Authorship and e-Science: Balancing Epistemological Trust and Skepticism in the Digital Environment

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Knowledge is a collective good. In securing our knowledge we rely upon others, and we cannot dispense with that reliance. That means that the relations in which we have and hold our knowledge have a moral character, and the word I use to indicate that moral relation is trust.


Abstract

In this article I consider the role of authorship in balancing epistemological trust and skepticism in e-science. Drawing on studies of the diagnostic practices of doctors in British breast care units and the gate-keeping practices of a Californian publisher of (professional and amateur) horticultural works, I suggest that conventions of authorial designation have an important role to play in nurturing the skepticism essential for scientific rigor within the framework of epistemological trust that pragmatism and morality require. In so doing I question the assumption of contemporary scholars that scientific works are determinate in fact, while nonetheless supporting the idea of semi-indeterminate authorship as a goal. I then consider the theoretical and practical consequences of that view with an analysis of the Anglo-Australian legal constraints on attributions of authorship, and the complex of other relevant (authorial and public) interests and rights that may require different models of attribution oriented not around authors themselves, but rather their employer, their manager or supervisor, or some (other)
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A pseudonym deemed to be an appropriate organizing mechanism for the works in question.

I. Introduction

Law exists among other things to facilitate social interaction by creating the conditions necessary to enable people to trust each other sufficiently to interact.¹ To that end it is part of a complex web of social mechanisms, variations in any part of which produce ripple effects in all others.

Scholars of intellectual property have studied a variant of this web modeled by Lessig as laws, norms and codes² to determine the impact throughout history of advances in reprographic technology on the copyright system. Specifically, they have looked at how such advances have affected the capacity of copyright law to fulfill its central purpose of maximizing the production and dissemination of creative and informational works. In so doing they have demonstrated the importance of analyzing technology in its proper social and regulatory context in order to check that its potentialities are fully exploited without undermining the capacity of the law to achieve its public benefit ends.

The direct impact of digital technology on copyright doctrine has been well studied. Less well studied has been the impact of

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¹ By ‘law’ in this context I mean the entire system of State imposed and enforced rules of conduct. Note the distinction here, drawn explicitly below and central to my analysis as a whole, between “trusted” and “trustworthy”; my suggestion being not that law makes people trustworthy, but rather significantly less likely – and capable of being trusted not – to act in certain ways.

digital technology on the production of informational works and the institutional arrangements for their protection. One of the reasons for the relative inattention given to these issues is presumably a lack of the requisite information, \textit{i.e.}, a lack of empirical information regarding the actual processes by which informational works are created and used. Generating that information with a view to analyzing these and other issues is a primary purpose of recent work by social theorists.

A central idea explored in that work is the idea of trust as a norm in the regulatory web described above with important implications for e-science. Thus, in two recent papers, Van House and Jirotka et al consider practices of trust in the production and protection of horticultural and medical information respectively, and the implications for those practices of publishing the information in digital libraries\textsuperscript{3} (CalFlora and eDiaMoND studies). In this article I review their studies using concepts of authorship. Drawing on insights from intellectual property and social epistemology, I argue that an important aspect of the practices studied by Van House and Jirotka et al concerns the conventions by which sources of information are identified. My suggestion is that focusing on those conventions enhances our understanding of e-science and the

\textsuperscript{3} Nancy Van House, “The CalFlora study and Practices of Trust: networked biodiversity information,” \textit{Social Epistemology} 16 (2002): 99-114; Marina Jirotka et al, “Collaboration and Trust in Healthcare Innovation: The eDiaMoND Case Study,” \textit{Computer Supported Cooperative Work} 14 (2005): 369-398. For further information regarding CalFlora and eDiaMoND see http://www.calflo\textsuperscript{a}ra.org/ and http://www.ediamond.ox.ac.uk/ respectively. The eDiaMoND study has been chosen because of its importance generally as “a flagship U.K. e-science project”, and specifically to the Oxford e-Social Science Project for which this article was written. (See Ralph Schroeder and Jenny Fry, “Social Science Approaches to e-Science: Framing an Agenda”, at http://jcmc.indiana.edu/vol12/issue2/schroeder.html (accessed 31 August 2008).) The CalFlora study has been chosen because of its use in the eDiaMoND study, and my suggestion that that use overlooks important differences between the eDiaMoND and CalFlora environments from which the insights in this paper are derived.
regulatory issues it raises by revealing the central role of authorial attribution in managing the relationship between trust and skepticism in and across epistemic communities. In particular, by underlining the distinction between trust and integrity, proper use of attribution conventions helps direct our focus in entering the digital environment away from preserving existing practices of trust toward assessing those practices with a view to making our digital infrastructures not only trusted, but also trustworthy.

Running through this thesis is a wider argument regarding authorship. That argument concerns a theme of contemporary discussions asserting the need to dissociate copyright and science lest scientists be conceived as property owners and science itself as property. My suggestion is that this theme is unfortunate, for it encourages a myopic view of the author within copyright as an owner rather than a creator, and relieves the Legislature and courts of the need to consider the wider social and legal consequences which designations of authorship attract. The result in turn is to limit the value of copyright jurisprudence as a source of policy standards and insights in discussions of science.

In Anglo-American copyright law, an author is a person who creates or makes a substantial and non-severable intellectual contribution to the creation of a work, where a work includes any intentional expression of literary, dramatic, musical or artistic ('LDMA') ideas that contributes to a recognized (statutory) genre. At law, works include their ideas and information, but, for LDM works at least, not the material forms in which they are fixed. While

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6 The relevant legislation is the Copyright, Designs and Patents Act 1988 (CDPA) in the UK, and the Copyright Act 1976 (USC Title 17) in the US (Copyright Act).

objects containing works are property, works themselves are not, and therefore cannot be owned. In the UK this was confirmed in *Donaldson v Beckett* (1774) 2 Bro PC 129, 1 ER 837 (HL), when the House of Lords held that in the era of statutory copyright authors have no common law property in respect of their published literary creations. It follows that while an expression that possesses the evidential and substantial characteristics of a copyright work will attract property, the property will be copyright which is not synonymous with the work itself. In addition, while the creators of the work will be the copyright’s presumptive first owners, their ultimate designation as such will be contingent and secondary to their designation as authors.

If an author at law is a person working in the shared and evolving tradition of a particular aesthetic or expressive tradition, who is a scientific author and how does s/he differ? According to Biagioli, a scientific author is a person judged by his or her peers to deserve credit and responsibility for a claim about nature. While claims (like ideas) will almost always be expressed in a copyright work, they will never themselves be works, nor will they be property.

This raises a further theme concerning the different conceptions of authorship protected by law. At law, authorship is both an act of creation protected by statute for the benefit of authors, and a statement of origin protected by a combination of common law and statute for the alternative benefit of authors and readers (users).

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8 Ibid.

