Scholarly reputation building in the digital age: An activity-specific approach. Review article

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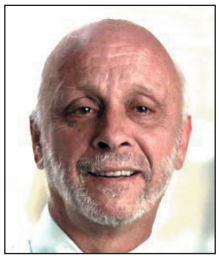

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Abstract

Seeking to understand how today's scholars may, indeed should go about building, maintaining and showcasing their professional reputation, the literature review presented here explores the reputational opportunities available to them in the increasingly open-values based, digital and networked environment of Science 2.0. Using a conceptual framework developed with the help of the *European Commission* and specifically designed for conducting analytical reviews and audits of the reputational value of scholarly activities, this study examines in some detail the practices –more than 30 of them- that comprise the present-day scientific undertaking from a reputation-accruing angle.

Keywords

Scholarly reputation; Reputation building; Communication; Scholars; Careers; Profession; Professional activities; Literature review; Bibliography.

1. Introduction

As it has long been shown, peer recognition of one's professional accomplishments, as it builds up over time to culminate in a good scientific reputation[1], is a primary goal and central motivator for members of the scholarly[2] community (**Becher**, 1989; **Becher**; **Trowler**, 2001; **Merton**, 1968; 1973; **Storer**, 1966).

Inevitably so, of course, for the cultivation of science is a highly communal undertaking, which has scholars extraordinarily dependent on informed scholars for a good opinion of their achievements. Indeed, it is only when a scientific contribution has been assessed, validated and its value confirmed by the scholarly community that it can confer on its originator a high intellectual standing (**Blackmore**; **Kandiko**, 2011; **Latour**; **Woolgar**, 1986; **Hagstrom**, 1964; 1974; **Storer**, 1963). As the achievement of a good reputation is translated into many concrete rewards for the scholar, some of which can be 'cashed in' for money –employment, tenure, promotions, resources, publications, prizes- it is hardly surprising that they strive relentlessly to build and enhance their prestige (**Blackmore**; **Kandiko**, 2011; **Reif**, 1961).

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Indeed, as Merton suggests, the hunger for recognition, so characteristic of scholars, is hardly the manifestation of vanity it may seem to be at a first glance; rather, it is

> "the outer face of the inner need for assurance that one's work really matters, that one has measured up to the hard standards maintained by the community of scientists" (**Merton**, 1963, p. 270).

Thinking much along the same lines, albeit going one step further, **Storer** (1963) contends that peer recognition is frequently interpreted by scholars not only as sanctioning the validity and significance of their work but, more generally, as an affirmation of their own personal worth.

If reputation is traditionally everything for a scholar, this would seem to be all the more so nowadays, when the increasingly marketised and entrepreneurial higher education system world-wide is driven by an intense rivalry among institutions forever competing for resources and recognition (**Altbach**; **Reisberg**; **Rumbley**, 2009; **Blackmore**, 2016a; **Clark**, 1998; **Delanty**, 1998; **Etzkowitz**; **Leydesdorff**, 2000; **Frost**; **Brockmann**, 2014; **Gibbons** *et al.*, 1994; **Nedeva**; **Boden**; **Nugroho**, 2012; **Waaijer** *et al.*, 2018; **Winter**, 2017). In fact, with universities vying with each other for students, star professors, funding and their share of the state's limited budget, prestige-affording recognition of their scholarly achievements becomes the key for winning the competition. So much so, that today the scholarly world seems to have at its heart a very elaborate prestige economy, a kind of celebrity system, whose linchpin are the scholars (**Barbour**; **Marshall**, 2012; **Blackmore**, 2016a; 2018; **Blackmore**; **Kandiko**, 2011).

> "Peer recognition is frequently interpreted by scholars not only as sanctioning the validity and significance of their work but, more generally, as an affirmation of their own personal worth"

Not only have scholars thus become 'managed professionals' (**Rhoades**, 1998) and 'state-subsidized entrepreneurs' (**Slaughter**; **Leslie**, 2001) in an incessant race for attaining commercially attractive purposes and marketable outcomes (**Gibbons** *et al.*, 1994; **Rinne**; **Koivula**, 2009), but their professional priorities, too, look as if they may be undergoing changes, with an attendant transformation in what is seen as a reputation-accruing scholarly accomplishment. Traditionally, narrowly defined research attainments –the volume of papers published in high-ranking journals and the number of citations they obtain- have been given disproportionate reputational weight above all other scholarly activities (**Boyer**, 1990; **Harley** *et al.*, 2010; **Van-Dalen**; **Henkens**, 2012). However, as **Blackmore** (2016a) contends, when pressures to produce particular outputs intensify, existing tensions in what is valued (for example, between research and teaching, or between pure and applied research) are likely to increase.

Thus, now that the open, democratised, technology- and collaboration-centered paradigms of Science 2.0 (*European Commission*, 2014; **Lasthiotakis**; **Kretz**; **Sá**, 2015; **Shneiderman**, 2008; **Vicente-Sáez**; **Martínez-Fuentes**, 2018; **Cronin**, 2017) are fast becoming the foundations on which today's scholarly realities are built (Weller, 2011); now that the 'triple helix' model of academic-government-industry collaboration (**Leydesdorff**; **Etzkowitz**, 1996; **Etzkowitz**; **Leydesdorff**, 2000) is well established; and now that the future in a globalised knowledge society is seen by policy makers as hinging not only on research and innovation, but also on education for all (*European Commission*, 2013; *European Parliament*, 2012), a more wide-ranging, inclusive and representative view of reputation-building scholarly achievement is called for. Seeking to understand how, in these circumstances, scholars may go about building, maintaining and showcasing their prestige, the state-of-the-art, literature-based study, reported here, takes an activity-specific approach to the exploration of the reputation-accruing components of today's scholarly practices.

> "Traditionally, narrowly defined research attainments –the volume of papers published in high-ranking journals and the number of citations they obtain– have been given disproportionate reputational weight above all other scholarly activities"

2. Aims and objectives

The overarching aim of the study is establishing, through a conceptual analysis and audit of the pertinent literature, how today's scholars do/might go about building, sustaining and enhancing their reputation as part and parcel of the great variety of activities that comprise their work-life.

The specific objects of the investigation are therefore:

- Identifying the range of traditional and novel, online and offline activities which, taken together, form the present-day scholarly undertaking.
- Identifying the reputational potentials and affordances of each activity.
- Identifying the ways and means at a scholar's disposal for taking advantage of the reputational opportunities found to be on offer in the increasingly open-values based, digital and networked environment of the Science 2.0 age.

3. Scope and definitions

The study reported here builds on the findings of an exploratory investigation (**Jamali**; **Nicholas**; **Herman**, 2016; **Nicholas**; **Herman**; **Jamali**, 2015a; 2015b; **Nicholas** *et al.*, 2015a), commissioned by the *European Commission* through its *Joint Research Centre* to investigate novel developments in the field of scholarly reputation building. The project, calling as it did for developing a conceptual framework for conducting analytical reviews and audits of the reputational affordances of scholarly activities (for full details see the Methodology section), yielded comprehensive and systematically structured evidence on the reputational components of scholars' professional practices. It is this unique body of evidence that is recapped, extended and brought up to date in the literature-based analytical examination of scholarly reputation building that follows.

However, first an examination of the term 'scholarly/scientific reputation' is in order, for, curiously enough, with all its above-noted centrality to the scholarly endeavor and the frequent reference to it in academic discourse, people seem to use the phrase without giving much thought to what it really means (**Bourne**; **Barbour**, 2011; **Parra** *et al.*, 2011). Neither is the term 'reputation' distinctly differentiated in everyday parlance from related concepts, such as recognition, visibility and impact. The definition adopted for the purposes of this study is Herman's literature-derived one:

> "Scholarly reputation is the expert appraisal of a scholar's standing in their collegial reference group, which is collectively determined on the basis of their research achievements in terms of productivity –high quantity and high-quality scholarly output, and impactfullness[3]- the effects attributable to their thinking and work over time. Thus, successful scholarly reputation building is contingent upon making one's research visible in the 'scholarly marketplace' in an effort to capture the attention of those who are capable of judging its over-all value" (**Herman**, 2018).

Also, although traditionally theoreticians have tended to treat the terms *prestige* and *reputation* as synonyms, when they talked of scientists' gain from the perceived scientific value of their contributions –see, for example, **Andersen**'s (2000) review of the literature on the subject-, more recent studies do propose a distinction between the two concepts, at least on the institutional level. Thus, for example, **Blackmore** (2016a), building on the work of **Brewer**, **Gates**, & **Goldman** (2001) on the topic, notes quite a few distinctions between the two terms, the gist of which being that reputation, unlike prestige, is an absolute term that is not measured in relation to others at all, indeed, does not necessarily have to be gained at the expense of a competitor.

