



Richard R Nelson (1930–2025): Evolutionary economist and innovation scholar

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ABSTRACT

This article attempts to set out systematically Richard Nelson's contributions to the economics of innovation and to the emerging field of innovation studies. While focusing mainly on his fundamental research contributions, it also examines his impact on policy as well as his work supervising students and mentoring young researchers. In addition, it highlights his role at the centre of an expanding international network of scholars working to build the field of innovation studies over the last 60 years, and helping to imbue it with a set of values emphasizing openness, collaboration and intellectual generosity.

1. Introduction

It is with great sadness that we have learned of the death of Richard R Nelson. For over 60 years, Dick Nelson (as he was universally known) combined great theoretical insight and wide-ranging empirical knowledge to advance the field of science policy and innovation studies, often opening entirely new areas of research with his contributions. His 1959 article on the economics of basic scientific research arguably launched the new field of science policy research. The book *The Rate and Direction of Inventive Activity* he edited in 1962 was celebrated on its 50th anniversary as having “ushered in the modern era of study of the economics of technological change” (Lerner and Stern, 2012, p. 1). In 1982, he and Sidney Winter published *An Evolutionary Theory of Economic Change*, which repositioned economic theory in an evolutionary framework, moving away from economics' reliance on an epistemological model derived from physics. A 1988 book co-edited with Giovanni Dosi, Chris Freeman, Gerald Silverberg and Luc Soete, *Technical Change and Economic Theory* developed theoretical tools for modelling innovation's

economic effects and provided empirical insights on how innovation systems operate in international trade and in different national and industrial contexts. The 1993 book he edited on *National Innovation Systems* deepened the empirical foundations and expanded Chris Freeman and Bengt-Åke Lundvall's defining work on innovation systems.

From the beginning and throughout his career Dick Nelson balanced path-breaking individual contributions and collaborative projects in an ever-widening network of researchers and policymakers, building the field of innovation studies and the practice of innovation policy. He always seemed to have time to listen to others, whether to eminent colleagues or the lowliest student, offering advice and encouragement. He was universally admired, an inspiration to us all for over half a century.¹

In what follows, we look first at Nelson's background and early career at RAND. The next sections then deal with his time at Yale University and his links with the Science Policy Research Unit (SPRU) at Sussex University and with other European institutions and scholars. Then we consider his work while at Columbia University. Most of what follows

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¹ As a Chinese graduate student he helped put it, Dick Nelson was simply “the nicest big shot I've ever met”. For those not familiar with him, there are footnotes later in this article where one can find online videos of Dick Nelson.

focusses on his research and published outputs, examining publications that had a major impact on the academic world.^{2,3} However, we also consider his impact on policy and as a teacher and supervisor before ending with a section on Dick Nelson, the person.

2. Education and early career at RAND

Richard Nelson was born in New York City in 1930. After two years studying at the University of Wisconsin,⁴ he transferred to Oberlin College where he earned a BA in 1952. He completed his PhD in economics at Yale in 1956, where one of his supervisors was James Tobin. Drawing on his thesis, his first journal article was published in 1956 in the *American Economic Review*, in which he set out 'A theory of the low level equilibrium trap in developing countries' (Nelson, 1956). Development and developing economies continued to be a theme of his research for much of his career, as we shall see below.

After a brief period as a post-doctoral student taking classes at MIT, he worked as an assistant professor at Oberlin College. Then in 1957 Nelson joined the RAND Corporation, working with a group of extraordinarily illustrious economists in developing the economics of R&D and technical change.⁵ That group was led by Burton Klein and included Armen Alchian, Kenneth Arrow, Bill Meckling, Merton (Joe) Peck and Sidney Winter. The United States had been alarmed by the launch in 1957 of the Soviet Sputnik, the first artificial earth orbiting satellite. The Soviet achievement focused attention on the role played by scientific research in the political economy and stimulated Nelson to set out 'The simple economics of basic scientific research' in an article published in the *Journal of Political Economy* in 1959. In this, he provided the basis for answering questions including whether society is spending enough on science, why basic research does not draw more resources from the corporate sector, why it is likely that we are not spending as much as is 'socially desirable', and what might be done to overcome this. As an illustration of Nelson's style of communication, consider his answer to the question of why basic research does not draw more resources from the corporate sector:

Few firms operate in so wide a field of economic activity that they are able themselves to benefit directly from all the new technological possibilities opened by the results of a successful basic research effort. In order to capture the value of the new knowledge in fields which the firm is unwilling to enter, the firm must patent the practical applications and sell or lease the patents to firms in the industries affected. But significant advances in scientific knowledge are often not directly and immediately applicable to the solutions of practical problems and hence do not quickly result in patents. Often the new knowledge is of greatest value as a key input of other research projects which, in turn, may yield results of practical and

patentable value. For this reason scientists have long argued for free and wide communication of research results, and for this reason natural "laws" and facts are not patentable. Thus it is quite likely that a firm will be unable to capture through patent rights the full economic value created in a basic-research project that it sponsors.

Nelson (1959, p. 302)

For those of us entering the field of science policy research in subsequent decades, this was required reading, indeed the place where we often began. Compared with journal articles published today, this paper is truly remarkable. There is no abstract, no bibliography of cited references. Indeed, apart from a few scattered footnotes citing a handful of NSF and other US government reports, there are no citations at all to previous academic work – this was not because Nelson was derelict in this task but simply because economics had previously had little to say about science.

In 1960, Nelson was appointed as an associate professor at the Carnegie Institute of Technology, and a year later he joined the staff of the Council of Economic Advisors during President Kennedy's administration. During this time, he organised a conference which brought together nearly all the American researchers who were trying to create a more systematic understanding of the relationships between science, technical change and the economy. This led to the publication of the 1962 book on *The Rate and Direction of Inventive Activity*, which, more than any other publication, can be said to have launched the field of innovation studies, at least in the United States. Nelson wrote an influential introduction to this volume, attempting to link hitherto rather disparate efforts into a more coherent whole (Nelson, 1962).

In 1964, Nelson returned to RAND where he continued to work until 1968. During this period there were three prominent contributions, all published in the *American Economic Review*, the flagship academic journal of US academic economists. The first (in 1964) was on 'Aggregate production functions and medium-range growth projections' (Nelson, 1964). The second was the 1966 paper co-authored with Edmund Phelps (subsequently the winner of the 2006 Nobel Prize) on 'Investment in humans, technological diffusion, and economic growth' (Nelson and Phelps, 1966), while the third was the 1968 paper on "A 'diffusion' model of international productivity differences in manufacturing industry" (Nelson, 1968). In contrast with his 1959 paper all these papers deeply engaged with the contemporaneous economic literature and its mathematical and econometric methodology. They also provided policy-related conclusions on (inter alia) the importance of maintaining full employment, the social value of education and the inadequacy of assumptions that lower levels of economic development are solely the consequence of shortfalls in capital accumulation.

