputs, including monographs, journal articles, and data. This study focuses on open access to peer-reviewed research articles, which constitute the bulk of the market and the primary mechanism through which research is disseminated across disciplinary communities and beyond.³

1.3 Methodology

Literature review

We reviewed the English-language literature on the OA market and business models to paint a picture of the existing landscape and identify areas of concern. This step also allowed us to gather information on the regulatory framework governing OA in European countries, and on existing proposals for making the transition to open access.

Stakeholder interviews

Stakeholder views were gathered through semi-structured interviews. Stakeholders were selected by the project funder, the OpenAIRE consortium, in collaboration with Research Consulting. The interviewees were selected in order to ensure representation from different European regions and a range of stakeholders in the scholarly communications process. The full list of interviewees can be found in Appendix A.

³ This is true for the scientific, engineering and medical communities, and some social science disciplines, but it is acknowledged that in other fields, particularly the arts and humanities, books and monographs are of greater importance.

Survey of beneficiaries of the FP7 post-grant open access pilot

The views of beneficiaries of the FP7 OA pilot were gathered through an online survey. The survey was comprised of 21 multiple choice and open text questions, and focused on both the workflow for receiving the funding and the sustainability of an APC-based Open Access publishing business model. It was distributed to recipients of pilot funding by email and had a total of 322 responses, which corresponds to about 59% of recipients of FP7 Post-grant funding. The results were analysed by Research Consulting, on behalf of the OpenAIRE consortium. More details on the survey and its results are available in Annex A.

Review of open access roadmaps and transition proposals

The recommendations made in a sample of 20 previous studies on the transition to open access were reviewed and synthesised in order to identify the interventions currently being considered or proposed by relevant stakeholders. The 20 studies were chosen judgementally as broadly indicative of current European and international thinking on the transition to open access. A full list is provided in appendix B, but in brief they comprise proposals and studies from the following bodies:

- Membership organisations representing European universities (EUA, LERU)
- Membership organisations representing European and Global research funders (Science Europe, the Global Research Council)
- National studies on the transition to OA from a range of European countries (Austria, France, Germany, Norway, Poland and the United Kingdom)
- A US-led academic study
- A previous EC-commissioned study of the scientific publishing market
- A selection of advocacy and thought pieces which have received recent support or attention within the scholarly community.

Validation of findings

A draft of this report was shared with the project steering and working groups for comment prior to publication. Comments were also sought from a number of other key stakeholders, including representatives of publisher trade associations. The input received from these individuals was used to validate and refine our findings, and ensure the interests of different stakeholders are appropriately reflected in the final version. The participation of these individuals in the consultation process does not constitute endorsement of all the report's findings and conclusions, and responsibility for any inaccuracies or errors in the final report lies with the authors alone.

The members of the project steering and working groups group are listed in Appendix A, together with the other stakeholders who contributed to the project.

1.4 Report structure

The report is organised in two parts. **Part A** summarises the current state of the open access market, placing it in the context of the scholarly publishing market as a whole. It then considers indicators of competition and sustainability in both markets, before assessing the case for treating open access to scientific knowledge as a public service.

Part B provides an overview of current European policy on open access, and presents comparative case studies of four European countries (Hungary, Norway, Portugal and the United Kingdom). It then identifies six key roadblocks to open access, and assesses the potential of four primary routes to open access to deliver a sustainable and competitive market. It concludes by providing suggestions to inform a roadmap to open access in Europe.

The report also contains a number of appendices: a list of interviewees and contributors to the study (Appendix A), details of the existing roadmaps and transition proposals considered in our work (Appendix B), and a list of abbreviations and glossary of terms used in the report.

Finally, the findings of our evaluation of the FP7 post-grant open access pilot are presented as a separate annex to this report (Annex A).

1.5 Definitions and glossary

The European Commission has defined open access (OA) as ‘the practice of providing on-line access to scientific information that is free of charge to the user and that is re-usable’.⁴

Legally binding definitions of ‘open access’ and ‘access’ in this context do not exist, but authoritative definitions of open access can be found in the Budapest Declaration and the Berlin Declaration.⁵ These definitions define ‘open access’ as including not only basic elements such as the right to read, download and print, but also the right to copy, distribute, search, link, crawl, and mine. This is commonly achieved through application of a Creative Commons Attribution License (CC-BY).⁶

A Glossary containing definitions of key terms and abbreviations can be found at the end of the document.

1.6 Limitations of the study

The study has several limitations. First, despite the vast available literature on open access, there is limited evidence on the size, significance and impact of the OA movement on the publishing sector as a whole. Leading market studies, for instance, focus on the size of the journal market for scientific, technical and medical (STM) disciplines only.⁷ Studies of the proportion of open access content can also reach widely differing conclusions depending on the methodologies used.⁸ Moreover, no study can

⁴ European Commission. (2016). [Background Note on Open Access to Scientific Publications and Open Research Data](#)

⁵ See the [Budapest Open Access Initiative](#) (2002) and the [Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities](#) (2003)

⁶ A [Creative Commons \(CC\) licence](#) is one of several public copyright licences that enable the free distribution of an otherwise copyrighted work. The Creative Commons Attribution licence (CC-BY) allows re-distribution and re-use of a licensed work on the condition that the creator is appropriately credited.

⁷ STM. (2015). [The STM Report: An overview of scientific and scholarly journal publishing](#)
Outsell. (2015). [Open Access 2015: Market Size, Share, Forecast, and Trends](#)

⁸ For example, Archambault et al. (2013) estimated that the tipping point for OA (more than 50% of the papers available for free) had already been reached in several countries, including Brazil, Switzerland, the Netherlands, the US. See [Proportion of Open Access Peer-Reviewed Papers at the European and World Levels—2004-2011](#).

reliably capture all peer-reviewed content globally, with data on OA journals published in national languages being particularly scarce.

Secondly, our work has relied primarily on the English-language literature on open access, which risks over-representing Western European and North American viewpoints, since studies in these regions are more likely to be published or translated into English. This risk has been mitigated in part via the inclusion of interviewees from Southern and Eastern Europe in our consultation process, but cannot be eliminated entirely.

Thirdly, while the analysis of the OA market undertaken in Part A considers the global picture, Part B focuses primarily on European countries (including those outside the European Union). Both the case-studies and the analysis of the open access policy options have therefore been undertaken with a focus on the European landscape, key stakeholders and decision-makers. The OA policy context outside Europe is given only limited consideration within the scope of this study, but the actions of stakeholders outside Europe, particularly in North America, will have significant implications for the future development of the open access market.

Finally, the potential impact of political developments such as Brexit on the European research and scholarly communications landscape is acknowledged, but falls outside the scope of this study.

1.7 Acknowledgements

We would like to thank the members of the OpenAIRE consortium, and particularly Pablo de Castro, Gwen Franck, Melanie Imming and Natalia Manola, for their invaluable input and involvement in the preparation of this report. We are also indebted to the members of the project steering and working groups for their expert advice and guidance throughout the project. Our thanks also go to the wide range of experts and other stakeholders who kindly participated in our consultation and provided feedback on early versions of this report. A full list of contributors can be found in Appendix A.

However, RIN et al. (2015), using a different methodology, argue the overall proportion of OA content is substantially lower due to high levels of duplication between immediate OA (Gold) and OA archiving. See [Monitoring the Transition to Open Access: A report for the Universities UK Open Access Co-ordination Group](#)

Part A

State of the open-access market



2. State of the OA market

The scholarly journals market is worth some \$10 billion per annum, with the majority of revenues earned by scientific, technical and medical publishers. The proportion of open access content is rising, but the OA market remains small, at only \$500m per annum, or 4-6% of the total market value.

2.1 Overview of the scholarly publishing market

It has long been recognised that the scholarly publishing market has, in economic terms, an unusual relationship between sellers and buyers.⁹ Essentially a supply-driven market, scholarly publishing serves the needs of researchers engaged in:

- Conducting research
- Writing publications
- Reviewing the quality of other research, and
- Constituting the main readership for scholarly work.

However, while researchers are both producers and consumers of scholarly publications, their purchase is typically undertaken by academic libraries. Under the dominant subscription model (variously described as ‘reader-pays’ or ‘toll-access’), this results in an ‘intermediated market’ which weakens the price sensitivity of consumers, be they authors or readers.¹⁰

In most cases, researcher-authors freely transfer copyright in their work to publishers, or grant them an exclusive right to publish the final version of their manuscript, also known as the ‘version of record’.¹¹ In return, journals perform four auxiliary but essential functions of scientific communication:

- Registration: establishing the author’s precedence and ownership of an idea
- Dissemination: communicating the findings to its intended audience
- Certification: ensuring quality control by managing the peer review process

⁹ See, e.g.,

- Peek, R.P. (1996). *Scholarly Publishing: Facing the New Frontier*
- Peek, R.P. & Newby, G.B. (1996). *Scholarly Publishing: The Electronic Frontier*. The MIT Press, Cambridge, Massachusetts.
- Research Information Network. (2008). *Activities, costs and funding flows in the scholarly communications system in the UK*.

¹⁰ European Commission. (2006). *Study on the economic and technical evolution of the scientific publication markets in Europe*.

¹¹ Versions of journal articles may appear online before, during and after formal journal publication, and may be subject to different rights and permissions to the published version (‘version of record’). For further information on Journal Article Versions please refer to the [guidance prepared by NISO/ALPSP](#).

- Archival record: preserving a fixed version of the paper for future reference and citation.¹²

It is beyond the scope of this study to chart the long history of scholarly publishing, but the literature points to several trends which have been instrumental in shaping today's market:

- 1945-1975 – the progressive entry of for-profit publishers into the market.
- 1975-1995 – dramatic increases in the prices of journals sold by for-profit and, to a lesser extent, not-for-profit publishers, outstripping growth in library budgets. This is commonly dubbed 'the serials crisis'.
- 1995-2007 - the emergence of electronic publishing, and the 'big deal', representing bundles of journals that vary from institution to institution. Market consolidation amongst publishers and the development of library consortia are a characteristic of this period.¹³
- 2008 onwards – the impact of the global financial crisis, resulting in significant and prolonged cuts for many libraries and consortia.¹⁴ This exerted downward pressure on publisher revenues in the immediate aftermath of the crisis, but the major publishers saw a return to steady growth in the early years of the current decade.¹⁵

In 2015, the annual revenues generated from English-language science, technology and medicine (STM) journal publishing alone have been estimated at between \$7 and \$10 billion. Meanwhile, the broader STM information publishing market is worth around \$26 billion,¹⁶ of which roughly 55% comes from the US and 28% from Europe.¹⁷ The STM report estimates that the STM publishing industry employs around 110,000 people globally, of which about 40% are based in the EU.¹⁸ In addition, an estimated 20–30,000 freelancers, editors and others are indirectly supported by the STM industry globally.¹⁹

Meanwhile, a recent study on the global market for social sciences and humanities (SSH) publications in all languages put its value at \$5 billion in 2015, or roughly 20% of the STM market.²⁰ While the STM market continues to grow, the overall SSH market is shrinking at a compound annual rate of 1.4%. Revenues from journals are increasing, but account for a relatively small proportion of the overall SSH market, where books continue to dominate. The SSH journals market also differs in a number of other respects from the STM journals market. It is more fragmented, with no single publisher approaching a 10% market share, non-English language publications are widespread, and many of the key players are not-for-profit rather than commercial.

¹² STM. (2015). *The STM Report: An overview of scientific and scholarly journal publishing*

¹³ European Commission. (2006). *Study on the economic and technical evolution of the scientific publication markets in Europe*

¹⁴ See, for example, International Coalition of Library Consortia. (2010). *Revised Statement on the Global Economic Crisis and Its Impact on Consortial Licenses*.

¹⁵ See Larivière, V., Haustein, S. & Mongeon P. (2015). *The Oligopoly of Academic Publishers in the Digital Era*

¹⁶ Outsell (2015) estimate the journals market at \$6.8 billion. *Open Access 2015: Market Size, Share, Forecast, and Trend*. By contrast, the *STM Report*, using analysis by Simba, estimates the STM journal publishing market at \$10 billion in 2013 (up from \$8 billion in 2008), but has a similar estimate of the whole scholarly publishing market.

¹⁷ Outsell. (2014). *Information Industry Outlook 2015: Sensored World, Sensible Choices*.

¹⁸ STM. (2015). *The STM Report: An overview of scientific and scholarly journal publishing* (p. 24)

¹⁹ *Ibid.*

²⁰ Simba Information. (2016). *Global Social Science & Humanities Publishing 2016-2020*.

Seen in the context of global research and development expenditure of \$1.5 trillion, and 7.8 million researchers, the figures for both STM and SSH publishing are a drop in the ocean.²¹ However, the development of an effective scholarly communication market is of importance for several reasons:

- Academic journals, and other scholarly communication mechanisms, are central to the dissemination of knowledge. Maximising the value of global investment in R&D is contingent on an effective and efficient scholarly communication system.
- When reading, writing, peer review, editorial boards and grant applications are considered, the true cost of scholarly communication may be almost 10 times higher than the market revenues alone would suggest.²² Delivering efficiencies in this process could deliver significant direct and indirect cost savings for research performing organisations (RPOs).
- Finally, the scholarly publishing market is largely funded from public sources, meaning there is a moral obligation to ensure the effective use of taxpayer funds.

Box 1. The role of peer review in certifying quality

Journals play an important role in ensuring the quality of published scientific research – the function referred to as ‘certification’. Research quality is ascertained through a thorough review conducted by experts in the field (‘peers’). Journals maintain a list of these experts, contact them on behalf of the author, and often provide guidance on how to conduct peer review. Through the peer review process, journals set a benchmark level of quality which both the editorial board and the readers of the journal expect the research to meet.

Criticisms have been levied at the quality of the peer review process in both OA²³ and subscription journals.²⁴ Quality problems are often attributed to a lack of transparency in the process,²⁵ and some observers have suggested moving towards an open peer review system.²⁶ Quality is preserved in part by rejecting manuscripts that do not meet the desired criteria, and high rejection rates can increase costs for publishers (see Box 8). Additional concerns have been expressed regarding OA journals that generate revenue by publishing papers – which creates a potential conflict of interest between maintaining quality and maximising short-term revenues.²⁷ These concerns have motivated the rise of quality control services targeted at OA journals, such as those performed by QOAM,²⁸ DOAJ²⁹ and the now defunct Beall’s List of predatory journals.

The scholarly community generally recognises that there is a positive correlation between a journal’s reputation and the quality of the research it publishes, while recent studies have also demonstrated a correlation between APC price and the citation rates of journals.³⁰ Although the relationship is imperfect, and it is often biased in favour of subscription journals, it is clear that journals play a significant role in maintaining the credibility and quality of the peer-review system, and that this has to be maintained in an OA system.

²¹ UNESCO. (2016). *UNESCO Science Report: Towards 2030*

²² Houghton, J, Rasmussen, B., Sheehan, P., Oppenheim, C., Morris, A., Creaser, C., Greenwood, H., Summers, M. & Gourlay, A. (2009). *Economic implications of alternative scholarly publishing models: Exploring the costs and benefits*

²³ Bohannon, J. (2013). *Who's Afraid of Peer Review?*

²⁴ Van Noorden, R. (2014). *Publishers withdraw more than 120 gibberish papers.*

²⁵ Wicherts, J.M. (2016). *Peer Review Quality and Transparency of the Peer-Review Process in Open Access and Subscription Journals.*

²⁶ Ford, E. (2013). *Defining and Characterizing Open Peer Review: A Review of the Literature*

²⁷ Beall, J. (2012). *Predatory publishers are corrupting open access.*

²⁸ The *Quality Open Access Market* (QOAM) is a market place for open access journals. Quality scoring of the journals in QOAM is based on academic crowd sourcing; price information includes institutional licensed pricing.

²⁹ *Directory of Open Access Journals* (DOAJ).

³⁰ See RIN et al (2015). *Monitoring the transition to open access*, p.57.

2.2 The open access publishing market

The transition to open access

Information technology has changed the publishing market profoundly. The vast majority of readers now access research journals electronically and virtually all journals are available online, with a sharp increase in the proportion of electronic-only journal subscriptions.³¹ More importantly, the cost and technical challenges of publishing and dissemination, and preserving content on the internet, have decreased to the extent that university departments, and even small groups of researchers, can now viably run their own peer-reviewed e-journal – although the scalability of these models remains largely untested. The growth of the e-journal has called into question the role of scholarly publishers as the only credible intermediaries between researchers and their intended audience, and the ‘walled garden’ approach to content distribution.

It is in this context that the idea of making scholarly research available to anyone free of charge (known as open access or OA) emerged. OA originated at the grassroots level, with scientists adopting internet technology for free and rapid dissemination of content as early as the late 1980s.³² However, it was subsequently taken up the library community in response to the rapidly-increasing prices of scholarly journals, and has been progressively endorsed by policymakers as a mechanism for disseminating scientific knowledge in a knowledge economy. Open access entered the policy agenda with the 2003 Berlin Declaration,³³ which is now supported by 580 institutions across Europe.³⁴ Today, there at least 71 OA policies from research funders in Europe,³⁵ whose ostensible focus is to support a transition from paid access to research publications (predominantly through journal subscriptions) to open access. For many, the hope is that policy interventions can also drive the development of a more competitive and sustainable publishing market - increasing access whilst simultaneously driving down the cost of scholarly communication. The extent to which these two goals are compatible, and the potential for tension between them, represents a key focus of the present study.³⁶

OA publishing and dissemination

For the purposes of this report, we identify four distinct pathways to open access:³⁷

- **Open access archiving ('Green OA')** - the practice of archiving a version of an article for free public use in an institutional or subject repository (e.g., PubMed Central). Where this is done by

³¹ STM. (2015). [The STM Report: An overview of scientific and scholarly journal publishing](#)

³² For a fuller discussion of the development of OA see Schöpfel, J. (2015). [Open access - the rise and fall of a community driven model of scientific communication](#)

³³ Mack Planck Society. (2003). [Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities](#)

³⁴ See the [Berlin Declaration signatories](#). Moreover, under the OA2020 initiative (see the signatories [here](#)), 65 European RPOs have already signed the 2016 Expression of Interest in the Large-scale Implementation of Open Access to Scholarly Journals.

³⁵ These have been included in the [ROARMAP database](#).

³⁶ On this issue, also see: OANA and UNIKO. (version 2, 2016). [Recommendations for the Transition to OA in Austria](#).

³⁷ It should be noted that there are at least two other major mechanisms for OA publishing and dissemination: delayed open access, when articles are made freely accessible on the publisher's platform after an embargo period; and open access posting, when versions of articles are made openly available on author websites, and other online locations such as academic social networks (ASNs), often after an embargo period.

the author the term ‘self-archiving’ is typically used. OA archiving is also commonly referred to as ‘Green OA’.

- **Gold-Hybrid** – peer-reviewed articles within a subscription-based journal are made immediately open access, typically on payment of a publication fee (also called an article processing charge or APC) to the publisher.³⁸
- **Gold-APC** – publication in journals that make all of their content OA via payment of a publication fee, and do not rely on subscriptions.
- **Gold no-APC** – publication in fully open-access journals which do not charge an APC.³⁹

OA archiving is a legitimate approach to increasing access to research outputs, but it is dependent on the existing subscription business model. Since it relies on the current market configuration, does not generate any revenue and does not relate to the provision of publishing services, it will not be considered in our analysis of the scholarly publishing market. However, OA archiving is widely favoured by policy makers across Europe, and represents an important strategy for increasing access (see Box 2). OA archiving will therefore be considered further in subsequent sections on OA policies (section 4) and the path to a sustainable and competitive open access market (section 5).