9 Claims in this sense are akin to ideas, which are not works in which copyright subsists. Whether the copyright subsisting in works protects the ideas which those works contain is a separate question. In the US it does not by virtue of US Code Title 17 §102(b), which states that “[n]o case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work”. In the UK, as stated by Lord Hailsham in *LB (Plastics) Ltd v Swish Products Ltd* [1979] RPC 551 (HL) 629, it “all depends on what you mean by ideas” (quoted by Lord Hoffman in *Designer’s Guild v Russell Williams Textiles Ltd* [2000] 1 WLR 2416 (HL) 2422).
Underlying the patchy legal protection given to authorship in its latter conception is the uncertainty that has always plagued the law regarding the relationship between works and their authors, and the consequent ability of acts and statements of authorship to be decoupled. In the studies of Van House and Jirotka et al, scientific works are cast as tethered to their authors. In this article I consider the implications of that tethering for e-science with reference to those studies, intellectual property jurisprudence, and ideas from social epistemology.

2. The CalFlora and eDiaMoND Studies: Practices of Trust in E-SCIENCE

(a) The CalFlora study

In the CalFlora study, Van House considers a web-based library of Californian horticultural photographs and observational reports (CalFlora works), and identifies interpersonal trust as a critical concern for their users and contributors. For users, the concern she identifies is with determining the works’ scientific credibility. For contributors, it is with protecting the works from misuse by others. In Van House’s analysis those concerns become potentially acute in the networked environment due to the effect of networking in “allow[ing] information to cross social and technical boundaries that have provided the context for assessing its credibility and meaning” (p. 100). Hence her purpose, which is to “address these issues in the context of the notions of communities of practice” (p. 100), focusing specifically on the ways in which users from different epistemic communities might solve “the problem of testimony” (p. 103) in a networked environment. “If knowledge is social”, she writes, “and knowledge work entails the distribution of cognitive labor, then people have to decide whose works to accept” (p. 102). According to
Van House, the decision of “whose works to accept” can only follow an assessment of each work’s provenance (p. 105).

The qualities of the originator of information … are critical in assessing its credibility. This can be termed provenance: from where and from whom does the information come, and what do we know about the originators or guarantors? The question is not only whether we consider them competent and honest, but “virtuous” – whether they embody our values and view of the world and our standards for work.

Hence the question motivating Van House, which is how people from different “communities of practice … and epistemic cultures” with different understandings of credibility and methods for determining it can be expected to assess the provenance of each other’s works in a networked environment (p. 100).

(b) The eDiaMoND study

In the eDiaMoND study, Jirotka et al pursue a similar enquiry in the very different context of regional British breast care units (BCUs). The basis for their enquiry is a government-funded project to explore the digital networking of mammograms and diagnostic reports (BCU works) with a view to developing a database of breast screening information. The government’s vision for the project is to make breast screening work a virtual activity, such that the production and reading of mammograms might occur in different physical locations, and the readings themselves involve geographically distributed workers.

In considering that vision the authors follow a similar path to that of Van House. Thus, they too study the practices of trust developed among users and producers of scientific works with a view also to preparing for a networked environment, and focus in doing so on the role of interpersonal trust in assessments of epistemological credibility. In their own words (pp. 376-377):

We examine the ways in which trust is achieved in the BCU and see how it depends, in part, on participants knowledge of their colleagues’ performance and how it forms part of the work practices through which
artifacts are produced and decisions are made. Drawing on this understanding of the ways in which trust is produced and maintained in breast screening work, we discuss what impact a system like eDiaMoND might have on relations of trust and thus, on the dependability of the work. That is, if breast screening work becomes a “virtual” activity, such that the production of mammograms and their reading are no longer physically co-located, and reading itself involves distributed actors, what are the likely implications and how might they be addressed?

The premise of this aim and the eDiaMoND study generally is that the dependability of the breast screening work undertaken in BCUs is due in part to the physical co-location of mammogram production and reading; it being that co-location which allows the relations and practices of trust to develop. In light of this premise the authors’ conclusion is unsurprising: in the networked environment, where those two aspects of breast screening work will be separated, mechanisms will be required to “support … trust relations in reading” (p. 391). In designing those mechanisms an understanding of the role of “trust in practice”, including the production of trust in the collaborative work environment of the BCU, will be essential (p. 392). This conclusion shares the theoretical premise of Van House’s study, viz, trust is central to the production and protection of valued information;¹² a social norm with central but hidden regulatory

¹² Jirotka et al also consider issues relating to the works’ protection in the digital environment, including specifically the concerns of healthcare workers to restrict access to medical information in order to comply with their legal and ethical obligations to protect patient privacy and confidentiality. The specific means which they employ to that end include the use of tracking sheets to record the various stages in the information’s production, rules restricting use and disclosure, and open-plan office design to make unauthorized or secret access to the information difficult. According to Jirotka et al, healthcare workers have confidence in their system because they believe it to be ethical. Faced with the eDiaMoND proposal, their confidence is threatened by a new concern with the future of their system. It is interesting to consider the reasons for that concern. Intuitively, information seems harder to extract from the material realm of print and therefore easier to secure. In addition, while the security possibilities of technology are cast as such that this ought not to be so – digital locks ought to make information easier to secure in digital form – it is more difficult to trust a system of which one is ignorant, particularly when the information is sensitive and the extent of a breach potentially substantial. In the popular conscious it is this that makes the digital world appear so vulnerable: an invisible,
significance “woven into the fabric of everyday organizational work as part of the taken for granted moral order” (p. 394). In reaching this conclusion the authors provide empirical support for the insight of Shapin that all knowledge is held in relations of trust, and in doing so offer further insight into the role of trust in the conduct of science.


(a) Provenance in CalFlora

In Van House’s study, epistemological trust denotes a positive assessment of a work’s provenance, where by “provenance” is meant “from where and from whom does the information come, and what do we know about the originators or guarantors” (pp. 105, 108). It is clear from her analysis that while the specific criteria governing that assessment may vary among people and communities, the conventions of designation on which it depends will not. This is because works contributed to CalFlora must bear the name of both an (individual or institutional) contributor and an author (photographer or observer). In addition, all contributors must provide certain standard information regarding the author’s professional experience, scientific methods, and confidence in his or her own work (pp. 108-

13 The “observer” is defined for CalFlora purposes as the person who made the observation for the report, being either the collector of the observed specimen or the author of the article from which the report itself was taken (http://www.calflora.org).
110). In this way CalFlora resolves the problem of testimony without any “centralized, formalized approach to deciding what is included and what is not, which places great power in the hands of system designers, and could easily devolve into censorship”; relying instead on a system that “provid[es] users with what they need to establish a source’s identity and determine their own willingness to believe information from that source” (p. 105). Speaking metaphorically, it eschews a system of state censorship in preference for the vagaries of the free market regulated by requirements for authorial (biographical and methodological) information.

Running through Van House’s analysis is the language of trademark law. Engaging directly with that language is useful, for it steers us away from the assessments of provenance with which Van House is concerned toward the nature of provenance itself and the mechanisms by which it is enabled. In particular, it elucidates the centrality to provenance of statements of authorship – what Heymann coins “authornyms” – as reputational externalities that organize user and producer inputs in respect of individual works in an efficient and transparent way.

