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MUIR, A. and OPPENHEIM, C.

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**NICK MOORE, HIS INFORMATION POLICY MATRIX, WITH A
BIBLIOMETRIC ANALYSIS**

Adrienne Muir
Robert Gordon University,
Garthdee Road
Aberdeen
AB10 7QE
a.muir3@rgu.ac.uk*

and
Charles Oppenheim
c.oppenheim@rgu.ac.uk

Introduction

One of Nick Moore's contributions to library and information research and practice was the development of a matrix to be used for analysing different countries' information policies. Conceptions of information policy have changed over time, from managing and disseminating government information to the role and use of information in organisations and society more generally. Orna (2008) has provided an overview of the historical development of information policy, which became important to governments in the late 1970s, whilst Mahon (1989) reviewed developments in European information policy up to the late 1980s. Information policy became a more widely prominent topic during the 1990s, coinciding with discussions around the information age and the development of information and knowledge based societies

Moore's work in information policy really started when he joined the independent Policy Studies Institute (PSI) in 1989 and secured funding from the then British Library Research and Development Department (BLR&DD) to write a book on information policy in the UK. As Moore (2012) explained in a presentation, the aim of the information policy work at PSI was "Making the bullets for others to fire" by carrying out research to inform the policy making process. Early on, Moore (1990) identified four broad categories of issues to be considered in information policy analysis:

- legislative and regulatory issues (such as intellectual property rights, data protection, privacy, freedom of information, liability for information as well as information as a tradeable commodity and regulations relating to that, transborder data flows, self-regulation by the information industry, and standardization);
- macroeconomic issues, such as defining and analysing the size and development of a country's information sector, comparing it to other countries, and investment in all aspects of the sector;
- organisational issues (such as use of information as a resource, the link between information and productivity, management implications, implications for skill sets, and the development of new career possibilities); and social issues, including information for

consumers, quality of information, meeting unmet needs, information literacy, role of libraries and information services, and information rich versus information poor.

Moore developed his information policy matrix for both conceptualisation and analysis purposes. In his 2012 presentation noted earlier, Moore explained that information policy can be analysed at three different levels: Industrial, Organizational and Societal. Moore was not dogmatic about the cross-cutting elements of his matrix, as he used slightly different forms at different times as he refined his thinking, and also perhaps in response to information-related developments over time. So for example, in 1993, Moore employed the following matrix:

	IT	INFORMATION MARKETS	INFORMATION ENGINEERING	HUMAN RESOURCES	LEGAL AND REGULATORY
INDUSTRIAL LEVEL					
ORGANISATIONAL LEVEL					
SOCIAL LEVEL					

Table 1: 1993 Information Policy Matrix (Moore, 1993).

The legal and regulatory element of the matrix has always been present. An element relating to the skills required to effectively handle information is also always present, whether it is termed "human resources" or "skills". The element relating to the supporting infrastructure has changed to reflect the development of technologies and the widespread presence of networks. The element "information engineering" appeared in the 1993 version of the matrix, but not in later versions. Moore (1993, p.284) defined information engineering as "the full range of activities and processes that are designed to improve the management and use of information" He may have decided upon reflection that information engineering is really part of information infrastructure, rather than as a totally separate entity from information and technologies. In addition, information engineering capability could be considered to be part of human resource requirements. The information markets element remains in 1996 and 1998 versions of the matrix (Moore, 1996, p. 213; 1998, p. 339). Moore's definition of the term "information market" is that it not only encompasses commercial trading of information, but can also include where information is provided "free at the point of use", for example, in libraries and other public or voluntary sector information and advice services.

The matrix presented by Moore in 2012 appears to reflect a further refinement. "Information markets" has disappeared from the cross-cutting elements and only the infrastructural, legal and regulatory and skills elements remain. IT has become ICT and Networks, explicitly reflecting developments in more recent years. The names of the three levels of policy making have been adjusted slightly. The change from "Industrial Level" to "Information Sector" could account for the removal of "Information Markets" as this latter term seems to encompass all models of information exchange. It seems this simplified and updated version of the matrix, shown below first appeared in 2012.