These concerns with the public policy implications of innovation, investment and growth are reflected in Nelson's 1967 book *Technology, Economic Growth, and Public Policy*, authored with his RAND colleagues, Merton Peck and Edward Kalachek. The starting point for this (as in several of his subsequent publications) was a critical observation on mainstream economics:

In most of the literature on economic growth, technological advance tended to float in the air as a factor which increased the productivity of capital and labor, its contribution being estimated sometimes by the residual in the growth rate after allowance for growth explained by other factors, sometimes by a time trend in productivity.

Nelson et al. (1967, p. 1)

The authors attempted to go further in relating technological change to economic growth, arguing that the most significant aspects of increased affluence can be attributed to technological advance and they amassed empirical evidence in support. This was consistent with key contributions of others including Moses Abramovitz (1956) and Robert Solow (1957) showing the inadequacy of capital accumulation as the explanation of economic growth, but exploring more deeply the contributions the role that public policy in education and support for

² In what follows, we focus on publications earning many hundreds of citations or more. To put this in context, most innovation scholars are delighted when they succeed in publishing a paper that earns hundreds of citations and perhaps by the end of their career may have a handful of these. Nelson had many dozens of these, but also around 25 earning thousands of citations. In that respect, he is unrivalled.

³ The impact of Nelson's work extended far beyond innovation studies, the main focus here. For example, his work on institutions and routines had a significant influence of researchers in management and organization studies, but we leave it to others better qualified to comment on that.

⁴ While at Wisconsin, he played quarterback in the college football team with some success and apparently had a novel move or 'play' named after him. As a former sportsman, he placed an emphasis on fitness, playing tennis energetically until late in life. Table tennis was another enthusiastic pursuit.

⁵ One of the group's objectives was to consider how to improve the efficiency of research and development. This was the subject of another of Nelson's earliest papers, 'Uncertainty, learning, and the economics of parallel research and development efforts' published in *The Review of Economics and Statistics* in 1961 (Nelson, 1961).

science might make to growth. Along the way, they noted that “American society has not learned how to rapidly update its central mechanism so as to better reconcile technical advance and the quantifiable aspects of progress with other facets of the good and sane life” (Nelson et al., 1967, p. 148), a troubling issue to which Nelson returned in his 1977 book on *The Moon and the Ghetto*, as we shall see below.

3. Yale

In 1968, Nelson was appointed Professor of Economics at Yale University, where he was to work for the next 18 years, including a period as Director of the Institute for Social and Policy Studies (ISPS). During this time, he continued to collaborate very productively with Sidney Winter. In 1973, they published an article in the *American Economic Review* on ‘Toward an evolutionary theory of economic capabilities’ (Nelson and Winter, 1973), followed a year later by a paper in *The Economic Journal* titled ‘Neoclassical vs. evolutionary theories of economic growth: critique and prospectus’ (Nelson and Winter, 1974). Later in 1976 and together with Herbert Schuette, they published ‘Technical change in an evolutionary model’ in the *Quarterly Journal of Economics* (Nelson et al., 1976), while in a 1977 article in the *American Economic Review* they wrote about ‘Simulation of Schumpeterian competition’ (Nelson and Winter, 1977a). In the same year, Nelson and Winter set off ‘In search of useful theory of innovation’ in an article published in *Research Policy* (Nelson and Winter, 1977b).

As argued elsewhere, perhaps the most influential contribution by innovation scholars over the last 60 years has been

the development of ‘evolutionary economics’ as an alternative to neo-classical economics. Central in this development have been Nelson and Winter. In Nelson and Winter (1977b), entitled ‘In search of useful theory of innovation’, they reviewed existing theoretical literature on innovation, pointing to its fragmented nature and to fundamental flaws in the strongest component of that literature, the work by economists. This was a starting point for their development of an alternative theory of economic change, the subject of Nelson and Winter (1982), *An Evolutionary Theory of Economic Change*. This is the most highly cited single publication in the SPIS [Science Policy and Innovation Studies] field (by some margin). In it, the authors argue that technological change and innovation are central to economic growth, generating ‘variation’ in the form of new products, services and so on. Firms compete on the basis of these new products or services, with the market providing a ‘selection’ mechanism. The development of new products or services is strongly influenced by ‘routines’⁶ within firms (i.e. by standardised patterns of action); these provide a ‘self-replication’ mechanism somewhat akin to genes.

Martin (2012, pp. 1229–30)

In addition, the book made a very important methodological contribution to innovation studies, arguing that formal theory should not be allowed to dominate over ‘appreciative theory’ – theory informed by rigorous empirical evidence and evolving in response to it that does not rely on the reductive assumptions necessary for formalised mathematical models – when studying technology and innovation, and indeed arguably economics more broadly.

At the time of writing, the 1982 Nelson and Winter book⁷ – *An Evolutionary Theory of Economic Change* – has been cited over 50,000 times – as far as we can tell, the most of any publication in the field of

innovation studies. Besides innovation scholars, it has been cited by researchers from across the full range of social sciences, with one notable exception – mainstream economics. For many innovation scholars, the absence of recognition for this work in mainstream economics is a lost opportunity to revisit and extend the underlying assumptions defining economics.

However, Nelson’s interests extended well beyond innovation and evolutionary economics to public policy more widely. In his 1977 book, *The Moon and the Ghetto* (Nelson, 1977), he tried to highlight a nagging and puzzling social question:

Why was it that a country that recently had accomplished the truly remarkable feat of sending a man to the moon and bringing him back to earth safely, had wiped out scourges like infantile paralysis [polio], and more generally had achieved an historically unprecedented standard of living for the middle class, for some reason seemed unable to provide an effective education for ghetto kids, halt or significantly slow down the rising cost of medical care, keep the air and water clean, or cut down on the incidence of drug addiction and drug-related crime?⁸

Nelson (2011, p. 681)

This was a theme to which he was to return in his 2003 article, ‘On the uneven evolution of human know-how’, which explored the reasons for the unevenness in the advance of knowledge across fields, in particularly comparing medicine and education (Nelson, 2003a).

