



Knowledge and Business Engagement Networks in Academic Maritime Research: A Case Study of the University of Southampton

R. Comunian^{1,*}, M. Morrison², R. Ajit³

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ABSTRACT

The role of higher education research and engagement with external partners has received growing attention from both scholars and policy makers. These practices are usually studied or promoted for their impact on local development or the development of new business opportunities. This paper takes a different perspective and uses the case studies of the University of Southampton Maritime Studies University Strategic Research Group to reflect on the nature of engagement and exchanges both within and beyond academia. The multidisciplinary nature of Maritime Studies is explored in relation to its ability to enable or create exchanges which cut across the boundaries between research communities but also provides an opportunity to consider different practices of engagement of these different academic communities with the external world. The conclusions highlight the opportunities offered by multidisciplinary fields as platforms for learning in reference to knowledge and business engagement.

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1. Introduction

Higher education plays an important role in creation, transfer and application of new knowledge. An extensive field of literature exists in knowledge studies and regional development examining the impact and the mapping of opportunities offered by university knowledge to the broader economy. This paper specifically focuses on the field of maritime studies and considers the knowledge networks that are developed within the university and beyond. Maritime studies is a particularly interesting field to explore knowledge connection as it has developed from the beginning as a multidisciplinary field stretching from arts and humanities to social and scientific subjects. Therefore, when using this field as an area of research in knowledge and business engagement network, the researcher can witness a very diverse range of approaches to knowledge transfer – from arts & humanities to engineering – as well as to engagement – from economic driven relation to socio-community based exchanges.

The paper is organised in three parts. Firstly, it briefly reviews the literature on universities, knowledge transfer and networks to provide an overview of the key issues and approaches. It also presents the case study and the framework behind the development of a multidisciplinary research group in maritime

¹Lecturer. Kings College London. Strand WC2R 2LS.

²Dr. Principal Teaching Fellow, Southampton Business School, University of Southampton m.s.morrison@soton.ac.uk

³Director, Professor. Southampton Marine and Maritime Institute, University of Southampton r.a.shenoi@soton.ac.uk

*Corresponding author: R. Comunian. Tel. (0)20 7848 1557/12345. E-mail address: roberta.comunian@kcl.ac.uk

studies at the University of Southampton. Secondly, it reflects on the aims of the research undertaken and the methodology during the project, presenting the sample of academics involved. The third part presents the research results under two headings, with one focusing on the internal networks and knowledge exchange developed within the case study and the other reflecting on the different approaches and opportunities for knowledge and business engagement with outside partners. The conclusions finally offer an opportunity to consider what can be learnt from the case study and avenues for future research.

2. Universities, Knowledge Transfer and Networks

2.1. *The Role of Higher Education in the (Maritime) Knowledge Economy*

There is an extensive literature addressing the role of higher education in regional economic development and we will only comment on a small number of relevant topics here. Many authors commonly recognise that this particular attention to the potential impact of higher education has been linked to a national knowledge economy agenda and the development a sustainable maritime economy is certainly important in many countries, including the UK. The role played by the ‘entrepreneurial’ university in shaping new economic development patterns for regions has been an important dimension in the studies. Although it is difficult to summarise the complex role of institutions of higher education in a specific geographical context, the literature articulates three key dimensions for our purposes:

- *Human Capital*: higher education institutions contribute to a specific locality through the provision of graduates and a highly educated workforce. This human capital, although very mobile, can influence the local economic development of specific contexts. Etzkowitz and Leydesdorff (2000) argue that the supply of graduates may in fact be universities’ most important contribution to innovation.
- *Knowledge*: it is acknowledged that the knowledge generated by universities can enrich the regional context through a variety of processes (knowledge transfer, spin-off companies, knowledge spillovers etc.) and give rise to potential economic benefits derived by that knowledge. Universities can adopt more or less entrepreneurial approaches in managing these spillovers.
- *Infrastructure*: in the processes through which knowledge and human capital interact and contribute to the local context there is always an element of infrastructure development taking place. This might, for example, be a new incubator space or new premises and conference facilities as well as new networking spaces or virtual platforms for interaction.