Casting provenance in this light elucidates the role of the authornym in achievements of trust. However, it also elucidates its insufficiency to that end, for in CalFlora it is not only statements of authorship that enable such achievements, but also the professional biographies and scientific methods and statements of authors themselves. By requiring this supplementary information CalFlora undermines the assumption of trademark jurisprudence that authorial biography specifically, and authors more generally, rest in no position of preeminence:

So long as the fan of Grisham’s novels can identify those novels branded with Grisham’s authornym and distinguish them from others, he need not know any details of Grisham’s “true” identity – indeed, “John Grisham” can be female or a nonlawyer or a collective authorial endeavor so long as the authornym allows the reader/consumer to locate both the work and his responses to it.14

14 Heymann, pp. 1422-1423.
In CalFlora this seems not to be true.

(b) Biographical familiarity in BCUs

In the CalFlora study, Van House studies the gate-keeping practices of CalFlora as a responsible publisher of works contributed by a diversity of people ranging from elementary school students to professional biologists. In the eDiaMoND study, by contrast, Jirotka et al consider the work practices of small communities of medical experts working together in the production of mammograms and diagnostic reports for use in the detection of breast cancer. While obviously significant, these differences belie a similarity in the studies’ orientation. The objective of Van House is to demonstrate how CalFlora staff attempt to replicate the biographical familiarity which users of BCU works currently have by providing the CalFlora public with as much information regarding CalFlora authors and their methods as it reasonably can do. The concern of Jirotka et al, on the other hand, is with considering how a version of the networked environment of CalFlora might be replicated within the public healthcare system without compromising the practices of trust built around that familiarity. My question is whether the preservation of those practices is necessarily an appropriate goal. In considering that question I first ask how closely the concept of provenance studied by Van House approximates the concept of biographical familiarity studied by Jirotka et al.

15 Van House, pp. 108-109. According to Van House, while “[i]n professional communities, the identity of an observer is often sufficient” on the ground that “users know who is reliable[,] CalFlora is wrestling with the problem of open access by both users and contributors who do not necessarily know one another”.


17 There is no suggestion by Jirotka et al that their concept of biographical familiarity does approximate Van House’s concept of provenance; while
In BCUs, mammograms are taken and processed by a radiologist, and then read and in many Units double read by a radiographer or other trained film reader. Each reading of a mammogram forms the basis of a medical diagnosis and is recorded on a standard BCU screening form. According to Hartswood et al (p. 94), the production and reading of mammograms are...rarely carried out contemporaneously; thus a reader will lack first hand experience of any difficulties encountered, or of peculiarities associated with individual cases that might have a bearing on their interpretation. Radiographers will give an account of such occurrences by making notes on the screening reporting form which serve to tie together these temporally separated activities. in their decision making. For example, in Fig. 1, the first reader has drawn attention to a feature that is believed to be new and recommends that the case be recalled. The second reader draws upon the recording of the patient’s HRT status to suggest that what is seen is merely breast tissue, “BT”, and therefore likely to be benign.

Both the act of taking a mammogram and the process of reading it are highly skilled exercises that depend on a mix of medical and technological knowledge and practice, the latter of which varies significantly between BCUs. In simplest terms, taking a mammogram involves “loading [a] cassette into an X-ray set, positioning the women on the machine, applying compression to the breast and selecting an exposure setting”. Reading a mammogram involves loading it into an alternator, visually examining it as part of a set of mammograms for the patient in question, and recording one of the three following decisions on the screening form: return to

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18 According to Hartswood et al (p. 93), “[m]any English and all Scottish screening centres practise double reading, where each mammogram is examined independently by two readers”.

19 An example of an annotated screening form is reproduced by Hartswood et al (p. 93), who also describe in detail the process by which screening forms are annotated (pp. 93-94).

20 See Jirotka et al, p. 380.
routine recall; recall for assessment; or technical recall.\textsuperscript{21} According to Hartswood et al, “[t]ime pressures mean that readers work quickly: on average, the examination of each set [of mammograms] takes less than 1 minute”.\textsuperscript{22} While first and second readings are notionally independent, the nature of the screening form supports a different reality,\textsuperscript{23} prompting Hartswood et al and Jirotka et al to describe the second reading process as collaborative and consultative; readers annotate the forms for the benefit of their colleagues, who can in turn “walk down the hall to ask [a reader] what she meant by this annotation or why she had seen/missed this feature”.\textsuperscript{24} This is important, for it is

\begin{enumerate}
\item\textsuperscript{21} Ibid.; Hartswood et al, p. 92.
\item\textsuperscript{22} Hartswood et al, p. 92.
\item\textsuperscript{23} Ibid p. 94. (describing “blinding practices in the majority of six centres that formed the core of our studies” as “entirely discretionary” due to the “public character of the screening reporting form”, which “readily affords the second reader the opportunity to view the first reader’s opinion”). See also Jirotka et al, p. 383.
\item\textsuperscript{24} Jirotka et al, p. 390. See also p. 383 (describing “the collaborative practices underpinning double reading” as “worthy of particular note”, with second readers able either to “annotate the form, in relation to something they themselves find noteworthy, or to give their opinion on the first reader’s … diagnosis”); Hartswood et al, p. 91 (describing the reading process as having “informal, collaborative features”, \textit{viz.} the annotations); p. 96 (stating that “[r]eaders almost always will annotate the … form when they conclude that there is an abnormality”, and will sometimes also annotate it “with comments about features that they have determined to be benign”). Examples of annotations are given by Hartswood et al at p. 96; the first comprising the mark “X” on the form’s breast schematic with the words “NRC” (no real change), and the second showing another mark on the schematic with “?” and “BT” (breast tissue) beside it. As the authors explain, the first annotation “seems intended merely to reinforce” the reader’s opinion, while the second is “to express – and to draw attention to – the first reader’s uncertainty”. The form reproduced by Hartswood et al (at p. 93) contains the following further annotations by the radiographer and first and second readers respectively: “Moles. Cyst – R Breast 20yrs ago. HRT for 2 yrs. Pain L breast and arm – GP says muscular” \textit{[with}}
these informal practices of annotation and consultation that constitute the practices of trust on which authors and users of the works are said to depend; practices through which workers develop the first-hand experience of, or biographical familiarity with, their colleagues that informs their authorial (annotative) practices and that additionally assists in their interpretation and assessment of individual works. As Jirotka et al state, “[w]hat it is to be a reader is a situated matter, and trust between readers turns upon a diachronically achieved biographical familiarity with colleagues’ performance which is, itself, dependant on the sorts of informal practices and visibility arrangements described above” (p. 383). Thus conceived, biographical familiarity differs from provenance in the following, critical respect: it describes the familiarity that one only derives from first-hand experience of a scientist’s methods and performance, in contrast to the familiarity that one derives from exposure to a body of works publicly attributed to the scientist and such other methodological and biographical information as happens to be available.