Besides the 1982 book, Nelson produced three other highly cited publications in the early 1980s relating to industry, innovation and R&D. One was on ‘Assessing private enterprise: an exegesis of tangled doctrine’, published in the *Bell Journal of Economics* in 1981, in which he challenged the faith of many economists that private enterprise is necessarily the best way of organising production, particularly when it comes to innovation (Nelson, 1981a). Later that same year, he published an article on ‘Research on productivity growth and productivity differences’ in the *Journal of Economic Literature*. In this, he again threw out a challenge to fellow economists, arguing that:

the theoretical model underlying most research by economists on productivity growth over time, and across countries, is superficial and to some degree even misleading regarding the following matters: the determinants of productivity at the level of the firm and of inter-firm differences; the processes that generate, screen, and spread new technologies; the influence of macroeconomic conditions and economic institutions on productivity growth.

Nelson (1981b, p. 1029)

This was followed in 1982 by a paper on ‘The role of knowledge in R&D efficiency’ in the *Quarterly Journal of Economics*. Here, the starting point was that, while it was apparent that both demand and capability influenced the allocation of R&D resources, most previous research had focused on demand. The paper then set out to model the role of knowledge in R&D, developing ideas that Nelson had previously expressed about the cumulative nature of knowledge and the role of learning in the creation of capabilities (Nelson, 1982). In a study conducted towards the end of his time at Yale (but published in 1987, a year after he left), he returned to this theme of industrial R&D in a paper jointly authored with his Yale colleagues, Richard Levin (one of Nelson’s early PhD students who later served as President of Yale University), Alvin Klevorick and Sidney Winter on ‘Appropriating the returns from industrial research and development’. Based on a survey of senior R&D executives, this paper analysed the relative importance of factors supporting the appropriation of returns from investment in R&D in over one

⁶ This concept of routines has a considerable impact on subsequent literature on ‘capabilities’ in management, with many citations coming from the field of strategic management.

⁷ A detailed analysis of the influences on Nelson and Winter and origins of their evolutionary thinking is to be found in Almudi and Fatas-Villafranca (2023).

⁸ The intellectual influence of this book on students and others was considerable, extending across a wide range of fields. A lecture entitled ‘The Moon and the Ghetto revisited’ can be found at <https://www.youtube.com/watch?v=KfL27L29I20>.

hundred manufacturing industries. Besides finding considerable inter-industry variation in the level of appropriability and in the mechanisms that provide it, such as early leadership and trade secrets, the study concluded that “improving the protection of intellectual property is not necessarily socially beneficial. ... Stronger appropriability will not yield more innovation in all contexts and, where it does, innovation may come at excessive cost.” (Levin et al., 1987, p. 816). Moreover, the importance of formal patent protection in supporting appropriability was modest in many industries, and varied considerably among them. Nelson was to return to this issue of intellectual property protection in later years as we shall see later.

4. Links with SPRU and the European innovation studies community

In 1973–74, Nelson spent a sabbatical at SPRU at the University of Sussex as a Visiting Fellow. By then, he had already become familiar with pioneering studies by Chris Freeman, Keith Pavitt, Roy Rothwell and others on innovation and, indeed, helped bring these to the attention of innovation researchers in the United States. Nelson felt truly at home in SPRU, valuing the much wider range of multi-disciplinary expertise to be found there compared with most university departments as well as forming a deep friendship with Chris Freeman, Keith Pavitt (a regular sparring partner at tennis!) and others including Luc Soete and Giovanni Dosi. During this stay and regular visits subsequently, the links that he developed with SPRU researchers and with others from elsewhere in Europe who were part of the wider SPRU network, created the basis for numerous subsequent collaborations. These included a large project in the second half of the 1980s sponsored by the International Federation of Institutes for Advanced Study (IFIAS). This brought together several researchers who were

involved in critical assessments of the way orthodox economic theory deals with ‘change’. Each [of these] had come to the conclusion that any analysis of change which ignored the fundamental role of technical change ... could not be valid. The time seemed to be ripe to bring together in a coherent framework a number of authors working in related directions to formulate a systematic critique of orthodox economic theory and to sketch out the common elements of a first, alternative theory on the role of technical change in microeconomic behaviour, processes of structural change and macroeconomic transformation of the economic system.

Dosi et al. (1988, p. ix)

The result was a 650-page book edited by Giovanni Dosi, Chris Freeman, Richard Nelson, Gerald Silverberg and Luc Soete and with contributions from around two dozen leading scholars to the emerging field of innovation studies (Dosi et al., 1988). This book created both a common analytical framework for the field and an institutional network of researchers that was to bind the field together over coming years.

Aside from evolutionary economics, one of the most important concepts to emerge from innovation studies is that of ‘systems of innovation’. Freeman (1987) was first to publish the concept of national systems of innovation but he was greatly influenced by Bengt-Åke Lundvall, who was developing similar ideas that were more fully set out in his 1992 book (Lundvall, 1992). The following year, Nelson edited a book on *National Innovation Systems: A Comparative Analysis* (Nelson, 1993). This reported on a large comparative study⁹ of national innovation systems in 15 countries around the world and, together with Lundvall's book, helped to cement the importance of this crucial new concept.¹⁰ Within a remarkably short period of time (and thanks in no

small part to Lundvall's work during his tenure at OECD), the concept found its way into national policies for innovation that focused on building and strengthening the national innovation system.

5. Columbia

In 1986, Nelson moved from Yale to Columbia University, first as Henry Luce Professor of International Political Economy, and later as George Blumenthal Professor of International and Public Affairs in the School of International and Public Affairs. There he was to work for the rest of his career, including serving as Director of the Program on Science, Technology and Global Development in the Columbia Earth Institute from 2005 onwards. His remarkable research output continued undiminished – indeed, it accelerated as he collaborated with a widening range of innovation scholars on key issues in the fast evolving field of innovation studies.

Some of his work was more general, covering technology and innovation, and appropriate policies for them. For example, together with Michael Tushman, he guest edited a 1990 Special Issue of *Administrative Science Quarterly* on ‘Technology, Organisations, and Innovation’. This sought to extend theoretical understanding of the nature of technological change and the linkage between technology and organisations. It addressed various questions including how technologies differ and the characteristics of organisations and environments that shape the technological change and innovation (Tushman and Nelson, 1990). One of the papers in this issue, ‘Absorptive capacity: A new perspective on learning and innovation’, by Wesley Cohen and Daniel Levinthal is one of those rare papers in the field with tens of thousands of citations. This was followed in 1992 by a *Journal of Economic Literature* paper jointly written with Gavin Wright on ‘The rise and fall of American technological leadership: the postwar era in historical perspective’.¹¹ Nelson and Wright argued that the rise of American leadership initially was the consequence of the inter-twined development of relative resource abundance and mass production technology in the 19th century which was followed by massive social investment in education and public R&D that contributed to the post-1945 rise of science-based industries. In their view, the post-1970 relative decline of the United States reflected improvements in the innovative capabilities of other industrialised nations combined with the internationalisation of resource and product markets that have eroded the distinctive advantages and, hence technological leadership, of the United States (Nelson and Wright, 1992).