While much of the literature tends to concentrate on specific aspects of the impact of higher education and their interactions with the knowledge economy, other authors recognise

the complexity of knowledge interactions taking place. However, as Harloe and Perry (2004), for example, have argued the much-anticipated alignment of university interests with the knowledge economy agenda has at best been uneven, and possibly even unconvincing. It is acknowledged that in the literature much of the discussion is about generic external or employer engagement. This is because research indicates that there is still a major gulf of understanding—often linked to different agenda and working practices—between higher education institutions and the private sector when it comes to collaboration. It is therefore important to increase the understanding of academic practices and processes. Nowotny et al. (1994) challenges the view that universities are moving seamlessly from ‘Mode 1’ knowledge production regimes (knowledge generated and controlled by specific disciplinary communities) to ‘Mode 2’ regimes (where knowledge is generated and applied in multidisciplinary and applied way). The picture, they suggest, appears much more complex with multiple and overlapping influences and interests at work. In many ways the engagement that universities have with the regional economy exhibits both traditional patterns and the inflexions of new development agendas. Within these new ‘development agendas’, the development of knowledge and research platforms, such as the University Strategic Research Groups (USRGs) developed by the University of Southampton⁴ can be explored as an interesting intervention on the traditional patterns of academic work and engagement.

2.2. *Universities Knowledge Infrastructures: the Case of the Maritime Studies University Strategic Research Group (MS USRG) at the University of Southampton*

The historical development of the city of Southampton and the role of its university have historically been intertwined with its port and maritime tradition and economy. However, with the speeding up of trade and knowledge interconnections brought by globalisation, universities have been under increased pressure to generate impact for the economy locally and nationally. This is also true within academia, where in response to the complexity of global issues, their understanding and solutions to associated problems, the research community has been aware of the need for new and productive collaborations. In response to this, in 2008 the University of Southampton took the decision to establish multidisciplinary research themes based on strategic research groups, and one of the first was Maritime Studies. The intention for all the USRGs was to “develop innovative approaches that bridge conventional boundaries between research disciplines and create innovative solutions”. In all 11 were created in the initial phases, covering issues as diverse as ageing and lifelong health, to nanoscience. In two cases, USRGs led to the consequent establishment of an Institute, as in the case Southampton Marine and Maritime Institute⁵, established in 2012.

⁴For more details: <http://www.southampton.ac.uk/interdisciplinary>

⁵The study on which this paper is based took place in 2010. Since then the MS-USRG has developed into a fully-flagged Institute within the University of Southampton, namely the Southampton Marine and Maritime Institute (for more details: <http://www.southampton.ac.uk/smmi>)

The Maritime Studies University Strategic Research Group (MS USRG) is used in this paper as a case study to understand the way academics and researchers work and connect internally, in a university-wide research context, and the way they engage with external partners. Maritime Studies is a particularly interesting field in which to undertake this research as it is a very multidisciplinary area of research, particularly at the University of Southampton, including experts from various research fields, from humanities to ship science, and from law to oceanography. In many ways the development of the MS USRG reflects the thinking and development of the subject itself, as highlighted by Couper as early as 1973 “the sociologist, economist, lawyer, anthropologist, psychologist, and geographer may study the same problem each from a different point of view; and this is crucial now that we have adopted a multidisciplinary approach to maritime problems. It will make for smoother team work if each understands something of the philosophy underlying the approaches of others. It will enable each to see the limits in his own subject and appreciate the different but legitimate methods and aims of others in the field”.

From the establishment of the MS USRG in 2009, key activities and interventions have been implemented to facilitate both academics interaction internally and showcase of research to external partners. The MS USRG was launched on the 15th September 2009, at the National Oceanography Centre in Southampton, attended by members of the USRG and representatives from companies and organisations with interests in the marine or maritime worlds. At the event, many of the academic groups shared their current or recent research to show the breadth of activity.

3. Aims, Methodology and Data

3.1. Project Background and Aims

The data used in the paper were collected as part of the Employer Engagement Initiative (EEI) at the University of Southampton funded by the Higher Education Funding Council for England (HEFCE). The key for the EEI was what could be learned about multidisciplinary collaborations (to provide broad professional development opportunities) and external relationships (to identify those opportunities). Cross disciplinary relationships are essential for development of a curriculum to reflect broad employer needs, and the need to understand more about how external relationships arise was acknowledged. The approach to better understand employer engagement was routed through comprehension of current interactions and collaboration in the institution, in particular:

- To increase our understanding of the role of USRG-type of infrastructures in facilitating cross disciplinary collaboration (internal networks).
- To document how a range of academics build external collaborations and how this relates to the development of internal collaborations (relation between internal and external networks).

- To identify barriers and opportunities both for the USRG and external engagement (external networks).

The research began by considering the internal network and then expanded to consider external collaborations. The internal component (of social network analysis) is an important basis for the following consideration of external relations (via analysis of data collected in semi structured interviews). The level of internal collaboration may have a direct impact on external collaborations and contacts, and the structure and features of the internal network and the needs of the individuals and network as a whole may influence what institutional infrastructure and processes best support them.