The three remaining mechanisms are funding and business models that allow peer-reviewed research articles to be made immediately open access by the publisher. This is known as the Gold route to OA. The prevalence of these different models is considered further in section 2.2.3, but each represents a proven approach to OA publishing. As indicated in Table 1, below, each model can be underpinned by multiple revenue sources.⁴⁰

Table 1 Funding and business models for open access publishing (Gold OA)

Funding/business model	Who pays for publishing?	Revenue sources
Gold-Hybrid	Readers’ RPOs and authors/authors’ RPOs/funders	Publication fees and subscriptions, with the possibility of ‘offsetting’ between these to prevent ‘double-dipping’
Gold-APC	Authors/authors’ RPOs/funders	Publication fees, potentially coupled with submission fees /memberships
Gold no-APC	Publisher’s institution/others	Support from funders & RPOs /memberships /adverts and sponsorships / priced editions

³⁸ An extension of this model is hybrid as part of offsetting deals, which are deals concluded between publishers and RPOs/funders to reduce the total cost incurred to both acquire subscriptions and pay for APCs within an institution. For the purposes of this report, offsetting is treated as a different payment mechanism operating within the Gold-Hybrid model, rather than an entirely separate pathway to OA. It will be further discussed in sections 3 and 5.

³⁹ The terms used here are taken from the report [Monitoring the transition to open access](#) (2015), prepared by RIN et al for the Universities UK Open Access Co-ordination Group

⁴⁰ For further details on publishing revenue models please refer to Outsell. (2015). [Open Access 2015: Market Size, Share, Forecast, and Trends](#), The Open Access Directory. (n.d.). [OA journal business models](#) and Crow, R. (2009). [Income models for open access: An overview of current practice](#)

Box 2. The role of OA archiving in shaping the open access market

Historically, the debate over how best to make the transition to OA has tended to focus on two primary options – OA archiving ('Green OA') or OA publishing ('Gold OA'), with the two sometimes characterised as binary alternatives.⁴¹

On a practical level, OA archiving and OA publishing have complementary functions. Repositories allow institutions to mandate OA without limiting the freedom of authors to submit to the journals of their choice, but rely on journals to select, review, aggregate and disseminate research in the first place.⁴² In academia, journals aggregate material, manage research quality control and provide a hierarchy of quality and relevance that satisfies various academic and research user needs.

Outside academia, users search for specific articles using keywords or names and therefore journals are of less relevance. The so-called OA archiving route is therefore likely to be a more cost-effective strategy for increased knowledge transfer and greater economic impact in the short term.⁴³

The value of OA archiving in developing a sustainable and competitive OA publishing market is less clear, however. Ultimately, if enough content is made freely available through OA archiving then it is likely to result in downward pressure on subscription prices, or even widespread cancellations. The point at which this would occur remains highly uncertain, with many arguing it could have disastrous consequences, while others point out that repositories and journals already co-exist successfully in disciplines such as physics.⁴⁴

Meanwhile, it has been argued that OA archiving could even slow the transition to open access because it legitimises continued publication in subscription journals.⁴⁵ OA archiving, generally only allows access to scientific publications after an embargo period (typically ranging between 6 and 24 months), during which publishers have exclusive rights to dissemination. This in turn supports the continued payments of subscriptions for immediate access and thus safeguards, at least in part, publishers' revenues.

For the time being, OA archiving operates in parallel to, not as a substitute for, journal publishing, and this is reflected in the mixed approach adopted by the majority of European policymakers, as outlined in section 4. OA archiving can be used alongside the various immediate OA publishing models presented in this report, but deployed in isolation it appears unlikely to result in a sustainable and competitive OA publishing market.⁴⁶ Its role will be discussed in more detail in section 5.

⁴¹ See for example the post by Eisen, M. (2015). [The inevitable failure of parasitic Green open access](#) and response from Harnad, S.

⁴² Suber's (2012) book [Open Access](#) makes a strong case for the need to pursue Gold open access and OA archiving in parallel, noting 'We know that Green and Gold OA are complementary as soon as we recognize that Green is better than Gold for registration (its time stamps are faster) and preservation, and that Gold OA is better than Green OA for certification (peer review).' With the emergence of preprints in biomedicine as well as physics, however, OA archiving's role in registration may change, with preprints becoming the point of certification.

⁴³ The argument that OA archiving represents the most cost-effective way to increase access in the short to medium-term has been advanced by, among others:

- Houghton, J. & Swan, A. (2013). [Planting the Green Seeds for a Golden Harvest](#)
- Armstrong, M. (2015). [Opening Access to Research](#)
- Cambridge Economic Policy Associates Ltd. (2016). [Financial Flows in Swiss Publishing](#)

⁴⁴ Suber, P. (2012). [Open Access](#). The MIT Press, Cambridge, Massachusetts.

⁴⁵ For instance, building on Michael Eisen's [controversial observation](#) that OA archiving is 'parasitic' on journal publishing an [opinion piece](#) on Open Science argued that: "Green open access relies on toll access journals, which provide essential services to authors publishing in this model (such as management of peer review), and as a typical parasite, Green OA cannot kill its host. Limits on the host's health are limits on the growth of the parasite."

⁴⁶ Additionally, it should be noted that OA archiving is also widely used by research-performing organisations (RPOs) as a means to record and archive their own research output.

Box 3. Offsetting deals

Some subscription journals allow open access publication of individual articles for which authors pay publication fees, also known as Article Publication Charges (APCs). This publishing model, known as Gold-Hybrid, has raised concerns because RPOs believe they may end up paying twice for the same product (so-called 'double-dipping'): they purchase subscription to a journal and on top of that pay publication fees to make part of that journal freely available. A study of the UK publishing market revealed that in 2013 APCs already constitute an average of 10% of the total cost of publication (excluding administrative costs).⁴⁷

In order to address concerns about double-dipping and reduce publication costs during the transition to OA, research funders, RPOs and their representative organisations have begun negotiating deals with publishers to 'offset' the additional costs of OA publishing in Gold-Hybrid journals against subscriptions.

Offsetting can take two primary forms: some form of discount on the price paid by individual RPOs that are part of the deal, and global reductions to the cost of subscriptions in respect of increasing volumes of open access articles in Gold-Hybrid journals.⁴⁸ The discount can take different forms, such as:

- A deduction from an RPO's subscription fees of the total amount of all APC revenue paid to the same publisher the previous year;
- A spending cap whereby an RPO maintaining subscription payments to journals pays no extra to have all the outputs from its researchers made open access in those same journals;
- A discount of at least 95% on a publisher's standard APC for all authors from a subscribing RPO;
- Vouchers for subscribing RPOs to spend on APCs, to a level that is commensurate with their level of subscriptions spend.⁴⁹

Evidence on the cost-effectiveness of offsetting deals is limited, but the combined value of offset agreements to the UK higher education sector in 2015 has been estimated at £2.5m (c.€3m).⁵⁰ Agreements between Dutch university libraries and traditional academic publishers with an open access element have been actively monitored since 2015, and data on costs incurred by universities per publisher has also been collected and made public under the Government Information (Public Access) Act.⁵¹

Size of the OA market

For the purposes of this report, the scholarly publishing market is defined as the arena in which publishing services are provided in exchange for financial consideration. It therefore only includes those services that are provided to researchers and RPOs (the beneficiaries or buyers of the service) by publishers (the providers or sellers) for payment, whether cash or in kind. Other OA publishing activities, such as those supported as cost centres within RPOs, thus do not form part of the OA market.

⁴⁷ Pinfield, S., Salter, J. and Bath, P.A. (2015). [The 'total cost of publication' in a hybrid open-access environment: Institutional approaches to funding journal article-processing charges in combination with subscriptions](#). *Journal of the Association for Information Science and Technology*.

⁴⁸ In the former case, publishers stress that local discounts for a global service are notoriously difficult to calculate. For example if a single countries papers were funded to be 100% Gold OA, that countries universities would still have to purchase the non-OA content from the rest of the world. The application of offsetting at institutional level becomes distortive since due to a mismatch between the costs attributable to research-producing and research-consuming Institutions.

⁴⁹ See Jisc Collections. (2015). [Principles for Offset Agreements](#)

⁵⁰ See Lawson, S. (2016) [Report on offset agreements: evaluating current Jisc Collections deals](#)

⁵¹ See Openaccess.nl (n.d) [Publisher agreements](#) and VSNU (n.d) [Overview of costs incurred by universities for books and journals by publisher](#)

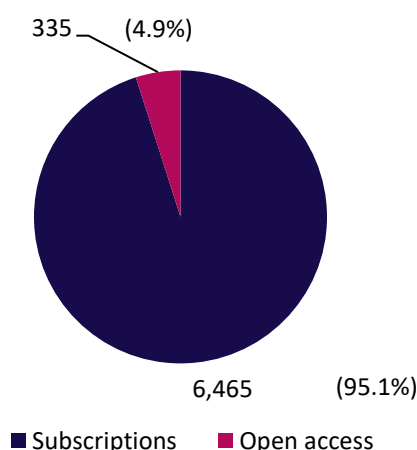
Nevertheless, these activities are part of the OA publishing sector and warrant further consideration in subsequent sections of this report.

The OA market is a subset of the scholarly publishing market, but has one crucial difference: instead of being paid for by or on behalf of the readers of the research (as in the subscription-based market), publishing services are paid for by or on behalf of the authors (Gold-APC and Gold-Hybrid) or underwritten by organisations acting in the broader interests of the scholarly community (Gold no-APC).

The open access market represents a small but growing part of the journal publishing market. It generated 4.3% of journal publishing revenues in 2014⁵², raising to an estimated 4.9% in 2015 (see Figure 1).⁵³ For STM disciplines, Outsell estimated growth of approximately 3.5% in both journals and STM revenues in 2014, compared to just over 15% growth in revenue from OA journal articles in the same year. The market was projected to keep growing by a similar amount each year until 2017, going from \$172 million in 2012, to \$335 million in 2015, and \$452 million by 2017. However, a more recent study by Delta Think indicates that the rate of growth may be slowing, to between 10 and 15% per annum.⁵⁴

While some OA publishers are profitable and sustainable in their own right,⁵⁵ at the present time a significant proportion of the OA market remains reliant on the subscription market, either explicitly (under the Gold-Hybrid model where journals are supported by both APCs and subscriptions), or implicitly, whereby publishers cross-subsidise OA titles from subscription revenues. Because the OA market does not exist as an entity separate from the scholarly publishing market, questions of competition and sustainability cannot reasonably focus on the OA market in isolation.

Figure 1. Publishing revenue per Outsell. 2015 (\$ million, 2015)



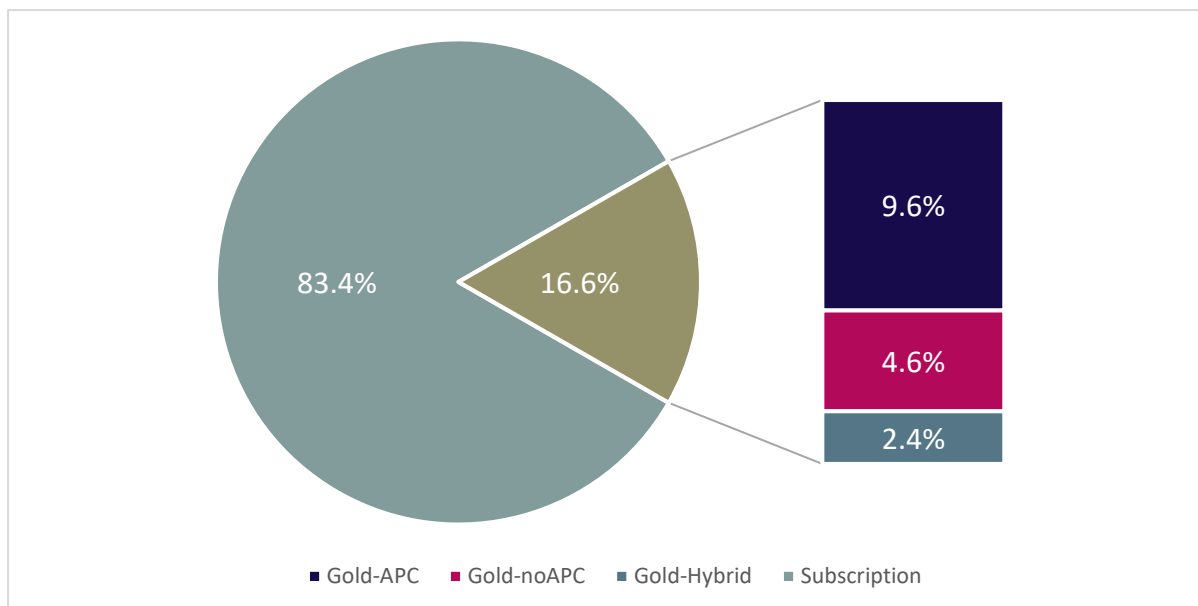
⁵² Outsell. (2015). [Open Access 2015: Market Size, Share, Forecast, and Trends](#)

⁵³ Ware, M. & Mabe, M. (2015). [The STM Report - An overview of scientific and scholarly journal publishing](#) Using STM's estimated figure of \$10 billion, OA publishing generated only 2.5% of revenues in the journal market.

⁵⁴ Delta Think (2016) [The Evolving State of Open Access](#).

⁵⁵ For example, the Public Library of Science, a not-for-profit open access publisher reported a surplus of nearly \$5m on revenues of \$46m in 2014, though this fell to a near-breakeven position on reduced revenues of \$43m in 2015. Data on the profitability of other open access publishers is scarce, but European publishers including Frontiers, MDPI and Copernicus have all developed successful open access publishing models. Following its acquisition by Springer in 2008, another major OA publisher, BioMedCentral was described by CEO Derk Haank as 'not marginally profitable but a very sound business' (2011).

Figure 2. Market share of different publishing models (as percentage of global articles, 2014)⁵⁶



As Figure 2 indicates, immediate open access models account for a substantially larger share of global article numbers (16.6% in 2014) than market revenues alone (4.9% in the same year) would suggest. Unaccounted OA expenditure within RPOs and/or services provided on a voluntary basis partly explains the gap between the two. However, the difference also reflects a pricing gap, with OA publishing being significantly less expensive than journal subscriptions per article (see section 3.2). The extent to which this reflects greater competition in the OA market, and the potential to introduce similar competitive pressures into the market as a whole, are explored in the next section.

⁵⁶ RIN et al. (2015). *Monitoring the Transition to Open Access: A report for the Universities UK Open Access Co-ordination Group*

Box 4. Publishing models: from journals to open platforms

This study is primarily concerned with the transition of scholarly journals from subscription to open access models, since journals represent the dominant model for scholarly communication at the present time. Nevertheless, there are indications that the journal could be superseded in future by open publishing platforms, which might also accommodate a much wider range of research outputs, included research data and software.

The rise of article-level metrics could see an erosion of the impact factor⁵⁷ as a measure of a journal's reputation, while improvements in indexing and discoverability tools open up alternative routes to dissemination of research. The growth of open access mega journals arguably represents one step in this direction.⁵⁸ A number of existing initiatives also point to a possible future beyond the journal, from both commercial providers (e.g. F1000, ScienceOpen) and not-for-profits/government bodies (e.g. Wellcome OpenResearch, SciELO).

Meanwhile, disaggregation of the journal's function represents another possible path of development. Several independent peer-review services have emerged in recent years, representing a separation of certification from the journal's other functions, for example.⁵⁹ Meanwhile, developments in machine-learning and artificial intelligence open up the possibility of automating elements of the editorial process, though few would argue that they can replace human judgement and peer review entirely.⁶⁰

To date, however, the consensus view in the publishing community remains that something like the journal will continue, even though the ways its functions are delivered may evolve, and some new functions may be added.⁶¹ Furthermore, the business models used to support a journal, mega-journal or platform share many common elements, as do the factors associated with the development of a sustainable and competitive OA market. Journals in 2030 may well look somewhat different than today, but it is unlikely that a medium which has endured successfully for centuries will disappear within the foreseeable future.

⁵⁷ A journal's impact factor (IF) is often used as a proxy for reputation. The IF calculates the yearly average number of citations to recent articles published in that journal, and it is thus considered a credible measure of the relative importance of a journal within its field. Journals with higher impact factors are often deemed to be more important than those with lower ones.

⁵⁸ This journal model consists of three key parts: full open access with a relatively low APC; rapid "non-selective" peer review based on "soundness not significance" (i.e. selecting papers on the basis that science is soundly conducted rather than more subjective criteria of impact, significance or relevance to a particular community); and a very broad subject scope. See Ware, M. (2015). *Evolution or revolution? Publishers' perceptions of future directions in research communications and the publisher role*

⁵⁹ See, for instance, an *incomplete list of independent peer-review platforms*.

⁶⁰ For example, Meta, and AI-powered search engine designed to help scientists to search, read and tie together more than 26 million science research papers, provides quantitative tools that complement the qualitative expertise that editors bring to their tasks. See Yang et al (2016), *Enabling editors through machine learning*.

⁶¹ Ware, M. (2015). *Evolution or revolution? Publishers' perceptions of future directions in research communications and the publisher role*

3. Competition and sustainability in the OA publishing market

Competition in the scholarly publishing market is inhibited by the non-substitutability of journals, lack of transparency and high levels of market concentration. Meanwhile, the revenue gap between subscription and OA business models limits the rate of transition. The case for market intervention rests on the status of scientific knowledge as a public good, disseminated by private actors.

3.1 Competition in the scholarly publishing market

Competition represents the ability of all economic actors to freely participate in the market. Competition within the scholarly publishing market is affected by two primary variables: barriers to entry and market concentration.

Journal non-substitutability as a barrier to entry into the market

The scholarly publishing market does not have the barriers to entry that are most common in other markets, namely the need for upfront capital investment (a financial barrier) and restrictive legislation (a regulatory barrier). As seen above, technological advances have reduced the cost of publishing to the point where finance is rarely a significant barrier for new operators, while on the regulatory side OA policies actively encourage the rise of new OA publishers.

The main barrier to entry for new publishers is the strong academic bias towards publishing in established (non-OA) journals with a reputable brand.⁶² Part of the problem, especially in countries with a less developed OA landscape, is that OA journals are often perceived as low quality - particularly as their image has been tarnished by predatory journals.⁶³ But a far more important factor is the *non-substitutability* of top-tier journals within a given discipline.⁶⁴ Non-substitutability affects both researchers as authors and researchers as readers. Authors attach great importance to publishing in the

⁶² See, among others: J. Wilsdon et al. (forthcoming), Next-generation metrics: Responsible metrics and evaluation for open science, Report of the European Commission Expert Group on Altmetrics

⁶³ This point has emerged in several consultations with OA experts that were undertaken as part of this study; the problem was considered especially acute in Eastern European countries, particularly among researchers from social science and technical disciplines.