This raises a further point of difference between the CalFlora and BCU environments. Unlike in CalFlora, there is no externally transparent mechanism for designating the origin of mammograms and diagnostic reports within BCUs. Rather, the mechanism used is a system of technical markings familiar only to workers within the relevant Unit (p. 381). Hence the threat identified by Jirotka et al as represented by the eDiaMoND proposal: once networked, mammograms and diagnoses will be read by people outside the BCU in which they have been produced, who will lack both knowledge of the technical markings and biographical familiarity with the sources they denote. The result will be an undermining of workers’ capacity to attribute the works, and an undermining of their ability to interpret and assess them. It will also be an undermining of the collegial space and context in which the informal authorial practices of BCU workers have developed. As Jirotka et al state (p. 383):

markings on schematic]; “new” [with circle on schematic]; “BT I think HRT related” [without schematic markings].
“[With] distributed reading … local and informal visibility arrangements, as well as biographical familiarity (with colleagues, technologies and processes) are disturbed. Recognising the latter as important in the maintenance of trust relations in screening practice raises important questions of how such relations can be established and maintained where reading is dislocated in this way. For distributed reading, the central questions are: first, how can a reader who lacks knowledge of the (local) conditions of a mammogram’s production read that mammogram confidently (i.e., in accordance with their sense of professional competence); second, how can a reader unknown to one be trusted to have read mammograms in an accountably acceptable manner?”

In the result, BCUs will become like CalFlora, but without the supplementary (biographical and methodological) information which CalFlora provides.

(c) Provenance versus biographical familiarity: separating acts and statements of authorship

The eDiaMoND study further undermines the conception of authorship as inherently indeterminate and of works themselves as “essentially pseudonymous” by showing how, in science, works remain tethered to their authors. In BCUs that tethering is such that readers annotate their works informally for their colleagues, who depend on having direct access to and biographical familiarity with the readers to assess and interpret their annotations and works.25

25 See ibid., p. 389 (suggesting as a focus for their paper the observation, which they attribute to Berg and Goorman (1999), that “healthcare workers develop a sense of the trustworthiness of the people (and machines) they work with and evaluate the meaning, status and quality of data in accordance”); p. 391 (stating that “while standardization of artifacts used to record decisions (e.g., the screening form) may give the impression of uniformity of practice, their use and interpretation is tied intimately to local practices”); p. 382 (describing the biographical familiarity which readers exhibit of “their own and their colleagues” performance”, and the way in which, “[b]y working together, readers come to know their own and each other’s strengths and weaknesses”).
Thus, BCU works are far from pseudonymous, and authorial biography is indeed in a position of preeminence.

On its face, however, this seems problematic, for BCU works are such that we might expect the minimization of their determinacy to be a goal of the people who create them. This view receives support from the reported concerns of BCU workers themselves regarding the transparency of the second reading process and the Units’ consultative practices generally on account of the potential for bias they are thought to create. According to Hartswood et al (pp. 94-95):

[R]eaders … expressed concerns about the possibility of bias and reported practising ad hoc blinding techniques (“not looking”)… There was also a clear concern expressed that bias might result through other forms of interaction with colleagues. For example, some readers were wary of explicit collaboration in decision making post reading for fear that the view of the “dominant personality” might prevail. In another centre it was suggested that they all demonstrated dominant personalities and “held out” for their own recalls, such that a system of discussion was discontinued. … Thus, readers demonstrate a keenness to be independent decision-makers.

For these reasons, it seems appropriate to ask whether BCUs ought to be seeking to replicate their existing practices of trust in the digital environment after all. This is not to question the reality of human and technological fallibility, nor to support the idea that acts and statements of authorship can be decoupled, but to ask whether a greater distance might be institutionalized between BCU authors and their works with a view to improving the balance between the epistemological skepticism that recognition of that fallibility entails, and the epistemological trust that pragmatism and morality require.

Both pragmatic and moral considerations weigh against … thoroughgoing skepticism. Commitment to distrust on that scale would oblige skeptics to work backwards through their community’s accumulated knowledge… Indeed, the very identity and solidarity of the scientific community stem from members’ need to trust each other if each individual is to add to the stock of credible knowledge. If skeptics were able, and enabled, to persist, they could, however, envisage an outcome to their indefinite perseverance: they would ultimately succeed in knowing nothing at all… There are moral as well as pragmatic reasons which make distrust difficult. It is at least uncivil, and perhaps terminally so, to decline to take knowledge from
authoritative sources... Skeptics run the real risk of being ejected from the practical communities of which they are members. Their skepticism expresses an uncooperativeness which invites uncooperativeness from others. Persistent distrust, therefore, has a moral terminus: expulsion from the community.\textsuperscript{26}

If the answer is yes, the question will arise as to how in practice this might be achieved.

(d) Balancing skepticism and trust through statements of authorship

As has been seen, source designation promotes economic efficiency by providing an anchor for information in respect of individual works and thereby reducing the costs of assessing their qualities. This, of course, is a very market-based analysis, fitting for the law of marketing that trademark is.\textsuperscript{27} Expressing the same point in epistemological language, one might speak of cognitive rather than economic efficiency, as Van House does, or attribute the value of the authornym to its provision of a device through which skepticism and trust can be brought into union.

It should ... be obvious that each act of distrust would be predicated upon an overall framework of trust, and, indeed, all distrust presupposes a system of takings-for-granted which make this instance of distrust possible. Distrust is something which takes place on the margins of trusting systems. While actors’ schemes may set trust and skepticism in opposition, the invitation to the analyst is to envisage a relationship between trust and skepticism in which the character of skepticism depends upon the extent and quality of trust.\textsuperscript{28}

Using trust and skepticism as our intellectual framework, we might further say that to encourage practices of trust built around first-hand knowledge of acts of authorship in the digital environment is not

\textsuperscript{26} Shapin, pp. 19-20.
\textsuperscript{28} Shapin, p. 19.
only futile, it is also undesirable, for it promotes precisely the thoroughgoing skepticism which Shapin describes. The reason for its futility is that those practices depend by definition on experience of local conditions which can never be replicated in a networked environment. Attempting to replicate them in the face of that dependence would leave the reality of professional (and technological) fallibility without the means for ensuring its correction.

On the other hand, to ignore completely differences in epistemological authority deriving in part from differences in the professional competence of individuals and the technical sufficiency of machines – for example, by discouraging practices of trust built around statements of authorship – would seem equally futile and equally undesirable. In relation to its futility: readers of scientific and other informational works will always seek the information they require to facilitate their purchasing decisions. In relation to its undesirability: it would both presume and encourage an absence of skepticism to the detriment of scientific rigor.