3.2. Methodology

The research project used a mixed method approach, complementing social network analysis (SNA) with qualitative semi-structured interviews. In reference to social network analysis, different approaches were adopted during the two phases of the project. During the first phase, a ‘complete networks’ approach was used. A SNA questionnaire was sent out to all members of the MS USRG. In the second phase an ‘ego network’ approach has been used in addition to qualitative semi-structured interviews. Anonymity and confidentiality are essential when collecting SNA data. Therefore, the internal network analysis does not include the names of the respondents. Schools, research groups and other characteristics of the respondents are used in the analysis.

The aim of the SNA was to map two types of relations: general awareness and collaboration⁶.

3.3. Sample Description

The list of academics was provided by MS USRG as a definitional boundary. This is of course not a definitive sample, as it is possible that other people who are not on this list might have interest in the topic, or that people on the list might simply be there to be kept informed about opportunities (like managerial and research support positions within Schools). Nevertheless, it presents a good sample of academics and researchers engaged in this area across the University. As the list of members indicates (see table 1), it also includes a wide disciplinary spread. In terms of a description of the sample: Out of 150 members of the MS USRG, 82 returned the questionnaire (a 54.6% response rate). In reference to the respondents profile 28% had been to the UoS less than three years, 27% between four and

⁶Types of relation mapped by the SNA questionnaire: Relation Type: I have heard of the person and I am aware of his / her research interests /activities and strengths but I have not actively collaborated with him / her (active collaboration means one or more of the following: a common publication; a common application for funding; a common research project / consultancy; a common teaching module or supervision of shared research students). In the case of support staff (only), this might include simply knowing the person’s role. Relation Type 2: I have actively collaborated with this person in the past (active collaboration means one or more of the following: a common publication; a common application for funding; a common research project / consultancy; a common teaching module or supervision of shared research students). In case of support staff, an interaction on a project is required.

ten years and 37% more than 10 years. The age profile is also consistent, with less than 10% of the members aged below 35 years old, 44% aged between 35 and 49 years old and 45% aged 50 years old or more. Amongst the career profile of the respondents, 22% were involved mainly in research, 67% were equally involved in teaching and research, and 10% were covering support / administrative roles.

It is important to consider that the MS USRG is a knowledge community involving 15 different Schools or divisions within the University (table 1). However, the Schools and divisions identified are not equally represented in the USRG. The four main Schools represented are: the School of Engineering Sciences (with 22 members) the National Oceanography Centre / School of Ocean and Earth Science (with 38 members), the School of Humanities (with 22 members) and the School of Civil Engineering and the Environment (with 16 members). While the respondents to the SNA questionnaires did not include all the Schools represented, it can be seen from table 1 that the respondents are representative of the distribution of individuals across Schools and divisions.

3.4. Qualitative Semi-Structured Interviews

Alongside the internal social network analysis, a sub-sample of the respondents to the first part of the research project was asked to take part in an interview (lasting between 15 minutes and 1 hour). 21 interviews took place between March and July 2010. The focus of the interviews was on the external engagement of the academics / participants. The interviews were organized in two stages. Firstly, the respondent was asked to provide a sample of the kind of companies, organizations, charities or individuals they worked with outside the academic sphere. These data are used as a base for presenting an ego network analysis of the data but also to engage with key issues about academics' external engagement. The key topics addressed during the interviews were:

- The main benefits of collaborating with external partners
- The personal (and career) motivations behind external engagement
- The relation between external engagement and teaching, in particular CPD
- The kind of infrastructures or practices that facilitate external engagement
- The barriers to external engagement experienced
- The role of the university (and USRG infrastructure) in external engagement

4. Results and Discussion

4.1. Internal Network and the Role of the MS USRG

As it is clearly illustrated in figure 1, the MS USRG is clearly a connected knowledge network. There are no individuals isolated – i.e. none who are completely unaware of others'

research. This means that each component of the can reach every other by some path (no matter how long). This means that any of the MS USRG members in the network can have awareness of each others' research, or gain access to others via an existing link (passing through others knowledge along the network). The fact that the network is completely connected (with no isolated nodes) is also expressed, in social network analysis terms, as the network being made by a single component (i.e. all the nodes are part of single united network). The 150 individuals (represented as nodes) show a great variety in reference to connections. The measure of outdegree and indegree considers the direction of a relationship, outdegree being the number of relationships identified by the individuals themselves, the indegree showing those identified by others (i.e. incoming arrows). The range of outdegree (contacts that people named in their questionnaires) ranges from 146 to 5, while most of the respondents have been named (indegree) by 10 to 19 respondents. This highlights that across the MS USRG the level of interactions and awareness is really varied and we will explore the way this might be linked to the School that the node belongs to, but also his / her academic profile or age group. These findings underline not only the level of diversity and complexity of interactions but also the level of individualism of each node, which interacts according to his / her specific interests, social skills and knowledge.