"Scholarly reputation is the expert appraisal of a scholar's standing in their collegial reference group, which is collectively determined on the basis of their research achievements in terms of productivity –high quantity and high-quality scholarly output, and impactfullness– the effects attributable to their thinking and work over time"

4. Methodology

4.1. The conceptual basis

The point of departure for this literature-based exploration of current and emerging scholarly practices and their reputation building purposes and mechanisms was **Boyer**'s (1990) seminal mapping of the broad territory of scholarly activity, which, although a product of the last century, remains valid in its basic observations and contentions[4]. Indeed, **Boyer**'s (1990) model, which defines scholarship as capturing the whole range of scholarly activities in an attempt to present 'a more exclusive view of what it means to be a scholar', has been shown in previous studies to be suitable for providing a sound basis for exploring scholarly behaviours (see, for example, **Braxton**; **Luckey**; **Helland**, 2002; **Crow** *et al.*, 2018; **Garnett**; **Ecclesfield**, 2012; **Greenhow**; **Gleason**, 2014; 2015; **Heap**; **Minocha**, 2012; **Pearce** *et al.*, 2010; **Scanlon**, 2014; **Weller**, 2011).

However, as any consideration of contemporary scholarly practices obviously needs to address their digitally changed and fluctuating nature, **Boyer**'s (1990) model could not have served our purposes had it not been updated and extended to reflect the realities of the Science 2.0 age. Thus, the conceptual basis of this paper for examining contemporary scholars' professional activities was Boyer's well-established, four-dimensional model of scholarship, updated by **Garnett** & **Ecclesfield** (2012) to include a fifth facet (co-creation):

1) The scholarship of research (discovery), the individual or collaborative creation of new knowledge;

2) The scholarship of integration, the arraying of extant knowledge into larger intellectual patterns, often within a wider, cross-disciplinary context;

3) The scholarship of application, the application of disciplinary knowledge and skill to societal/practical problems;

4) The scholarship of teaching, the conveying of the human store of knowledge to new generations;

5) The scholarship of co-creation, the participation of teachers, students and practitioners in the increasingly converging processes of knowledge production and transmission.

4.2. Data collection and analysis

The methodology employed for this paper is desk research and expert evaluation, with the gathering and analysis of the evidence undertaken through the utilisation, as a template, of a framework specially developed for the purpose (see next section). Using **Boyer**'s (1990) classification as a benchmark against which present-day scholarly practices could be compared, as suggested by **Scanlon** (2014) and **Weller** (2011), the study was thus conducted in six stages, each one feeding into the next:

- The published literature was searched in order to compile a comprehensive list of the range of scholarly activities, both online and offline, which comprise the work-life of scholars.
- Each activity identified was defined/described to denote its precise nature and procedures.
- Each of the activities was then analysed to discern its scientific purposes. This enabled the classification of the various activities by the main scientific purpose they serve into the five scholarly categories.
- Each of the activities was further analysed to determine its reputational purposes (if any).
- Each activity found to have reputational purposes was evaluated to discern the specific fit for purpose reputational mechanism(s) it utilised. This, on the basis of our literature-based awareness of the ways and means at the disposal of scholars for achieving visibility and obtaining peer recognition and esteem, which allowed for 'matching' the processes and mechanisms that could be useful in each case with the hoped-for reputational outcome.
- The picture that had emerged from steps 1-5 was further analysed in an attempt to compare the overall reputational potential of the five categories of scholarly activities.

It is important to note here that whilst the literature provides a wealth of information as to the specific practices encompassing the scholarly undertaking, surprisingly, very little of it had been examined from a reputational angle, the only exceptions being discussions of the reputational effects of excelling (or not) in research and the reputational affordances of scholarly social networking platforms (SSNs). Plainly then, many of the findings presented in this study are based on a careful analysis of the literature on how things work in academe, rather than specific empirical evidence on scholarly reputational building practices. Exactly how the paper went about finding answers to the questions asked at the outset is perhaps best explained through the example which follows.

"Many of the findings presented in this study are based on a careful analysis of the literature on how things work in academe, rather than specific empirical evidence on scholarly reputational building practices"

The relatively mundane activity of requesting/providing help in locating research literature is certainly an activity that scholars often undertake in the course of their work. However, can it possibly have reputation building potential? There appears to be no concrete evidence as to how this activity may be of help in reputation building. Still, online sharing/accepting of help can certainly afford visibility, which, by definition, is conducive to enhanced reputation, for it is through exposure of their work that scholars can capture the attention of those who are capable of judging their scientific accomplishments (**Franck**, 1999). Thus, it may be said that scholars' sharing of research literature on a peer-to-peer basis, and from a reputational point of view even more effectively via SSNs, can contribute to their achieving visibility-afforded reputation.

4.3. The framework

Originally developed as part and parcel of the aforementioned *European Commission* commissioned exploratory investigation (**Nicholas**; **Herman**; **Jamali**, 2015a; 2015b), the framework adopted was aired at interviews, focus groups and in a questionnaire with 251 academics from a wide-range of European countries (**Jamali**; **Nicholas**; **Herman**, 2016; **Nicholas** *et al.*, 2015a). Since its employment for the purposes of the original *EC* project that serves as the basis for the present undertaking, the framework has also been rolled-out in a study that assessed the support provided by *ResearchGate* (*RG*) to scholars' reputation building endeavours (**Nicholas**; **Herman**; **Clark**, 2016).

The framework is represented and summarised in eight tables, delineating the activities that comprise the scholarly undertaking in each of the above-noted 5 categories of scholarship: research, integration, application, teaching and co-creation. Each category is summarised separately, although in point of fact the entire range of research associated activities is dispersed amongst three categories (research, integration and application). This, because all three have as their aim the creation of new knowledge, albeit with a different focus. Inevitably, then, some of the research activities are typically undertaken in all of these categories. In an attempt to avoid redundancy, the first four tables, summarising the scholarship of research, offer a full description of the different research activities typically undertaken in a scholarly investigation. The tables summarising the two remaining research categories focus,

"Scholars' sharing of research literature on a peer-to-peer basis can contribute to their achieving visibility-afforded reputation"

therefore, only on the activities unique to the scholarships of integration and application, respectively.

For each broad category the following data are provided:

- Specific activities: practices performed either online or offline by scholars for work-related purposes. Thus, for example, a major research activity in the work-life of scholars is the producing of research output.
- Scientific purpose: the anticipated contribution of a scholarly activity towards the advancement of science and the achievement of its goals for benefiting humankind. Thus, for example, the expected contribution of producing a research output is advancing science via discovering new knowledge and/or achieving enhanced understanding in order to solve a theoretical or practical problem for the public good.
- Reputational purpose: the anticipated contribution of a scholarly activity towards building/ maintaining/ enhancing a scholar's standing among their peers and, at times, the general public. Thus, for example, producing a research output has as its reputational purpose the obtaining of peer recognition and esteem.
- Fit for purpose reputational mechanism: the specific purpose-relevant process used to build reputation. Thus, for example, in order to achieve the reputational purpose of producing a research output the results of a scientific investigation need to be formally-written up and communicated in a manner suitable for presenting to peers for their evaluation and use.

5. Findings

5.1. The scholarship of research (discovery)

The scholarship of research, the pursuit of knowledge for its own sake and the benefit of humankind, is universally held to be the principal professional endeavour and focal point of the scholarly enterprise (**Harley** *et al.*, 2010; **Van-Dalen**; **Henkens**, 2012; **Wilson**, 1942; **Wolff-Eisenberg**; **Rod**; **Schonfeld**, 2016a; 2016b). Indeed, as this study's findings re-affirm yet again, there can be little doubt that in these days, too, as **Boyer** (1990, p. 2) said more than a quarter of a century ago, "to be a scholar is to be a researcher". The evident primacy of the scholarship of research over other aspects of the scientific undertaking is obviously associated with the importance accorded to its stated goal of extending the stock of human knowledge. Still, the centrality of research, 'disinterested' a pursuit as it should be (**Merton**, 1973), undeniably stems from its aforementioned reputation building capacities, too, for research achievements are used as the yardstick by which scholarly success is measured (**Borrego**; **Anglada**, 2016; **Boyer**, 1990; **De-Rond**; **Miller**, 2005; **Dewett**; **Denisi**, 2004; **Fanelli**; **Larivière**, 2016; **Harley** *et al.*, 2010; **Mabe**; **Mulligan**, 2011; **Miller**; **Taylor**; **Bedeian**, 2011; **Mulligan**; **Hall**; **Raphael**, 2013; **Ponte**; **Simon**, 2011; **Van-Dalen**; **Henkens**, 2012; **Waaijer** *et al.*, 2018; **Wilson**, 1942). Thus, scholars are greatly concerned with the impact of their research upon the wealth of human knowledge for the sake of the scholarly endeavour and society, certainly, but no less for the sake of their professional prestige.