	ICT AND NETWORKS	LEGAL AND REGULATORY	SKILLS
INFORMATION SECTOR			
INFORMATION IN ORGANISATIONS			
INFORMATION IN SOCIETY			

Table: 2012 Information Policy Matrix (Moore 2012)

Whatever form of Moore's matrix they use, researchers can use it by analysing each cell in the matrix to identify policies that are already in place, and policies that are needed to address perceived weaknesses. This would be an appropriate approach when analysing national information policies. Given the pervasiveness of information and the overlaps and interdependencies between the nine information dimensions in the 3 x 3 matrix, the matrix probably works best when all cells are investigated, even if the focus of the research is narrow (for example examining policies related to improving scholarly communication, or managing access to the internet in public libraries). This work is best undertaken by a small team of individuals with experience and knowledge of the current situation in the country, the policies in place, and of formulating and implementing policy. Brainstorming ideas in a free-ranging discussion works best when using Moore's matrix. One of us (CO) worked with Moore and others in a visit to China in 1993¹ to assist the Chinese government develop its information policy priorities, and found the experience of working on the matrix both enjoyable and enlightening. Comparisons between countries, or focusing on particular industries or market sectors can of course also be carried out using the matrix.

When Moore first developed his matrix, the internet, social media, wifi, the Cloud, machine learning and artificial intelligence, mobile phones, etc., either did not exist at all, or were at an extremely early stage of development. Nonetheless, his matrix, particularly in its latest iteration, is sufficiently flexible to accommodate all those new developments and future anticipated developments, and many of the issues highlighted in the use of Moore's matrix are relevant key issues today. For example, all the key developments identified in a very recent information policy briefing paper (Anon, 2017) are all capable of being analysed using Moore's matrix. The matrix is also a useful tool for comparison between countries, not only to highlight gaps in policy but also to highlight differences in approach. Analysts can then evaluate the reasons for and impact of the differences.

The purpose of this article is to remind readers of Moore's information policy matrix and note how it has been employed by Moore. We have combined that with a small bibliometric study on Moore's overall impact on other scholars. One would expect that his intuitive matrix would be widely employed by researchers and policy-makers throughout the world. Yet, as will be shown, an analysis of the literature suggests that Moore's information policy matrix is rarely used. We consider possible reasons for this, drawing on the information policy literature and evaluating the

¹ This was the British Council/Aslib "Chinese Information Policy and Strategy to 2000" symposium, held in Beijing, 6 - 11 September 1993.

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6 relative value of different approaches to analysing information policies in
7 comparison to Moore's matrix.
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9 **Has the matrix been used?**

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11 One problem with undertaking this research has been the uncertainty of
12 when Moore first developed his policy matrix, and when he first wrote
13 about it. It seems the first description of his thinking on information
14 policy analysis was in his 1990 PSI pamphlet, followed by several journal
15 articles by Moore in the years following. Although the pamphlet, which
16 quite possibly was for internal use only, has been cited once, approvingly
17 and with some detail (though the matrix itself was not employed), by
18 Menou (1991), we have been unable to inspect a copy of it. The PSI itself
19 does not seem to have a copy, and nor does the British Library. The
20 British Library-funded information policy book by Moore and Steele (1991)
21 does not explicitly describe Moore's matrix, and indeed it makes no
22 mention of any policy-analysing matrix. It may be that Moore developed
23 his matrix in the course of carrying out the research and analysis for the
24 book, but it was too late to include it in the work.
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26 Moore (1993) set out and explained his policy matrix in a paper that he
27 presented to the joint Aslib/British Council symposium mentioned above.
28 The use of the matrix here was to introduce a method for presenting a set
29 of suggestions for policy goals in China rather than evaluating the current
30 policy situation. Another presentation, this time to the Workshop on the
31 European Information Services Market, was published in 1996. In this
32 case, the matrix was used to analyse the policy issues arising from a
33 European Commission commissioned survey of the European electronic
34 information market (Moore 1996). In another published conference paper,
35 Moore (1997) discusses differences in approach to national information
36 policy making. The policy matrix and analysis process is not discussed in
37 the paper, but it may well have featured in the analysis that led to the
38 conclusions on different models of policy making. Moore (1998) also used
39 the matrix to discuss the UK policy landscape. Interestingly, in this paper
40 Moore claims that the matrix was developed to assist the European
41 Commission, but the citation to this comment he gives is to (Moore, 1993)
42 relating to China. Given that Moore was awarded the large European
43 Commission Information Market Observatory contract in the early 1990s,
44 this remark may, nonetheless, be correct, i.e., he developed his matrix
45 thanks to European Commission funding, but it is first described in the
46 China paper. What is clear is that Moore has used his matrix in various
47 ways: to analyse policy issues in one country and across a union of
48 member states, as a framework to measure the current situation against
49 a set of possible policy goals and to identify differences in values and
50 approaches to policy making in different countries.
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52 Moore clearly found matrices a helpful tool for analysing complex
53 situations. For example, in Moore (2002) on models of social needs, he
54 broke down the issues into a series of cells in a matrix, albeit with very
55 different headings to his information policy matrix, whilst his analysis of
56 information policies in East Asia (Moore, 1997), though not explicitly using