The implication of this analysis is that we ought in digital libraries and other e-science environments to seek to institutionalize a practice of authorial attribution supplemented by the provision of such other biographical and methodological information as judged appropriate for the works in question. In CalFlora, contributors are already required to provide that information. In BCUs, readers could be required to do the same, perhaps through formalized practices of annotation (indicating among other things the reader’s confidence in his or her diagnosis) and strict conventions of authorial designation. The purpose of such requirements would be to nurture scientific skepticism while encouraging trust in achievement of precisely the relationship that Shapin envisages. In particular, it would be to recognize that the reality of human and technological fallibility is such that scientific works can never stand completely independent of the people and machines that have produced them, while nonetheless providing a mechanism through which users of their works might acquire, and be satisfied they have acquired, what they need to assess the works’ epistemic credibility. The result in turn would be an encouragement to authors to produce works capable of standing at a distance from themselves.
If this suggests a role for the authornym as a mechanism for helping to hold trust and skepticism in appropriate relation for the benefit of users, it says nothing of the complex of other authorial and public interests and rights that may require an alternative model of attribution oriented not around author(s) themselves, but rather their (corporate or individual) employer, their manager or supervisor, or some other individual or collective pseudonym deemed to be an appropriate “organizing mechanism” for the works in question. The necessary starting point for consideration of those interests and rights is the law, and the question what if any constraints the law imposes on the choice of source designation for scientific works. Does the law require the attribution of such works to institutions over individuals, individuals over institutions, and/or certain individuals or institutions over others? The answer is far from straightforward, and varies depending on the jurisdiction in question, the nature of the works, and the context in which they have been created. What follows is a discussion of the Anglo-Australian position.

4. Conventions of Source Designation: Constraints from the Law

In the UK and Australia, constraints on source designation do exist, and derive from both legal and institutional prohibitions against making false statements of authorship and using certain works without appropriate authorial attribution. Further constraints may also derive from employment and other contracts, as well as from professional practice codes.

(a) Prohibitions against the false attribution of authorship

Generally speaking, a person or organization may not attribute a work’s authorship to a non-author without his or her permission. This is a function of the common law tort of passing off, which prohibits certain misrepresentations as to the origin of goods. In the case of copyright works, it is more directly a function of section 84 of the CDPA, which gives people a right to object to the false attribution to them of the authorship of certain copyright works, and section
195AC of the Australian Copyright Act, which gives authors of certain works a right to object to the false attribution of those works to others.

In most academic and other research environments, it is also the case that a person may not attribute a work’s authorship to a non-author with his or her permission, or the permission of the author. Such prohibitions against the attribution of honorary authorship derive not from law, but rather from the ethical codes which all academic and research institutions can be expected to have. In many cases those prohibitions are express;\(^{29}\) in others they are implicit in the proscription of deception in the reporting of research.\(^{30}\)

(b) Prohibitions against certain (public) uses of works without authorial attribution

In the UK, section 77(1) of the CDPA gives the author of certain copyright works a right to be recognized as such on any

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\(^{29}\) Prohibitions against honorary authorship tend to be explicit in the codes of the increasing number of universities which adopt the ICMJE's *Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication*, [http://www.icmje.org/#aboutur](http://www.icmje.org/#aboutur) (Vancouver Protocol), which provides that “[a]ll persons designated as authors should qualify for authorship, and all those who qualify should be listed.” Even those Universities which adopt the Protocol but leave scope for disciplinary differences will often prohibit false (including honorary) attributions of authorship. An example is Monash University, the Handbook for Doctoral and MPhil Degrees of which includes the following provisions (at [http://www.mrgs.monash.edu.au/research/doctoral/chapter6b.html](http://www.mrgs.monash.edu.au/research/doctoral/chapter6b.html)):

> Although Monash is guided by the Vancouver Protocol on authorship, it is important to remember that each discipline has its own customs and practices for joint or multi authorship… Due recognition of all contributions is part of proper research process. However, honorary authorship (where a person is listed as an author when they have not participated in any substantial way) is unacceptable.”

\(^{30}\) See for example the University of Oxford’s Academic Integrity in Research: Code of Practice and Procedure ([http://www.admin.ox.ac.uk/ps/staff/codes/air.shtml](http://www.admin.ox.ac.uk/ps/staff/codes/air.shtml)):

> “3. Misconduct for the purpose of this code means the fabrication, falsification, plagiarism, or deception in proposing, carrying out, or reporting results of research.”
commercially published, publicly performed or exhibited, or publicly communicated copies of the same. A similar right, extending also to materially reproduced copies, is conferred by section 193 of the Australian Act. Reflecting its theoretical conception as a moral (personal) right of the author, both rights can be waived but not transferred. They are however subject to some important exceptions, including in the UK for acts done in relation to a work produced in the course of employment “by or with the authority of the copyright owner” (s. 79(3)), and in Australia for acts done in circumstances which are such as to make the non-attribution “reasonable” (s. 195AR). It is also not infringed in the UK unless it has been asserted (s. 77(1)) by written and signed statement (for literary works) or inclusion of the author’s name on distributed copies of the work (for artistic works) (CDPA s. 79).

Prohibitions against the use of another’s work without appropriate attribution are central to Anglo-Australian academic ethics codes and are almost always express. As for the UK prohibition against the granting of honorary authorship, they rarely defer to accepted academic practice or excuse honest or unintentional transgressions. While prohibitions of this type still vary considerably in the detail with which they are framed, the trend is toward prescription at the level of the Vancouver Protocol. Thus, published works must give full authorial credit, where such credit

...should be based on 1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published. Authors should meet conditions 1, 2, and 3.

Contributions not deserving of authorial credit according to these criteria must also be acknowledged as follows.

All contributors who do not meet the criteria for authorship should be listed in an acknowledgments section. Examples of those who might be acknowledged include a person who provided purely technical help, writing
assistance, or a department chair who provided only general support... Financial and material support should also be acknowledged.

Groups of persons who have contributed materially to the paper but whose contributions do not justify authorship may be listed under a heading such as “clinical investigators” or “participating investigators,” and their function or contribution should be described – for example, “served as scientific advisors,” “critically reviewed the study proposal,” “collected data,” or “provided and cared for study patients.”

Because readers may infer their endorsement of the data and conclusions, all persons must give written permission to be acknowledged.

(c) Residual constraints from contract

In addition to the constraints above, a person or organization who or that has undertaken to designate the source of a work in a particular way – for example, by ensuring that its copies include an acknowledgement of its authorship – will generally be bound by that undertaking.

(d) Conclusion

From this discussion we can conclude as follows.

i) Works created by a member of an academic or research institute governed by an integrity in research code will generally need to include an attribution of authorship and list of other contributors, and must never include an attribution that is false. Without affecting ii) and iii), works created in any other context may include an attribution of honorary authorship provided the honorary author has consented.

ii) Works created outside of employment and academia need not include a designation of authorship unless the author(s) themselves have required it, either under contract, or in the case of a copyright work in the UK, by assertion of their moral rights to be identified.

iii) Works created in the course of employment need not include a designation of authorship unless the author(s) or owner(s) have required it under contract, or for copyright works used in the UK without the authority of the copyright owner, by assertion of their moral rights to be identified.
As this makes clear, the legal and other institutional constraints on source designation are complex, and depend among other things on the existence of a copyright work and/or paper to which an academic or other institutional code applies. Determining whether a scientific work is such a work or paper can be far from straightforward, as the following analysis of the status of the BCU mammograms and screening forms in the UK demonstrates.

5. The Complexity of the Legal Constraints on Authorial Designations for Scientific Works

(a) General principles

As noted above, a work for UK copyright purposes includes any literary, dramatic, musical or artistic expression of information or ideas. For such an expression to be a copyright work it must be original, and in the case of literary, dramatic and musical works have been recorded in writing or otherwise. The work itself however is not the record, nor the author the recorder. Rather, the work is the expression and the author(s) its creator(s). This is made explicit in the CDPA by the provision for works recorded by people other than their authors (s. 3(2)).