> "Scholars are greatly concerned with the impact of their research upon the wealth of human knowledge for the sake of the scholarly endeavour and society, certainly, but no less for the sake of their professional prestige"

With research achievements seen as being synonymous with scholarly success, it is hardly surprising to find, as Åkerlind (2008) concludes from a review of a host of studies, that an important underlying intention in being a researcher and undertaking research is establishing oneself in the field and gaining, thereby, standing amongst scholarly peers. Indeed, according to **Blackmore** & **Kandiko** (2011), the extrinsic motivator of money and the intrinsic motivator of interest in the field of activity intersect for scholars to culminate in a blended motivation of prestige benefits awarded for pursuing, creating, and sharing knowledge. Thus, as **Brew** (2001) finds, one perception among scholars of the concept of research is that it is a kind of social marketplace, where the products of research (publications, grants, and networks) are exchanged for money, prestige or recognition. By the same token, **Bazeley** (2010) sees scholarly reputation as not merely a by-product of the research process but, alongside publications and impact, one of its three main outcomes.

Plainly then, the quest for reputation is literally 'built into' research work. Indeed, the portrayal of the range of traditional and novel activities comprising the scholarship of research in today's knowledge-driven era, presented below, shows them all to have a strong reputational focus alongside their scientific one. This holds true whether a research activity is performed individually or in collaboration with others, whether it is specifically aimed at the actual producing of an original contribution to human knowledge, the dissemination of the by-products and outputs of research work, the networking with colleagues or the evaluation of others' research outputs.

> "The quest for reputation is literally 'built into' research work"

5.1.1. Producing research output

Producing a new input to the extant body of certified knowledge is comprised of stages that follow a reliable, if not always consciously or rigorously adhered to progressive order (**Garvey**, 1975). This generic workflow is very much with us still, despite the aforementioned societal-demands-driven transformations in the scholarly environment and the te-

chnology-afforded changes in the research process itself (**Weller**, 2011), which brought about a widening of the range of acceptable research outputs and distribution channels. The procedure involves a series of activities, each of which has been found to have reputation building potentials (for a full list see **Nicholas**; **Herman**; **Jamali**, 2015a). A representative selection of the key activities are presented in Table 1.1.

Table 1.1. Producing research output

Activity	Scientific purpose	Reputational purpose	Fit for purpose reputational mechanism
Identifying a researchable topic, planning the research project and obtaining funding	Finding a scientifically significant research topic and establishing its viability	Producing evidence of scholarly ability to identify the significance of the topic and conduct the research as proposed; achieving visibility for one's ideas	Constructing a proposal for interested collaborators and for persuading funders that the proposed project can yield the best research on an important topic
Reviewing the pertinent previous knowledge	Anchoring a research undertaking in its theoretical base	Obtaining peer recognition and esteem	Selecting appropriate research content and presenting it as an analytic review of the literature
Requesting/providing help for locating pertinent previous knowledge	Same as above	Achieving disciplinary and trans-disciplinary visibility	Sharing literature peer-to-peer or via social media based scholarly platforms
Producing a research output individually or in collaboration with peers or even committed amateur experts	Discovering new knowledge and/or achieving enhanced understanding	Obtaining peer recognition and esteem; achieving visibility among one's peers	Presenting the results of a scientific investigation in a manner suitable for peer use and evaluation

Having seen how various activities aimed at producing a research output can contribute towards enhancing scholarly reputation, it is important to single out one activity that plays an especially vital role in the process: obtaining external research funding. After all, there can be little doubt that beyond providing scholars with the essential financial resources to conduct research, grants are also purveyors of prestige, especially if the funder is a blue-chip organisation. As **Laudel** (2005) explains, the decision of a grant-giving agency to fund a research, based as it is on peer review, represents a vote of confidence in a scholar by their peers, and, of course, the more competitive the grant, and the more rigorous the peer review system of the funder, the higher it is weighted. Indeed, a host of studies attests to the importance accorded in academe to the acquisition of research grants as a measure of successful research performance, which, as already noted, is seen as a reputation enhancing achievement (**Anderson**; **Slade**, 2016; **Auranen**; **Nieminen**, 2010; **Bloch**; **Graversen**; **Pedersen**, 2014; **Boyer**; **Cockriel**, 1998; 2001; **Nicholas** *et al.*, 2018; **Van-Arensbergen**; **Van-der-Weijden**; **Van-den-Besselaar**, 2014). So much so, that the rigorous directives of the 'publish-or-perish' mentality in academe have long been joined by the no less compelling behavioural rules of the 'get-grants-or-perish' ideology (**Vannini**, 2006; **Waaijer** *et al.*, 2018).

> Obtaining external research funding is an activity that plays an especially vital role in the process of enhancing scholarly reputation through the production of a research output

Another activity of especially far-fetching reputational ramifications is the collaborative producing of a research output[5]. Research collaboration has long been considered central to the scholarly enterprise by virtue of its singular ability to address in a comprehensive manner and to a synergetic effect complex, critical problems in an era of increasing specialisation (**Leahey**, 2016; **Sonnenwald**, 2007; **Wray**, 2006). Often it is also an inescapable necessity, for the costs of gaining access to expensive instruments, unique scientific data and expertise, scarce natural and social resources, and large amounts of scientific funding prohibit their being borne single-handedly by any one researcher or institution, at times even one country (**Bukvova**, 2010; **Sonnenwald**, 2007). Collaborative knowledge production has been gaining all the more importance in the open science environment, where greater collaboration is seen by its advocates as the key for the future success of research (**Shneiderman**, 2008).

Spurred on by the unprecedented opportunities for cooperative work in today's digital, web-based, socio-technical environment (**Leahey**, 2016), on the one hand, and by many public and private funding agencies' policies that promote collaborative, preferably also interdisciplinary and/or international programmes, on the other (**Breschi**; **Cusmano**, 2004; **Corley**; **Boardman**; **Bozeman**, 2006; **Defazio**; **Lockett**; **Wright**, 2009; **Hoekman** *et al.*, 2012), the last few decades have seen a veritable paradigm shift in scientific research from a singular enterprise into an expanding social endeavour (**Benavent-Pérez** *et al.*, 2012; **Bukvova**, 2010; **Cronin**; **Shaw**; **La-Barre**, 2003; **Freeman**; **Ganguli**; **Murciano-Goroff**, 2014; **Hsieh**, 2013; **Larivière** *et al.*, 2015; **Leahey**, 2016; **Sonnenwald**, 2007; **Wuchty**; **Jones**; **Uzzi**, 2007).

This virtual explosion in collaborative activity over the past decades has had strong individual-level, career- and reputa-

tion- related benefits for the researcher. On the most basic level, collaborating researchers are better placed to achieve visibility in the scholarly community, which is the essential prerequisite of reputation building, simply because they are more people to share information about their work and enlist support for it through the distinct set of relationships that each group member can use for the purpose (**Bikard**; **Murray**; **Gans**, 2015).

Furthermore, collaborative research has repeatedly been found to be associated with greater productivity (**Abramo**; **D'Angelo**; **Di-Costa**, 2009, 2010; **Adams** *et al.*, 2005; **Beaver**; **Rosen**, 1978; **Bordons** *et al.*, 1996; **Price**; **Beaver**, 1966 **Glänzel**; **De-Lange**, 2002; **Landry**; **Traore**; **Godin**, 1996; **Lee**; **Bozeman**, 2005; **Mairesse**; **Turner**, 2005) and wider impact (**Beaver**, 2004; **Bikard**, **Murray**; **Gans**, 2015; **Freeman**; **Ganguli**; **Murciano-Goroff**, 2014; **Katz**; **Martin**, 1997; **Larivière** *et al.*, 2015; **Leahey**, 2016; **Singh**; **Fleming**, 2010; **Van-Raan**, 1998; **Wuchty**; **Jones**; **Uzzi**, 2007), although as **Leahey** (2016) suggests, the coordination costs that accompany collaboration for the individual researcher may at times compromise real productivity. As research productivity coupled with research impactfullness are seen as the main composites of scholarly reputation, and, as such, the goals to be pursued to achieve a stellar standing as a scientist (**Herman**, 2018), scholars have very good reasons for perceiving collaborative research as helpful for realising their aspirations for attaining greater prestige.

Viewed from a reputational angle, collaborative research is also beneficial because a kind of 'reflected glory' can be gained from collaboration with renowned scholars (**Becher**; **Trowler**, 2001; **Kling**; **McKim**, 1999; **Lee**; **Bozeman**, 2005; **Lindgren**, 2011; **Van-Dalen**; **Henkens**, 2001). Indeed, collaboration with better known colleagues within a discipline can also gain stronger 'sponsorship' in proposals to funders, editors and among referees, as well among colleagues who would then be more likely to cite the collaborative publication (**Abramo**; **D'Angelo**; **Murgia**, 2014). No wonder then, as **Martín-Sempere**, **Rey-Rocha**, & **Garzón-García** (2002) find, that researchers belonging to established research groups (unlike those who are affiliated to non-established groups or belong to no group) show higher propensity to international collaboration and to participation in international projects.

Moreover, the 'Matthew-effect'[6] governed systems of science reward the collaborating scholar's above-noted improved research accomplishments and enhanced visibility with additional work and heightened reputation; it is a virtuous circle. Still, as **Abramo**, **D'Angelo** & **Murgia** (2014) contend, the 'Matthew effect' also implies that the merit for a co-authored article will go primarily to the most famous of the scientists credited in the byline, a state of affairs that may have career-related repercussions for a researcher, especially an early career researcher (ECR). However, as a recent longitudinal study into ECRs' scholarly behaviours and attitudes finds, the important reputational asset of being first author is, on the whole, not that difficult for them to attain (**Nicholas**; **Rodríguez-Bravo**; **Watkinson** *et al*., 2017).