⁶⁴ Substitutability is in fact a proxy for competition. The EC states that a market is competitive if customers can choose between a range of products with similar characteristics (demand-side substitutability) and if the supplier does not face obstacles to supplying products or services on a given market (supply-side substitutability). For more information, see EC (1997). [Definition of relevant market](#)

most reputable journals within their discipline or field⁶⁵ – which generally corresponds to the journals with the highest impact factor. This deeply entrenched cultural bias is frequently reinforced and perpetuated by the way in which funders and institutions reward authors based on the reputation of the journal in which they publish.⁶⁶ The combination of legacy academic culture and perverse behavioural incentives creates tension between the ‘abstract’ goal of OA and the very tangible goal of increased visibility and career progression, and exerts a formidable influence on authors’ publication choices.⁶⁷

From a reader perspective, established journals become ‘must-have’ titles and effectively operate as their own mini-monopoly within a discipline or field.⁶⁸ Meanwhile, article-level access is by definition a monopoly granted by copyright.⁶⁹ Because many of these titles are subscription-only, RPOs currently spend a large part of their budget purchasing access to top-tier journals, reducing their ability to pay for OA publishing. This problem has been exacerbated by the spread of “Big Deal” packages, through which RPOs can purchase access to a bundle of journals and articles in a given discipline at a discounted price. While this decreases the price paid by institutions for a single journal, RPOs end up purchasing access to less important subscription journals from the same publisher and have little budget left to subscribe to smaller journals or publishers. Criticisms have also been levelled against the fact that “Big Deals” are usually protected by non-disclosure clauses, which raises doubts about their actual cost-effectiveness.⁷⁰

An important caveat is that barriers to entry into the market are not insurmountable. A sizeable part of the scholarly community is receptive to open access and sees benefit in terms of career, visibility and broader scientific advancement. This is particularly true for the life sciences, where the positive disposition of the research community, coupled with clear leadership from research funders such as the US National Institutes for Health and Wellcome,⁷¹ has contributed to the rise of successful OA publishers such as PLOS, eLife and Hindawi.⁷² Similarly, OA platforms such as ArXiv and SCOAP⁷³ have played a

⁶⁵ The Author Insights 2015 survey, run by Nature Publishing Group, reveals that the reputation of the journal is ‘very important’ or ‘important’ for 97% of respondents (up 1% from 2014), with the other most important factors being: relevance to the discipline (96%), quality of the peer review (92%) and journal impact factor (90%). The option to publish via OA was fourth from last in the ranking of factors, with only 36% of authors deeming it ‘important’ or ‘very important’ (down from 37% in 2014). For more information, see Nature Publishing Group (2015). [Authors Insights 2015 survey](#)

⁶⁶ Rewards to authors for publishing in high IF journals can be both informal and formal (i.e. embedded in a funder’s research assessment). There is considerable variation between countries as well as disciplines.

⁶⁷ This is consistent with the findings of the 2016 report from CIBER [Early career researchers: the harbingers of change?](#), which shows the importance of a journal’s reputation in an early career researcher’s publication choices.

⁶⁸ Pinfield, S. (2013). [Is scholarly publishing going from crisis to crisis?](#)

⁶⁹ The point is made quite explicitly in this [pamphlet](#) from Harvard (2013).

⁷⁰ Bergstrom, T.C., Courant, P.N., McAfee, R.P. & Williams, M.A. (2014) [Evaluating big deal journal bundles](#)

⁷¹ See [NIH Public Access Policy](#) and the [Wellcome Trust’s open access policy](#)

⁷² PLOS [defines itself](#) as “a nonprofit Open Access publisher, innovator and advocacy organization with a mission to accelerate progress in science and medicine by leading a transformation in research communication”; eLife is a leading not-for-profit OA publisher in the life sciences and biomedicine; Hindawi is a successful commercial publisher of peer-reviewed, fully open access journals.

⁷³ ArXiv is an online repository of electronic preprints of scientific papers in the fields of mathematics, physics, astronomy, computer science, quantitative biology, statistics, and quantitative finance; SCOAP³ (Sponsoring Consortium for Open Access Publishing in Particle Physics) is a partnership of over three thousand libraries, funding agencies and research centres dedicated to making journals in those disciplines open access.

major role in the fields of physics, mathematics, and computer science. However, this does not change the fact that the majority of the academic community is not incentivised to publish in open access journals. Furthermore, there is increasing evidence that successful OA publishers are likely to be bought by the major commercial publishers before they can become a significant threat.⁷⁴

Box 5. Lack of transparency in the publishing market

The subscription model has been widely criticised for lacking transparency in the price paid by RPOs to access their literature.⁷⁵ The problem originates in the fact that subscription contracts are negotiated by publishers with individual RPOs or university consortia, and each deal is covered by commercial confidentiality – meaning that RPOs cannot benchmark their prices against those paid by others, but only against what they had paid previously. Offsetting deals – which seek to offset the price paid by RPOs for subscriptions and APCs on a range of journals – can be even less transparent than subscriptions since they are based on hard-to-verify assumptions (such as the future number of OA articles published and the impact these have on publishers' profits).

The lack of transparency around pricing hampers competition in the market, as smaller publishers find it difficult to benchmark their current pricing options against those of their larger competitors. There have been attempts in several countries to increase transparency around subscription agreements via freedom of information requests,⁷⁶ especially in the UK,⁷⁷ Switzerland, the Netherlands⁷⁸ and Finland.⁷⁹

APCs provide one way of overcoming lack of transparency by attributing a price to each article made open access. However, APC prices can also prove quite obscure due the range of licences, discounts, memberships and other variables affecting the price paid by each institution.⁸⁰ Moreover, the Gold-Hybrid model is perhaps even less transparent because the price paid for subscriptions and APCs are not linked in the negotiations with universities, resulting in concerns over double-dipping (see Box 3). Finally, RPOs themselves are often unaware of what they are actually paying in publication fees due to the low level of monitoring in the global APC market, and the significant proportion of APCs paid from departmental and project funds.⁸¹

Market concentration

Even if new publishers are free to enter a market, an excessively concentrated market, such as a monopoly or oligopoly, hampers their ability to compete and acquire market share. A concentrated market is not necessarily a market with few actors, but rather a market that is *largely dominated* by a few actors.⁸²

⁷⁴ Examples include BioMedCentral (acquired by Springer in 2008) and Co-Action Publishing (acquired by Taylor & Francis in 2016)

⁷⁵ For a historical perspective, see: Moore, K. & Duggan, L. (2011). [Transparency and Publisher Pricing Models](#)

⁷⁶ See Gowers, T. (2014). [Elsevier journals — some facts](#) and Gutknecht, C. (2015). [Zahlungen der ETH Zürich an Elsevier, Springer und Wiley nun öffentlich](#)

⁷⁷ The data on cost of publication in the UK is available [here](#)

⁷⁸ The Dutch data is available [here](#)

⁷⁹ Data from Finland is available [here](#) and [here](#)

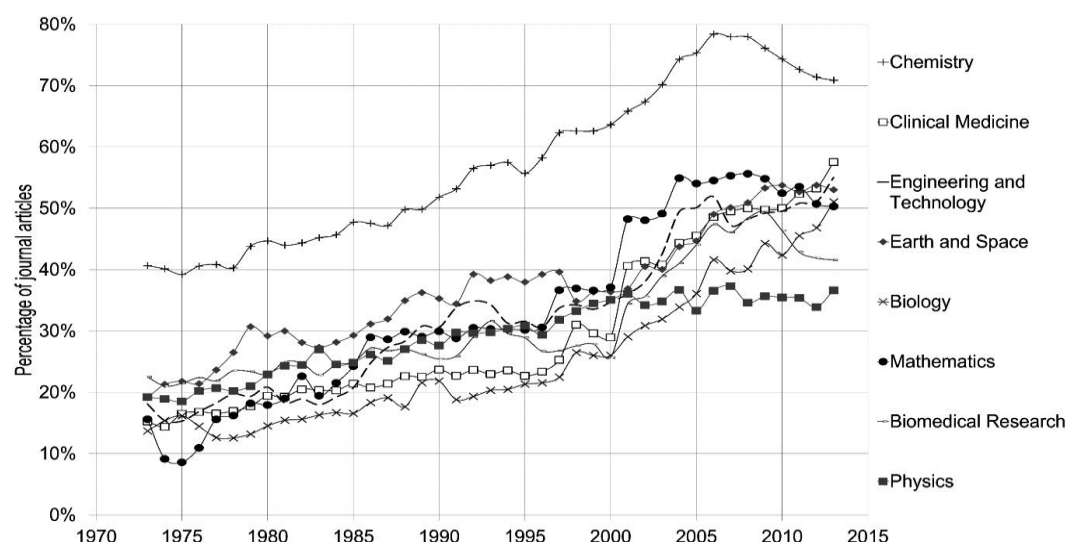
⁸⁰ There have been attempts to increase transparency in this field. Jisc Collections has been gathering and openly releasing [data on article processing charge \(APC\) payments](#) made by UK higher education institutions

⁸¹ euroCRIS. (2016). [Modeling APC payments in CERIF](#)

⁸² For instance, the Herfindahl-Hirschman Index (HHI) calculates concentration ratios by squaring the market share of the fifty largest firms in an industry.

While the characterisation of the scholarly publishing market as an oligopoly may seem somewhat exaggerated in a global market with over 5,000 journal publishers,⁸³ the current market configuration makes it hard for small publishers to grow and compete with large publishers, and keeps prices artificially high. Progressive market consolidation has meant that a few large commercial companies have gained market share largely at the expense of smaller non-profit publishers, such as learned society publishers. The market is currently dominated by five commercial publishers owning many of the most prestigious journals and accounting for more than 50% of all articles published in 2013.⁸⁴ There are important disciplinary differences, however, with concentration levels ranging from 70% of published papers in the social sciences to just 20% in the humanities. STEM disciplines are somewhere in between these two extremes, with most disciplines around the 50% mark, mainly because of the strength of their learned societies.⁸⁵ As shown in Figure 3, the increase in concentration seems to have levelled off over the last decade (physics and mathematics) or even decreased (biomedical research and chemistry). In the former case this may be linked to the popularity of the ArXiv pre-prints repository, while in biomedicine it can be attributed to the success of not-for-profit OA publishers such as PLoS and – more recently – eLife. Some have suggested that concentration is somewhat endemic to the publishing market, and that it would recur even under a full OA publishing system based on APCs.⁸⁶

Figure 3. Market concentration in STEM disciplines - Percentage of papers published by the five major publishers, by discipline in the Natural and Medical Sciences, 1973–2013⁸⁷



⁸³ Elsevier's Scopus database lists over 5,000 journal publishers globally. On top of that, a 2008 study by RIN estimated around 2,000 active small publishers¹, many of which **may not qualify for inclusion in Scopus** (for instance, because they do not have an English homepage or because editors do not have sufficient geographical diversity). **The 2015 STM Report** estimates that total at between 5,000-10,000.

⁸⁴ The five largest scholarly publishers are: Reed-Elsevier, Springer Nature, Wiley-Blackwell, Taylor & Francis, and Sage. See Larivière, V., Haustein, S. & Mongeon P. (2015). **The Oligopoly of Academic Publishers in the Digital Era**

⁸⁵ Ibid.

⁸⁶ Reckling, F. (2016). **Analysis of the Publication Costs of the Austrian Science Fund (FWF) in 2015**.

⁸⁷ Reproduced from Larivière, V., Haustein, S. & Mongeon P. (2015). **The Oligopoly of Academic Publishers in the Digital Era**.

Non-substitutability and market concentration have combined to create, in effect, two parallel markets. On one side, the large commercial publishers operate in a seller-driven market where prestigious journals are still the most popular choice for authors, and inelastic demand allows them to keep prices up. On the other side, full-OA journals operate in a buyer-driven market, where they struggle to grow due to entrenched bias and constrained availability of funding.⁸⁸ These publishers have a minority market share, use price and short publication times to attract demand, and often operate with little or no profits. Moreover, the subset of publishers that do not charge APCs struggles to establish sustainable business models that work at scale. There are a few exceptions in the form of large and established OA journals and mega-journals (such as PLoS ONE). These journals charge APCs and turn a profit despite having prices below the level of top-tier commercial journals,⁸⁹ but despite their success they have not made a sizeable impact on the scholarly publishing market outside certain disciplines.⁹⁰ It can also be argued that the journals' profitability relies in part on their adoption of peer-review criteria based on methodological soundness alone ('technical peer review') rather than perceived importance or impact, resulting in lower editorial costs than traditional journals.

Box 6. Market concentration and the dispersed buyer problem

Market concentration on the publisher side is compounded by the so-called 'dispersed buyer problem'.⁹¹ Large publishers, owning many of the journals that enjoy a position of quasi-monopoly within individual disciplines, often negotiate subscription deals with individual RPOs, or consortia of RPOs. If one considers that the number of HEIs globally is estimated to be up to 40,000⁹² (many of which have small library budgets), it is clear how the dispersed nature of buyers can lead to asymmetry of bargaining power between publishers and RPOs. This too can be seen as an aspect of the substitutability problem: large publishers can push for high prices, and even afford to lose some customer as a result, while RPOs can much less afford losing access to top journals in various disciplines.

This fragmentation on the buyer side happens at different levels. Individual research institutions are often non-specialised, meaning that they have to cater for the need of researchers operating in various disciplines – each having their own must-have journals. RPOs also have very different priorities and financial availability, meaning that it is often difficult to negotiate subscription deals collectively at the national level. Similarly, countries rarely coordinate negotiations with publishers at international level. Large publishers are global companies, and for them even a research-intensive country the size of the UK or Germany is only part of a much larger commercial market. Protecting the integrity and profitability of that market is the publishers' legitimate aim, and driving a hard bargain with them is a tall order for dispersed buyers.

⁸⁸ For further discussion on the emergence of two parallel markets see Björk, B.C. and Solomon, D.J. (2014). [Developing an Effective Market for Open Access Article Processing Charges](#) and Björk, B.C. (2017), Scholarly journal publishing in transition– from restricted to open access. Accepted version (after peer review, but prior to final copyediting) of an article to be published in *Electronic Markets, The International Journal on Networked Business*, Special issue on "Transformation of the academic publishing market", DOI: 10.1007/s12525-017-0249-2

⁸⁹ R. Van Noorden. (2013). [PLOS profits prompt revamp](#), *Nature News*

⁹⁰ RIN et al. (2015). [Monitoring the Transition to Open Access: A report for the Universities UK Open Access Co-ordination Group](#) estimates the total number of peer-reviewed articles made OA to be around 25% in life sciences, 13% in scientific and technical disciplines, 10% in social sciences and 7% in the arts and humanities.

⁹¹ Tickell, A. (2016). [Open access to research publications: Independent advice to the UK government](#)

⁹² See the [Ranking Web of Universities data](#) for more information

3.2 Sustainability in the scholarly publishing market

The second market characteristic under consideration is sustainability. Sustainability implies a price equilibrium that leads to the greatest possible continued access to high-quality scientific research. A sustainable market therefore balances the interests of the suppliers of publishing services (publishers and learned societies) with those of beneficiaries (RPOs and research funders).

Supply-side sustainability

To be sustainable, publishers need to recover their costs, both direct and indirect, and generate sufficient surplus or profit to support innovation and growth. The latter point is significant, since demand for publishers' services continues to grow as global article volumes rise.⁹³ For-profit publishers further seek to generate a return on shareholder funds, while many not-for-profit publishers rely on surpluses to further their missions.

Publishers tend to self-identify with one of three broad groupings, corresponding to the major international trade associations:

- International scientific, technical and medical (STM) publishers
- Learned and professional society publishers
- Open access publishers

There is significant crossover between these groups, as well as wide variations in the size and missions of their constituent members. However, as a rule, STM and learned and professional society publishers remain highly reliant on the subscription model, and have higher cost bases than open access publishers. From their perspective, sustainability is closely associated with the ability to maintain current margins and market share.⁹⁴

It is unclear whether Gold-APC, at present the primary alternative to subscription revenues, can lead to sustainability on these terms. A 2014 study looked at over one hundred thousand articles published in 1,370 fee-charging open-access journals active in 2010, and found that full-OA journals generally charged around \$1,400 (€1,315) per APC, while the figure for high-impact factor Gold-Hybrid journals for the six biggest publishers was in excess of \$2,700 (€2,537).⁹⁵ Another study reports a mean APC cost of €1,780 and a median of €1,591.⁹⁶ With revenues from subscriptions averaging over \$5,000 (€4,700) per article,⁹⁷ moving rapidly to a Gold-APC model presents a significant risk to sustainability for established publishers. The financial obstacles are further exacerbated by the potential loss of the significant revenues that publishers earn from channels other than library subscriptions in an OA world

⁹³ Article volumes have been growing at 3% per year for some two hundred years, according to the [2015 STM Report](#).

⁹⁴ It is important to acknowledge that publishing surpluses generated by learned societies are typically used to promote the health of the discipline, in furtherance of their charitable objectives. However, as Armstrong (2015) has observed, 'a principle of competition policy is that exploitative conduct cannot be justified by the use subsequently made of monopoly profits, however benign'. [Opening Access to Research](#), p.25.

⁹⁵ Björk, B. & Solomon, D. (2014) [Developing an Effective Market for Open Access Article Processing Charges](#)

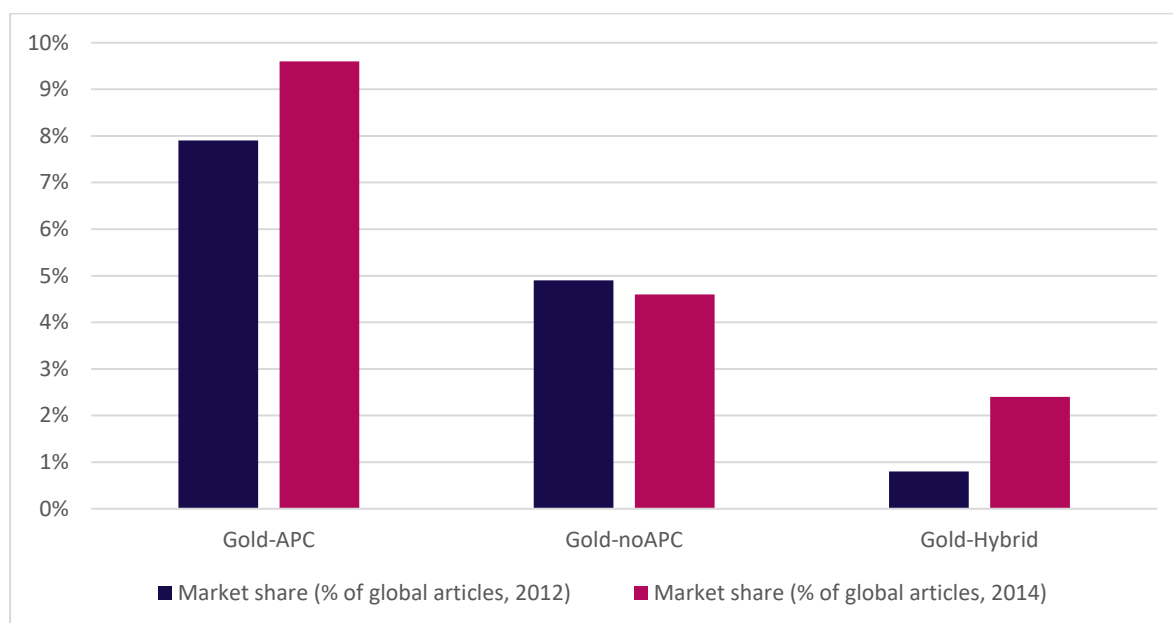
⁹⁶ The [OpenAPC dataset](#) estimate is based on €42m of publication fee spending by European research organisations, as at January 2017. However, it is primarily comprised of data from German institutions which are subject to a €2,000 price cap and do not fund Gold-Hybrid APCs, which is likely to depress the reported figures.

⁹⁷ Van Noorden, R. (2013). [Open access: The true cost of science publishing](#).

– including licensing revenues and corporate subscriptions.⁹⁸ It is difficult, to say the least, for publishers to pursue a rapid transition to OA when it appears to be at odds with the interests of shareholders or society members.

The growth in uptake of Gold-Hybrid OA in recent years (see Figure 4) thus reflects not only the increased availability of funding for this purpose, but also a strong preference for the Gold-Hybrid model over ‘flipping’ journals to fully open access business models.⁹⁹

Figure 4 Uptake of open access business models (2012-14)¹⁰⁰



Open-access (Gold-APC) publishers, meanwhile, do not bear the legacy costs of subscription publishers, and have been able to develop viable business models based on much lower per-article revenues. Gold

⁹⁸ The International Association of STM Publishers advised us that 10-15% of its members’ revenues come from corporate subscriptions, with a further 10% from rights income (reprints etc.). A 2014 [study commissioned by the Dutch government](#) (in Dutch) estimated that, in the Netherlands, private and corporate subscribers are between 5% and 10% of the total, while a [2008 study by Research Information Network](#) found that journal publishing revenues in the UK came primarily from academic library subscriptions (68-75% of the total), followed by corporate subscriptions (15-17%), advertising (4%), membership fees and personal subscriptions (3%), and various author-side payments (3%).