When we look at the collaborations network (figure 2), we can see that it is less dense. Although there is still only one major component (including all the red nodes), there is one single isolate (blue node). This suggests that there is someone who has not collaborated with anyone within the MS USRG to date.

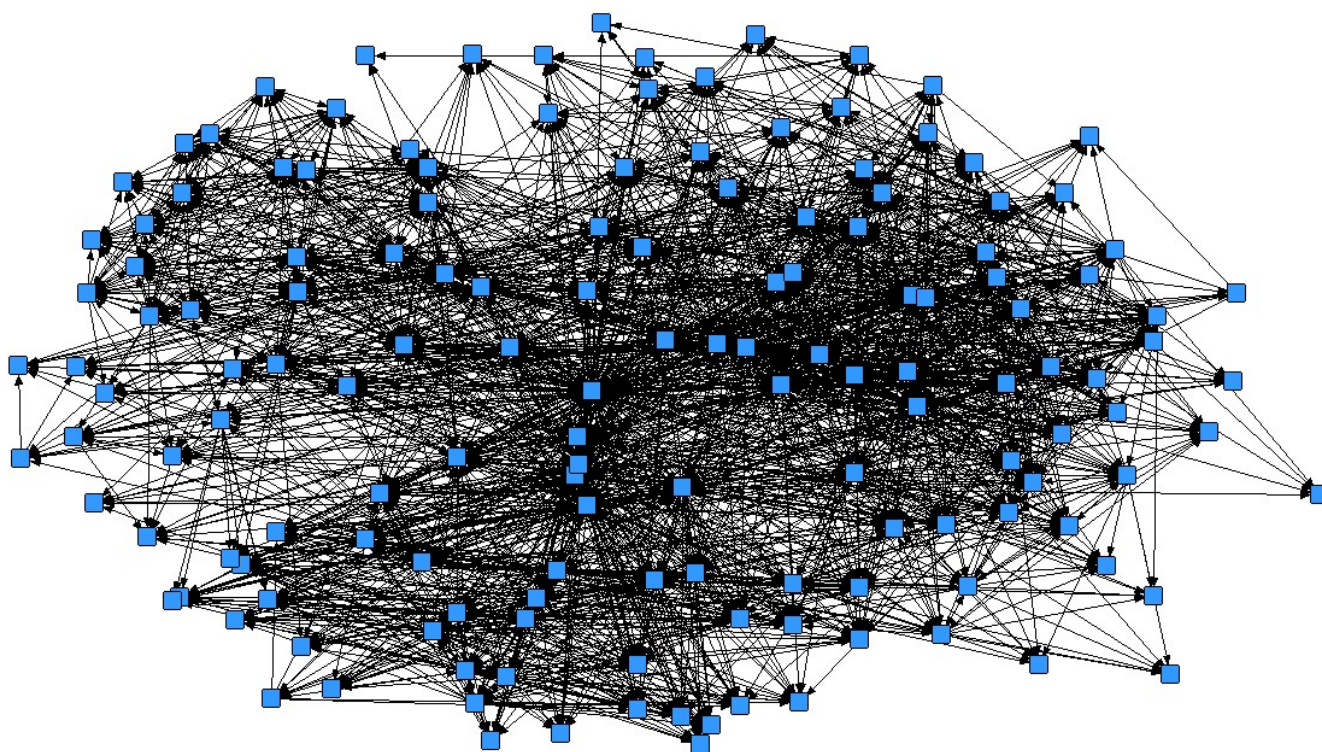
The density measure between the two networks is also interesting. This is the number of current connections as a percentage of the number of possible ties that can be achieved. We can compare the density of the networks in fig. 1 and 2. The awareness network has a density of 16.7 %, while the collaboration network has a density of 8.45% (so nearly half). Of course, as we only have responses from 54.6% members of the network, and assuming that the non-respondents would present a similar type of profile to our sample, we could estimate that in the overall awareness network around 33% of the potential knowledge connections are realized, while in terms of actual collaboration, the figure is around 16%. This means that while there are many connections taking place, these are still only one-third of the possible awareness relations that can take place within the MS USRG. The qualitative interviews undertaken allowed us to reflect further on the role played by the MS USRG in creating this awareness and the possibility for collaborations. In general, across a variety of school and career stages, there was recognition of the role that the MS USRG has played in raising the awareness of others' research interests across the university. The MS USRG has broadened my horizon a lot, a year ago I would not know about what was going on around the University in the Marine sector, I am much more aware and having seminar lists and lists of talks (School of Civil Engineering and the Environment) Further to the general awareness, some of the interviews saw an active role played by the MS USRG in helping them establish contacts and having greater opportuni-

Table 1: Description of the whole network and respondents by Schools/ Research Groups.