5.1.2. Communicating, sharing and networking

As basic tenet of the scholarly world is the interdependence of specialised scientists, who contribute information to one another and receive in exchange the recognition of their colleagues (**Hagstrom**, 1964). Obviously then, scholars accord great importance to the building of a network of connections in order to communicate with likeminded colleagues. It is, in point of fact, as **Becher** (1989) suggests, an inescapable imperative for a scholar, as both the promotion of knowledge (the main cognitive concern) and the establishment of reputation (the key social consideration) are necessarily dependent on communication.

Inevitably then, communicating, sharing and networking –all collaborative sub-activities, of course-, have always been a vital part of the work-life of a scholar, and courtesy of the Web 2.0 enabled possibilities for scholars to congregate virtually in order to share their work, ideas and experiences, the common-interests based bonds among scholars are more easily forged and maintained (**White**; **Le-Cornu**, 2011). Concurrently, as **Copiello** & **Bonifaci** (2018) contend, the advent of Web 2.0 and the growing use of social media by scholars are changing, perhaps even revolutionising our capability to identify those who most contribute to the advancement of science. In consequence, the present-day digital and intercommunicative environment affords more effective ways and means of achieving and managing scholarly reputation than ever. This is all the more important given that all the sharing/communicating/networking activities scholars undertake in the course of their research work have been found in to possess reputation building capabilities, as the selective list of the main activities in Table 1.2 demonstrates (for a full list see **Nicholas**, **Herman**, & **Jamali**, 2015a).

> "Communicating, sharing and networking have always been a vital part of the work-life of a scholar"

A closer look at the prestige-enhancing capabilities of the scholarly communication practices that emerge from the above examples, indicates that they can be, if not already, greatly enriched through scholars' growing propensity to harness the web to engage more openly and in novel ways with colleagues and interested community groups. Traditional communication opportunities, such as face-to-face meetings, telephone conversations or email exchanges, will all support scholars' reputation building efforts, provided that they target their close circle of peers. However, how much more effective could it be, reputation-wise, if the net is spread wider to include the broader scholarly community and even the general public.

Moreover, the spirit of openness, generosity and helpfulness, which is at the heart of the communication-targeted scholarly activities delineated here, is inherently conducive to reputational gains, for being reputable involves, as **Willinsky**

Table 1.2. Communicating, sharing and networking

Activity	Scientific purpose	Reputational purpose	Fit for purpose reputational mechanism
Sharing research data with the scholarly community	Enabling other researchers to use extant data for discovering new knowledge faster; inviting collaboration	Achieving disciplinary and trans-disciplinary visibility; obtaining peer recognition and esteem; networking; enhancing one's digital identity	Disseminating data sets – peer to peer or via institutional websites, data centres or repositories
Sharing methodologies, research tools and protocols with the scholarly community	Enabling other researchers to use tried and proven methods for discovering new knowledge; promoting scholarly rigour and scrutiny	Same as above	Making one's working practices transparent and accessible over the web
Providing help for solving problems arising in the course of others' research	Enabling other researchers to discover new knowledge	Achieving disciplinary visibility; obtaining peer recognition and esteem; networking; enhancing one's digital identity	Disseminating information, 'tips', resources etc., peer-to-peer or on social media based scholarly platforms
Sharing research ideas, opinions and interim research findings with disciplinary peers and the wider scholarly community	Obtaining peer feedback and review of one's work, both explicit and implicit[7]; influencing scholarly thinking	Achieving disciplinary and trans-disciplinary visibility; obtaining peer recognition and esteem; networking; enhancing one's digital identity	Interacting with peers in conferences or on social media based scholarly platforms; live tweeting from conferences; blogging

(2010) points out, the possession of precisely such attributes. Indeed, proponents of the open and sharing ideologies of Science 2.0 cite its proven reputation-enhancing outcomes, such as citations, funding and media attention, as the major incentives for its adoption (**McKiernan** *et al.*, 2016). Take, for example, data sharing, which has been shown to attract reputational rewards: in a study which examined 10,555 studies, robust citation benefit was found in the case of those that made data publicly available, compared to those that did not (**Piwowar**; **Vision**, 2013).

Perhaps the best proof of the reputational potentials of communicating and networking online is the meteoric rise of scholarly social networks (SSNs) over the past few years. SSNs, enabling scholars to make new connections, maintain existing ones and showcase achievements, thus extend traditional practices of converting interactions and outputs into reputational terms, and more directly and quickly, too (**Desrochers** *et al.*, 2018; **Hammarfelt**; **De-Rijcke**; **Rushforth**, 2016). Beyond that, SSNs contribute directly to scholarly prestige building via their much-appreciated identity management and profiling functions (**Barbour**; **Marshall**, 2012; **Donelan**, 2016; **Duffy**; **Pooley**, 2017; **Hammarfelt**; **De-Rijcke**; **Rushforth**, 2016; **Jordan**, 2017; **Menéndez**; **De-Angeli**; **Menestrina**, 2012; **Van-Noorden**, 2014).

5.1.3. Disseminating and publishing research findings

The dissemination of research findings is accorded a critical role in the scholarly enterprise, laying the essential foundations for the cooperative, cumulative generation of eventually reliable additions to the stock of human knowledge (**David**; **Den-Besten**; **Schroeder**, 2010). Indeed, the norm calling for the open disclosure of the outcomes of scientific enquiry is one of the basic creeds of the scientific ethos (**Merton**, 1973). Traditionally, the dissemination of scholarly outputs was seen a two-staged process: first the preliminary results of work underway were reported semi-formally or informally to restricted audiences, and, as such, were typically rendered ephemeral and non-retrievable; then the finalised results were reported formally, predominantly published as journal articles, monographs or chapters in edited books, so that the information was made publicly available and remained in permanent storage (**Garvey**; **Griffith**, 1972; **Meadows**, 1998).

> "The dividing lines between formal/informal dissemination of scholarly work have crumbled"

No longer, though: now that a scholar's more or less finalised research outputs are showcased in institutional/disciplinary repositories and on personal websites and SSN profile pages, which serve as complementary distribution channels to publishing in pay-walled or open access scholarly journals and books, the dividing lines between formal/informal dissemination of scholarly work have crumbled. However, as **Kjellberg** & **Haider** (2018) find, rather than challenging the status of the formal scientific publication, the new forms of informal scholarly distribution channels, providing additional indicators of value, afford it more credibility and merit and thereby, reinforce its importance and stabilise its value as the scholarly world's chief currency.

This state of affairs has far fetching reputational ramifications, for, given the primacy of research achievements amongst the measures of scholarly success, the dissemination-fueled showcasing of the results of a scientific investigation has key reputation building roles. In fact, in today's digital and social media focused scholarly realities this showcasing can be undertaken more effectively, as **Herman** (2018) concludes, thanks to the greater visibility, quantifiable information on

research performance and networking and even increased citations afforded by the new dissemination channels, most notably SSNs. No wonder then that scholarly dissemination practices, as identified in the literature, have all been found to possess reputation-building purposes and potentials, as the representative selection of the key activities, presented in Table 1.3, exemplifies (for a full list see **Nicholas**; **Herman**; **Jamali**, 2015a).

Table 1.3. Disseminating and publishing research findings

Activity	Scientific purpose	Reputational purpose	Fit for purpose reputational mechanism
Disseminating research results formally	Reporting the results of research for scholarly peers to verify/critique and use	Securing priority for a new contribution; achieving visibility; obtaining recognition and esteem; achieving scholarly impact; enhancing one's digital identity	Publishing research articles in peer reviewed and highly regarded scholarly journals; publishing books with well-regarded publishing houses
Disseminating research results informally to colleagues and disciplinary peers	Same as above	Establishing priority of a new contribution; achieving visibility and obtaining peer recognition and esteem; networking; enhancing one's digital identity	Disseminating manuscripts, pre- or post-prints peer to peer or via repositories, personal websites and SSNs; giving a talk/paper/poster in a conference; blogging; live tweeting from a conference
Disseminating research findings informally to both the disciplinary and the wider scholarly community	Same as above	Same as above; additionally, reaching multiple audiences	Making research findings openly accessible in repositories and on personal websites and SSNs; blogging
Disseminating research findings informally to the public	Popularising science	Achieving public visibility; reaching multiple audiences; enhancing one's digital identity	Posting recorded lectures, pictures or video trailers on popular social media (i.e. *Facebook*); blogging

As the above analysis demonstrates, now that research findings in digital form are so conveniently shared and made visible on the web, realising the reputation building potential of disseminating activities has become easier to achieve. No surprise then that scholars, having become increasingly cognisant of the potential benefits of utilising web and social media afforded ways of showcasing their work (**Dermentzi** *et al.*, 2016; **Haustein** *et al.*, 2014; **Lupton**, 2014; **Nicholas** *et al.*, 2018; **Rowlands** *et al.*, 2011) and ever more aware of the need to build their digital identities (**Duffy**; **Pooley**, 2017; **Meishar-Tal**; **Pieterse**, 2017; **Van-Noorden**, 2014), manifest a much greater degree of readiness to embrace novel platforms and techniques (**Sugimoto** *et al.*, 2017). True, scientists have traditionally been reluctant to engage in public communication for fear of the 'sagan Effect' –the professional stigma attached to spending too much time translating one's research to the broader public and thereby creating 'dumbed-down' science (**Ecklund**; **James**; **Lincoln**, 2012)-, and especially for fear of its coming at the expense of focusing on academic productivity (**Dunwoody**; **Ryan**, 1985). However, according to **Liang** *et al.* (2014) there is scholarly impact enhancing, and therefore reputational value in utilising social media as well as legacy mass communication channels to reach public audiences.