Much of Nelson's work in this later period can be classified under several broad themes.

5.1. Evolutionary economics

An ongoing focus was evolutionary economics. In 1990, he published an article in *Research Policy* on ‘Capitalism as an engine of progress’ (Nelson, 1990b), in which he built on Schumpeter's analysis of technical advance as an evolutionary process, but developed it to take account of the complex relationships between science and technology, on the one hand, and their supporting institutional structures, on the other. (Institutions were another focus of his work during this period, as we discuss below.) 1994 saw a collaboration with Giovanni Dosi, another central figure in the development of evolutionary economics, to produce ‘An introduction to evolutionary theories in economics’, published in the then recently established *Journal of Evolutionary Economics* (Dosi and Nelson, 1994). (Later work with Dosi included a chapter on ‘Technical change and industrial dynamics as evolutionary processes’ (Dosi and Nelson, 2010) published in the 2010 *Handbook of the Economics of Innovation*.)

In the light of the evident challenge posed to neoclassical growth

⁹ Although the book's editor was Nelson, there were substantial inputs to the study from others including Lundvall and Charles Edquist.

¹⁰ Nelson later published a ‘Retrospective’ on this study as a book chapter (Nelson, 1996b).

¹¹ This built on an earlier paper in *Research Policy* entitled ‘US technological leadership: where did it come from and where did it go?’ (Nelson, 1990a).

theory by critiques, including those of evolutionary economics, that it failed to provide a realistic account of the role of science and technology and the ways in which innovation shapes economic activity, Paul Romer had proposed an alternative in the form of endogenous growth theory (Romer, 1986, 1990). A few years later, Nelson and Romer collaborated in a 1996 paper on 'Science, economic growth, and public policy' that reprises Nelson's, 1959 argument that because the social returns to R&D investment are large and cannot be captured by any single firm, countries tend to underinvest in research, a shortfall that is greater for 'basic' research. Nelson and Romer explored the implications of this tendency for newer industries such as software. They also contended that policy choices might reorder priorities but that it would be hazardous to social wellbeing to undertake major changes in the institutional framework created for scientific research, namely universities and large public laboratories (Nelson and Romer, 1996). Two years later (and evidently yet to be convinced of the merits of endogenous growth theory), Nelson returned to this subject, publishing 'The agenda for growth theory: a different point of view', in the *Cambridge Journal of Economics*. Here, he argued that, new growth theory, like neoclassical growth theory, was inherently incapable of explaining economic growth:

It is proposed that to make real headway with understanding economic growth, a growth theory needs the following elements: (1) the ability to treat technological advance as an essentially disequilibrium process; (2) to incorporate a theory of the firm in which firm capabilities and differences across firms are central elements; and (3) to incorporate into the theory a richer body of institutions than currently are treated in standard growth theory, including, at the least, universities.

Nelson (1998, p. 497)

His work on evolutionary economics continued. In 1999, he and Howard Pack published an article in *The Economic Journal* on 'The Asian miracle and modern growth theory', which linked that growth miracle to structural changes in the economies of the Asian 'tigers' and shifts in the size of firms and sectors of specialisation (Nelson and Pack, 1999). Meanwhile his long-standing collaboration with Winter continued advocating an evolutionary approach to problems of economic analysis in a 2002 article in the *Journal of Economic Perspectives* on 'Evolutionary theorizing in economics' (Nelson and Winter, 2002). Nelson and Winter also collaborated with Markus Becker and Nathalie Lazaric in a paper on 'Applying organizational routines in understanding organizational change' published in *Industrial and Corporate Change* in 2005, which considered how the concept of organizational routines might be applied to better understand organizational change (Becker et al., 2005). This was followed in 2008 by a paper reflecting Nelson's lifelong interest in economic development. Published in *Oxford Development Studies*, the article on 'Economic development from the perspective of evolutionary theory' set out the differences between neoclassical and evolutionary theories of economic activity and change, arguing that long-run economic development involves the co-evolution of technologies and the institutional structures supporting these (Nelson, 2008b).

5.2. Institutions

Institutions constituted a second focus of Nelson's research, one closely related to his work on evolutionary economics as well as to his work on innovation systems with its stress on the non-market elements of such systems. In a 1994 paper in *Industrial and Corporate Change*, Nelson examined 'The co-evolution of technology, industrial structure, and supporting institutions' (Nelson, 1994), followed in 1995 by a closely related paper on the 'Co-evolution of industry structure, technology and supporting institutions, and the making of comparative advantage'. Published in the *International Journal of the Economics of Business*, this examined how private and public institutions, and public programs and policies co-evolved with a technology and industry (Nelson, 1995). This focus on institutions continued over the years. In

2001, he joined with his student, Bhaven Sampat, in an article in the *Journal of Economic Behavior & Organization* on 'Making sense of institutions as a factor shaping economic performance'. After reviewing the literature on institutions, they developed a concept of institutions as standard 'social technologies' (Nelson and Sampat, 2001). A year later, in a paper published in *Research Policy*, he suggested that, following recent advances in the field of cognitive science, there was merit in collaborating with scholars in that field in studying 'Technology, institutions, and innovation systems' (Nelson, 2002).

Nelson's work on institutions was closely related to his ongoing efforts on evolutionary economics, as is evident from his 2003 chapter on 'Bringing institutions into economic growth theory'. In this, he argued that, while classical economics had been both evolutionary and institutional, these elements had been squeezed out in neoclassical economics, but now needed to be reincorporated (Nelson, 2003b).¹² This was followed by another *Research Policy* article (Nelson, 2008a) entitled 'What enables rapid economic progress: what are the needed institutions?' in which Nelson further developed his analysis of the relationships between institutions and institutional change and technological advance with the concept of 'social technologies' which support 'physical technologies' playing a central part in this analysis. A key insight of this paper arose from the observation that the rise of new physical technologies often requires the development of new institutions. Unlike physical technologies it is difficult to experiment with new institutions 'offline' or to assure that initial designs for these new social technologies will be readily transferable and replicable. This suggested that the new institutions that come into being may not be entirely fit for purpose, a proposition that was explored in relation to the intellectual property protection of biotechnology and the Bayh-Dole Act allowing universities to patent research conducted using US Federal grants and contracts.