(b) Are mammograms copyright works? If so, who is their author?

Because of the technology by which they are produced, mammograms are photographs within the meaning of the CDPA and are therefore artistic works which, if original, will be protected by copyright (s. 4).

Generally speaking, for a work to be original it must be the product of independent skill and labour (University of London Press v University Tutorial Press [1916] 2 Ch 601 (Ch)). In essence this means that it must have been originated by an author and not be the product of servile copying (Sawkins v Hyperion Records [2005] RPC 32 (CA)). While it can be argued that a more stringent test based on “intellectual creation” applies for photographs by reason of the EC
Directive 93/98/EEC, the resolution of that issue is of little current relevance, for it is clear on either test that mammograms are original. This is supported by Creation Records Ltd v News Group Newspapers Ltd [1997] EMLR 444 (Ch), where the mere act of taking a photograph was described as an act of origination sufficient to confer originality. As Neuberger J in Antiquesportfolio Plc v Rodney Fitch & Co Ltd [2001] FSR 345 (Ch) subsequently made clear, the premise of that view is that the particular investment required for originality will, for photographs of a static, non-spherical, three-dimensional object at least, always be present in the choice and positioning of the subject matter, the adjustment of lighting and camera angle, and the various other human interventions that determine the visual form of the representation. A mammogram is clearly such a photograph, and the process of taking it an act of substantial skill and labour. It is therefore a copyright work, authored by the radiologist or other person who has determined the “position, compression and exposure in order to cater for the wide variations in the physiology of the women screened,” regardless of whether s/he is also the person who has pressed the shutter button (or its equivalent) on the X-ray machine.

(c) Are diagnostic reports copyright works? If so, who is their author?

The position with respect to diagnostic reports is more complex.

A diagnostic report is a completed screening form. The form itself is standard across BCUs, and makes provision for pictorial and literal annotations by a radiographer and two readers. While qualitatively substantial by virtue of the information they convey, the annotations themselves are basic. Indeed, on the example reproduced by Hartswood et al the annotation of reader 1 is a hand-drawn circle with the word “new” and a tick in a box marked “Abnormal, review requested”. The annotation of reader 2 comprises the words “BT I think HRT related” and a tick in a box marked “Normal/Benign/Other, routine recall”. The radiographer’s report is

31 Jirotka et al, p. 380.
more substantial, comprising several markings on a schematic, several shorthand notations, and the completion of a series of (yes/no, √/x) informational boxes. Is this a work?

It clearly is, being both a graphic work within the meaning of CDPA s 4(2) and a literary work within the meaning of the cases – viz, a work expressed in literal or notational form that conveys ideas or information. In this it is analogous to the circuit layout held to be both a literary and artistic work in Anacon Corp Ltd v Environmental Research Technology Ltd [1994] FSR 659 (Ch). Is it a copyright work? In considering this question a problem immediately arises by virtue of the need to decide who is the work’s author, in order to decide whose skill and labour can be counted in determining the work’s originality. If the report is a single work, it must be as a work of joint authorship created by the designer of the original screening form in collaboration with the radiographer and two readers whose annotations it now includes.

According to the CDPA (section 10(1)), a work of joint authorship is a “work produced by the collaboration of two or more authors in which the contribution of each author is not distinct from that of the other[s]”. Conceived as a literary work of instruction or information the report seems unlikely to satisfy this definition, for the contribution of each person is distinct and severable. On the other hand, even if conceived as a graphic work of indistinct parts, collaboration may be an issue; for while Jirotka et al present the works as the product of collaboration, they seem better viewed as the product of consultation, with readers consulting their colleagues but retaining professional and intellectual responsibility for the reports they create. In my view this is the conclusion that the courts would be more likely to reach, with the result that the reports would not be accepted as works of joint authorship at all.

Do they contain three single works of authorship? The difficulty here derives from the well established principle that for an expression to be a work it must be substantial, or at least sufficiently non-trivial to avoid exclusion from copyright on the principle de minimis non curat lex (the law does not concern itself with trifling matters). And yet this principle is very limited in scope, having only
ever been applied in respect of short titles and invented words, and even then on the specific and limited point of literary copyright.32

In the form reproduced by Hartwood et al, the expression of the first reader comprises a hand-drawn circle demonstrating the location of a lesion with the word “new”. The expression of the second reader comprises the words “BT I think HRT related” with a tick in the box indicating a decision to recall. It seems likely that both expressions are sufficiently substantial to be a literary work, for while undoubtedly brief, they were each intended to afford, and do afford, information and instruction (Exxon v Exxon Insurance [1982] RPC 69 (CA)). The same applies for the annotations of the radiographer. It is less clear but also likely that the first reader’s expression would also be an artistic work. This is consistent with the decision of the Court of Appeal in Solar Thomson v Barton [1977] RPC 532, where an argument that drawings of concentric circles were not entitled to copyright protection for insubstantiality was rejected on the ground that the circles were not merely concentric circles, but rather concentric circles drawn to the precise measurements which illustrated in plan the rubber ring to which the drawing related. Similarly here, the drawing is not merely an illustration of a circle, but rather an illustration which demonstrates in plan the location of a potentially cancerous lesion.

Assuming this to be so, and the diagnostic report to contain three independent works, the question remains as to their originality. On this there seems little doubt, for despite being the product of minimal labour and relevant (literary and artistic) skill, they have originated from their authors in the sense of not having been slavishly copied.

For these reasons, mammograms and at least some diagnostic reports will be copyright works authored by the radiographer and readers responsible for their creation. As works created in the course of employment, the radiographer and readers are entitled to the benefits of copyright.

The outcome in many of the cases in which copyright has been denied for de minimis reasons may have been different had the subject matter been presented as artistic works on the ground that invented words and slogans convey no meaning and have no significance independent of the context in which they are used, and are thus better treated as artistic works in recognition of their primarily visual or associative significance.
of their authors’ employment, however, they are unlikely to require
the inclusion of any designation of authorship, and may also be
falsely attributed, provided the honorary author has agreed, and
neither s/he nor the real authors are also members of an academic or
other professional community governed for relevant purposes by an
integrity in research code.\(^{33}\)

(d) What constitutes a (false) attribution of authorship for academic
and other institutional purposes?

While every university and other research institute can be expected to
have its own integrity code and attribution requirements, there is an
increasing trend toward uniformity and prescription in reflection of
the diversity of disciplinary practices that do exist and the scope they
create for exploitative practices.\(^{34}\)

As has been noted, a code used increasingly in Anglo-
Australian universities is the Vancouver Protocol, the provisions of
which are more limited than law in their application to published
studies rather than works, but also more onerous in their requirement
for full disclosure of both authorial and non-authorial contributions
and prohibition against false attributions of authorship. The criteria
for authorial credit are reproduced above, and reflect when read in
the context of the Protocol as a whole a view of the author that
marries the legal and scientific conceptions above, viz, a person who
has contributed intellectually to the creation of a work and who, by
virtue of that contribution, deserves “to take public responsibility for
appropriate portions of the work’s content.” The nature of a false
attribution of authorship is implicit in this and the Protocol’s

33 The conclusion that mammograms and diagnostic reports are copyright
works means that they are also the object of copyright. Absent any
agreement to the contrary, that copyright would not be owned by their
authors, but rather their authors’ employers, meaning presumably the
individual Units for which they work.