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6 his matrix, uses terms to break down his analysis that are in part based
7 on his policy matrix.
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9 To our surprise, the vast majority of post-1990 papers on national
10 information policies have not used Moore's matrix. There have been few
11 reviews of information policy methods; Browne's review of the field
12 (Browne, 1997) mentioned, but failed to explore Moore's work. Rowlands'
13 (1996) review, in contrast, does explore Moore's work and his matrix in
14 some detail, but does not cite any outputs that have employed Moore's
15 matrix. Orna's (2008) excellent review of both the USA and UK makes no
16 mention of the tools used to analyse information policies. Oppenheim's
17 (1996) review of UK national information policy cites Moore and Steele,
18 but the way he classifies the policies is not based upon Moore's previous
19 work. Finally, another review by Rowlands (1998) develops a matrix for
20 policy analysis, which, though it bears some resemblances to Moore's, is
21 very different in structure to it.
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23 What about primary research outputs? We have selected just a few
24 exemplars of such non-use of Moore's matrix. Middleton's (1997) review
25 of Australian information policy does not use the matrix, Gomez-Barroso
26 *et al's* (2008) review of European information policies makes no mention
27 of the matrix, and similarly, Herson's (1998) analysis of US information
28 policy does not make use of his matrix; Shuler (2002) in his review of
29 information policies in local governments makes no use of the matrix,
30 whilst Priftis and Oppenheim (1999) acknowledged Moore's work in their
31 study of Greek national information policies, but failed to use his matrix.
32 Ma *et al* (2012) used a three level classification based on the information
33 life cycle for their analysis of Chinese information policies, similarly,
34 Zawayah *et al* (2012) develop a classification approach to information
35 policy analysis rather than a two dimensional matrix. Finally, our own
36 series of research papers (Muir and Oppenheim 2002a, 2002b, 2002c,
37 2002d) on national information policies did not employ the matrix.

38 Rowlands, Eisenschitz and Bawden (2002) recommend the use of frame
39 theory for exploring the values underpinning policy making rather than
40 mentioning the matrix, but this approach would be a method of analysis
41 that could be compatible with use of the matrix.

42 Maxwell (2004) developed an information policy framework for analysing
43 the politics of the USA's Digital Millennium Copyright Act. In this paper, he
44 claims that Herson and McClure (1987) were the first authors to call for
45 the establishment of a discipline of information policy analysis, and that
46 they developed initial models for such analysis in their book. As Maxwell
47 notes, few researchers have followed this up by carrying out such policy
48 analyses. The difficulty, he claimed, lies with the fact that the raw
49 materials for such policy analyses most often appears in oral testimony,
50 newspaper or journal articles and legislative reports - materials that resist
51 easy analysis in part because of the bias of researchers. However,
52 Maxwell does not explain why he thinks information policy researchers
53 would be biased, and supplies no evidence of any such bias. Maxwell
54 recommends content analysis for the extraction of textual documents and
55 subsequent quantitative analysis of the text as a suitable method for
information policy analysis. Maxwell then describes his own matrix,

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6 comprising two columns (Communal and Individual) with four cross-
7 cutting themes (called Sovereign, Transformation, Production, and Global)
8 into which he populates the frequency of use of keywords associated with
9 each cell of the matrix to see what were the most important themes
10 emerging. The approach is thus very different from that of Moore, who
11 populates his matrix by means of discussion and brainstorming amongst
12 experts. Maxwell does not cite any of Moore's work, and, indeed, all the
13 references to the background of information policy analysis in his article
14 are to US sources. One of these works looks potentially relevant - a book
15 chapter by Charles McClure *et al* entitled "Frameworks for studying federal
16 information policies", which appeared in a 1989 book edited by Hernon *et*
17 *al* entitled "United States government information policies".
18 Unfortunately, we have been unable to get hold of either this book, or the
Hernon and McClure book chapter mentioned above, so cannot comment
19 on their contents.