> "The dissemination-fueled showcasing of the results of a scientific investigation has key reputation building roles"

The importance accorded these days to adopting new ways and means of scholarly reputation building is perhaps best exemplified by the diffusion of SSNs in academia. As of November 2018, *ResearchGate* (*RG*) reports to have over 15 million registered users (*ResearchGate*, 2018), whilst *Academia.edu*'s corresponding figure is over 69 million registered users (*Academia.edu*, 2018). Still, active use of SSNs seems to lag (far) behind readiness to register, with studies finding quite low rates of actual use (**Mas-Bleda** *et al.*, 2014; **Nentwich**; **König**, 2014; **Ortega**, 2015). Take, for example, a relatively recent study into *RG* usage and perceptions among academics (particularly in the USA and Europe), which suggests that academics are not very active users of the site, with less than 4 percent reporting usage on a daily basis (daily use is a very high bar, though) and a majority reporting using it only once a week or on a monthly basis (**Muscanel**; **Utz**, 2017).

As **Sugimoto** *et al.* (2017, p. 2052) argue, despite the evident popularity and interest among scholars in social media-based tools, platforms and indicators, only

> "time will tell whether social media and altmetrics are an epiphenomenon of the research landscape, or if they become central to scholars' research dissemination and evaluation practices".

It is important to note here that among ECRs active SSN use has become much more commonplace (*Ciber Research*, 2018), indeed, a mainstream activity, which can arguably foreshadow future developments in the wider scholarly community.

Thus, it is by no mistake that we are talking here of taking up novel ways and means as aids in, rather than alternatives to, the traditional dissemination of research. There can be little doubt that scholars are wary of relinquishing their tried and true formal disseminating practices (**Nicholas** *et al.*, 2017; 2014; *Ciber Research*, 2018; **Tenopir** *et al.*, 2015; **Watkinson** *et al.*, 2016; **Wolff-Eisenberg**; **Rod**; **Schonfeld**, 2016a; 2016b), which, of course, is hardly surprising. Faced with the greater competition resulting from the massive explosion of content and players and well-aware of the career-advancing reputational strengths of traditional dissemination norms and behaviours, scholars cannot but tread carefully where reputation building is concerned.

5.1.4. Evaluating research

With research based on trusted sources, channels and metrics that serve as widely-accepted proxies of the quality and reliability of the knowledge communicated, evaluative activities by necessity have always formed an essential part of its processes (**Becher**, 1989; **Latour**; **Woolgar**, 1986). However, determining the value of research has become ever more crucial with advent of the publish-and-perish driven, competitive and pressured scholarly information environment, in which the quality and dependability of some of the knowledge produced might be questionable (**Bauerlein** *et al.*, 2010; **Casadevall**; **Fang**, 2012; **Colquhoun**, 2011; **Ness**, 2014; **Truex** *et al.*, 2011; **Voas** *et al.*, 2011). Indeed, as producers of information, intent upon making sure that their message is the one attended to, researchers are well-aware that their contributions must first pass muster with their peers (**Franck**, 1999). As keen consumers of information, they are well-aware of the need to assess carefully others' research outputs in order to sift out the wheat from the chaff in the discovery process, in the information management process, and in the citation process (**Tenopir** *et al.*, 2015; **Watkinson** *et al.*, 2016). However, being the avid pursuers of prestige that they are, they are bound to be particularly mindful of the importance of evaluating research performance, both their own and their scholarly peers', with an eye to comparing their endeavours to those of their colleagues. Unsurprisingly, therefore, the evaluative practices that form such an inseparable part of scholarly work have all been found to possess reputation-conferring potential (Table 1.4).

Table 1.4. Evaluating research

Activity	Scientific purpose	Reputational purpose	Fit for purpose reputational mechanism
Peer reviewing	Maintaining and improving research quality and rigour	Obtaining peer recognition and esteem	Demonstrating scholarly proficiency and expertise as referee by: appearing on the list of a journal's reviewers; noting reviewing experience on one's CV and website; keeping a validated track-record of contributions as a reviewer on *Publons*
Participating in open peer reviewing	Same as above	Same as above; additionally, achieving visibility; enhancing one's digital identity	Demonstrating scholarly proficiency and expertise via posting reviews of others' research on dedicated sites
Monitoring one's impact	Accruing tangible evidence that one's research work is high quality and trustworthy	Obtaining peer recognition and esteem	Showcasing (for example, on one's website) the scores achieved in: citations-based metrics; usage-based metrics; SSN ratings

Researchers' evaluative practices thus all have reputation-building potentials, although, here again, adherence to traditional perceptions and behavioural rules characterise them. This can be best seen in the importance accorded to peer review, the process in which professional experts (peers) are invited to critically assess the quality, novelty, theoretical and empirical validity, and potential impact of research (**Tennant** *et al.*, 2017). Universally held to be essential for safeguarding the quality and reliability of human knowledge, peer review has been found central to the scholarly enterprise (see, for example, **Harley** *et al.*, 2010; **Mulligan**; **Hall**; **Raphael**, 2013; **Nicholas** *et al.*, 2015b; 2015c; *Nature Publishing Group*, 2015; *Publishing Research Consortium*, 2016; *Research Information network* (*RIN*), 2010; **Rodríguez-Bravo** *et al.*, 2017; *Sense about Science*, 2009; *Taylor & Francis*, 2016; **Ware**; **Monkman**, 2008).

Despite its well-documented pitfalls, among which problematic scientific gatekeeping, reviewer bias, ineffective filtering of error or fraud and the suppression of innovation are arguably the most notable (**Becher**; **Trowler**, 2001; **Bornman**, 2011; **Egghe**; **Bornman**, 2013; **Lee** *et al.*, 2013; *Research Information network* (*RIN*), 2010; **Shatz**, 2004; **Siler**; **Lee**; **Bero**, 2015; **Souder**, 2011; **Weller**, 2001), peer review remains a vital component of the publication-based reward and incentive system of the scholarly enterprise (**Fyfe** *et al.*, 2017; **Moore** *et al.*, 2017; **Tennant**, 2018). Calls to modify the present system to align with web 2.0 technologies abound, with reputational gains, such as greater visibility and digital identity enhancement, cited among the incentives to do so (**Ross-Hellauer**; **Deppe**; **Schmidt**, 2017; **Tennant**, 2018). However, whilst there is considerable scope for new initiatives to be developed, their success is contingent on a significant change of incentives in research environments (**Tennant** *et al.*, 2017). Importantly from a reputational point of view, by now scholars can validate and showcase their contributions to peer review via a dedicated platform – *Publons*. Thus, over time they can build up a public profile of their activity, both as a reviewer and as an editor for different academic journals, which may be used to claim credit –in job or promotion (**Curry**, 2017).

Another area where the reputation building potentials of the present-day scholarly practices, whilst very much evident, are less easily realised, is that of monitoring one's 'impactfullness'. Measuring 'impactfullness', in its original sense, would mean counting the number of people who change their thinking or practice because of some research achievement (**Allen**; **Stanton**; **Di-Pietro** *et al.*, 2013), a manifestly impossible task. Obviously then, determining the impact of a scholar's professional undertakings has to rely on surrogate indicators, with all their limitations –as a recent study demonstrates–, peer judgements of the importance and significance of scholarly work differ from metrics-based measurements (**Borchardt** *et al.*, 2018). As a result, the scholarly world, constantly preoccupied with reputation, has become governed by a 'culture of counting', culminating in a so called 'metric tide' or 'metric deluge' (**Wilsdon** *et al.*, 2015).

After decades of scholarly impact being viewed through the narrow prism of paper productivity and citation-based metrics, none of which seems to be ideally suited to capture scientific impact (**Agarwal** *et al.*, 2016; **Bornmann**; **Daniel**, 2008; **Cronin**, 2013; **Tahamtan**; **Afshar**; **Ahamdzadeh**, 2016; **Waltman**, 2016), researchers are being offered a wider range of metrics, known as altmetrics. Touted as presenting alternative indicators of impact (**Priem** *et al.*, 2010), and, as such, capable of counter-balancing the obsession with and influence of citation-based indicators (**Haustein**, 2016), altmetrics capture impact beyond citations to include speedier measures of the overall usage of more diverse types of scholarly work and even ideas aired in conversations or teaching, as well as their social effects (**Bornmann**, 2014; **Erdt** *et al.*, 2016; **Halevi**; **Schimming**, 2018; **Haustein**; **Larivière**, 2015; **Moed**; **Halevi**, 2015; **Priem**, 2014; **Wouters** *et al.*, 2015).