5.3. Universities and public science

A third research focus was on universities and public science. In 1994, Nelson collaborated with another central figure in the establishment of the field of innovation studies, namely Nathan Rosenberg, to produce an article in *Research Policy* on 'American universities and technical advance in industry' which analysed the role that universities play in promoting technical advance in industry, identifying the distinctive strengths and the limitations of university research (Rosenberg and Nelson, 1994). Later related work with Wesley Cohen and John Walsh saw the publication of a 2002 article in *Management Science* on 'Links and impacts: the influence of public research on industrial R&D'. Using data from the Carnegie Mellon Survey on industrial R&D, they assessed the role played by public research in universities and government R&D labs, concluding that public research is critical to industrial R&D in certain industries and benefits industrial R&D across much of manufacturing (Cohen et al., 2002b). In a 2007 article in *Research Policy*, Roberto Mazzoleni and Nelson examined 'Public research institutions and economic catch-up', arguing that such institutions had often played a significant role in supporting economic

¹² Nelson, along with Mario Cimoli and Giovanni Dosi, subsequently joined with the eminent economist, Joseph Stiglitz, to produce a paper on 'Institutions and policies shaping industrial development'. Circulated as a Working Paper (Cimoli et al., 2006), it was highly cited but never apparently published. This began with a devastating side-swipe at neoclassical economics: "no example can be found in history of a process of development nested in an environment even vaguely resembling the institution-free tale of economic interactions that one finds in a good deal of contemporary economic theory" (Cimoli et al., 2006, p. 1). And while the Working Paper does not seem to have been published, the collaboration eventually resulted in the publication of an edited book, *Industrial Policy and Development: The Political Economy of Capabilities Accumulation* (Cimoli et al., 2009).

catch-up, a role that was likely to become even more important in the future (Mazzoleni and Nelson, 2007). Each of these articles argued for the contribution of universities to the accumulation of capabilities, both through the preparation of scientists and engineers with the latest knowledge and the advance of that knowledge resulting from multiple motivations, including those not directly linked to the prospect of immediate economic return.

5.4. Intellectual property and IP

Another focus was intellectual property (IP) and patents. A 1990 *Columbia Law Review* paper written with Robert Merges focussed ‘On the complex economics of patent scope’ (Merges and Nelson, 1990). They followed this in 1994 with another article ‘On limiting or encouraging rivalry in technical progress: the effect of patent scope decisions’ published in the *Journal of Economic Behaviour & Organization*. The issue of patent scope emerged from patent office practice, particularly in the United States, of granting patent protection to broader claims than those specifically tied to immediate application. Broader scope would allow firms to patent a technology for a particular application but then to argue that the ‘scope’ of protection includes many other applications related to the patent (Merges and Nelson, 1994). Building on the theme of patent scope, in 1998 Nelson co-authored with Roberto Mazzoleni an article in *Research Policy* on ‘The benefits and costs of strong patent protection: a contribution to the current debate’ which concluded, in the context of the increasingly wide scope of patent protection, that “there is reason for concern that the present movement towards stronger patent protection may hinder rather than stimulate technological and economic progress” (Mazzoleni and Nelson, 1998a, p. 273).¹³

The effect of the Bayh-Dole Act on patenting by universities was a particular focus of Nelson's work. In ‘Observations on the post-Bayh-Dole rise of patenting at American universities’ published in the *Journal of Technology Transfer* in 2001, he argued that it is vital to preserve open public science and resist encroachments of private property rights into that domain. While allowing universities to patent knowledge produced as the result of US federal research funding may encourage the transfer of new knowledge to industry, it also incentivised universities to maximise their returns from such patents, in some cases, foreclosing competition or even the use of patented knowledge in further research (Nelson, 2001). Nelson also collaborated with David Mowery, Bhaven Sampat and Arvids Ziedonis on this topic. They published a 2001 article in *Research Policy* on ‘The growth of patenting and licensing by U.S. universities: an assessment of the effects of the Bayh-Dole Act of 1980’, in which they argued that Bayh-Dole was only one of a number of factors accounting for the increase in university patenting and licensing and that it had had little apparent effect on the content of academic research (Mowery et al., 2001).¹⁴

In 2002, Nelson, Rosenberg and Sampat joined forces with Jeannette Colyvas, Michael Crow, Annetine Gelijns and Roberto Mazzoleni to publish an article in *Management Science* on ‘How do university inventions get into practice?’ They found that intellectual property rights and exclusive licenses are likely to be most important for embryonic inventions, but relatively unimportant for inventions that are useful to industry ‘off the shelf’ and, indeed, may actually hinder their transfer (Colyvas et al., 2002). Also in 2002, Nelson collaborated with Wes Cohen, Akira Goto, Akiya Nagata and John Walsh to examine ‘R&D spillovers, patents and the incentives to innovate in Japan and the United States’ in a *Research Policy* article. A comparison between the two countries revealed that patents play a larger role in diffusing

information in Japan, accounting for the greater intra-industry R&D spillovers there (Cohen et al., 2002a). And, in another *Research Policy* paper in 2004 on ‘The market economy and the scientific commons’, Nelson made a case as to why the patenting of scientific findings was potentially detrimental to the advance of technology as well as science (Nelson, 2004).

Dick Nelson's analysis of intellectual property rights was also distinguished by his approach to the topic, especially by comparison with many other economists and legal scholars. He took an interdisciplinary lens to patent policy, drawing on law, history, and economics, as well as a detailed understanding of the dynamics of technological change in specific industries. He challenged conventional narratives, was often ahead of his time, and his writings resisted simplistic labels of being ‘pro’ or ‘anti’ patent. Instead, they reflected a nuanced, open-minded commitment to intellectual rigor and getting things right.

5.5. Industrial R&D

Industrial R&D was another focus of Nelson's work. In a 1991 paper in the *Strategic Management Journal*, he considered ‘Why do firms differ, and how does it matter?’, contrasting the tendency of mainstream economists to ignore differences among firms in the same industry with the view of innovation scholars and others that such differences should be at the heart of their studies (Nelson, 1991).

In 1995, Nelson re-joined forces with his former Yale colleagues, Klevorick and Levin and his long-term collaborator Winter (who by then had moved to the Wharton School) to publish another *Research Policy* paper, ‘On the sources and significance of interindustry differences in technological opportunities’. In this, they examined the concept of technological opportunity, the intuitively appealing idea that some areas of research are more fertile in producing industrial innovations than others. They distinguished three sources of those opportunities – advances in scientific understanding or technique, spillovers from other firms or research institutions, and the cumulation of capabilities within the firm. Drawing on empirical evidence from the Yale Survey on Industrial Research and Development, they observed that recourse to these sources depends upon the level of R&D expenditure within each industry as well as the extent to which an industry is science-based (Kleivorick et al., 1995).