⁹⁹ A recent Harvard study lists 85 journals which have converted from a subscription model to a variety of open access business models, and indicates that other examples were found in the course of the study. Solomon, D. J., Laakso, M. and Björk, B.C. (authors). Suber, P. (editor) (2016). [Converting Scholarly Journals to Open Access: A Review of Approaches and Experiences](#). As a proportion of the nearly 35,000 peer-reviewed journals worldwide, the number of conversions remains vanishingly small (see [STM report](#) (2015), p6).

¹⁰⁰ Data taken from RIN et al. (2015). [Monitoring the Transition to Open Access: A report for the Universities UK Open Access Co-ordination Group](#).

no-APC publishers are primarily interested in the ability to increase revenues at a rate not lower than the growth of activities, as follows:

- 1) **Fully scalable:** when revenues are derived directly from, and scale with, the publishing output, as in the case of full OA journals.¹⁰¹
- 2) **Partly scalable:** when revenues are not derived from publishing outputs but there is a proven revenue source that can support growth of such activities, such as Gold no-APC journals supported by a consortium of institutions or philanthropic organisations.¹⁰²
- 3) **Not scalable:** when revenues are not derived from publishing activities and there is limited scope from increasing revenues from existing sources, as in the case of small Gold no-APC journals in single institutions.

From this perspective, a sustainable market is one where most publishers have the potential to achieve and accommodate growth in publishing activities via fully and – to some extent – partly scalable business models. The question of profit margins is less important than the ability to scale revenues in a way that can sustain the publishing operation as it acquires market share. Once these activities become significant as a share of the overall market, this relies on the reallocation of subscription funding to Gold-

Box 7. The impact of submission fees on publication quality and cost

Another potential revenue source for publishers are submission fees - tolls that authors pay to submit a manuscript for peer review. Submission fees are much lower than publication fees, and their use would provide two clear benefits for top-tier journals.

First, they would reduce the number of speculative submissions, thus reducing the number, and increasing the quality of the manuscripts the editors have to process. Secondly, submission fees can go some way to cover costs in journals with high-rejection rates. For this reason, submission fees could be used in conjunction with publication fees (APCs) as an alternative business model in top-tier journals.

Submission fees have substantial drawbacks which have prevented their widespread adoption to date.¹⁰³ They add complexity to payment systems, which is unattractive to institutions and funders – so a straightforward payment mechanism would have to be established (such as, for instance, institutional accounts).

Funders also have reservations about meeting the costs of submission because this can be seen as payment for non-publication, although this problem would not be too acute if submission fees remained at low level. Most importantly, their adoption has probably been stopped in its tracks by the fact that unilateral adoption of submission fees could put a journal at a serious competitive disadvantage. It is hard to see how this typical 'collective action problem' would be solved by using market mechanisms only.

Concerted action by funders and policy-makers would be needed to broker the adoption of submission fees beyond the current level. At the present time, it is not clear that sufficient political will and consensus exists to pursue such a strategy in earnest, but it may merit attention in future as the problem of transitioning high-rejection rate journals to open access becomes more acute.

¹⁰¹ An example of a Gold no-APC platform that is seeking to achieve a scalable publishing model is the [OpenEdition Freemium programme](#). The programme publishes open access journals and books in HTML format, but offers PDF and ePub formats for fee-paying partners (libraries, HEIs and other RPOs).

¹⁰² Examples of partially scalable revenue models are OA publishing consortia such as the [Open Library of Humanities](#), the [Open Access Network](#) and [SCOAP³](#).

¹⁰³ These points are raised more extensively by Ware, M. (2010). [Submission Fees - A tool in the transition to open access?](#)

APC and Gold no-APC models, and/or the injection of additional funding by libraries and research funders.¹⁰⁴

Demand-side sustainability

Sustainability for recipients of publishing services measures the ability of readers to access, in perpetuity, and of authors to publish, scientific research at an affordable cost. By aiming to make scientific research freely available to anyone, open access removes readers from the equation: the cost of publishing services can therefore be covered by authors' sponsors (under Gold-APC) or by publishers' sponsors (under Gold no-APC).

Gold APC shifts publishing costs from readers, or their representatives, to authors, research funders or RPOs. In some respect, this is the most scalable and transparent model in the sense that APCs provide a direct connection between the publishing activity and the price paid. The issue therefore becomes the pricing of APCs, and sustainability is achieved when there is a convergence between publishing costs and prices paid by, or on behalf of, authors. Under perfect market conditions, such convergence would be driven by competition – and the transparency of the APC model undoubtedly increases competition compared to the subscription market.

Box 8. The cost of publishing

Despite the advantages brought by technology, publishing still presents significant costs. The Houghton report estimated the cost of publishing a journal article online in 2009 at \$3,509 (€3,302) for traditional publishers and \$2,289 (€2,154) for open access publishers (the difference between the two costs would be largely covered by reduced marketing and sales costs, simplified administrative processes and lower profit margins for OA publishers).¹⁰⁵ More recently, the OA journal eLife has estimated its own publishing costs per article at £3,085 (€3,569), of which roughly 40% are fixed costs (article processing, features and marketing) and the remaining 60% is marginal costs (editors, online systems, staff and collection costs).¹⁰⁶

Marginal costs are substantially affected by the stringency of the peer review process, and by article rejection rates. High-reputation journals tend to receive a large number of submissions, all of which need to be processed and reviewed. The editorial board generally has a vetting role to ensure that articles that are submitted to peer review are of a good quality. While this reduces the workload involved in organising peer reviews, it also means that editors spend considerable time on desk-based reviews. Almost a third of eLife expenditures were directed to the editorial board in 2015, for example.¹⁰⁷

Nevertheless, there is evidence that journal publishing can be delivered substantially more cheaply than these figures suggest. For example, the LingOA project (see Box 9) publishes articles with Ubiquity Press at a cost of only €400 per article, in addition to a low fixed cost base. Rejection rates for these journals vary between 20% and over 70%, indicating that selectivity does not always result in a high cost per article. The project also promotes a transparent approach to APC pricing, by itemising the cost structure of its APCs in detail.

Regulatory intervention in this case would only be justified if competition is distorted (e.g. by the persistence of disciplinary monopolies caused by journal non-substitutability), if the different ability to

¹⁰⁵ Houghton, J, Rasmussen, B., Sheehan, P., Oppenheim, C., Morris, A., Creaser, C., Greenwood, H., Summers, M. & Gourlay, A. (2009). *Economic implications of alternative scholarly publishing models: Exploring the costs and benefits*

¹⁰⁶ Patterson, M. (2016). *Inside eLife: setting a fee for publication*

pay in a global market penalises researchers from low and mid-income countries, or if the costs for research-intensive universities become unsustainable. With regards to the first point, we have seen above that publishing costs for top journals are on average much higher than current APCs due to a combination of the large number of submissions editors have to deal with, rigorous peer review processes and higher profit margins. Shifting large numbers of established journals from a subscription or Gold-Hybrid to Gold-APC model would probably mean accepting higher per article prices in some instances, but with increased scope for price differentiation based on journal reputation, quality and rejection rates.

The second problem appears to be thornier. A sustainable open access market is one that not only ensures that all *published* research is made freely available for everyone to read, but that all researchers have the freedom to publish open access. Under the Gold-APC model, authors in low and middle-income countries could be excluded from publishing in internationally-prominent publications, so publishers provide discretionary publication waivers.¹⁰⁸ However, European countries are not normally eligible for these waivers and our case studies reveal that APCs are already regarded as too expensive across Southern and Eastern Europe APCs. These problems may be solved – at least in part - when the transition to OA is complete – and in fact, one study suggests that the worldwide adoption of an APC model could be cheaper for many universities, though not all, compared to journal subscriptions.¹⁰⁹ However, during the transition APC costs are likely to remain unsustainable in many countries: this is especially the case for researchers publishing in Gold-Hybrid journals, which have high APCs and also present the problem of ‘double dipping’ (see Box 3). For these reasons, some observers have reservations about the sustainability of the APC model.¹¹⁰

Finally, shifting publishing costs towards authors has strong distributional implications in that a relatively small group of research-intensive universities could end up paying most of the OA publishing bill. The implications of this problem have been explored in the University of California, Davis and the California Digital Library’s ‘Pay It Forward’ study (2016). The project focused on large, research-intensive universities in North America, and defined sustainability as:

“...costing those institutions roughly no more than, and ideally considerably less than, current journal subscription costs for comparable journals today, with a rate of growth that will be possible for these institutions to support over time”¹¹¹

Although it is widely accepted that costs for research-intensive universities or their funders might go up during the transition phase, the desire to maintain costs at the level of existing subscriptions, or less, in perpetuity presents a significant sustainability challenge. If research-intensive universities and their

¹⁰⁶ Patterson, M. (2016). [Inside eLife: setting a fee for publication](#)

¹⁰⁷ Patterson, M. (2016). [Inside eLife: What it costs to publish](#)

¹⁰⁸ A graded pricing policy that reflects the different ability to pay among countries would make the APC market more sustainable. See, for instance, the [policy implemented by Wiley Open Access Journals](#).

¹⁰⁹ Houghton, J. & Swan, A. (2013). [Planting the Green Seeds for a Golden Harvest](#)

¹¹⁰ Ware, M. (2015). [Evolution or revolution? Publishers’ perceptions of future directions in research communications and the publisher role](#)

¹¹¹ Mellon Foundation. (2016). [Pay it forward - Investigating a Sustainable Model of Open Access Article Processing Charges for Large North American Research Institutions](#)

fundors are not prepared to pay more than they currently pay for subscriptions, RPOs with fewer publications pay considerably less than what they are paying now, and some existing readers do not pay at all (e.g. industry), there will likely be a considerable gap between what authors pay and the revenues expected by publishers. As suggested in the 'Pay It Forward' report, research funders may then have to intervene: 'a flexible funding model is necessary to allow research-intensive institutions to combine funding sources to cover APCs, while containing costs over time.'¹¹² However, so far only limited thought has been given to how such a flexible funding model would work in practice.

Overall market sustainability

The publishing market as a whole is sustainable – within the parameters set by the open access imperative – when publishing services are underpinned by stable and scalable revenues, authors can publish their research open access at affordable prices and readers are able to access journal articles free of charge. Collectively, the market must enable efficient and high quality dissemination of scientific information.¹¹³

As seen above, achieving this difficult balancing act from the current situation of market imbalance will require a decisive shift of resources from subscription towards full-OA and Gold no-APC models – but this is likely to leave a considerable spending gap which might have to be filled through efficiencies. At one end of the spectrum, Gold-Hybrid is tilted towards supplier sustainability and liable to reinforce oligopolistic market conditions. It has the potential to increase access more quickly than other routes, but appears an unsustainable proposition in countries with limited financial capacity. At the other end of the spectrum, Gold no-APC publishing models place the burden on OA publishers (and their sponsors) to sustain their operations despite a low market share (particularly in Europe and North America), cultural barriers in the academic community and underdeveloped business models.¹¹⁴ This can have a negative impact on the quality and scalability of publishing services. The Gold-APC model falls in between these two extremes: it is still beyond the ability to pay in many countries,¹¹⁵ but there does not seem to be great scope for publishers to reduce APCs, with some arguing the model is unlikely to be viable for highly-selective journals.¹¹⁶ Moreover, Gold-APC still faces cultural barriers to adoption and,

¹¹² Mellon Foundation. (2016). [Pay it forward - Investigating a Sustainable Model of Open Access Article Processing Charges for Large North American Research Institutions](#)

¹¹³ A recent [Statement on scientific publications by three national Academies](#) (Academie des sciences, Leopoldina, and Royal Society) draws attention to the rise of low quality 'pseudo-journals', and the need to protect the integrity of the scientific record by ensuring existing and emerging journals follow best practice in terms of peer review.

¹¹⁴ A particular concern for Gold no-APC publishers which have 'flipped' journals from a subscription model, but do not have the rights to use the original journal title, is the two-year timeframe before they can be considered for inclusion in Clarivate Analytics' (formerly Thomson Reuters) [Journal Citation Reports](#). This prevents researchers in some countries, particularly in Asia, from submitting to the journal due to institutional requirements only to publish in JCR-indexed journals.

¹¹⁵ Initiatives such as [Research4Life](#) provide free or low-cost access to scholarly research to developing countries; these initiatives are, at least in part, 'costed into' the price paid by developed countries for subscriptions, and partly supported by governmental actors. Similarly, OA journals provide APC waivers and discounts for researchers in developing countries – which are cross-subsidised by researchers paying APCs in developed countries. It is conceivable that – in a fully OA world – a similar approach could be taken based on countries' ability to pay, both in the APC market and with offsetting deals.

¹¹⁶ Crotty, D. (2016). [Can Highly Selective Journals Survive on APCs?](#) The Scholarly Kitchen.

given the difficulty of displacing subscription journals in the short-term, it presents additional systemic cost for the research community.

The existing subscription promotes supplier sustainability, at the expense of buyers. Market sustainability which achieves equitable access for both readers and authors is likely to require targeted intervention to upscale Gold no-APC publications, make the price of APCs flexible enough to accommodate different spending capacities across countries, and help research-intensive universities meet the cost of their extensive publishing activities – whilst also ensuring that prices reflect the actual costs incurred by publishers. Some possible interventions will be discussed in section 5, while the next section will explore on what basis such regulatory interventions can be justified.

3.3 Open access to scientific knowledge as a public service

A laissez-faire approach to the scholarly publishing market is incompatible with the goal of open access. Sufficient time has passed since the inception of the internet, and the launch of the first open-access journals, to debunk any claim that market forces alone will deliver widespread access to scientific information. There is a further case for intervention to correct the market failures of excessive concentration and journal non-substitutability. These are rooted in cultural factors within academia, but lead to a market equilibrium biased in favour of suppliers of subscription-based publishing services.¹¹⁷ The rationale for open access relies in part on the characterisation of scientific knowledge as a global public good, which should be disseminated freely for the wider benefit of society.¹¹⁸ As Wellen puts it:

*"even neoliberal governments fiercely committed to the use of market mechanisms typically ensure that the sphere of curiosity-based knowledge creation is largely structured as a commons where the creation and use of ideas is not constrained by barriers of price and permission."*¹¹⁹

The case for intervention in the scholarly publishing market can thus be viewed through the lens of public interest theory.¹²⁰

If scientific knowledge is a public good that is open and free for all, then its dissemination should be considered a public service. That is not to say that publishing services should be provided by state actors, but only that governments have the right and duty to intervene so that the service can be accessed by

¹¹⁷ As long ago as 2002 the UK Office for Fair Trading concluded 'there is evidence to suggest that the market for STM journals may not be working well', while a 2006 EC-commissioned study found a market that was 'very far away from the 'ideal perfectly competitive private market' that has been celebrated ever since Adam Smith (1776)'.

¹¹⁸ Stiglitz, J. (1999). *Knowledge as a public good*, in Kaul, I., Grunberg, I., & Stern, M.A. (1999). *Global Public Goods: International Cooperation in the 21st Century*. OUP, New York.

¹¹⁹ Wellen, R. (2013). *Open access, megajournals, and MOOCs: On the political economy of academic unbundling*

¹²⁰ Public interest theory is an economic theory first developed by Arthur Cecil Pigou that holds that regulation is supplied in response to the demand of the public for the correction of inefficient or inequitable market practices. Regulation is assumed initially to benefit society as a whole rather than particular vested interests. The regulatory body is considered to represent the interest of the society in which it operates rather than the private interests of the regulators. For an overview on the issue, see : A. Schleifer (2005), *Understanding Regulation*, *European Financial Management*, 11 (4), 439–51

all. It has become quite common to involve private actors in the delivery of public goods.¹²¹ For instance, useful parallels can be drawn between the publishing market and a liberalised energy market:

- First, both markets are guided by the overarching public interest of ensuring the widest possible access to the public good (scientific knowledge and energy respectively);
- Second, it is also in the public interest that the provision of the public service be performed as efficiently as possible so as to reduce costs for consumers;
- Third, the private sector is involved in the delivery of the public good because this is deemed to be more efficient than government monopoly; however
- Fourth, a small number of suppliers have a dominant position in the market, which would naturally lead to an oligopoly and therefore market inefficiencies without regulatory intervention.

European governments and research funders have already recognised the public interest nature of scientific knowledge. It is reflected, for example, in the Conclusions of the European Council of Ministers agreed in May 2016, which set an ambitious goal for open access in Europe.¹²² By seeing the publishing market in this light, governments can not only find a public interest justification for interventions, but can also draw from an array of public policy tools that have been used in other sectors. In theory, the justification would be strong enough for direct interventions, such as profit caps,¹²³ or mandatory service regulations. It is important to stress, however, that scholarly publishing is a highly successful European industry, and Europe is a net exporter of these services to the rest of the world.¹²⁴ Partly as a result, the approach taken by policymakers and research funding bodies to date has focused on indirect interventions – the creation of incentives and disincentives, financial support and other measures that act on the market by influencing customer behaviour.¹²⁵

The use of APC price caps by some funders, including the European Commission (see Box 12), reflects a recognition that in some cases pricing controls are justified, but these measures aim to influence authors' choices rather than control publishers' prices directly. Similarly, public-private partnerships such as Research4life reflect a common acceptance of the principle that access to scientific information should not be based solely on ability to pay.¹²⁶ This focus on influencing the market via indirect means reflects the multinational nature of the publishing industry, its value to the European economy, and the significant differences between European countries' research sectors. To be effective, though, indirect intervention in the market will need to be scaled up significantly from current levels. Section 4 will look at the current OA policy landscape in Europe, while section 5 will explore measures that promote open access in the publishing market in line with an indirect regulatory approach.

¹²¹ Ghatak, M. (2005). *Who Should Provide Public Goods? A Perspective from the Theory of Organizations*

¹²² Council of the European Union. (2016). *Council conclusions on the transition towards an open science system*

¹²³ Profit caps are not uncommon in utility markets. For instance, in the UK, the independent regulator Ofgem imposes caps on the return on investment made by energy companies. The last time such measure was adopted was 2014.

¹²⁴ Europe accounted for 28% of global STM revenues in 2013, but 40% of employment within the industry. See Ware, M. & Mabe, M. (2015). *The STM Report - An overview of scientific and scholarly journal publishing*, p. 6.

¹²⁵ See, e.g., Björk, B. & Solomon, D. (2014) *Developing an Effective Market for Open Access Article Processing Charges*

¹²⁶ See note 115, above

Box 9. FAIR OA

The Fair Open Access Network believes that the traditional model of scholarly publishing is failing to deliver fair open access for its academic authors, editors, and their research libraries. It calls instead for a researcher-centric and pluralistic publishing model, whereby public money is used to pay only for the real production costs of online publishing.

Fair open access is based on the following principles:

- The editorial board or a learned society owns the title of the journals.
- The author owns the copyright of his or her articles, and a CC-BY license applies.
- All articles are published in Full Open Access (no subscriptions, no ‘double dipping’).
- Article processing charges (APCs) are low (max. of 1000 euros), transparent, and in proportion to the work carried out by the publisher.
- No author is responsible for paying the APCs, but consortia of libraries like the Open Library of the Humanities ensure this.¹²⁷

These principles have been successfully put into practice in the LingOA project, under which four international linguistics journals have moved their entire editorial staff, authors, and peer reviewers from a traditional subscription publisher to a new Fair Open Access publisher.¹²⁸

The costs have been underwritten for a five-year period by the Association of Universities in the Netherlands,¹²⁹ and the Netherlands Organisation for Scientific Research,¹³⁰ with the journals’ continued existence thereafter guaranteed by the Open Library of Humanities.

The success of the LingOA model is attributed to grassroots support from journal editors and widespread community support from within the discipline. Linguistics is a relatively small discipline, with approximately 26,000 researchers, the vast majority of whom are a member of a single online community.¹³¹ Social media communication therefore played a crucial role in securing support for the transition from subscription to fair open access publication.