However, with all these alternative forms of impact measurement do allow for a degree of self-assessment (**Wouters**; **Costas**, 2012), and, indeed, scholars are growingly aware of the added value that altmetrics may have in their scholarly undertakings (**Aung**; **Erdt**; **Theng**, 2017; **Desrochers** *et al.*, 2018; **Haustein** *et al.*, 2014; **Sugimoto** *et al.*, 2017), their behaviour continues to be guided by traditional, productivity- and citation-based metrics (**Kjellberg**; **Haider**, 2018; **Nicholas** *et al.*, 2015a; **Nicholas** *et al.*, 2018; **Tenopir** *et al.*, 2015; **Watkinson** *et al.*, 2016; **Zheng**; **Erdt**; **Theng**, 2018). Inevitably so, of course, with academics typically still recruited, promoted and funded exclusively on the basis of their publication record and citation scores-based reputation (**Alperin** *et al.*, 2018).

5.2. The scholarship of integration

The scholarship of integration, defined as the assembling of extant knowledge into larger intellectual patterns within a wider, often cross-disciplinary context (**Boyer**, 1990), sets out to combine perspectives, concepts, theories, information and data to achieve thorough explorations of complex problems from novel angles. Thus, it aims specifically at producing research outputs that critically analyse, interpret and bring new insight to bear on original research, for example, a review article surveying the salient developments in a field, a textbook, or an article that reports on multi-faceted investigations of a specific topic.

Thus, if in original research the question is 'What is to be known, what is yet to be found'? in integrative research it is rather 'Is it possible to interpret what's been discovered in ways that provide more comprehensive understanding?' (**Boyer**, 1990). Nevertheless, the synthesising research tradition represented by the integrative mode of scholarship is just as much concerned with creating knowledge as the investigative tradition represented by the scholarship of research. In fact, its approach to problem solving is especially suitable for tackling complex, societal often global challenges, which cannot be solved by a single disciplinary approach (**Weller**, 2011). Of course, many of the research activities described in the preceding sections, inclusive of their reputation building capabilities, characterise the scholarship of integration, too. Those practices, unique to the scholarship of integration, which are listed in Table 2, have all been found to have reputational potentials (for a full list see **Nicholas**; **Herman**; **Jamali**, 2015a).

Table 2. Conducting integrative research

Activity	Scientific purpose	Reputational purpose	Fit for purpose reputational mechanism
Identifying a complex topic in need of a more wide-ranging understanding and planning the research project to investigate it	Finding a scientifically significant research question and establishing how cross-fertilisation of knowledge can answer it	Producing evidence of scholarly ability to identify the significance of the problem and conduct the research as proposed	Constructing a proposal for interesting collaborators and editors/ publishers
Producing and disseminating an integrative research output using traditional strategies	Discovering and sharing wider- and novel-perspectives afforded new knowledge	Obtaining peer recognition and esteem; achieving disciplinary and trans-disciplinary visibility; achieving scholarly impact	Presenting the results of integrative interpretation of the extant knowledge on a topic in a manner suitable for peer use and evaluation
Producing and disseminating an integrative research output using open and participatory strategies	Same as above; additionally, updating and complementing extant knowledge by current informed opinion	Same as above; additionally, networking; reaching multiple audiences; enhancing one's digital identity	Same as above; additionally, crowd-sourcing and interacting with peers on social media based scholarly platforms

Engaging in the integrative mode of scholarship, effectively showcasing as it does scholarly expertise and proficiency, can thus serve scholars' reputation-building goals. The analytical synthesising of (discipline-spanning) knowledge, which is the raison d'être of integrative scholarship, may give rise to fresh theoretical insights (**Conole** *et al.*, 2010; **Carayol**; **Thi**, 2005), with all the reputation-enhancing implications such an achievement is bound to have. Nevertheless, integrative scholarship has its reputational costs, too, primarily because, almost by definition, it necessitates taking a multi-disciplinary approach.

> "Academics still are recruited, promoted and funded exclusively on the basis of their publication record and citation scores-based reputation"

The managing of the transition between disciplines can be challenging, as is mastering more than one discipline (**Conole** *et al.*, 2010; **Weller**, 2011). Thus, coordination problems are especially rife in interdisciplinary research, prone as it is to epistemological or methodological conflicts between members of different disciplines (**Leahey**; **Beckman**; **Stanko**, 2012). Complicating things further, peer review, standards of validity and effective criteria of excellence in academe are essentially based on disciplinary standards (**Mallard**; **Lamont**; **Guetzkow**, 2009; **Rafols** *et al.*, 2012). Add to this that prestigious journals tend to be strongly disciplinary (**Weller**, 2011), and interdisciplinary publications are seen as less prestigious (**Conole** *et al.*, 2010), and it becomes obvious why researchers claim that crossing research boundaries comes at a price (**Rhoten**; **Parker**, 2004).

Also, perhaps most notably from a reputational point of view, opting for interdisciplinary projects may bring on a 'production penalty' in a world where success is measured in terms of getting published and cited. Indeed, scholars with greater interdisciplinary research experience have been found to have lower levels of productivity (**Leahey**; **Beckman**; **Stanko**, 2012), possibly because the aforementioned epistemological or methodological conflicts can slow progress toward publication (**Murray**, 2010). The findings as to the relationship between interdisciplinary research and its citation impact are also suggestive, if less decisive: bibliometric studies come up with mixed findings on the topic, possibly because different studies use different operational definitions of interdisciplinarity or because interdisciplinary work can have broad societal and economic impacts that are not captured by citations (**Larivière**; **Gingras**, 2010; **Van-Noorden**, 2015; **Wang**; **Thijs**; **Glänzel**, 2015). Thus, for example, **Larivière** & **Gingras** (2010) found no clear correlation between the level of interdisciplinarity of articles and their citation rates in general, although there were some disciplines in which a higher level of interdisciplinarity was related to a higher citation rates whilst for other disciplines, citations declined as interdisciplinarity grew. It is hardly surprising to find then that disciplinary collaborations contribute more to career development –and hence to reputation- than interdisciplinary collaborations (**Van-Rijnsoever**; **Hessels**, 2011).

5.3. The scholarship of application

Setting out to meet its express aim of informing practice, the scholarship of application (**Boyer**, 1990) utilises disciplinary knowledge and skill to address societal and industrial/organisational challenges. It sees scholars partnering with practitioners, policymakers and community leaders to design application oriented, albeit no less rigorously treated research-based solutions that fruitfully bring together theory and practice. Thus, although scientists and policy-makers alike insist that the distinction between basic research and applied research is increasingly irrelevant and based on misconceptions about modern knowledge production (**Gulbrandsen**; **Kyvik**, 2010), in the context of accelerated international competition, financial austerity and governmental steering of university research towards 'useful' knowledge generation, the scholarship of application has gained an unprecedented significance (**Koryakina**; **Sarrico**; **Teixeira**, 2015). Indeed, as **Blackmore** & **Kandiko** (2011) point out, the work of many scholars includes a wider range of activities –notably 'third stream' or highly applied research that is more closely linked with industry-. In this way universities manage to comply with the imperative of the day, becoming more entrepreneurial and market-oriented in order to obtain legitimacy and to conform to outside pressures, whilst maintaining and supporting the highly valued traditional research activities (**Koryakina**; **Sarrico**; **Teixeira**, 2015).

> "Disciplinary collaborations contribute more to career development –and hence to reputation- than interdisciplinary ones"

The scholarship of application can be seen as encompassing the area of service work and academic administration, too. This is less surprising than it might seem, for serving the scholarly community, i.e., sitting on committees, fulfilling editorial roles, heading professional organisations, has the practical aspect of furthering the scholarly aims of one's discipline and its local manifestation, to use **Blackmore** & **Kandiko**'s (2011) words, the department. Nevertheless, the ultimate goal of this application-oriented mode of scholarship is the creation of new knowledge, which is why quite a few of the activities comprising the research enterprise are typical of it, too. There are, of course, activities that more uniquely characterise the scholarship of application, as exemplified in the representative list of the key ones among them, presented in Table 3, all of which have been found to possess reputation building potential (for a full list see **Nicholas**; **Herman**; **Jamali**, 2015a).