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21 To conclude: although we are not dismissing the idea that Moore's matrix
22 has been used, our literature searching failed to uncover an example of
23 use of the matrix other than by Moore himself. We did, however, find two
24 papers that use a matrix approach for analysing information policies and
25 which predate Moore's work. Both are more complex in approach than
26 Moore's. Karni (1983) developed a matrix with eight elements and six
27 cross cutting dimensions. His elements included topics such as function,
28 inputs, outputs, process, environment and human agents, and his
29 dimensions were physical, operations, development, assurance, interface
30 and evaluation. The primary purpose of his matrix was, it seems, for use
31 by the private sector rather than by governments. Both Karni's paper, and
32 Menou's (1985) similarly very complex information policy matrix naturally
33 do not mention Moore's work, as they predate it, but it is possible that
34 their work inspired Moore to develop a matrix that was more accessible
35 and intuitive. We believe, however, that it is more likely that Moore
36 developed his matrix quite independently of these earlier information
37 policy matrixes, as his matrix papers do not cite any earlier work as
38 providing him with the ideas for a matrix.

39 **Bibliometrics, information policy and Nick Moore**

40
41 The topic of information policy has not often been the subject of
42 bibliometric studies. One notable example is Ian Rowlands' PhD thesis,
43 which was later summarised in two journal articles (Rowlands 1999a;
44 1999b). Rowlands classified information policy research into seven broad
45 headings, some of which map onto Moore's matrix, but some of which do
46 not. They were: information management in government; information
47 protectionism; public access to information; national and international
48 frameworks; scientific and technical information policy; information
49 infrastructure and regulation; and social implications of ICT. Using well-
50 established co-citation techniques, Rowlands found, somewhat
51 surprisingly, that Moore's research output was only associated with one of
52 these fields, i.e., information infrastructure and regulation, which
53 according to Rowlands covers "information industry and markets; political
54 economy of information; manpower and training; public-private synergy;
55 copyright and intellectual property; and information law and regulation",

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6 whilst he was not mentioned in the grouping entitled national and
7 international frameworks, which Rowlands defines as covering “national
8 and international policies and strategies; national libraries; international
9 collaborations and agreements; and scientific and technical information”.
10 In an article based upon his thesis, Rowlands (1999a) noted that, based
11 upon his document text collection of 771 articles published between 1972
12 and 1996, which was compiled from records in *Social Sciences Citation*
13 *Index*, the structure and dynamics of the information policy journal
14 literature diverges in several respects from typical social science
15 literatures. He found that the information policy journal literature was
16 characterised by very rapid growth, high immediacy (in Price’s sense),
17 rapid reception and ageing processes, and relatively low documentary
18 scatter.

19 As part of the research we undertook in preparation of this article, we
20 carried out a citation study on Moore, to assess which of his publications
21 have been most cited, what subject areas these were focussed on, and, in
22 particular, how influential his matrix for analysing information policies in
23 different countries has been. The citation analysis was carried out
24 between December 2016 and January 2017. We found there was a
25 problem of inconsistencies in the way citations were recorded on the
26 different databases we used, and it is therefore possible that the figures
27 obtained are not 100% correct, but we believe they provide a good
28 estimate of impact, and in particular, the relative importance of the
29 numerous outputs that Moore published in his lifetime. The results also
30 show just how widely variable the major citation databases are with their
31 results of citation counts.

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33 Based on our results, perhaps the most important (based on the possibly
34 dubious assumption that “more citations” equals “more important”) of
35 Moore’s papers regarding the use of his matrix is (Moore 1993).

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37 *Microsoft Academic Search* (www.academic.microsoft.com)

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39 Using this source, Moore’s most highly cited output is his textbook *How to*
40 *do Research*. This had received 202 citations at the time we checked. The
41 most highly cited of his papers that employed his matrix (Moore, 1998)
42 was the 11th most cited item in the list. It had received eight citations.
43 Moore’s most cited outputs according to this service are papers not
44 relating to his information policy matrix. Using this service, Moore’s h
45 index² is 9.

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47 *Google Scholar* (scholar.google.com)

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49 Again using this resource, Moore’s most cited work was *How to do*
50 *research* with 367 citations. The most cited of his outputs using his matrix
51 was (Moore, 1993), equal tenth with 27 citations.

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53 Using this service, Moore’s h index comes out at 17.

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55 ²For a concise review of the h index, its strengths and weaknesses, see
<https://en.wikipedia.org/wiki/H-index>

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7 *Web of Science*

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9 Using *Web of Science*, a much smaller data set was obtained. A search for
10 Moore, N. as an author produced a large number of hits. When the data
11 set was reduced down to social sciences and related areas, there were still
12 many false drops, especially because of a very productive author called
13 Niamh Moore. By checking individual titles, an analysis with reasonable
14 accuracy was completed. On this basis, an article of Moore's entitled
15 "Emerging employment market for librarians and information workers"
16 had the most citations, with 13. His most cited matrix paper was (Moore
17 1993), equal 7th with five citations.