Similar initiatives are now under development in both mathematics and psychology, and as noted in Box 8, the model has been proven to work even for prestigious journals with high rejection rates. Furthermore, by ‘flipping’ existing subscription journals to an OA model, it has the potential to free up existing expenditure from library budgets. The critical ingredients for wider uptake of the model are financial support in the early stages from universities and/or funders, and a supportive disciplinary community.

¹²⁷ The **Open Library of Humanities** (OLH) is a charitable organisation dedicated to publishing open access scholarship with no author-facing article processing charges (APCs). It is funded by an international consortium of libraries who have chosen to support OLH’s mission to make scholarly publishing fairer, more accessible, and rigorously preserved for the digital future.

¹²⁸ See **LingOA** for more information

¹²⁹ See **VSNU** for more information

¹³⁰ See **NWO** for more information

¹³¹ See **The LINGUIST list** for more information

Part B

The policy dimension of open access



4. The OA policy landscape in Europe

The European Council's call for immediate open access represents a step change in OA policy within Europe. However, the policy landscape remains highly fragmented, with significant variations between European nations, and only limited alignment between European, North American and Chinese policies.

4.1 European policy context

European Commission policy on open access has evolved steadily over the last decade, culminating in the May 2016 Council Conclusions calling for a transition to immediate open access to scientific peer reviewed publications as the default by 2020.¹³² The Council recognised the fact that various OA models are possible, and invited the Commission, Member States and relevant stakeholders to pursue the transition 'in a cost-effective way, without embargoes or with as short as possible embargoes, and without financial and legal barriers, taking into account the diversity in research systems and disciplines'. This sets the overarching policy context within which the present study takes place.

4.2 The evolution of European policy on open access

The potential need for policy makers to influence the scholarly publications market has long been acknowledged. A 2006 EC-commissioned study concluded that 'policies should make sure that the market is sufficiently competitive and "dissemination-friendly"'. In particular they should address the need to:

- (i) enhance access to research output;
- (ii) prevent strategic barriers to entry and to experimentation.¹³³

Since that time EC policy has promoted enhanced access to research outputs through a number of mechanisms, including:

- 2008 – launch of open access pilot under Framework Programme 7¹³⁴

¹³² Council of the European Union. (2016). [Council conclusions on the transition towards an open science system](#)

¹³³ European Commission. (2006). [Study on the economic and technical evolution of the scientific publication markets in Europe](#)

¹³⁴ European Commission. (n.d.). [Policy on Open Access in FP7](#)

- 2011 – development of proposals for open access in Horizon 2020 (H2020).¹³⁵
- 2012 – Communication on measures to improve access to scientific information produced in Europe,¹³⁶ and Recommendation to member states on access to and preservation of scientific information¹³⁷
- 2013 – launch of H2020 and related open access policies
- 2015 – launch of the FP7 post-grant open access pilot¹³⁸
- 2016 – establishment of the open science policy platform¹³⁹

The extent to which EC policy has served to ‘prevent strategic barriers to entry and to experimentation’ is less clear. As outlined in section 3.1, open access and technical developments have allowed a number of new players to enter the market, while the trend towards ever greater market concentration has slowed in recent years, but not reversed.

4.3 Open access in European member states

The 2015 report ‘Access to and Preservation of Scientific Information in Europe’¹⁴⁰ provides a broad overview of open access policy in all 28 member states, plus Norway and Turkey. Representatives of the participating countries were asked to report their preference for OA archiving or Gold open access. Table 2 presents these results by OpenAIRE region¹⁴¹, and provides some evidence of a North-South divide, with Southern European countries highly likely to favour OA archiving, while in other respects there is no clear consensus even within individual regions. This is also the case within countries, as the report observes: ‘there is generally a system of predominance of one model with the possibility of using the other model, so a mixture of both routes results’.¹⁴² A 2016 survey report from Science Europe presents additional information on 21 OA policies across Europe (19 EU countries, plus Norway and Switzerland).¹⁴³

¹³⁵ European Commission. (n.d.). [Main references to open access in the European Commission's proposals for Horizon 2020](#)

¹³⁶ European Commission. (2012). Press release - [Scientific data: open access to research results will boost Europe's innovation capacity](#)

¹³⁷ European Commission. (2012). [Commission recommendation on access to and preservation of scientific information](#)

¹³⁸ The implementation of the FP7 post-grant open access pilot is considered further in section 5, and represents an additional instrument to improve access to research results from FP7 projects, without affecting authors' choice on how their project publications are made open access.

¹³⁹ European Commission. (2015). [New policy initiative: The establishment of an Open Science Policy Platform](#)

¹⁴⁰ European Commission. (2012). [Access to and Preservation of Scientific Information in Europe](#)

¹⁴¹ OpenAIRE website - [OpenAIRE Regional offices](#).

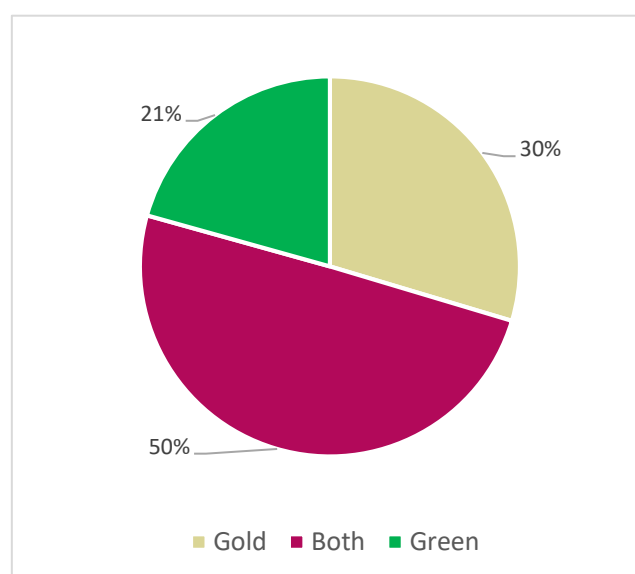
¹⁴² European Commission. (2012). [Access to and Preservation of Scientific Information in Europe](#)

¹⁴³ Science Europe. (2016). [Open Access Publishing Policies in Science Europe Member Organisations Key Results from Science Europe and Global Research Council Surveys](#)

Table 2 National OA preference by OpenAIRE region¹⁴⁴

National preference	Eastern Europe	Northern Europe	North-western Europe	Southern Europe
OA archiving	Estonia, Lithuania, Slovakia, Czech Republic ¹⁴⁵	Denmark, Norway	Belgium, Ireland,	Cyprus, Greece, Malta, Portugal, Spain
Gold (OA publishing)	Hungary, Romania, Bulgaria ¹⁴⁶	Sweden	United Kingdom, the Netherlands,	
Both models equally supported	Croatia, Poland, Latvia, Slovenia ¹⁴⁷	Finland	Germany, France, Luxembourg, Austria ¹⁴⁸	Italy

Variations in national approaches to open access can be attributed to a range of factors, but a country's relative balance between research production and consumption, and the presence or absence of a significant academic publishing industry, are undoubtedly important factors. Figure 5 shows the distribution of publications by EU countries over the period 2000-2013, based on national OA preference.¹⁴⁹ This indicates that, while 13 EU countries, or nearly half of the Union, express a preference for OA archiving, they account for only around one-fifth of the EU's scientific production. More research-intensive countries are thus significantly more likely to favour a Gold OA model, or to support both routes equally.

Figure 5. Share of EU-28 publications by national OA preference


¹⁴⁴ Table 2 summarises the findings of the 2015 European Commission report '[Access to and Preservation of Scientific Information in Europe](#)'

¹⁴⁵ No national preference for the Czech Republic is noted in the original report, but its policy terms relate mainly to OA archiving (Green OA)

¹⁴⁶ No national preference for Bulgaria is noted in the original report, but it states 'a certain lack of repositories may indicate a de facto preference for Gold OA'

¹⁴⁷ No national preference for Latvia and Slovenia is noted in the original report, but the countries' policies support both OA archiving and Gold OA

¹⁴⁸ No national preference for Austria is noted in the original report, but it states 'Green recommended although hybrid allowed' – also see [this page](#)

¹⁴⁹ Publication data represents each country's fractional of total EU-28 publications over the period 2000-2013. Data is taken from the report [Analysis of bibliometric indicators for European policies](#), prepared by Science Metrix on behalf of the European Commission (2015).

4.4 National case studies

This study has built on the above findings from 2015, as well as previous work done by the PASTEUR4OA project,¹⁵⁰ to prepare in-depth case studies of the open access policy landscape in four European countries. The case study countries (Hungary, Norway, Portugal and the United Kingdom) were selected in order to provide both a geographical spread, with one from each OpenAIRE region, and a range of perspectives on the merits of Gold open access and OA archiving. The table below summarises the findings arising from this work, and illustrates the wide variation in current policy environments across Europe.

Table 3 The Open Access policy landscape in four European countries

Country	Hungary	Norway	Portugal	United Kingdom
European region	Eastern Europe	Northern Europe	Southern Europe	North-Western Europe
Open access policy environment				
Government support for open access¹⁵¹	Low	High	High	Moderate
	Hungary has no law or national policy on OA, while the National Science Funder (an arm of government) operates only a simple OA policy	The Ministry of Education and Research is working on a set of guidelines for OA that provide long- and short-term incentives for compliance across all Norwegian RPOs. The	The current government is actively supportive of open science, and it is high on the political agenda. The Secretary of State has recently formed a number of consultation groups	Government support for open access is not enshrined in law, but the government formally accepted the 2012 recommendations of the Finch group on the topic, and

¹⁵⁰ As part of its advocacy resources, the PASTEUR4OA project produced a set of **national case studies** covering Belgium, Denmark, Hungary, Ireland, Norway, Portugal and the UK.

¹⁵¹ For the purposes of this table we have distinguished between ‘Government’ and ‘Research funder’ support for open access, reflecting the fact that the overall political context for open access may differ from the policies enacted by individual funding bodies. It is acknowledged, however, that the degree of separation between government and research funding bodies varies between the case study countries.

		guidelines are generally seen as a significant step forward.	to shape future government policy on the topic.	ministers have publicly stated their commitment to OA.
Research funder support for open access	Moderate	High	Moderate	High
	National Science Funder (NKFIH) has a simple OA policy, while the Hungarian Academy of Sciences (MTA) operates a more detailed policy. The academy has a small fund to support immediate OA.	The Research Council of Norway requires archiving in a repository, and supports payment of APCs through a 'stimulation scheme for open access publication' (STIM-OA)	The main research funder, Fundação para a Ciência e a Tecnologia (FCT), requires deposit of all funded publications, but there are no direct consequences for non-compliance. No financial support for immediate OA is provided.	Research Councils UK and charities such as the Wellcome Trust support both 'Gold' OA and OA archiving, and provide block grant funding to HEIs to cover APC and other publication costs. The UK's Research Excellence Framework includes an archiving requirement, linking OA to research assessment.
Research organisation performing support for open access	Moderate	High	Moderate	High
	Two universities (Debrecen and Szeged) actively promote OA, including through the provision of publication funds, but support elsewhere in the sector is limited.	Most RPOs have their own OA policies, largely consistent with the RCN policy. Libraries and research offices have a central role in managing OA payment, monitoring compliance and advising authors on OA publication.	Most, though not all, Portuguese RPOs have policies on archiving, but these usually lack provisions on embargo periods and monitoring. There is little or no support for payment of APCs.	Virtually all RPOs have their own OA policies, largely consistent with the RCUK and REF policies. Libraries and research offices have a central role in managing OA payment, monitoring compliance and advising authors on OA publication.
Open access monitoring and compliance	Low	Moderate	Moderate	High

	<p>The Hungarian National Scientific Bibliography project (MTMT) collects the national scientific output of all Hungarian researchers, but there are no national monitoring mechanisms in place for OA. Deposit rates are less than 60% in the Academy (both OA and under embargo), while between 13-30% of the output in the six largest universities is OA¹⁵²</p>	<p>RCN monitors compliance with its policy through the national research information system, CRISTin. To date compliance rates have been low, and it is estimated that only 8-10% of articles are currently made open access via archiving, and 16% via immediate OA. New national guidelines are expected to result in an increase in these figures.</p>	<p>At present there are no national monitoring mechanisms, but FCT is currently exploring this via the Scientific Open Access Repository of Portugal (RCAAP). Some individual HEIs have a proactive approach to monitoring, with Minho University reporting close to 100% compliance with its OA archiving policy.</p>	<p>National monitoring exercise undertaken in 2015. Further monitoring is undertaken by research funders (RCUK, Wellcome), and many institutions have introduced internal monitoring processes to support REF compliance. Recent estimates indicate 15-20% immediate OA, and >40% archiving.</p>
Pathways to open access				
Gold-Hybrid – support for payment of APCs	Low	Low	Low	High
	<p>Gold-Hybrid APCs are not supported by either funders or RPOs, and there is no evidence of them being paid by authors from project funds.</p>	<p>Gold-Hybrid APCs are not supported in STIM-OA due to concerns over ‘double-dipping’, and not recommended in recent national guidelines on OA. Most institutions’ official policy is to avoid paying Gold-Hybrid APCs, but individual researchers may make some payments from project funds.</p>	<p>Gold-Hybrid APCs are not supported by either funders or RPOs, and there is no evidence of them being paid by authors from project funds.</p>	<p>Payment of Gold-Hybrid APCs is supported by the major research funders, and by a limited number of RPOs. Infrastructure to support APC payment is relatively advanced.</p>
Gold-Hybrid – support for offsetting	Low	Moderate	Low	High

¹⁵² G. Frank, [OA mandate of the Hungarian Academy of Sciences – how effective is it?](#)

	Offsetting arrangements are not currently being pursued. Subscriptions to the major international journals remain out of reach for many universities.	2016 guidelines indicate growing support for offsetting as a transition scheme from the subscription model to open access publication. Norway is currently negotiating its first offsetting deals, and hopes to put the first agreement in place during 2017.	Budget constraints mean Portugal is not pursuing offsetting deals, and does not favour the 'flipping' of journals to OA.	Jisc Collections, which negotiates on behalf of UK HEIs, is actively pursuing offset systems designed to reduce cost to UK higher education, with a number of publisher agreements already in place. Jisc has also published a set of principles for offsetting deals.
Gold-APC	Low to Moderate	High	Low	Moderate
	APC funds are operated by the MTA and a small number of universities. The payment infrastructure is in place but funding levels are low. Uptake of the OpenAIRE pilot has been reasonable, with 12 requests approved by 30 November 2016.	Norway's national guidelines on OA indicate that publication in Gold OA journals should be the first choice for publicly-funded researchers. RCN support via the STIM-OA scheme means that most universities have sufficient funds to meet demand for Gold-APC at the present time.	Gold-APC is unattractive to Portugal, reflecting estimates that flipping current subscription expenditure to APCs would support payments of only €600 per article. There are no known examples of institutions operating APC funds, but 13 Portuguese authors have accessed funds through the OpenAIRE pilot.	The UK has established mechanisms to support Gold-APC payments, with funding widely available for externally-funded projects, but more limited at HEI level. However, APC payment data indicates that uptake of the Gold-Hybrid APC model is significantly greater than that of Gold-APC in practice. The UK is the second-largest recipient of funds from the OpenAIRE APC pilot.
Gold no-APC	High	Moderate	High	Moderate
	The development of independent Gold no-APC journals is actively supported by universities, the national library and MTA. Two	RCN indicates that Gold no-APC can be supported through a consortial funding model, but it does not explicitly support it.	Most universities have their own Gold no-APC journals, many of which are hosted on the national scientific repository (RCAP). Gold no-APC	Gold no-APC models are not actively supported by public research funders or through policy measures, but have emerged from the academic

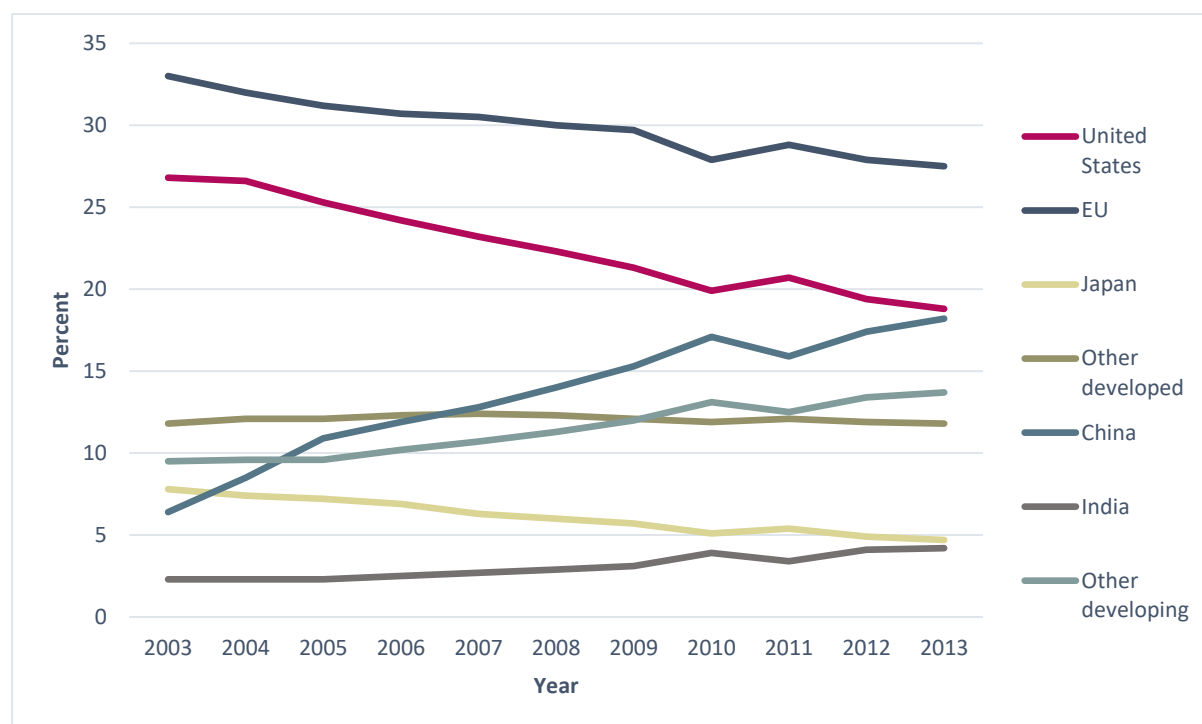
	Hungarian institutions have received support from the OpenAIRE alternative-funding mechanism.	Other initiatives exist at institutional level.	journals are sponsored by institutions, and partly by FCT.	community (e.g. Open Library Humanities) and private foundations (e.g. Wellcome Open Research).
OA archiving	Moderate	Moderate	Moderate	High
	Repository infrastructure is reasonably well-established, but in the absence of robust policies overall uptake remains low. There are exceptions, however, with the University of Debrecen estimating an 80% deposit rate.	Repository infrastructure is well-established, but uptake remains low. Maximum embargoes of 6/12 months are applied, in line with the EU Commission's recommendations.	Repository infrastructure is well-established, but uptake is highly variable between RPOs.	The UK has a well-developed repository infrastructure, and the OA deposit requirement of its Research Excellence Framework, effective 1 April 2016, has resulted in a rapid increase in uptake.
Academic culture				
Author attitudes and awareness	Low	Moderate	Low	Moderate
	Awareness of OA remains low, and there is significant resistance amongst older researchers. Misconceptions are common, due in part to the influence of predatory publishers. However, Gold no-APC journals are popular in the humanities and social sciences; MTA will host a national OJS platform and adopt a quality assurance process for OA journals.	Awareness of OA is rising amongst the academic community, and the principle is gaining broad acceptance. However, existing incentive structures mitigate against widespread changes in publishing practice. Both RCN and the new national guidelines for OA have identified a need for additional incentives to increase uptake.	Under FCT policy, researchers have responsibility for depositing their research in the institutional repository, but deposit rates are still low. There is low awareness and support for Gold APCs.	Funder mandates, and associated financing, have driven a rapid increase in use of both OA archiving and Gold OA by authors. However, institutions continue to cite academic culture as the biggest challenge to OA, and existing incentive structures mitigate against widespread changes in publishing practice.