Linking research-based insights to practice through dynamic interaction, the scholarship of application thus opens up the boundaries between academia and the real world (**Pearce** *et al.*, 2010). Indeed, in these days of Science 2.0 supported initiatives that break down traditional binaries like research/practice, scholar/participant, inside/outside and contribu-

Table 3. Engaging in application-aimed scholarship

Activity	Scientific purpose	Reputational purpose	Fit for purpose reputational mechanism
Identifying a societal/ industrial challenge in need of a theory-based practical solution, planning the research project and obtaining funding	Finding a scientifically significant application-oriented research question and establishing its viability	Producing evidence of scholarly ability to identify the significance of the topic and conduct the research as proposed; achieving visibility for one's ideas	Constructing a proposal for interesting peer and practitioner collaborators and for persuading funders that the proposed project can yield the best research on an important topic
Producing and disseminating an application-oriented research output	Discovering new knowledge that offers solutions to a practical problem	Achieving scholarly and public visibility; obtaining peer and public recognition and esteem; achieving scholarly and societal impact	Presenting the results of an application-aimed investigation both in a manner suitable for peer use and evaluation and for mass media dissemination
Serving government or industry as an external consultant	Devising scholarly expertise afforded solutions to societal/ industrial problems	Same as above	Reporting the solutions both in a manner suitable for peer use and evaluation and for mass media dissemination
Serving the scholarly community (i.e., sitting on committees, fulfilling editorial roles, heading professional organisations)	Furthering the aims of one's professional community to better enable the pursuit of scientific goals	Same as above; additionally, networking	Demonstrating proficiency and expertise in scholarly leadership roles via personal and institutional websites; reporting achievements in community functions and publications

tor/user (**Greenhow**; **Gleason**, 2014), application-oriented undertakings are increasingly becoming joint, rather than individual ventures (see also the forthcoming section on the scholarship of co-creation). The ensuing dialogue between scholars and representatives of practitioner/public interests can prove to be advantageous for both parties. For the former, it is the opportunities to open up fresh interconnections between public, scientific, institutional, political and ethical visions of change. For the latter, it is the opportunities for 'sustained dialogue' among groups normally excluded from decision making (**Irwin**, 2008).

From a reputational point of view the great strength of taking on application-aimed scholarly projects is the socio-economic impact they can afford, especially now that furnishing evidence of impact beyond academia is often a requirement in governmental research assessment exercises, as exemplified by the *Research Excellence Framework* (*REF*) in the UK (**Penfield** *et al.*, 2014). By the same token, application-targeted scholarly undertakings can enhance public visibility, which can go a long way towards enhancing scholarly prestige, too. No surprise then that in a survey amongst members of the *American Association for the Advancement of Science* (*AAAS*), the vast majority (87%) supported the idea that participation in policy debates and engagement with citizens was necessary to further their work and careers (**Rainie**; **Funk**; **Anderson**, 2015).

Not that application-aimed, professional/non-professional alliances pose no problems for scholars; rather the contrary. They may have apprehensions about failure for lack of shared language with lay collaborators; they may be concerned about time taken away from 'real' research work, when a lack of time is seen as the most insurmountable barrier to doing more outreach anyway; they may be worried that publicly transparent undertakings may lead to their being 'scooped'. They may also confront a lack of encouragement at the institutional level or a lack of funding for more extensive engagement in the scholarship of application (**Ecklund**; **James**; **Lincoln**, 2012; **Jensen** *et al.*, 2008). However, above all, a major discourager for scholars to take on community-interest driven, application-oriented projects is that the outcomes may remain unpublished (**Braxton**; **Luckey**; **Helland**, 2002). In the scholarly world, where success is measured by publications and citations, such a project is likely to be regarded as too costly in reputational terms.

> "The scholarship of application, with its considerable potential for enhancing public visibility and thereby scholarly reputation, has gained an unprecedented significance"

As to the prestige-conferring capabilities of engaging in the scholarship of application via its service work and academic administration aspect: it is widely held that the holding of managerial/leadership/headship positions in one's collegial community, constituting as it does a very strong source of personal power, influence and respect (**Kekäle**, 2003; **Kogan**, 2007; **Winter**, 2017), serves to enhance a scholar's reputation. Indeed, academic managers, who normally have been appointed to a leadership role in virtue of their superior scholarly achievements and professional competence (**Moodie**; **Eustace**, 1974), are greatly visible and well-known figures, certainly in their own institutions, but very possibly outside of

it, too. As a result, they are more likely to be invited to hold offices in professional organisations, serve on committees, and undertake public-spirited tasks, all of which may serve to further increase their prestige in a virtuous circle brought about by the aforementioned Matthew effect (**Merton**, 1968).

5.4. The scholarship of teaching

Readily understood to refer to the conveying of the human store of knowledge to new generations, the scholarship of teaching, as **Boyer** (1990) sees it, is a more expansive concept than commonly held perceptions indicate. It requires that scientists take a studied approach to their pedagogy in order to achieve evidence-based 'best' teaching practices that can transform, extend and enhance students' learning (**Greenhow**; **Gleason**, 2014). In fact, **Boyer**'s vision of the scholarship of teaching sounds more appealing these days: it is wholly in line with current pedagogical thinking, which puts the student at the heart of the teaching/learning process (**Anderson**, 2016; **Brew**, 2012; **Robson**, 2017; **Weller**, 2016), and readily facilitated by Science 2.0 principles- and technologies-afforded participatory strategies (**Veletsianos**, 2016). The problem is, of course, that the rhetoric with regard to the fundamental importance of both teaching and research has not (yet?) been transported to reality: as **Blackmore** (2016b) puts it, excellence in research attracts prestige, but excellence in teaching does not. As it is only research that is rewarded, there is no incentive for a scholar to spend any more than the minimally required time on teaching and student advising (**Melguizo**; **Strober**, 2007). Indeed, teaching is perceived as simply taking time away from the all-important research, to the extent that ECRs, as a rule, are advised to focus on publishing and avoid spending too much time on any other scholarly pursuit (**Harley**; **Acord**; **Earl-Novell** *et al.*, 2010).

> "A major discourager for scholars to take on community-interest driven, application-oriented projects is that the outcomes may remain unpublished"

However, now that recent policy-level decisions regard the teaching component of scholarly undertakings a global/national/regional priority and call for a sharper focus on teaching and for granting teachers the same professional recognition and opportunities that researchers get (*European Commission*, 2013; *European Parliament*, 2012; **French**, 2017), things might change. Not according to **Blackmore** (2016b), though, who contends that such well-intentioned governmental proposals to recognise and reward teaching excellence may not be sufficient to change the current state of affairs. Instead, he proposes adopting the current pedagogical theories that have at their heart the concept of linking research and teaching closely together at all levels (**Brew**, 2012; **Robson**, 2017; **Weller**, 2016; **Wood**, 2017), so that students take a more active and engaged part in their learning and research-informed teaching can be effectively evaluated in terms of learning success and positive societal effects. The change of climate brought about might culminate in the disproportionate reputational weight given to research above teaching becoming a thing of the past. It is certainly a development to hope for, as scholarly teaching activities, especially those fueled by novel approaches, do seem to possess reputational potentials, as the representative list of the key activities in Table 4 demonstrates (for a full list see **Nicholas**; **Herman**; **Jamali**, 2015a).

Table 4. Engaging in the scholarship of teaching

Activity	Scientific purpose	Reputational purpose	Fit for purpose reputational mechanism
Designing a course/learning programme	Establishing how extant knowledge may best be transmitted/shared to promote and support an effective learning process	Producing evidence of disciplinary and pedagogical ability to teach the course/programme as proposed	Constructing a proposal for peer evaluation of its potential effectiveness and for attracting students
Producing and delivering a course using traditional strategies	Achieving effective learning	Obtaining peer and student recognition and esteem	Demonstrating scholarly and pedagogical proficiency and expertise as teacher; excelling in peer monitoring/student ratings of teaching quality
Producing and delivering a course using open and participatory strategies	Same as above	Achieving scholarly and public visibility; obtaining peer, student and public recognition and esteem; enhancing one's digital identity	Same as above; additionally, excelling in public feedback on teaching quality
Engaging in classroom research to advance learning theory	Discovering new pedagogical knowledge and/or achieving enhanced understandings of instructional design	Obtaining peer recognition and esteem	Presenting the results of a scientific investigation in a manner suitable for peer use and evaluation

For the time being teaching activities may be marginalized in the scholarly quest for prestige, but the analysis reported here does show them all to have reputational potentials. Of course, where the specific activity of engaging in classroom research to advance learning theory is concerned, this is hardly surprising; for all practical purposes, classroom research is no different from any other research, affording as it does expert achievements-based eligibility for peer recognition

and esteem through publications. However, the existence of reputation building potentials holds true even where the activities conform to traditional teaching strategies, which, based on the notion of the teacher as the focal point of teaching and centred on lectures delivered either face-to-face or online, are more likely to attract local attention (although in the age of social media word of mouth can spread quickly and widely). Still, it is when teaching is approached, as **Boyer** (1990) suggests and the aforementioned current theories and policies advocate, in a manner similar to research-focused scholarly work, as a disciplinary- and pedagogical-knowledge based, peer-authorised and formally reported undertaking, the outcomes can become all the more reputation accruing.