18 Moore's h index is 6 using this source.

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20 Some further comments on these results are worth making. They confirm
21 the well known differences in results when undertaking citation searches
22 using different search tools, with, as expected, the free service *Google*
23 *Scholar* offering much higher citation, and h index scores than the
24 charged-for *Web of Science* or indeed the free *Microsoft Academic Search*.
25 This result is not surprising, as such findings are well known from other
26 studies. It was also not surprising that Moore's standard textbook, *How*
27 *to do research*, is heavily cited, as this is consistent with other studies
28 that show that publications describing basic methods or techniques
29 receive more citations than possibly more ground-breaking outputs. What
30 is perhaps more surprising is the lack of correlation of individual items in
31 the three sets of results. One might have expected that even though the
32 totals for each service would differ, that in general the most highly cited
33 items in one list would also be the most highly cited in another. In
34 practice, however, this was not the case.

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36 We also found that in terms of his research outputs, Moore's work on the
37 library and information workforce in the UK is cited much more than his
38 work on national information policies, and, in particular, his information
39 policy matrix has not been widely cited despite its simplicity and ease of
40 use. Due to lack of time, we did not investigate the papers that cited
41 Moore's matrix any further.

42 We also carried out searches on the title words "National Information
43 Policy" on *Web of Science* and on *Science Direct*. The former produced 46
44 hits, the latter 14 hits. None of the items was authored by Moore. The
45 low number of items found (in each case the search was 1960 to date)
46 indicates a surprisingly low level of scholarly interest in the topic. Of
47 course, as we were searching for the phrase "national information policy"
48 in the title, other potentially relevant items but without that phrase in the
49 title were overlooked. Of the papers we did find in the searches, only
50 one, by Menou (1991), specifically referred to Moore's matrix.

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52 We carried out a similar search for "national information policy" in the title
53 using *Library Literature and Information Science*, an Ebsco abstracting
54 service. We found 52 items, none of which were by Moore, but one item,
55 by Haines (2002) states that much of the work carried out by her team

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6 was based on research undertaken by Moore using his matrix. At the time
7 this article was written, Haines was head of the UK's Library and
8 Information Commission, and one of its tasks was to develop a national
9 information policy for the UK. Unfortunately, the Commission, after
10 various mergers and changes of name, was abolished in 2012 by the UK
11 Government, and in any case failed to convince the UK Government to
12 adopt a pro-active national information policy. Overall, we found that
13 Moore was the only person who used his matrix for information policy
14 analysis. Examples include his (1998), (1991a), (1991b), (1996) (1998)
15 papers, and of course (Moore, 1993).
16

17 **Conclusions**

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19 Two things have emerged from our exploration of Moore's contribution to
20 information policy analysis. Firstly, it is clear that there have been two
21 quite separate trains of research, one in the USA and one in Europe, and
22 that neither party seems to be aware of the other party's work. Secondly,
23 and focusing on the UK and European research, we are puzzled that the
24 papers we inspected that report information policy analyses make no
25 mention of Moore's work. Without further research, it is difficult to know
26 the reasons and therefore we are only able to speculate. It could be
27 argued that Moore's matrix is too simplistic for such a complex topic as
28 information policy, but it may also be the case that there is a lack of
29 awareness of how the matrix can be used in policy analysis. We were
30 unable to find any rigorous academic papers explaining the theoretical
31 basis of the policy matrix authored by Moore; his papers addressing the
32 matrix were general descriptions of its application, published versions of
33 conference papers or other types of presentation. In these publications,
34 Moore described the matrix, reported the findings of his analyses or
35 suggested policy goals. We were unable to find any more theoretical or
36 methodological papers where Moore explained how to go about policy
37 analysis using his matrix or how he arrived at suggestions for policy goals.
38 This may be the reason that academic researchers have not used the
39 matrix. As pointed out at the beginning of this paper, Moore developed his
40 matrix in the context of providing information to influence the policy
41 agenda rather than as a contribution to the theory of policy studies.
42 Scholars in the information field who have explored theoretical
43 approaches to understanding information policy include Rowlands,
44 Eisenschitz and Bawden (2002), who, as noted above, applied frame
45 theory to the issue of how to make "the value systems that underpin our
46 understandings of information policy more explicit", but such papers are
47 rare.

48 In conclusion, perhaps because of Moore's failure to provide a strong
49 theoretical basis to his matrix, we believe it is an under-used, but
50 potentially valuable method of analysing information policies.
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