5.6. Other topics

As concerns about global warming grew, there were calls for the US government to mount a project in response based on the Apollo Program or Manhattan Project. In 2010, David Mowery and Ben Martin joined Nelson in a *Research Policy* article on ‘Technology policy and global warming: why new policy models are needed (or why putting new wine in old bottles won't work)’, setting out reasons why a different form of policy response was required to meet this new challenge given that the global warming challenge differs in scale and diversity as well as impacting on existing industries, which necessitates decentralised experimentation and learning to find better paths over time (Mowery et al., 2010).

Later in 2012, Dominique Foray, David Mowery and Nelson served as Guest Editors of a Special Issue of *Research Policy*. Their introductory overview ‘Public R&D and social challenges: what lessons from mission R&D programs?’ reiterated the argument that the Manhattan and Apollo projects were not the right models for policies to address today's challenges. Nevertheless, well-designed mission-oriented R&D programs, they argued, may draw upon some of the lessons from previous programs in meeting current challenges such as climate change or disease pandemics (Foray et al., 2012).

5.7. Books

Besides journal articles, Dick Nelson also produced numerous books.

¹³ That same year, Mazzoleni and Nelson (1998b) published a related article in the *Journal of Economic Issues* on ‘Economic theories about the benefits and costs of patents’.

¹⁴ An earlier version had been published in 1999 as a chapter in an edited book (see Mowery et al., 1999).

Many of these books resulted from his efforts to bring together researchers from existing networks and to include others. Characteristically, Nelson assumed a ‘convenor’ role in outlining the common objectives of the group and the role of constructive critic as researchers developed drafts of their contributions.

These works include the 1994 book edited with William Baumol and Edward Wolff on *Convergence of Productivity: Cross-National Studies and Historical Evidence*, a collection of essays reviewing the state of knowledge on ‘the convergence hypothesis’, according to which certain countries “are undergoing a process that brings their levels of productivity and living standards increasingly close to one another” (Baumol et al., 1994, p. 3). In 1995, Nelson and Sylvia Ostry published a book on *Techno-Nationalism and Techno-Globalism*, which cautioned against those advocating policies based on techno-nationalism as a response to the decline in US technological leadership (Ostry and Nelson, 1995). 1996 brought a book on *The Sources of Economic Growth*, which gathered many of Nelson’s previous papers on “economic growth, technical advance as the key driving force behind economic growth, and the social institutions that mold technical advance and in turn are modified as an essential part of the economic growth process” (Nelson, 1996a, p. 1). And in a project that had begun in 1992, he collaborated with David Mowery to edit a book published in 1999 on *Sources of Industrial Leadership*, which drew together studies of the evolution of seven leading industries, exploring the development of each in the United States, Japan, and Western Europe. The resulting analysis identified factors accounting for cross-national and cross-industry differences helping to explain differences in national patterns of industrial leadership (Mowery and Nelson, 1999).

In 2000, he teamed up again with Dosi and Winter to edit a book on *The Nature and Dynamics of Organizational Capabilities*, with contributions from over 20 leading figures in the growing area of capabilities (Dosi et al., 2000). 2000 also saw the publication of a book co-edited with Linsu Kim on *Technology, Learning, and Innovation: Experiences of Newly Industrializing Economies*, in which leading authorities on new industrializing economies examined how these nations achieved their success and what lessons could be drawn for other developing countries (Kim and Nelson, 2000).¹⁵

In 2002, in a project with Benn Steil and David Victor and the Council on Foreign Relations, he co-edited a book on *Technological Innovation and Economic Performance*, which brought together some 20 leading macro and micro economists to provide an authoritative and detailed analysis of the causes of technological innovation and its relationship to economic performance (Steil et al., 2002). In 2004, Mowery, Nelson, Sampat and Ziedonis synthesised their work on university patents and technology transfer in a book entitled *Ivory Tower and Industrial Innovation: University-Industry Technology Transfer Before and After the Bayh-Dole Act*. In this, they emphasised that the public mission of universities must remain central and that licensing practices should favour the broad dissemination of patented research results (Mowery et al., 2004).

During the early part of the first decade of the 21st Century, Nelson worked with Jan Fagerberg and David Mowery, editing what became *The Oxford Handbook of Innovation*. Published in 2004, this brought together more than 20 contributions by leading practitioners in the field of innovation studies to summarise the start of the art in the field (Fagerberg et al., 2004). In a similar effort in the following decade, Nelson led a large group of prominent evolutionary economists, including Giovanni Dosi, Franco Malerba and Sidney Winter, to produce *Modern Evolutionary Economics: An Overview* (Nelson et al., 2018), a handbook for this rapidly developing field.

One further book deserves mention. From an early stage, Nelson placed great emphasis on appreciative theory (theory that takes it

inspiration from observation and empirical analyses) as the most fruitful approach to the study of innovation. In the 2010s, Franco Malerba, Luigi Orsenigo and Sidney Winter worked with Nelson to develop ‘history-friendly’ models of innovation. These models incorporate key elements of evolutionary economics such as boundedly rational firms that are heterogenous in their capabilities, strategies and organisations. These firms follow routines and are engaged in search processes for new markets and technologies. The models are ‘history friendly’ because they take account of the specific context - technological, industrial, demand and institutional – in which firms operate and because they attempt to replicate the main features of actual historical experience. History friendly models of computer, semiconductor and pharmaceutical industries as well as the method of their construction are presented in their book, *Innovation and the Evolution of Industries: History-Friendly Models* (Malerba et al., 2016).

5.8. Epilogue

There can be few academics who have published in eight different decades. With his first paper having been appeared in 1956, Dick Nelson continued to publish journal articles into the 2020s as he revisited some of his earlier themes, with papers on ‘A perspective on the evolution of evolutionary economics’, and “On ‘reasoned history’”, to name but two. His last journal article appears to have been ‘The economic system question revisited’, which was published in *Industrial and Corporate Change* in 2022. Fittingly, it fired one final broadside at mainstream economics:

The core argument of this paper is that thinking of modern economies, like that of the United States, the UK, Germany, and Japan, as “market” economies – a view presented in most of the standard economic texts that provide populations with their economic education – greatly oversimplifies the complex and varied ways that these economies actually use to organize and govern provision of the great variety of goods and services that serve their multiple needs and wants. These economies certainly do make extensive use of for-profit firms selling their wares on markets. However, even in sectors where market mechanisms are central, there almost always are important non-market mechanisms involved as well. And for many of the most important goods and services these economies provide and use, non-market institutions are central and market mechanisms secondary. It is important to recognize the oversimplification. It makes dealing with the problems in sectors whose performance is widely judged to be unsatisfactory much more difficult to resolve adequately.