4.5 OA in a global context

This report has focussed on the European landscape for open access, but scholarly publishing is a global industry, in which Europe is only a minority player. In this section we therefore consider the current state of open access policy in the US and China, which together with Europe account for some two-thirds of global scientific output.

As Figure 6 shows, the European bloc remains the single largest global producer of science and engineering (S&E) articles, but its share has fallen below 30% in recent years.¹⁵³ Meanwhile, China's share of global S&E articles has increased rapidly in recent years, and is likely to have surpassed the United States in the recent past. However, in terms of revenues the North American market for scholarly journals remains highly significant, and open access policies adopted within the United States, in particular, will play a critical role in shaping the future open access market.

Figure 6 Science & Engineering articles, by global share of selected region/country/economy: 2003–13¹⁵⁴



¹⁵³ No equivalent data is available on the global distribution of social science and humanities articles, but studies of the performance of individual countries indicate that Europe and the US account for a larger proportion of global output within these disciplines. See for example Elsevier (2013) [International Comparative Performance of the UK Research Base](#).

¹⁵⁴ Source: National Science Foundation. (2016). [Science and Engineering Indicators](#).

Open access in the United States

Recent developments in national legislation and policy on open access in the US can be summarised as follows:

- The US was the first country to adopt a national OA mandate with the Consolidated Appropriations Act 2008, the legislative basis for the OA policy of the National Institutes of Health (NIH) - the largest biomedical research agency in the world.¹⁵⁵
- In February 2013, the White House's Office of Science and Technology Policy (OSTP) issued a policy memorandum (the OSTP Directive on Public Access) directing all federal agencies with R&D expenditures of over US\$100 million to develop open access strategies.¹⁵⁶
- In 2014, Section 527 of the Consolidated Appropriations Act required that the Departments of Health and Human Services, Education and Labor introduce a Public Access Program along the lines of the OSTP Memo.¹⁵⁷
- Meanwhile, two bills including provisions to further increase access have been progressing through the US legislative process since 2013 - the Public Access to Public Science Act (PAPS) and the Fair Access to Science and Technology Research Act (FASTR).¹⁵⁸

Common to all of these existing policies, and the two bills, is the fact that they mandate OA through repositories (OA archiving), with a 12-month post-publication embargo period, and are silent on OA through journals (whether Gold-Hybrid, Gold-APC or Gold no-APC).

The preference for the term 'public access' in the US reflects the differing emphases of US and European policies. To date, US policymakers have sought to increase access without significantly changing or disrupting the business models of scholarly publishers.¹⁵⁹ European policymakers, by signalling their support for *immediate* open access and more liberal licensing arrangements, have set a more ambitious goal which will require changes to publisher business models and market dynamics.

A further difference between the US and European contexts lies in the structure of their higher education sectors. The US higher education sector is very diverse, and institutions typically have a higher degree of autonomy and market-orientation than in Europe.¹⁶⁰ US public research universities may receive as little as 10% of their revenues from the state,¹⁶¹ and thus the ability of government policymakers to exert influence over institutional policy is limited. Purchasing power is also more

¹⁵⁵ For further details see [NIH Public Access Policy Details](#).

¹⁵⁶ United States Office of Science and Technology Policy (OSTP). (2013). [Memorandum for the heads of Executive Departments and Agencies](#).

¹⁵⁷ See [H.R.3547 - Consolidated Appropriations Act, 2014](#).

¹⁵⁸ Further details on both bills, including a comparison between them,, can be found on the pages of the [Harvard Open Access Project](#).

¹⁵⁹ It is worth noting, however, that many of the thought leaders in the open access movement are based in the US, and that there are substantial advocacy initiatives in support of immediate open access, led by organisations such as [SPARC](#) and [PLOS](#). There is also significant support for immediate open access amongst charitable bodies such as the [Andrew W. Mellon Foundation](#) and the [Bill and Melinda Gates Foundation](#).

¹⁶⁰ For further discussion on these points see Labaree, D. (2010). [Understanding the Rise of American Higher Education: How Complexity Breeds Autonomy](#).

¹⁶¹ *Ibid*.

distributed in North America, with large numbers of independent library consortia conducting separate licensing negotiations with publishers.¹⁶² As a result the concept of a national open access strategy, such as those adopted by a number of European countries in the recent past, has little currency in the US. Furthermore, European proposals for a co-ordinated effort to shift libraries' journals budgets away from subscriptions and towards article processing costs have tended to receive a lukewarm response.¹⁶³ Widespread take-up of immediate OA publishing is likely to require bottom-up adoption by US academic libraries, but to date the appetite for this appears low.¹⁶⁴

Open access in China

Like the United States, open access policy in China has predominantly favoured OA archiving to date. In May 2014, the Chinese Academy of Sciences (CAS) and National Natural Science Foundation of China (NSFC) announced a mandate requiring deposition of final, peer-reviewed manuscripts in an open access repository within 12 months of publication. However, both organisations (and most research funders in China) do allow researchers to use grant funds to cover publishing costs — including in open-access journals.¹⁶⁵ The CAS policy also includes a commitment to support publication in open-access journals and to make its own journals open access. Institutional support for open access remains limited, however, with most universities yet to adopt formal OA policies.¹⁶⁶

More recently, statements by Chinese representatives have indicated in principle support for the OA 2020 movement, and for experimentation with subscription agreements that would also cover OA papers authored by an institutions' researchers. In this respect, China's goals appear increasingly closely aligned with those of the EU, with a shared recognition of the need to improve market competitiveness, reduce costs, and enable affordable participation by all.¹⁶⁷

4.6 Implications for European policymakers

The policy landscape for open access is complex and diverse, both within Europe and internationally. European policymakers have assumed a leadership role by stating a clear preference for immediate open access to scientific content by 2020, and this is supported by national policies within some European countries, but by no means all. Globally, there is greater support for OA archiving than for routes to immediate open access, particularly in the US. The absence of a co-ordinated global approach does not undermine the case for market intervention, but will undoubtedly act as a brake on Europe's efforts to make immediate open access the default.

¹⁶² The [International Coalition of Library Consortia](#) (ICLC) lists more than 100 library consortia from North America, compared with only 44 in Europe.

¹⁶³ See for example the [Briefing Document: Max Planck Proposal to Flip Subscriptions to OA](#) (2016), prepared by Kathleen Shearer for the Association of Research Libraries' Advocacy and Policy Committee.

¹⁶⁴ An analysis of 'redirectable library expenditures' for 13 North American institutions in the 2013 year by the Pay It Forward project found that OA memberships and APC payments represented less than 1% of total expenditure, with the balance relating to subscription costs for in-scope materials. See University of California Libraries (2016), [Pay It Forward](#), p.59.

¹⁶⁵ Van Noorden, R. (2014). [Chinese agencies announce open-access policies](#).

¹⁶⁶ See Zhang, X. (2016). [Open Access in China](#).

¹⁶⁷ Ibid.

5. Charting a path towards a sustainable and competitive OA market

The goals of increasing access and achieving a sustainable and competitive OA market are distinct and not necessarily synergistic. Current policy approaches are insufficient to deliver immediate open access in the near future, and there are significant roadblocks which must be overcome for an effective OA market to develop.

5.1 Understanding the transition

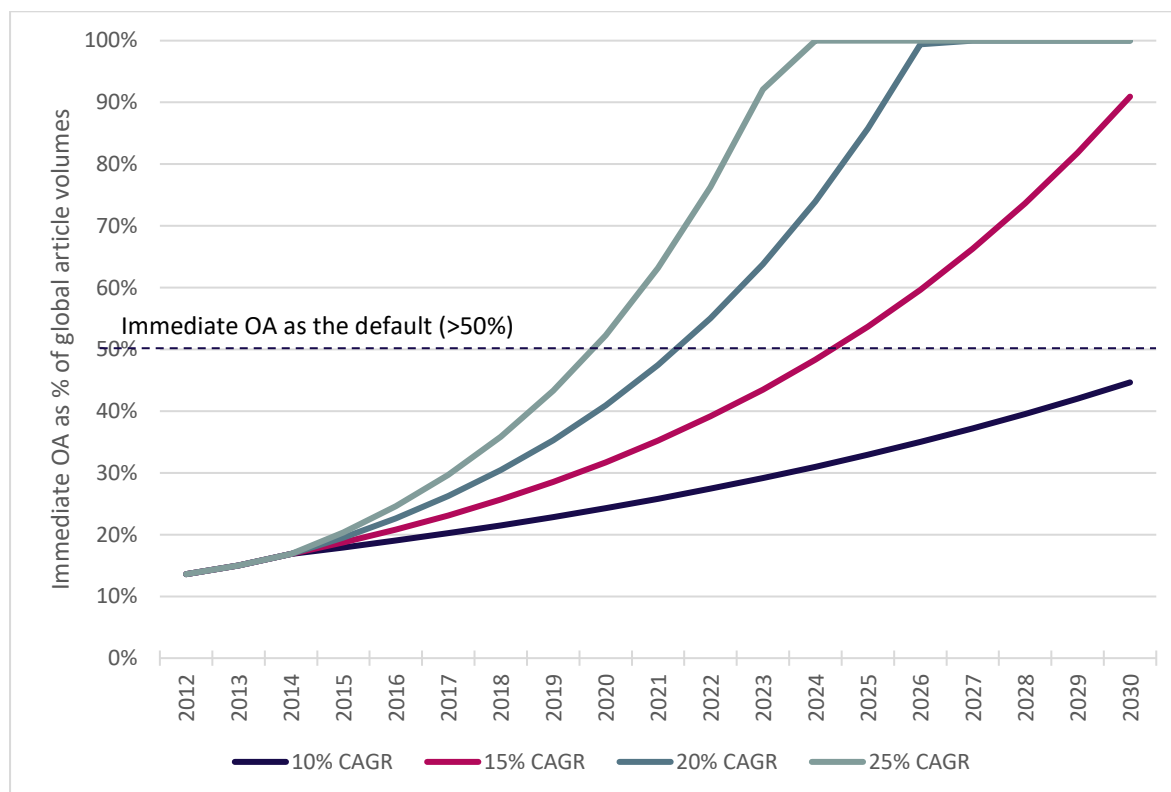
Defining the goal of the transition to open access is important. On one hand is the Council of Ministers' goal of achieving full immediate open access, or open access with as short an embargo as possible, by 2020. On the other hand, is the objective of achieving a sustainable and competitive OA market. The two goals are distinct and not necessarily synergistic - a strategy aimed at increasing OA quickly may be unsustainable over the long-term (because it leads to higher costs) and it may reduce competition (because it does not challenge market concentration). There is no doubt that making immediate open access the default for European researchers by 2020 represents a formidable challenge. Achieving a sustainable and competitive OA market is a longer-term commitment. The potential tensions between strategies that increase access in the short-term and those that aim to reshape the scholarly publishing market more fundamentally should not be underestimated.

Our study calls into question the effectiveness of the approaches adopted to date. Section 2.2 has shown that growth in the open access market is slowing, while section 3 makes clear that market forces are unlikely to deliver either widespread open access, or a competitive and sustainable market. Evidence from the FP7 post-grant OA pilot (see box 12, below), and similar initiatives, shows that availability of APC funding is not sufficient to drive widespread change in publication practices. Authors lack the incentives to switch to open access journals on a large scale, and publishers lack any commercial imperative to 'flip' journals from a subscription to an APC-based model.

Figure 7 shows that making immediate open access the default position globally would require a compound annual growth rate (CAGR) for immediate open access content of 25% over the six years 2014 to 2020. The actual global growth rate from 2012-14 was approximately 15% per annum, and while growth was faster in some parts of the world (e.g. over 20% per annum in the UK), there are

indications that overall growth rates have slowed since that time.¹⁶⁸ On the current trajectory, immediate OA as the default is unlikely to be achieved until 2025 at the earliest – even assuming that the recent slowdown in growth rates does not continue.

Figure 7 Growth in immediate open access content - extrapolation from 2012-2014 global baseline¹⁶⁹



Without further intervention by policymakers, the most likely scenario by 2020 will be limited growth in the full open access market, while the existing subscription market remains largely unreformed, and publishers continue to benefit from Gold-Hybrid OA revenues. The market for Gold-APC journals will continue to operate effectively on most measures, with low prices and evidence of competition, but movement of journals and authors into this market will remain too slow to achieve a rapid overall increase in access. The situation will be partly ameliorated through a gradual increase in rates of OA archiving, but coverage will remain too piecemeal, and concerns over the second-rate nature of repository articles too prevalent, to lead to widespread cancellation of subscriptions. The EU's stated goal of immediate open access as the default will not be met by 2020, and is likely to remain out of reach until well into the next decade, or even beyond. There is need to marry urgency with strategy in

¹⁶⁸ A recent study estimates the growth rate for the open access market at 10-15% per annum until 2020 - although it is possible that article volumes may grow at a faster rate. Delta Think (2016) [The Evolving State of Open Access](#).

¹⁶⁹ Data for the 2012-14 period is taken from RIN et al. (2015), [Monitoring the Transition to Open Access: A report for the Universities UK Open Access Co-ordination Group](#), with the immediate OA proportion representing a combination of Gold-Hybrid, Gold-APC and Gold no-APC models. The scenarios shown from 2015 onwards are based on an annual growth rate of 3.5% in global article volumes.

responding to this challenge. This does not mean abandoning ambitious short-term goals, but rather ensuring that interventions also address the underlying cultural and structural barriers to OA.

Box 10. Open access: publishing or archiving?

To date, European policy interventions in the OA market have largely focussed on enabling, but not requiring, immediate OA publishing through the provision of funding for APCs (Gold OA), and increasing rates of OA archiving (Green OA). In parallel, the OpenAIRE project has primarily supported OA archiving, developing the technical infrastructure to interconnect Europe's research outputs through interoperable repositories.¹⁷⁰

The case studies prepared for this report reinforce the complementary nature of OA archiving and the Gold route to OA, indicating that both should continue to be supported in the transition to full OA. The most appropriate balance between each route will vary depending on the national context. Specifically, less research-intensive countries, particularly in Southern and Eastern Europe, lack the resources to pay for APCs or to conclude offsetting deals. OA archiving thus allows low and middle-income countries to make progress on OA until it is possible to redirect some of the money currently paid for subscriptions to pay for OA publishing. Meanwhile, more research-intensive countries in Northern and North-western Europe have greater resources and desire to support immediate OA. This reflects in part the importance of the publishing industry in some of these countries, meaning that additional public investment in OA is more likely to benefit the national economy.

OA archiving is already a widely-used strategy to increase access to academic publications: progress towards meeting the 2020 goal would be fatally undermined if OA policies were restricted to immediate OA publishing. Worries that supporting OA archiving will dilute and slow down the progress of immediate OA rest on the assumption that OA archiving is used as an alternative to OA publishing, not in addition to it. But, as seen in section 4, many of the most research-intensive countries within EU-28 are actively pursuing both routes in parallel, or with a preference for immediate OA.¹⁷¹

In sum, OA archiving increases access in the short term and at relatively low cost,¹⁷² provides an institutional or disciplinary focal point for raising awareness of open access among researchers, and – by increasing the share of articles available free of charge – may increase pressure on publishers to flip their business model. It is equally clear, however, that even in low and mid-income countries OA archiving cannot operate in isolation. It must be combined with other approaches if we are to make immediate open access the default across Europe.

¹⁷⁰ See, for instance, the [Zenodo](#) repository for EC-funded research. Similar initiatives are being pursued in other parts of the world, such as LaReferencia in Latin America and SHARE in the US.

¹⁷¹ For example, the four countries which have arguably demonstrated the greatest commitment to immediate OA publishing are the UK, which accounted for 18% of EU-28 publications in the period 2001-2013, Germany (17%), the Netherlands (5%) and Austria (2%). Nevertheless, other significant research nations such as France (15%), Italy (10%) and Spain (8%) are notably less supportive of immediate OA. Source: [Analysis of bibliometric indicators for European policies](#), prepared by Science Metrix on behalf of the European Commission (2015).

¹⁷² A past study by Research Consulting ([Counting the Costs of Open Access](#), 2014) found the administrative costs associated with OA archiving (£33 per article) to be substantially lower than the cost of processing APC payments (£81 per article), even before the cost of the APCs themselves were taken into consideration.

5.2 Roadblocks in the transition to open access

Our work has identified six main roadblocks to open access that should be addressed through appropriate policies and measures. These are:

1. **Weak author incentives for open access:** The single greatest barrier to wider uptake of open access is cultural resistance within the academic community. Until there are sufficient incentives for researchers to actively choose open access publication and archiving, demand will remain muted - and publisher support for open access will mirror this. If Europe is serious about increasing access, then its mechanisms for research assessment, grant funding, academic promotion, and institutional funding need to reflect this.¹⁷³

Principle 1: Create incentives and remove disincentives for authors to publish OA

2. **Unclear route to transition for subscription publishers:** The gap between per article revenues under a subscription model and those available under an APC or Gold no-APC model still appears unbridgeable for many commercial and society publishers. More must be done to show that the transition can be made without irreparable damage to publishers' business models – whether through offsetting mechanisms, acceptance of higher APCs, or increased adoption of Gold no-APC models like FAIR OA. However, this must be accompanied by increased expectations of the service provided by publishers, including licensing and machine-readability.

Principle 3: Provide subscription publishers with a viable route to flip their business models to open access

3. **Lack of transparency in the market:** The lack of transparency in the subscription market compounds the problem of journal non-substitutability, and results in a dysfunctional market which serves neither researchers, institutions nor the public interest effectively. Piecemeal attempts to improve transparency through Freedom of Information requests, often undertaken only by students and grassroots activists, must give way to a concerted policy-led effort to deliver transparency and improve competition in both the subscription and pure open access markets.

Principle 4: Stimulate competition by improving transparency in the market

4. **Disparate national and disciplinary contexts:** There is no single pathway to open access that finds support from a clear majority of stakeholders. Therefore the adoption of a pathway should not preclude also adopting other OA strategies and pathways. Different approaches are needed depending on the national and disciplinary context, and policy interventions must therefore promote and enable flexibility. Funders and institutions need to proactively support not only the entry of new players into the market, but also their development at scale.

Principle 2: Support a diversity of approaches

5. **Suboptimal infrastructure:** The administrative burden associated with open access models remains too high for all stakeholders – whether authors, institutions, publishers or funders.

¹⁷³ On the importance of alternative metrics to incentivise authors to publish open access, see: J. Wilsdon et al. (forthcoming), Next-generation metrics: Responsible metrics and evaluation for open science, Report of the European Commission Expert Group on Altmetrics

Improved processing, payment, deposit and reporting mechanisms, built on common standards and infrastructure, are needed to allow open access to scale rapidly and efficiently.
Principle 5: Develop robust infrastructure, built on common, open standards

6. **Inadequate monitoring and reporting:** Europe's ability to track progress and assess the effect of interventions in the market is greatly inhibited by fragmented and underdeveloped monitoring and reporting mechanisms. Investment is needed in standards and tools to track compliance with open access policies, reliably determine the aggregate proportion of the scientific literature which is available in open access form, and monitor sustainability on both the demand and supply-side.

Principle 6: Implement effective mechanisms to monitor compliance, the proportion of open access content, and sustainability

5.3 Options for achieving the transition to open access

As part of our work we reviewed and synthesised the recommendations made in a sample of 20 previous studies to identify the interventions seen as most likely to facilitate an effective transition. The full list of studies and the methodology followed for this exercise can be found in Appendix B, while the measures identified are shown in Figure 8.