The affordances of open science 2.0 facilitate the changes in this direction, enabling a shift to learner-centred, qualitatively different, open and participatory practices of teaching, which break out of the confines of the four walls of the classroom to reach multiple and diverse audiences. Thus, for example, the ubiquitous access to an unprecedented wealth of digitised learning resources, brought about by the adoption of open educational resources (OER) policies by a wide variety of governmental, institutional and philanthropic organisations (**Veletsianos**; **Kimmons**, 2012), must have further bolstered the increasingly more prevalent practice of creating open courses and/or making openly available course materials to the public, as well as the many, social-media afforded networked spaces that invite participatory engagement in learning (**Couros**; **Hildebrandt**, 2016; **Cronin; MacLaren**, 2018; **Koseoglu**; **Bozkurt**, 2018; **Veletsianos**, 2016).

The opportunities for reaping the prestige-accruing rewards of excelling as a teacher have grown immeasurably now that web-based, open and participatory teaching strategies, focusing on expert-facilitated dialogue and knowledge exchange among all participants, have come into vogue. This is demonstrated most clearly by MOOCs (massive open online courses) –social networks based, crowd-sourcing technologies enabled, participatory online courses (**Moe**, 2016)-. As **Daniel** (2012) argues, institutions that place their MOOCs in the public domain for a worldwide audience, inevitably have to do more than pay lip service to the importance of teaching and put it at the core of their missions. If so, scholars conducting MOOCs stand to gain twice: their teaching achievements will be taken into career-related consideration, whilst the massive, globe-spanning visibility, which is an inherent feature of MOOCs, will contribute significantly to their scholarly and public visibility driven prestige.

5.5. The scholarship of co-creation

Taking the notions driving much of the current discourse on the nature of contemporary scholarship one step further, **Garnett** and **Ecclesfield** (2012) update **Boyer**'s (1990) model by proposing the addition of a fifth dimension, the scholarship of co-creation. A timely undertaking, indeed, for Boyer's framework, which considers research and teaching as two distinct spheres of activity, and sees the producing of knowledge as a linear process, no longer wholly reflect the realities of the digital and interactive world. The dimension of co-creation refers to the increasingly converging processes of knowledge discovery and knowledge transmission and the resultant blurring of the distinction between the roles of researcher and teacher (**Brew**, 2012; **Robson**, 2017; **Weller**, 2016; **Wood**, 2017).

Beyond the changing face of higher education teaching, as delineated in the previous section, it is public participation in scientific research (PPSR) projects –intentional collaborative endeavors between science researchers and public participants, including but not limited to amateur experts-, concerned community members and/or students, that best embody the spirit of the scholarship of co-creation. Typically designed and led by scientists, with members of the public primarily gathering and analysing data (**Bonney** *et al.*, 2009; **Shirk** *et al.*, 2012), PPSR projects (also known as citizen science projects and community-based participatory research projects), have been gaining traction for the past two decades (**Willyard**; **Scudellari**; **Nordling**, 2018).

The analysis of the activities involved in the participatory and collaborative discovery of new knowledge, as exemplified by PPSR undertakings, shows them to have a strong reputation building capacity, as Table 5 below demonstrates. This is perhaps not surprising: with scholars' various activities in the course of both their research and teaching clearly possessing reputation-accruing potentials, a synergetic effect of their combination is only to be expected.

Table 5. Engaging in the scholarship of co-creation

Activity	Scientific purpose	Reputational purpose	Fit for purpose reputational mechanism
Collaborating in a PPSR (public participation in scientific research) project	Discovering new knowledge that can resolve local concerns; promoting learning about science concepts and processes	Achieving scholarly and public visibility; obtaining peer and public recognition and esteem; achieving scholarly and societal impact	Presenting the results of a PPSR investigation both in a manner suitable for peer use and evaluation and as a societal publication
Leading a PPSR project in a course/learning programme	Same as above; additionally, achieving effective learning about science concepts and processes	Achieving scholarly and public visibility; obtaining peer, student and public recognition and esteem	Same as above; additionally, demonstrating scholarly and pedagogical proficiency and expertise as teacher; excelling in peer monitoring/student ratings of teaching quality

The above examination of what seems to be the most obvious instance of co-creation, the increasingly widespread trend of public participation in scientific research (**Williamson** *et al.*, 2016) demonstrates their strengths in this area. If nothing else, PPSR projects, inviting as they do amateur experts and informed citizens to join the scholarly net and opening the entire process of research to the scrutiny of public collaborators and audiences, can bring about increased visibility-afforded prestige for the scholar.

However, it goes beyond that: since such projects may yield both conventional scientific papers and popular media publications, the scholar stands to gain both peer recognition and esteem and reputation-enhancing societal impact. As **Rotman** *et al.* (2012) have shown, scientists see the opportunity to obtain data on a scale that otherwise might not have been obtainable to support their publishing endeavours as their primary motivation (aside from advancing science) for participating in such co-created endeavors. Obviously, then, they mainly appreciate the reputational, career-advancing potentials of such undertakings. Still, it is interesting to note in this context that according to **Chikoore** *et al.* (2016), the majority of UK academics questioned in their study were opposed to the notion of mandating public engagement with research as part of appraisal systems.

> "Teaching is perceived as simply taking time away from the all-important research"

6. Conclusions

The evidence produced by more than 200 relevant and authoritative papers on scholarly reputation and related matters has been gathered and assessed in the writing of this review. The data has been categorised utilizing a powerful reputational framework designed for the purpose, with the framework providing a lens through which we can examine, almost line by line, the reputational potential of all the practices (nearly 30 of them) that comprise scholars' work-life. In addition, the review produced is advisory in that it demonstrates how scholars may, indeed should, go about building, maintaining and showcasing their reputation.

It clearly emerges from the review that scholarly reputation is still very much associated with research activities. Hardly surprisingly, of course, with recruitment of staff, their career advancements and their further work opportunities widely seen as contingent on proven research achievements, most notably as measured by the quantity of papers published in high-ranking journals and the number of citations they obtain. Thus, although the reputation building component of the scholarly undertaking is potentially very well-supported indeed in this era of Science 2.0, there are still challenges to be faced. The scholar may have strong incentives to embrace more inclusive scholarly goals and to pursue them via open and participatory ways of working, which can provide more encompassing means of achieving and showcasing scholarly reputation, but the reputational price to be paid may be too high.

Thus, as we have seen, the integrative mode of scholarship, effectively showcasing scholarly expertise and proficiency as it does, can successfully serve scholars' reputation-building goals, but this, not without reputational risk. By the same token, both the scholarship of application and the scholarship of co-creation, with their potential to create today's much sought after socio-economic impact, are certainly conducive to prestige, but they, too, can be costly in reputational terms. However, it is the scholarship of teaching, which is the ultimate proof that the reputational price to be paid for participating in novel scholarly undertakings may be too high: with all that creating open courses and/or making openly available course materials to the public can have considerable potential for enhancing a scholar's standing, as these activities cannot be readily translated into conventional research outputs and their effects are mainly felt locally, their reputational value is seen as very limited indeed

> "Activities involved in the participatory and collaborative discovery of new knowledge have a strong reputation building capacity"

It is to be hoped that this analysis of the prestige-accruing potential of scholarly practices can fill the somewhat surprising gap in what we know about this truly vital aspect of the scholarly undertaking. The 'matching' of the hoped-for reputational outcome of an activity with the ways and means at the disposal of scholars for achieving visibility and obtaining peer recognition and esteem, as these emerge from the literature, thus hopefully resulted in a move towards untangling the complex picture of scholarly reputation building.

7. Notes

1. For an exploration of the concept of reputation, roughly definable as the overall judgment of a scholar's standing as determined by experts in their field, see the **Scope and definitions** section.

2. The term 'scholarly' refers in this paper to the characteristics of the research undertaking, the systematic utilising of observation, analysis and/or experimentation to describe and explain social, cultural, medical, natural and agricultural phenomena, in any branch of knowledge. Thus, for all intents and purposes the terms 'scientific' and 'scholarly' are treated as synonyms.

3. So dubbed by **Cronin** (2013) 'for want of a better word'.

4. For example, *IEEE Transactions on education* accepts manuscript submissions under three areas of scholarship, based on Boyer's categories.
https://ieeexplore.ieee.org/xpl/aboutJournal.jsp?punumber=13

5. Collaborating is the action of working with someone to produce/create something; it is cooperation for the sake of achieving something together, whereas networking is the cultivation of relationships in order to enable the ongoing exchange of useful information or services.

6. **Merton**'s (1968) terminology for denoting the pattern of a misallocation of credit for scientific work, whereby greater increments of recognition for scientific contributions are accorded to scientists of considerable repute and such recognition is withheld from scientists who have not (yet) made their mark.

7. Explicit review is the process whereby work is made openly accessible and the audience invited to scrutinise, comment or rate it. Implicit review is the capturing and integrating of usage metadata (page views and downloads, *Twitter* counts, *Facebook* comments, science blog postings, bookmarking and reference sharing), to provide immediate feedback about the performance of a journal, an author or an article.

> "The integrative, application-oriented and co-creation aimed modes integrative mode of scholarship can successfully serve scholars' reputation-building goals, but this not without reputational risk"

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