Nelson (2022, p. 591)

Finally (and in perhaps his last major book publication), Nelson collaborated with Kurt Dopfer, Jason Potts and Andreas Pyka to edit the *Routledge Handbook of Evolutionary Economics*, which was published towards the end of 2023. This provided an updated overview of the state-of-the art on both the micro and macro levels, and of emerging trends and issues in the field of evolutionary economics, the field that he and Sidney Winter had created over 40 years earlier – a fitting end to his long and illustrious career (Dopfer et al., 2023).

6. The wider impact of Nelson’s work

6.1. Impact on policy

While the above has focused on his research and published output, Nelson also influenced US government policy for science, technology and innovation over the years. His seminal papers on the economics of basic research literally laid the foundations for economists’ understanding of the key role of public investment in supporting national innovation systems. In addition, of course, Nelson’s service on the Kennedy Administration Council of Economic Advisers during a period

¹⁵ This is another example of his continuing interest in development and developing economies.

during which this White House policy group was at the zenith of its influence was associated with major federal programs in space exploration and biomedical research.

During the 1970s, his influence on international science and technology policy grew, in particular through his work with OECD and the expert group established by Jean-Jacques Salomon. In the late 1980s, his interest shifted to the 'transition economies' and especially the Soviet Union. In a joint East-West project under the auspices of IIASA, the International Institute for Applied Systems Analysis in Laxenberg, Austria, leading authorities from the West including Nelson, Richard Levin and Merton Peck met with their Soviet counterparts (including Boris Saltikov, who went on to become Minister for Science under President Yeltsin) to map out the restructuring of Soviet science. And in the 1990s, Nelson's work with Howard Pack on the Asian 'tigers' had a major influence on policy in these and other emerging economies.

Over time, however, Nelson's growing alienation from the neo-classical economic paradigm that dominated economic policy during the 1980s and 1990s arguably limited his direct influence in the United States. Nonetheless, Nelson's informal advice and work with a myriad of non-governmental advisory groups such as the National Research Council provided much-needed cautionary counsel. In addition, of course, Nelson's indirect influence on policy through his many PhD students was enormous, a channel of policy influence that operated with equal force in other high-income and developing nations. His theoretical and historical work showed that appropriate patent policies may vary when viewed through the lens of evolutionary economics, particularly in contexts of cumulative innovation. He made a strong economic defence of the scientific commons and challenged the assumption that stronger patents always promote innovation. His work on patents and patent policy in developing countries, brought the same depth and nuance to global challenges.

6.2. Teacher, supervisor, mentor

In an academic world characterised by increasing competitive pressures and beset by petty rivalries, Dick Nelson remained the most approachable of individuals, always willing to listen, to advise, to encourage. As his career advanced, he collaborated with an ever increasing range of innovation scholars, not only those at the top but also young emerging talents.¹⁶ Despite the effort required to produce such a prodigious research output, he always made time for others and was willing to help.

Particularly indebted to Dick Nelson are all the students that he supervised at Yale and Columbia.¹⁷ His impact on students, both undergraduate and doctoral, was profound and long lasting. For example, a second-year student at Yale was looking for an undergraduate supervisor and almost by chance walked into Dick Nelson's office:

I figured I would have him sign my schedule and be on my way quickly. Dick then proceeded to invite me into his office and spent close to an hour talking to me about my interests and background. Here I was, a second year undergrad, and Dick was likely in the thralls of finishing his *Evolutionary Theory of Economic Change*, and he spends an hour getting to know me. That was Dick. We had a number of meetings over the year ... We even did a 1-1 tutorial type course where he would assign me readings, I would do a write up, and we would meet and discuss. ... I still to this day consider myself incredibly lucky to have someone like Dick spending this much time with me when I was just an undergrad.

This was Gary Pisano's introduction to the field of innovation studies. Another of Dick's students, noted that, even as an undergraduate, Dick had encouraged him to sit on his graduate classes:

They were like no others. He eschewed textbooks and made efforts to expose students to different perspectives on issues (in those days, we spent a lot of time on industrial policy), emphasizing the importance of understanding the best arguments from all sides before forming an opinion. He would offer a smile and a gentle nod of approval when you realized many issues were, actually, pretty complicated. As I got to know Dick ... I was struck by how happy he was, with boundless enthusiasm and energy. I assumed all professors were that happy, so academia must be a great gig, and I decided to go to grad school. [Later, as a PhD student] Dick helped me get through a conservative, mainstream PhD economics program, all the while exposing me to perspectives and readings "on the side" that complicated everything I was learning in the classroom. He connected me with innovation and science policy scholars across the world, making sure I felt part of a network and not alone. He invited me to the interdisciplinary, cross-institutional convenings he held on major projects, where I saw he had a superpower: bringing together people with different perspectives, listening carefully, and through comments and drafts, nudging discussions not just towards convergence but towards coherent collections of perspectives that were greater than the sum of their parts. He modelled intellectual curiosity, open-mindedness. ... More than any specific tools, he taught students the habit of deep institutional understanding of the contexts they were studying, reading broadly and from different perspectives, talking to (non-academic) experts in the field, and worrying less about methodology than about simply getting things right—using whatever tools (theory, history, case studies, econometrics) fit the problem best.

Twenty years after completing his PhD at Columbia, that student, Bhaven Sampat, had risen to become a full professor at Columbia. However, Nelson's immense influence on PhD students of innovation extend beyond those he personally mentored. He was a founding member (with David Mowery and David Teece) of the Consortium for Competitiveness and Cooperation Doctoral Conference (CCC). CCC was initially envisioned as an annual gathering of PhD students of innovation and intended to nurture a fledgling community of next-generation innovation scholars within US business schools. Students at the pre-defence stage presented their ideas and received feedback and individual attention from prominent scholars in the field. The conference was initially held at Carnegie-Mellon University in 1994 and has been repeated annually at different campuses across North America and in Europe. Hundreds of students have 'graduated' from the CCC and, in the spirit of Dick's generosity, many have returned as faculty advisors themselves.

Nelson's close interactions with SPRU, MERIT at Maastricht University, and other specialised innovation research centres such that at Manchester University also brought him into contact with students. One who was a PhD student at Manchester University at the time recalls visiting Dick in his Columbia office.