This report has identified four pathways to open access (section 2.2): Gold-Hybrid, Gold-APC, Gold no-APC and OA archiving. Figure 8 reinforces the fact that these pathways must be seen as complementary, with no single measure receiving support from a clear majority of previous studies. The key is to retain sufficient flexibility of approaches that suit different national and disciplinary contexts.

The rest of this section will assess each pathway against the following criteria, developed based on our analysis of past studies and the stakeholder interviews conducted for this study:

1. **Author incentives** – The extent to which support for this pathway creates incentives/removes disincentives for authors to publish OA;
2. **Publisher incentives** – The extent to which the pathway provides subscription publishers with a viable route to flip their business model to open access;
3. **Competition** – Whether supporting this pathway is likely to improve competition in the scholarly publishing market;
4. **Pluralism** – The role of the pathway in enabling diverse approaches that are tailored to the differing national and disciplinary contexts;
5. **Infrastructure** – The availability of infrastructure to allow this pathway to support the efficient delivery of open access at scale;
6. **Monitoring** – The extent to which effective mechanisms to monitor compliance and assess sustainability are available under this pathway.¹⁷⁴

¹⁷⁴ The European Commission recently asked a consortium comprising RAND Europe, Deloitte, Observatoire des Sciences et des Technologies (OST), Altmetric and Digital Science, to develop a Europe-wide monitoring system

Figure 8 Recommendations on promoting the transition to open access (sourced from 20 published studies)



Gold-Hybrid -offsetting

Gold-Hybrid is now being actively pursued by a number of countries in Northern and North-western Europe through the implementation of offsetting agreements.¹⁷⁵ Various studies encourage

for Open Science. The monitor is likely to be developed using altmetrics, bibliometrics, data mining and interviews. See: <http://www.rand.org/randeurope/research/projects/open-science-monitor.html>

¹⁷⁵ It is important to note that offsetting agreements represent a transitional mechanism, and of necessity should have a finite life. Open Access Network Austria (2015) envisages 'three temporally coordinated steps' with offsetting succeeded firstly by 'Read & Publish Models' that include access permission for the subscribing institutions as well as an Open Access publication option for scholars of the institution, and finally by 'Open Access service-based models', whose price is no longer derived from the subscription package but from the costs of the individual published articles. See [Recommendations for the Transition to Open Access in Austria](#).

institutions to adopt offsetting deals to increase access quickly and avoid double dipping (n=10).¹⁷⁶ A small number of studies explicitly oppose the continued use of Gold-Hybrid OA independently of offsetting, due to its high cost (n=2). Deals should be collectively negotiated at the national level or through institutional consortia (n=10), so as to enable stronger bargaining power on the buyer side, and prices should be made public (n=8).¹⁷⁷

Box 11. The pros and cons of Gold-Hybrid

Gold-Hybrid is a form of OA publication whereby a subscription journal allows individual articles to be made open access via payment of an APC. Gold-Hybrid has raised concern among RPOs and research funders that publishers can effectively charge twice (via subscription fees and publication fees) for the same content – a problem commonly referred to as ‘double dipping’.¹⁷⁸

The concern about double dipping has led many funders and institutions to allow APC funds to be used only for full-OA journals, or to actively pursue offsetting deals. These allow journals to retain both subscriptions and publication fee for a transitional period, but strive to offset one against the other – thus reducing the total cost for RPOs. Other concerns associated with the Gold-Hybrid model include high levels of non-compliance with research funder open access requirements.¹⁷⁹ While Gold-Hybrid is still officially supported in the UK, it seems likely to be increasingly linked to offsetting in the coming years.

Nevertheless, Gold-Hybrid was the fastest growing route to open access in the period 2012-14,¹⁸⁰ and it allows access to be increased rapidly without the need to renegotiate existing subscription deals, provided the necessary funding is available. In the long term, offsetting – which focuses on OA bundles rather than individual articles – has the potential to promote OA at a much larger scale, but it requires protracted negotiation with publishers, with the multi-year timeframes of some agreements making rapid change difficult to achieve.

Many of the underlying principles for pursuing offsetting are set out in an ‘Expression of Interest in the Large-scale Implementation of Open Access to Scholarly Journals’,¹⁸¹ an outcome of the Berlin12 Open Access Conference (December 2015). To date, the Expression of Interest has 71 signatories, predominantly from Western Europe, but also Southern Europe, Asia and North America.¹⁸²

¹⁷⁶ Values in brackets show the number of studies recommending a given course of action, out of the 20 listed in Appendix B (see Figure 8)

¹⁷⁷ There is also important work to be done to develop a common approach to these deals. Jisc Collections in the UK has initiated this process through its [Principles for Offset Agreements](#) (2015), while the ESAC initiative in Germany has played a valuable role in collecting details of existing agreements, and promoting dialogue on the topic. See ESAC. (2016). [Open access offsetting under construction](#) for more information

¹⁷⁸ Some publishers, most notably, Elsevier have challenged this concept, arguing that money coming in through a journal subscription is used to pay for a particular number of articles, and that open-access articles in Gold-Hybrid journals are additional to that. See Research Fortnight (2014), [“The Empire Strikes Back”](#).

¹⁷⁹ Data published by the Wellcome Trust in 2016 indicates that 35% of Gold-Hybrid articles for which an OA fee had been paid failed to comply with its OA policy in 2014-15, compared with only 4% of articles in fully OA journals. See Wellcome Trust. (2016). [Wellcome Trust and COAF Open Access Spend, 2014-15](#).

¹⁸⁰ See RIN et al. (2015). [Monitoring the Transition to Open Access: A report for the Universities UK Open Access Co-ordination Group](#)

¹⁸¹ Max Planck Society. (2015). [Expression of Interest in the Large-scale Implementation of Open Access to Scholarly Journals](#)

¹⁸² Max Planck Society. (2016). [Signatories of the Expression of Interest in the Large-scale Implementation of Open Access to Scholarly Journals](#)

Table 4 Evaluation of Gold-Hybrid-offsetting

Criteria	Description	Impact on criteria
Author incentives	Gold-Hybrid offsetting does not require authors to change their publishing practices. This is both its greatest strength, as it allows rates of immediate OA to be increased without behavioural change, and arguably its greatest weakness, as it fails to address the cultural issues leading to a dysfunctional market.	Low
Publisher incentives	This pathway offers a transitional mechanism to enable the flipping of journals to an OA model, and thereby rapidly increase levels of immediate OA. However, it relies on widespread adoption to be successful, so is not without risk. In other words, offsetting deals could facilitate the transition from paying for access (when access/subscription is the major cost and OA publishing only concerns a small number of articles) to paying to publish (whereby contracts are concluded in a manner that the price is no longer derived from the subscription package but from the costs of the individual published articles). ¹⁸³	High
Competition	From a certain level of hybridity onwards, subscription fees may fall, and publishers may be incentivised to switch to a fully APC-based model. However, this is likely to maintain or even increase existing levels of market concentration. If offsetting deals remain too expensive, low- to mid-income countries will operate in a parallel market which relies on OA archiving /Gold no-APC while gaining access to research published in high-income countries. Costs will be progressively shifted from many research-consuming organisations and countries to fewer research-producing organisations and countries.	Low
Pluralism	This route is likely to preserve the status quo by tying up existing subscription budgets with the major commercial publishers. This may in turn limit buyers' ability to adopt a combination of strategies/pathways to OA, and would make them excessively dependent on the success of offsetting negotiations. Smaller deals, covering small groups of journals, may be more appropriate to achieve disciplinary and pathway flexibility.	Low
Infrastructure	Offsetting reduces concerns over 'double dipping' and allows for consolidated invoicing, minimising transaction costs. By working with existing subscription publishers, existing highly developed infrastructure for discoverability, payments and reporting can be repurposed for open access.	High
Monitoring	Existing mechanisms to identify the proportion of open access content in Gold-Hybrid journals are inadequate. Gold-Hybrid-offsetting promotes increased access and offers a route to	Medium

¹⁸³ Open Access Network Austria (2015), [Recommendations for the Transition to Open Access in Austria](#)

sustainability for existing subscription publishers and learned societies, but does little to address barriers to entry and market concentration.

Gold-APC

Gold-APC has a double-digit market share and is growing steadily. There are established OA journals across virtually all disciplines and the existing policy framework is likely to generate a moderate increase in the level of articles made immediately OA. However, the short-term contribution of Gold-APC is hampered by the significant cultural resistance in part of the research community towards publishing in OA journals, limited availability of funding (particularly in Southern and Eastern Europe) and the administrative complexity of processing APCs at scale.

Past studies recommend that funders support authors via the payment of APC fees (n=7), and that APC funds should be established at institutional level (n=6) using simplified payment mechanisms (n=3). Funders are also encouraged to set caps to APCs to prevent uncontrolled price increases (n=3).

Table 5 Evaluation of Gold-APC

Criteria	Description	Impact on criteria
Author incentives	Currently, authors' openness to Gold-APC varies between countries (depending on policy requirements and the processes in place to pay APCs) and between disciplines (depending on the reputation of OA journals). The presence of high quality Gold-APC journals increase authors' publication choices, but cultural factors represent a continued barrier to widespread adoption of this model.	Medium
Publisher incentives	Gold-APC offers a clear, stable and predictable revenue source to journals. However, to date there have been few cases of journals flipping from a subscription to a Gold-APC model. Any increase is likely to depend on closing the gap in per article revenues, which is at odds with the preference in some quarters for APC price caps.	Medium
Competition	Gold-APC models are reasonably transparent, and the market currently functions effectively. Transparency could be improved by gathering better data on journal quality, linking this to pricing, and providing details on costs and profit margins per APC. Efforts will also be needed to ensure the current level of transparency is not eroded as institutions and publishers shift to prepayment and bundling arrangements.	High
Pluralism	Gold-APC models represent an important mechanism to increase flexibility and diversity in the marketplace. Switching from subscriptions to APCs could result in considerable savings for many universities in time, but increases for research-intensive ones. However, top subscription journals are likely to charge	Medium

	higher fees if they switch to full OA, and during the transition APCs will represent an additional cost.	
Infrastructure	Uptake of Gold-APC models is constrained by the additional administrative burden it places on authors, libraries, publishers and funders. Prepayment models and standards-based workflows should alleviate this in time, but progress remains slow.	Low
Monitoring	Gold-APC models are highly amenable to effective monitoring, with established initiatives including the Directory of Open Access Journals and OpenAPC. Any increase in offsetting arrangements should be accompanied by efforts to monitor the health of Gold-APC publishers and their ability to compete effectively in the market.	High

Box 12. The role of the FP7 post-grant OA pilot in promoting Gold-APC

The Framework Programme 7 post-grant OA funding pilot provided a mechanism for Gold-APC costs incurred by eligible authors to be funded after the end of the relevant grant agreement. Launched in May 2015, and due to run until April 2017, the pilot has also provided grants to a number of Gold no-APC platforms.

The results of our evaluation of the pilot, completed in the context of this study, can be found in Annex A to the report. The key findings are summarised below.

Efficient management

A survey of over 500 beneficiaries of the pilot found that the pilot was well-administered, with high quality support for applicants, and rapid payment of APCs. 91% of recipients described their overall experience of obtaining funding as either 'good' or 'excellent', with the median time commitment required from authors being approximately two hours.

Beneficiaries noted minor reservations about the length and bureaucratic complexity of the process, and expressed frustration with the limits placed on spending and number of publications involved. Nevertheless, this did not substantially affect their overall level of satisfaction with the quality of support received.

Positive impact on publication choices

The pilot provides some evidence that availability of funding is a factor in determining authors' decision to publish in an OA journal. 37% of beneficiaries stated that without pilot funding they would have published the article in a subscription-only journal. However, 56% of respondents stated that they would have still submitted their work to the same or to another OA journal, indicating that in these cases FP7 funding may have simply displaced funding from other sources.¹⁸⁴

Despite this, fully 98% of beneficiaries believe it is important (28%) or very important (70%) for the EC to continue to offer a specific post-grant funding mechanism for OA publications.

Disappointing uptake

¹⁸⁴ This is consistent with the findings of a forthcoming study for the Knowledge Exchange, which found that APC-funds appear to have two effects: (1) a replacement effect (authors prefer using the APC-fund instead of their own discretionary funds) and (2) a stimulating effect (authors publish OA who would not otherwise have done so). See Van der Graaf, M. (2017 – [to be published](#)). The financial and administrative issues around article publication costs for Open Access: the authors' perspective.

Although the experience of pilot beneficiaries was almost universally positive, the overall level of uptake remains low. As at January 2017 and with only three months until its closing date, the pilot had supported some 700 publications, at a cost of €1.2 million, and made grants to Gold no-APC publishers totalling €200k. Further spend is anticipated in early 2017, but is unlikely to exceed 50% of the total budget of €4 million.

The low level of uptake can be attributed to a number of factors, including:

- excessively strict eligibility criteria, particularly the 2-year post grant time limit;
- the context in which the pilot was launched (part-way through Framework Programme 7);
- low levels of awareness among authors, institutional support staff and publishers;
- disinclination on the part of authors to apply for funds due to the administrative effort involved.

Implications

Action can be taken to address these limiting factors in future schemes of these nature, by revising eligibility criteria, improving communication and streamlining administrative processes. However, the most significant barrier to pilot uptake remains getting authors involved. In the words of Schimmer, the pilot was “an effort to move the researcher towards OA”, whereas we should be “moving OA towards the researcher”.¹⁸⁵ In other words, placing an obligation on researchers has intrinsic limits due to resistance towards changing publication outlets (discussed in section 2 above), and to the overheads involved in managing APC funds at author level. Instead, OA must become embedded in the researchers’ workflows and publishing choices. In practice, this might mean operating on two fronts. First, by providing author-level incentives to publish in full OA journals. Second, by removing any burden on authors to administer OA-related processes (such as APC payments), while preserving price transparency. This is likely to require increased use of block grants, pooling resources from various funders, and delegating their management to HEIs.

Gold no-APC

Gold no-APC publication relies on an emerging infrastructure that has three main nodes:

- Gold no-APC journals via consortia or institutional-level funding
- Digital platforms hosting Gold no-APC journals (such as Hrčak in Croatia)¹⁸⁶
- Gold no-APC platforms that publish articles directly (such as SciELO)¹⁸⁷

The development of Gold no-APC journals and platforms attains great importance in countries and in academic disciplines where funding is scarce. Countries such as Hungary, Croatia and Serbia have developed national platforms that aggregate OA publications, especially from local journals publishing in their national language. Meanwhile initiatives such as the Open Library of Humanities (see Box 9) and the OpenEdition freemium programme¹⁸⁸ have emerged from more affluent countries in response to the particular needs of the humanities community. These initiatives have often developed with little funding and would be greatly boosted by increased support.

Recommendations in this area stress the need to support Gold no-APC platforms and journals (n=8), and actively explore new business models (n=4). Gold no-APC publishers are considered non-profit

¹⁸⁵ Schimmer, R. for SPARC Europe. (2016). [Making moves towards the large-scale transition to Open Access](#)

¹⁸⁶ Hrčak is a portal for scientific journals in Croatia

¹⁸⁷ SciELO (Scientific Electronic Library Online) is a bibliographic database, digital library, and cooperative electronic publishing model of open access journals, originating in Latin America

¹⁸⁸ The OpenEdition Freemium programme offers partnerships to RPOs that grants them access to open access journals and books in PDF and ePub formats; non-partners only have access to the journal in HTML format.

players and are expected to play an increasingly important role in the future, but will need support from supra-national institutions to become fully established.

Table 6 Evaluation of Gold no-APC

Criteria	Description	Impact on criteria
Author incentives	The success of Gold no-APC models is significantly constrained by cultural barriers, and particularly the continued emphasis on the journal impact factor. Wider changes in incentive structures will be needed for these models to succeed at scale, but funder and community support has proven effective in driving uptake within some disciplines.	Medium
Publisher incentives	Gold no-APC models generally do not offer an attractive mechanism to flip journals to OA. Flipping may be attractive for smaller journals, in particular disciplinary and national contexts, as a strategy to increase circulation - but this is unlikely to achieve widespread change at the whole market level.	Low
Competition	Gold no-APC models tend to be community-owned and/or not-for-profit, and so concerns over transparency are less acute, and they increase competition in the market. Publishers should nevertheless be encouraged to adhere to high standards of transparency in regard to their operating costs.	High
Pluralism	Increasing support for Gold no-APC models would significantly enhance diversity in the marketplace, and mitigate the risk that authors without access to APC funds are precluded from publishing in OA form.	High
Infrastructure	Gold no-APC platforms can deliver publishing services at low cost, and without author-side charges. However, they face challenges in scaling their activities efficiently, developing robust infrastructure and implementing sustainable business models.	Medium
Monitoring	Many Gold no-APC journals are listed in the DOAJ, which enables effective monitoring of Gold no-APC article volumes. However, they are frequently excluded from commercial indexes, and the extensive use of volunteer labour and institutional subsidies makes sustainability difficult to assess.	Medium

Box 13. Lessons from Gold no-APC platforms supported by the FP7 OA pilot

Gold no-APC platforms are expanding in Europe, but their potential to provide a scalable alternative to traditional publishing remain untested. The FP7 Post-grant OA Pilot also included an Alternative Funding Mechanism (AFM) dedicated to supporting a small number of Gold no-APC initiatives. We consulted four such initiatives to understand their business model and potential to scale: Hrčak (a national web portal for Croatian journals); eKT publishing (a gateway and technical infrastructure for Greek journals); Journal.fi (a publishing platform for Finnish Learned Societies); and the Internet Policy Review (a digital-only, Gold no-APC journal). More details on the consultation can be found in Appendix A to the report.

Business models

None of the alternative publishing services that we interviewed has developed a sustainable business model, in which revenues are linked to outputs. Two initiatives (Hrčak and eKT publishing) were entirely supported from various government sources, while Journal.fi is supported by the National Library of Finland and by the Federation of Finnish Learned Societies. IPR relies on funding from a consortium of European research institutes, and only receives targeted support by the German research council to strengthen its OA model. It also generates additional revenues by publishing special journal issues that are paid for by institutes or research centres.

The search for sustainability

All four initiatives felt limited by the lack of scalable revenues and are actively looking at additional funding sources. eKT is seeking grant support from institutional and private funders. Journal.fi is exploring a consortium funding model that links support to output (number of published OA articles), but it is also considering charging APCs in some journals. Hrčak hopes to build a more advanced platform that could be paid for by publishers and scaled up to serve the whole Balkan region. IPR is looking at additional sources for further development, including: crowdfunding (individual voluntary subscriptions and one-off donations); partnerships with media institutions to license some articles; partnership with mainstream discipline-specific magazines, which publish articles based on the research papers published by IPR. No initiative has yet identified a sustainable business model in which revenues are linked to outputs.

The funding bottleneck

Despite the funding constraints and the lack of scalable business models, all publishers are expanding their operations (e.g. increasing the number of hosted journals or articles). This suggests that there is a demand for such services which could be tapped into with adequate support. The AFM mechanism proved extremely valuable to all the beneficiaries, allowing them to implement technical improvements in their platforms. However, upscaling these services to the point in which they can substantially increase their market share will require more substantial and stable investment that may never lead to business sustainability.

Supporting OA archiving

OA archiving is the pathway of choice in many European countries, as well as in China and the US> It is a low-cost alternative to OA publishing that can increase access in a market context still dominated by subscriptions. Past studies hail OA archiving as an important pathway in the current market, and recommend further developing the repository infrastructures (n=8). In addition, OA archiving should be incentivised through stronger institutional or funders' policies (n=6).

In parallel with this, studies advocate for the retention of copyright by authors (n=5) along with a reduction in embargo periods (n=5). OA archiving can also be facilitated by publishers, who are encouraged to archive copies of articles on behalf of their authors (n=2).