34 See, eg, Bill L Williamson, “[Ab]using Students: The Ethics of Faculty Use of
additional statement that “[a]cquisition of funding, collection of data, or general supervision of the research group, alone, does not justify authorship.” Applying these principles to the BCU works themselves returns the same conclusion as at law, namely, that diagnostic reports contain three works of scientific authorship, being the reports of the radiographer and two readers respectively, which ought to be attributed accordingly.

What is the significance of this analysis for the use of authorial designations in e-science?

My suggestion has been that explicit designations of source are an appropriate mechanism for balancing skepticism and trust in e-science. To fill that role, however, they need to be the subject of clear and consistent guidelines. What the legal analysis shows is that the law, while undoubtedly complex, will often be sufficiently limited in its reach that employers and other institutional publishers of digital libraries will retain considerable discretion in formulating such guidelines. The question this raises is how, absent any legal or institutional constraints, they ought to be formulated.

6. Conventions of Source Designation: Further Interests and Considerations

The answer to the question how source designation guidelines ought to be formulated depends on the values they seek to promote. As has been seen, the values of source designation are conceived as deriving largely from the designator’s facilitation of organizational integrity through its provision of a reputational externality on which users from different markets can rely in assessing the quality and characteristics of a work. They are the economic and ethical values of transparency and efficiency, which map to the pragmatic and moral value of enabling people to exist within a community of limited resources without sacrificing the skepticism required for intellectual rigor. As Heymann notes, those values support a kind of moral right for readers; a right that seems particularly important in a context like the BCU, where radiographers and other highly skilled professionals depend on their readings to undertake publicly funded (medical)
diagnostic work within a tight legal and ethical regulatory framework.

My argument has been that while the CalFlora and eDiaMoND studies underline the determinate nature of scientific authorship in fact (by demonstrating the dependence of readers on biographical information), they also suggest the appropriateness of semi-indeterminate authorship as a goal. A question arises, however, as to what this means, and whether conceiving authorship as determinate (in fact) commits us to recognizing the moral right of readers to know the authors of a work, or indeed the moral right of authors to be identified as such on the works they create. For present purposes the first of these questions can be answered without attempting the second.

It seems clear that recognizing authorial determinacy does not commit us in all cases to providing users of scientific works with biographical information, for while facilitating users’ ability to assess the epistemological credibility of works is important, it will not always be paramount, having rather to take its place alongside the complex of authorial and public rights and interests as well. In relation to the former: even where authors do not have a legal right to determine whether and how authorship of their works is attributed, they will often still have a legitimate professional or other reason for wishing their authorship of a work to be publicly recognized, in which case it will be the responsibility of the work’s publisher to decide whether the work is such that that wish ought to be respected. Similarly, the public itself may have a collective interest in allowing authors to determine whether and how authorship of their works is attributed, for example as a mechanism for incentivising best (scientific) practice, or it may have an interest in preserving the anonymity of certain works, for example to ensure that readers are not unduly influenced by their biographical familiarity with the work’s source.

Attempting further to unravel these different and potentially conflicting interests in the specific context of the BCU demonstrates their complexity.
i) In performing their duties, BCU workers currently depend on the opportunities for informal consultation that the organizational structure of their Units provide, including consultation with other readers of the mammograms they are asked to examine. Much of the value of that consultation derives from the opportunities it provides for readers to question colleagues regarding their interpretation of individual mammograms and diagnostic annotations. Even where such consultation does not take place, readers still depend on the transparency of the authorial source of individual works in order to assess the works’ credibility and interpret the works’ meaning. From this we might conclude that there are strong reasons for requiring transparency in authorship, viz, it facilitates the authorial and consultative practices which operate within BCUs, and is important for BCU workers’ confidence in their ability to trust the works on which they depend for the performance of their own diagnostic work.

ii) To the extent that these practices of consultation and conventions of transparency have become necessary for workers’ ability (or confidence in their ability) to interpret BCU works, they might be regarded as problematic for discouraging and obstructing authorial independence. Consequently, we might say that there are countervailing reasons for suppressing biographical information, either by omitting designations of source on individual works altogether or by adopting an alternative model of authornym than one oriented around individual authors.

iii) In BCUs, the radiographers and readers responsible for producing the diagnostic reports, and possibly also the radiologists responsible for taking the mammograms themselves, have different and competing professional orientations reflecting the different groups whose interests their work serves, as well as the different communities of which they are members. Included among the relevant interest groups are the individual patients referred to BCUs for screening, the referring doctors for whose immediate benefit the diagnostic reports are created, other BCU workers
who rely on those reports as a way of calibrating their professional performance, the government and insurance (and other) industries interested in public healthcare statistics, and the wider medical research community. In relation to BCU workers’ communities: workers are both public employees servicing the healthcare system and the individuals who use it, and researchers servicing the greater academic enterprise and their own (related) reputational interests. While this plurality of allegiances and interests might not affect the formal rules by which source designation is governed, it will almost certainly affect workers’ attitudes to those rules. For example, while most public service employees could be expected to be unconcerned about issues of authorial attribution (assuming that other mechanisms of professional recognition exist), the same might not be true of scientists and other active employees with independent research interests. In BCUs, for example, we might expect workers to want to be identified as the authors of the mammograms and diagnostic reports they produce, and possibly their supervisors to want to be identified as having supervised their production. In addition, this may be particularly so in the networked environment of eDiaMoND, where reports will almost certainly be more detailed and workers and their works more visible. For the latter reason specifically we might say that BCUs will continue as the invisible colleges Jirotka et al describe them as, but BCU workers will become visible colleagues (p. 386):

Appr...
Casting BCU workers as members of a research community which eDiaMoND will make more visible suggests as a default model of attribution one oriented around the (individual or collaborative) author(s), where by “author” I mean, consistent with law and science, those persons who have contributed intellectually to the creation of a work and who, by virtue of that contribution, deserve to take public responsibility for appropriate portions of the work’s content. The reason is that it would seem to be the model most likely to satisfy the interests of authors, readers and the public respectively: (a) by giving readers the biographical information they require to assess the epistemic credibility of individual works; (b) by incentivizing authors to comply with the highest possible standards in the knowledge of the reputational implications of their professional visibility; and (c) by promoting values of truth and transparency, and thereby institutionalizing an appropriate distance between acts and statements of authorship so as to bring skepticism into union with trust to the benefit of the public. Might it nevertheless be inappropriate for eDiaMoND? Points i) and ii) above suggest it might be inappropriate, first because of its restrictive conception of authorship, which could be criticized for failing to reflect the collaborative environment of the BCU, and second because of its transparency, and the problems thereby created for independent diagnoses.