¹⁶ His impact on the young scholars he worked with was considerable, long lasting and fondly remembered. One typical observation is as follows: "Working with Dick on the project and the paper on the evolution of medical practice has been both a pleasure and an inspiration. I'll miss his witty and sharp insights that most of the time led me to see things differently and explore new possibilities. On a personal level I admired his taste for life, from playing tennis to preparing barbecued fish for his guests, and long conversations and clear views about politics, and many other topics." (Piera Morlacchi, private correspondence).

¹⁷ His doctoral students include Wes Cohen, Lu Feng, Paul Joskow, Richard Levin, Franco Malerba, Lalit Manral, Roberto Mazzoleni, Peter Murmann, Richard Murnane, Javier Papa, Holly Raider, Bhaven Sampat, Donald Siegel, Atsushi Sunami, Christopher Tucker, Michael Turner, Ken Warner and Arvids A. Ziedonis.

I am in awe of the remarkable collection of books on the shelves ... we start brainstorming and, all of a sudden, I become very self-aware of the fact that I am in a meeting with Dick Nelson, and compulsively start jotting down notes on the pad that I had bought for the occasion. All of a sudden, he looks at me scribbling frantically and utters with his trademark witty smile: "Don't write it down yet, mull it over first ... if it ain't clear here (pointing at his head), it won't be clearer there (pointing at the pad)." To this day, when I occasionally slide into frantic mode I utter myself "mull it over".

That student was Davide Consoli, now a senior member of staff at INGENIO in Valencia. "Mull it over" is a much inspiring motto in current times of threat to creativity and novelty and the race to publish or perish. Those who benefited from such supervision and mentoring, along with the innovation studies more widely, now have the responsibility of passing on his values, his theoretically grounded, non-conformist intellectual legacy, and his mentoring generosity to future generations. He had a unique way of seeing the world in its whole complexity and a truly remarkable ability to spark the interest and curiosity of students, young scholars and early-career researchers.

7. Dick Nelson the person

Dick Nelson was universally liked and admired. His values and norms, not least his openness and intellectual generosity, were shared by other key figures, such as Chris Freeman and Nathan Rosenberg, in the establishment of the field originally known as 'science policy' but now more commonly known as 'innovation studies'. As a result, our community today is fortunately less afflicted by the hypercompetitive ethos and accompanying unpleasantness that permeates numerous other research fields.

Nelson served for many years on the SPRU International Advisory Board, providing invaluable advice to successive SPRU Directors and others, especially early-career researchers. He likewise provided advice and help to other institutions such as MERIT at Maastricht University,¹⁸ and Manchester University (where he was a professor in the later stages of his career). During his last years, he played a prominent role in GLOBELICS, the Global Network for Economics of learning, Innovation, and Competence Building Systems, set up by Bengt-Åke Lundvall and others to provide a platform for North-South interactive learning. For example, he gave the Opening Lecture at the 15th International GLOBELICS Conference in Athens in 2018,¹⁹ and played an active part in other GLOBELICS meetings in Rio de Janeiro, Saratov, Trivandrum and Beijing. He also featured in the 2023 GLOBELICS meeting 'Celebrating Professor Richard R Nelson'.²⁰ In addition, Nelson was the subject of the inaugural talk in 2021 organised by CRIS (the Consortium for Research on Innovation Studies set up to aid the learning of early-career researchers, especially from the Global South) in a revealing discussion with Franco Malerba.²¹

Nelson served on the Editorial Board for *Research Policy* for much of its existence, helping the editors in their efforts to build and strengthen the reputation of the journal. A total of 21 of his articles were published

in this journal, the first and most highly cited being the 1977 paper with Sidney Winter, 'In search of useful theory of innovation'. (The *American Economic Review* appears to have been the next most common journal, with 15 of Nelson's papers, the last appearing in 1991.²²)

Richard Nelson received many awards and honours including the Tinbergen Award, the Leontief Award, the Veblen-Commons Award, and the Honda Prize. He was a Fellow of the American Academy of Arts and Sciences, and Honorary Lifetime President of The International Schumpeter Society. In 2022, he received a Lifetime Achievement Award from the Technology and Innovation Management (TIM) Division the Academy of Management.²³ He was awarded honorary degrees by the Universities of Maastricht, Sussex, Louis Pasteur and Aalborg among others. Although there was to be no Nobel Prize, Dick professed not to be disappointed by this. Nevertheless, he took particular delight when in 2011 his son-in-law, Saul Perlmutter, won the Nobel Prize for Physics for his part in the discovery that the expansion of the universe was not slowing due to gravity as previously assumed, but accelerating, presumably due to some new, unknown force.

Dick Nelson will be sorely missed by family, friends and colleagues. Without him and his immense contributions, the field of innovation studies would be very different. While Schumpeter is generally credited with being the founder of innovation studies, his was in certain respects a 'voice in the wilderness', and for a number of years after his death in 1950 his legacy was unclear. It took the efforts of Dick Nelson in the United States as well as Chris Freeman and others in Europe to revive the Schumpeterian school of thought and set innovation studies on a firm footing such that today it is a thriving community of thousands of scholars throughout the world.²⁴ We are all truly in his debt.

CRedit authorship contribution statement

Ben R. Martin: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **W. Edward Steinmueller:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors have no interests to declare here.

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¹⁸ Now UNU-MERIT, United Nations University – Maastricht Economic and Social Research Institute on Innovation and Technology.

¹⁹ A video of this can be found at <https://www.youtube.com/watch?v=7kr-8N5vuPQ>.

²⁰ See <https://www.globelicsnetwork.org/zoom-meeting-celebrating-professor-richard-r-nelson/>.

²¹ The video can be viewed at <https://www.youtube.com/watch?v=9oMcacJ1K3w>. This includes a discussion by Nelson of key influences in his early work.

²² In later years, Nelson expressed frustration at the increasing difficulty he was encountering in trying to get published in leading economics journals. In his view, the field of economics, which had been quite open when he was a student in the early 1950s, became notably more closed over the decades, reflecting the antipathy of many mainstream economists towards the work of evolutionary economists.

²³ A video of tributes can be found at <https://www.youtube.com/watch?v=wrZHZTia55M>.

²⁴ Adopting the classic Schumpeter-Freeman distinction between 'invention' and 'innovation', one might view Schumpeter as 'the inventor' of innovation studies but Dick Nelson (along with Chris Freeman) as 'the innovator' – i.e. bringing innovation studies into widespread use. Hence the subtitle for this article.

Maryann Feldman and Luc Soete.

Data availability

No data was used for the research described in the article.

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