Table 7 Evaluation of OA archiving

Criteria	Description	Impact on criteria
Author incentives	OA archiving allows authors continued freedom to publish in the journal of their choice, and so does not directly address cultural bias against OA publication. Incentives for OA archiving remain inadequate in most European countries, and as a result author compliance with policies is relatively low, though rising.	Low
Publisher incentives	OA archiving represents a low-cost alternative to immediate OA publication, and may exert indirect pressure on subscription publishers to move to OA models as it becomes more widespread.	Low
Competition	While there have been limited experiments with ‘overlay journals’ based on repositories, the potential for repositories to act as publishers remains mostly theoretical. As things stand, OA archiving relies on subscription content and thus does not directly encourage competition in the publishing sector.	Low
Pluralism	OA archiving represents a crucial tool for increasing access at relatively low cost, and it can be pursued in addition to other OA strategies/pathways. OA archiving can therefore be a central element of a balanced and flexible OA strategy.	High
Infrastructure	Repository infrastructure remains fragmented, and the long-term relationship between institutional and subject repositories (as well as academic social networks) is unclear. However, significant progress in connecting repositories has been made in recent years through initiatives like OpenAIRE and the work of the Coalition for Open Access Repositories (COAR). ¹⁸⁹	Medium
Monitoring	Monitoring of OA archiving remains challenging due a lack of commonly agreed standards and high levels of duplication, often with multiple versions of the same article being made available online. The true costs of repository infrastructure are poorly understood and difficult to track. However, infrastructures that link local and national repositories show potential for improving monitoring deposit rates at large scale.	Medium

¹⁸⁹ COAR’s Next Generation Repositories Working Group released its [Vision for Next Generation Repositories](#) for public comment in early 2017, identifying 12 user stories that outline priority functionalities for repositories.

Box 14. External sources of disruption

There is a growing possibility that external actors may have a disruptive impact on the publishing market. One example is Sci-Hub, the world's largest pirate website for scholarly literature. It functions as an online search engine with over 58 million articles available for download, bypassing publisher paywalls. New papers are uploaded daily when accessed through educational institution proxies, and papers stored in the LibGen repository. A 2015 lawsuit filed by Elsevier in the US led to the loss of the original sci-hub.org domain, but efforts to close down the site are hampered by the fact it is hosted in St. Petersburg, Russia.¹⁹⁰

Over the 6 months to March 2016, Sci-Hub had 28 million download requests, from all regions of the world and covering most scientific disciplines. Users are not limited to the developed world, and appear to include those who could access the same papers through their libraries but turn to Sci-Hub instead—for convenience rather than necessity.¹⁹¹ Meanwhile, researchers and libraries appear increasingly willing to invoke Sci-Hub as an alternative to licit access as part of publisher licensing negotiations.¹⁹² Sci-Hub remains the best known and most widely-used source of illicit scholarly papers, but there are others, frequently operating in legally grey areas, such as the #ICanHazPDF Twitter tag.¹⁹³

A further source of potential disruption is academic social networks (ASNs) such as Academia and Researchgate, which claim 48 million and 11 million users respectively and have attracted significant venture capital investments.¹⁹⁴ Both networks are expected to leverage their memberships and datasets to develop commercial data products in the medium term, but they also function as document-sharing sites, somewhat akin to repositories. Like repositories, they therefore pose a potential threat to publishers' subscription revenues. Publishers have so far sought to manage this risk through a combination of legal takedown notices and the development of voluntary principles for article sharing on scholarly collaboration networks.¹⁹⁵

To date, the scholarly publishing market has shown itself to be remarkably resistant to disruption. While publishers' functions of registration and dissemination can be easily replaced by new technologies, the cultural importance of journals' certification function, in the form of peer review, is much more difficult to replicate.¹⁹⁶ Meanwhile it has been observed that mid-tier players are likely to suffer most from external disruption, while the large commercial players continue unscathed, and may even benefit.¹⁹⁷ The risk of significant disruption of the industry cannot be discounted, but as the rest of this study has shown, powerful cultural forces serve to maintain the status quo.

¹⁹⁰ For further information see the [Sci-Hub Wikipedia entry](#).

¹⁹¹ See Bohannon, J. (2016). [Who's downloading pirated papers? Everyone](#), Science. As one observer, Ivy Anderson, noted in [a comment on the article](#), 'the core problem is the persistence of a friction-based business model in a network environment that is essentially frictionless'.

¹⁹² In connection with German institution's recent negotiations with Elsevier, Dr Ralf Schimmer of the Max Planck Digital Library has stated that German researchers would 'of course' use Sci-Hub if their access was cut, and 'The younger generation does it all the time.' See Matthews, D. (2017), [Deal impasse severs Elsevier access for some German universities](#), Times Higher Education.

¹⁹³ See the [ICanHazPDF Wikipedia entry](#).

¹⁹⁴ See [Academia.edu](#) and Satariano, A. (2016). [Bill Gates-Backed Research Network Targets Advertising Revenue](#)

¹⁹⁵ See The Economist. (2014). [No peeking...: A publishing giant goes after the authors of its journals' papers](#) and STM (2015) [Voluntary principles for article sharing on scholarly collaboration networks](#)

¹⁹⁶ Michael Clarke (2010) argues that there are in fact three 'deeply entrenched cultural functions' of scientific journals – validation, filtration and designation- which render them resistant to disruption.

¹⁹⁷ See Anderson, K. (2017). [The Price of Silicon Valley's "Disruption" — Is It Possible to Now Have Responsible Information Economics?](#)

6. Conclusions

Intervention in the open access market is essential to achieve Europe's policy goals. Collective action is needed but trade-offs are inevitable, and short-term increases in access must not be to the detriment of market competition and sustainability. Progress relies on overcoming roadblocks to open access through a balanced approach, recognising diverse national and disciplinary contexts.

There are strong justifications for intervention by policy makers to promote OA, and – by doing so – to address current failures in the scholarly publishing market. Research funders across member states and at EC level have already experimented with many of the measures suggested in the previous section, but in a fragmented fashion to date. Collective action is now needed, both across Europe and internationally, if the EC's policy goal of immediate open access as the default is to become a reality.

The challenge faced by policymakers is that there is little consensus on the most appropriate pathway to immediate open access, and varying disciplinary and national contexts mean that no single approach is likely to succeed. As the previous section shows, each of the pathways to open access involves trade-offs between different criteria, all of which are individually important. Different countries and stakeholders will choose to prioritise different elements of these criteria, and so adopt different pathways to a common goal.

The central finding of this report is that pursuing a short-term increase in access, at any cost, is unlikely to lead to a more competitive and sustainable market. The most significant barriers to open access are cultural and behavioural, and thus not amenable to rapid change. Mechanisms such as offsetting allow these challenges to be circumvented in the short-term, but are likely to reinforce deep-rooted problems of non-substitutability and lack of transparency. Offsetting and similar measures should continue to be pursued, but must be accompanied by steps designed to mitigate their adverse consequences. This entails continued support for other pathways, including post-grant funding of APCs, and, crucially, development of stronger incentives to support both OA publication and archiving. We consider that the importance of Gold no-APC models for some disciplines and countries has been overlooked in past discussions of the transition to OA, and that these merit greater consideration and policy support in future.

This report is intended to inform a roadmap to a competitive and sustainable open access market in Europe. The aim of this roadmap should be to overcome the six roadblocks we have identified to a competitive and sustainable open access market, as follows:

1. **Author incentives** - Create incentives/remove disincentives for authors to adopt OA publishing and archiving.
2. **Publisher incentives** - Provide subscription publishers with a viable route to flip their business models to open access.
3. **Competition** - Improve transparency in the market, with the goal of making the costs of publishing and accessing scientific research as open as the research itself.
4. **Pluralism** – Support a diversity of approaches, reflecting the varying disciplinary and national contexts across Europe and internationally.
5. **Infrastructure** - Develop robust infrastructure, built on common, open standards, to allow open access to scale rapidly and efficiently.
6. **Monitoring** - Implement effective mechanisms to monitor policy compliance, the proportion of open access content, and the sustainability of different stakeholders in the scholarly communications process.

The concrete actions which should be taken to deliver these goals, and their implications for the different pathways to open access, can be found in the roadmap accompanying the final version of this report.

Part C

Appendices



Appendix A List of consultation participants and contributors

The stakeholders interviewed for the preparation of this report are gathered in Table 8, below, while the large number of individuals who provided comments on draft version of this report are listed in Table 9.

Table 8 Stakeholders interviewed.

Name	Institution	Country
Andras Holl	Hungarian Academy of Science	Hungary
Antti-Jussi Nygård	Scientific Journals Online	Finland
Catherine Sharp	University College London	UK
Dirk van Gorp	Radboud University Nijmegen	Netherlands
Eloy Rodrigues	Universidade do Minho	Portugal
Frédéric Dubois	Alexander von Humboldt Institute	Germany
Gyöngyi Karácsony	University of Debrecen	Hungary
Hannah Hope	Wellcome Trust	UK
Ines Lopes da Fonseca	Portuguese Foundation for Science and Technology, FCT	Portugal
Irakleitos Sougioultzoglou	EKT ePublishing	Greece
Iryna Kuchma	eIFL	Hungary
Jadranka Stojanovski	University of Zagreb Computing Centre	Croatia
João Moreira	Portuguese Foundation for Science and Technology, FCT	Portugal
Johanne Raade	University of Tromsø	Norway
Johannes Waage Løvhaug	The Research Council of Norway	Norway
Katrine Weisteen Bjerde	CRISTin	Norway
Marina Angelaki	National Documentation Centre	Greece
Maurits van der Graaf	Pleiade	Netherlands
Pablo de Castro	University of Strathclyde	Netherlands
Steven Hill	HEFCE	UK
Xenia van Edig	Copernicus Publications	Germany

Table 9 Other contributors

Name	Institution	Role	Country
Audrey McCulloch	Association of Learned and Professional Society Publishers	Publisher trade association	UK/International
Birgit Schmidt	SUB Göttingen	OpenAIRE work package member	Germany
Catriona MacCullum	PLoS/Open Access Scholarly Publishers Associations	Publisher trade association	UK/International
Enrico Turrin	Federation of European Publishers	Publisher trade association	Belgium/International
Frank Manista	Jisc	OpenAIRE work package member	UK
Iryna Kuchma	EIFL/OpenAIRE	Steering group member	Ukraine
Johan Rooryck	Linguistics in Open Access	Gold no-APC publisher	Netherlands
Karin van Grieken	SURFmarket	OpenAIRE work package member	Netherlands
Katharina Rieck	FWF	Steering group member	Austria
Leo Waaijers	Quality Open Access Market	Founder of Quality Open Access Market	Netherlands
Liam Earney	Jisc Collections	Steering group member	UK
Mark Patterson	eLife/Open Access Scholarly Publishers Associations	Publisher trade association	UK/International
Martin Eve	Open Library of Humanities	Gold no-APC publisher	UK
Michael Mabe	International Association of STM Publishers	Publisher trade association	UK/International
Nina Karlstrom	CRISTin	Steering group member	Norway
Pablo de Castro	University of Strathclyde	Steering group member	UK
Saskia de Vries	Sampan	OpenAIRE work package member	Netherlands
Tony Ross-Hellauer	SUB Göttingen	OpenAIRE work package member	Germany

Appendix B Existing roadmaps and transition proposals

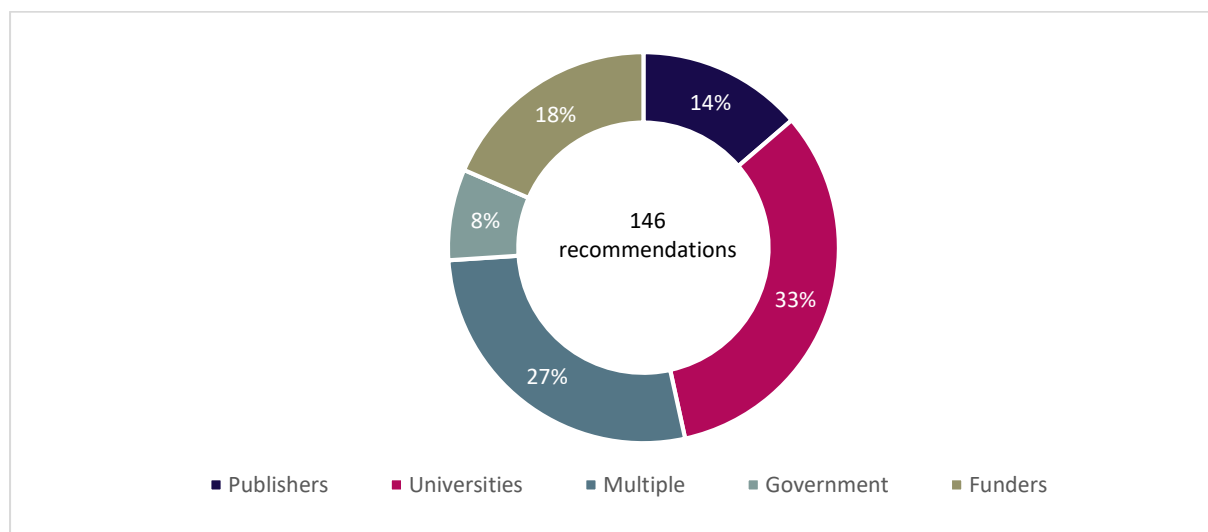
The recommendations made in a sample of 20 previous studies on the transition to open access were reviewed and synthesised in order to identify the interventions currently being considered or proposed by relevant stakeholders. The studies were selected judgementslly, based on the authors' knowledge of the landscape, with a conscious bias towards studies from European sources. Recent studies were preferred, but some older documents were included where this were deemed to have significant influence on subsequent thinking on the topic, e.g. a previous EC study of the scientific publication market (2006), and the Finch report (2012).

The identification and normalisation of recommendations within the studies was undertaken as follows:

1. **Identification and extraction of recommendations from the text.** In some cases recommendations were clearly signalled in the relevant document, in other cases they were contained within the body text. Each document was read in full to identify recommendations relevant to the move to open access, and the text of each recommendation was then extracted into a separate document.
2. **Coding and normalisation of recommendations** – The categorisation and normalisation of recommendations was undertaken by a process of inductive category development.¹⁹⁸
3. **Classification by OA pathway** – The normalised recommendations were then classified by the OA pathway they primarily relate to (Gold-Hybrid, Gold-APC, Gold no-APC or OA archiving), or identified as 'general', as appropriate.

Further analysis of the recommendations by the stakeholder group to whom they are addressed (see Figure 9) underlines the crucial role played by universities and other research performing organisations in facilitating the transition to open access (see 5). One third of the 146 recommendations raised are addressed directly to this group of stakeholders, with 27% addressed to multiple stakeholders, and a further 18% directed to funders. Publishers are seen as playing a secondary role, with only 14% of recommendations directed to this group of stakeholders, reflecting the fact that they will respond to customer demands for open access, but have limited scope to create such demand where it doesn't already exist. Analysis of the evolution of these recommendations over time indicates a progressive shift in thinking from the provision of APC funding in conjunction with policies promoting OA archiving, towards more radical interventions offering the prospect of a more rapid transition (such as the use of offsetting agreements), or more cost-effective access (such as the development of Gold no-APC journals and platforms supported by the research community).

¹⁹⁸ For further information on the process of inductive category development see Mayring, P. (2000). [Qualitative Content Analysis](#)

Figure 9 Analysis of recommendations by addressee


The documents included in this exercise are gathered in chronological order in Table 10. Each document can be accessed by clicking on its title.

Table 10 Main sources of information for the development of a roadmap to a sustainable and competitive OA market.

Title	Organisation or Author(s)	Year	Country of focus
Study on the economic and technical evolution of the scientific publication markets in Europe	European Commission	2006	Europe
The LERU roadmap towards open access	League of European Research Universities (LERU) open access working group	2011	Europe
Accessibility, sustainability, excellence: how to expand access to research publications (also known as 'The Finch Report')	Working Group on Expanding Access to Published Research Findings	2012	UK
Action Plan towards Open Access to Publications	Global Research Council	2013	International
Developing an effective market for open access article processing charges	Consortium of research funders ¹⁹⁹	2014	Europe
Science Europe Principles on Open Access to Research Publications	Science Europe	Updated 2015	Europe

¹⁹⁹ The consortium included Jisc, Research Libraries UK, Research Councils UK, the Wellcome Trust, the Austrian Science Fund, the Luxembourg National Research Fund, and the Max Planck Institute for Gravitational Physics.

Disrupting the subscription journals' business model for the necessary large-scale transformation to open access	Max Planck Digital Library	2015	Germany
Recommendations for the Transition to Open Access in Austria	Open Access Network Austria (OANA)	2015	Austria
Analysis of Economic Issues Related to Open Access to Scientific Publications	Interdisciplinary Centre for Mathematical and Computational Modelling, University of Warsaw	2014	Poland
Positions on creating an Open Access publication market which is scholarly adequate	Alliance of Science Organisations, Germany	2015	Germany
Academic journal markets, their limitations, and the consequences for a transition to Open Access	Jisc	2015	UK
Christmas is over. Research funding should go to research, not to publishers!	League of European Research Universities (LERU)	2016	Europe
EUA Roadmap on Open Access to Research Publications	European University Association (EUA)	2016	Europe
Critical study of the new ways of "editorialising" open access scientific journals	BSN Digital Scientific Library	2016	France
Alternative Open Access Publishing Models: Exploring New Territories in Scholarly Communication	European Commission	2016	Europe
National guidelines for Open Access to Research Results	Ministry of Education and Research	2016	Norway
Open access to research publications – Independent advice	University of Birmingham	2016	UK
Pay It Forward: Investigating a Sustainable Model of Open Access Article Processing Charges for Large North American Research Institutions	University of California Libraries/Mellon Foundation	2016	USA
OA2020 Roadmap	Max Planck Digital Library	2016	Europe
How could an open access scholarly journal system look like? A scenario analysis	M. van der Graaf & L. Waaijers	2017	Netherlands

Glossary

Below you can find an explanation of the open access terms used in this report (in alphabetical order).

Name	Institution
Article processing charge/article publication charge (APC)	A fee which is sometimes charged to authors in order to publish an article in an open access journal. The fee is usually paid by an author's institution or research funder rather than by the author themselves.
ArXiv	A repository of pre-prints, particularly in the physical sciences.
Delayed open access	When articles are made freely accessible on the publisher's platform after an embargo period
Gold open access	Funding and business models that allow peer-reviewed research articles to be made immediately open access by the publisher
Gold-APC open access	Publication in journals that make all of their content OA via payment of an APC, and do not rely on subscriptions.
Gold no-APC open access	Publication in fully open-access journals which do not charge an APC.
Gold-Hybrid open access	Peer-reviewed articles within a subscription-based journal are made immediately open access, typically on payment of a publication fee (also called an article publication charge or APC) to the publisher
Green open access	See open access archiving
Open access publication	The article is published in an open access journal that provides immediate open access to all of its articles on the publisher's website.
Infrastructure	Those services that are invisible to the end user but which contribute, directly or indirectly, to the successful implementation of OA workflows.
Metadata	A set of data that describes and gives information about other data, for example linking publications to authors and institutions
Offsetting deal	Deals concluded between publishers and RPOs/funders to reduce the total cost incurred to both acquire subscriptions and pay for APCs within an institution.
Open access policies (or mandates)	The documents, declarations, recommendations or set of operational guidelines adopted – formally or informally – by a research funder, governmental entity, research organisation or higher education institution, which regulate Open Access to academic publications.
Pre-print	A version of an article before it is submitted to a journal

Repository	A mechanism for managing and storing digital content. Repositories can be subject, institutional, national or international in their focus.
Open access (OA) archiving	A term sometimes used to describe the process of posting or depositing versions of articles in a repository or other website, with a view to making them freely accessible.
STM	Scientific, technical and medical.
Version of record	The final published version of an article.