The first of these points is of particular note, for it connects to a further theme running through the literature regarding the impact of collaborative authorial practices on conceptions of authorship. According to that theme, it is no longer appropriate to speak of individuated acts (and models) of scientific authorship, for they assume a reality that is removed from the collaborative practices of the digital era. In many cases, however, what is described as

35 See, e.g., Dreyfuss, pp. 1162-1163.
Justine Pila

collaboration is in reality something different, viz collegiality and consultation. As suggested above, this may be true of the eDiaMoND study, where readers consult their colleagues but retain professional and intellectual responsibility for the reports they create.

While the distinction between collaboration and consultation might in some cases be difficult, it ought not to be unduly so. Hence my suggestion, that as the law itself recognizes the author is and remains central to science and other intellectual pursuits. In addition, the need for a mechanism to recognize that centrality seems particularly great in institutional environments, where responsibility and credit are easily shifted among others. Thus, rather than undermining authorship, institutional authorial practices make its recognition and protection more important. Put differently, while institutional authorial practices may challenge conventions of attribution, they do not challenge the importance of authorship itself as both a source of information about a work and a means of ensuring public credit and accountability for its content. This is a central message of the CalFlora and eDiaMoND studies, as well as of the Vancouver Protocol.36

The Vancouver Protocol states as follows: “Increasingly, authorship of multi-center trials is attributed to a group. All members of the group who are named as authors should fully meet the above criteria for authorship... The order of authorship on the byline should be a joint decision of the co-authors. Authors should be prepared to explain the order in which authors are listed.” See further Biagioli, pp. 263, quoting from Drummond Rennie, Veronica Tank, and Linda Emanuel, “When Authorship Fails: A Proposal to Make Contributors Accountable,” JAMA 278 (1997) pp. 582-584: “If there remains a problem with the language of authorship, it can easily be discarded for the language of contributorship. Such changes in nomenclature however do not involve a change in the nature and importance of authorship itself. A model of authorship oriented around contributors rather than authors is used by the American Medical Association (JAMA), which justifies it as follows: ‘Because the current system of authorship is idiosyncratic, ambiguous, and predisposed to misuse, we propose in its place a radical change: a new system that is accurate and discloses accountability. We propose the substitution of the word and concept contributor for the word and concept author... Abandoning the concept of author in favour of contributor frees us from the historical and emotional connotations of authorship,
This leaves the second point, regarding the problems of authorial transparency. It is interesting to speculate as to how these problems might be resolved. One solution would be to introduce a system that preserves the anonymity of first readings from second readers until completion of their report. Another would be to abandon the model of individual authorship for one of collective or corporate authorship. Such a model would still provide an organizing mechanism for consumer and user information in respect of individual works, while allowing the consultative practices within Units to continue and instituting individual (but not collective) authorial anonymity between BCUs. Provided first and second readings of a mammogram were never performed within the same Unit, and the problems of bias created by the consultative practices within BCUs resolved, this might succeed in preserving the practices of annotation and consultation that currently exist within an institutional framework of corporate credit and responsibility that balances the conflicting needs for information about source on one hand with professional independence (in the performance of second readings) on the other.

Examples of corporate and other collective authorships abound. One well known among mathematicians is the group of authors from the École Normale Supérieure who came together in 1935 to write a series of works on a variety of mathematical topics under the collective pseudonym of Nicolas Bourbaki. While most works were reportedly written by single authors, all were published under Bourbaki’s name without individual authorial identification. A further model described by Biagioli is the international network of physicists known as The Collider Detector at Fermilab, or CDF, who publish all their works under a standard list of names regardless of each person’s contribution. That list is periodically reviewed and updated to ensure that the people on it have provided sufficient service to the network as a whole to be worthy of inclusion.

For the reasons above, the Bourbaki and CDF models of attribution could be said to have attractions for eDiaMoND. A lot and leads us to a concept that is far more in line with the actuality of modern scientific work.”
will depend, however, on the institutional arrangements and culture of BCUs and their capacity adequately to deal with the complexity of the professional dynamics and interests of workers themselves. This is apparent from the following description by Biagioli of the CDF (p. 272).

The bureaucratization of the author’s name … indicates that authorship credit and responsibility is not crucial in that setting, and it is not crucial because those functions have been taken up by other relations. Authorship has become more of a “fact of life” than a struggle for professional life… Credit does not reside primarily in one’s publication list simply because everyone develops similar lists during the period in which they are part of the collaboration. Credit develops through the professional appreciation one gains from colleagues by working with them on a regular… basis… As with credit, CDF’s approach to responsibility is also framed by the structure and scale of its community. Nowhere in the CDF bylaws or in its authorship guidelines can one find the biomedical mantra about the inseparability of credit and responsibility and their essential link to the name of the scientists. What one finds, instead, are detailed corporate protocols for the internal review of manuscripts to be submitted for publication. It seems that the physicists at CDF do not need to rely on the name of the scientist as a device to keep credit and responsibility together simply because they are comfortable with the procedures they have developed for managing these two issues separately.

It follows that whether the corporate authoronym described above would be appropriate for the networked environment of eDiaMoND will depend in part on whether BCU workers are indeed concerned about individual credit and responsibility – theirs and others – or whether authorship is “more of a ‘fact of life’” than a struggle for professional status. Among other things, this may depend on the opportunities that exist within BCUs for workers to make use of their and others’ diagnostic reports for their own research purposes.

7. Conclusion

The premise of the eDiaMoND study is that existing practices of trust are essential to the production and maintenance of valued
knowledge. The immediate question raised by this premise is how so, and whether the practices in question make the BCU systems and information not merely trusted, but also trustworthy.

The answer suggested by Jirtoka et al to the first part of this question is that the practices are essential because the BCU workers believe them to be thus; in part because of their belief that their “situated professional decisions ... reflect what is ethically appropriate in the context of their duty of care, and their legal and professional obligations” (p. 378). If this suggests an ambivalence in the distinction between trustedness and trustworthiness, a similar ambivalence might be seen in the tension between the authors’ view of the needs of BCU workers themselves and the needs of the patients for whom the workers care. This tension arises from their apparent assumption that giving healthcare workers what they regard themselves as needing in order to perform their duties will ensure that those duties are performed to the highest possible standard. While this may well be true, and it is certainly not my intention to suggest otherwise for BCUs, it seems nonetheless an assumption that ought to be more critically investigated, for while scientists may value the informal and ad hoc possibilities of their existing work environment, whether those possibilities produce the highest quality work is a separate question. For this reason alone, it seems reasonable to view digitization not as a threat to informal decision making practices, but rather an encouragement to review those practices in order to determine whether works are capable of standing at a greater distance from the specific contexts in which they have been produced.

This leads to my conclusion, that while the distancing of acts and statements of authorship will always be difficult if not impossible in a geographically concentrated environment of limited resources, coupling them will not necessarily be an appropriate basis for institutional arrangements in the e-sciences, where pragmatism, morality, and best practice may require that authors be identified, but that practices built around first-hand familiarity with them be discouraged.