SNA code	School and unit	Number of Individuals in MS USRG	Response rate	Number of Responses
1	Institute of Sound and Vibration Research	10	40%	4
2	National Oceanography Centre / School of Ocean and Earth Science	38	42%	16
3	Research and Innovation Services	5	80%	4
4	School of Biological Sciences	1	100%	1
5	School of Chemistry	3	33%	1
6	School of Civil Engineering and the Environment	16	37.5%	6
7	School of Electronics and Computer Science	3	0%	0
8	School of Engineering Sciences	22	77%	17
9	School of Geography	8	75%	6
10	School of Humanities	22	77.2%	17
11	School of Law	5	60%	3
12	School of Management	8	75%	6
13	School of Mathematics	6	17%	1
14	School of Social Sciences	1	0%	0
15	Winchester School of Art	2	0%	0
	TOTAL	150	54.6%	82

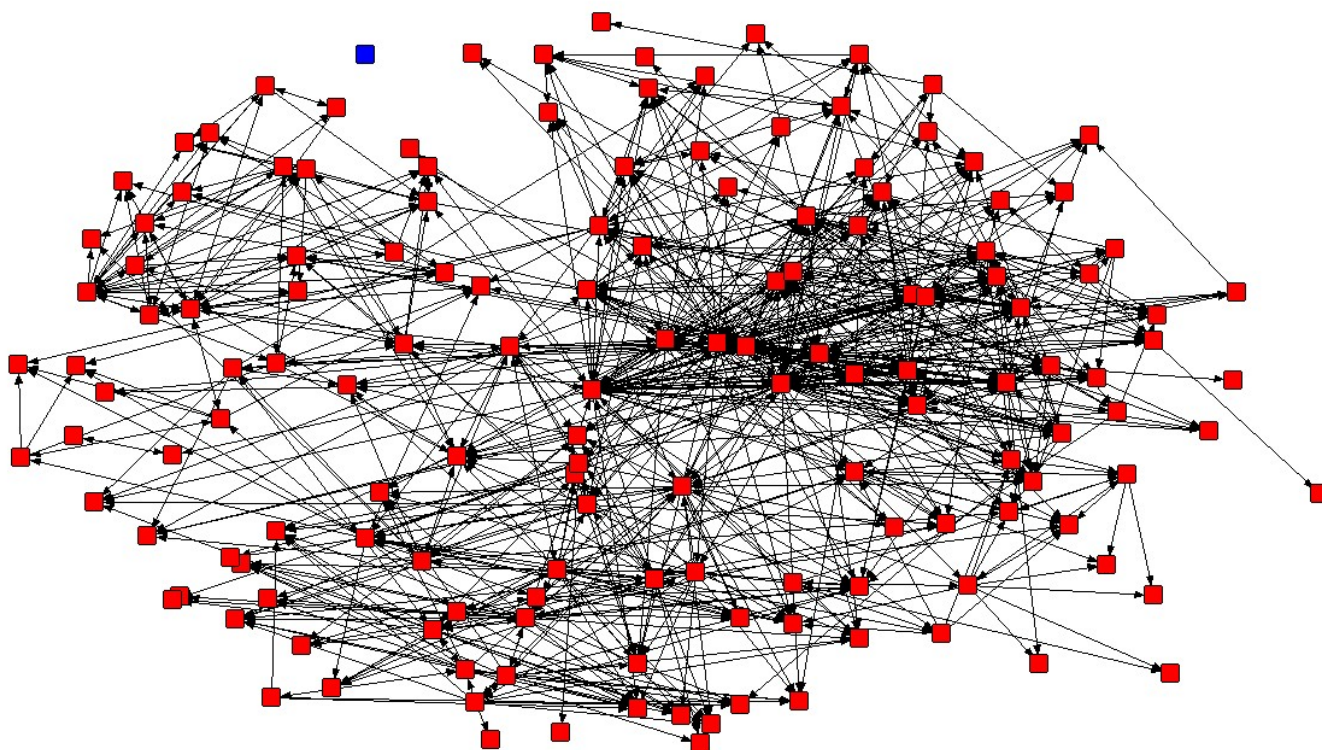
Source: Authors

Figure 1: The MS USRG awareness network.



Source: Authors

Figure 2: The MS USRG network of collaborations (only).



Source: Authors

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I am quite sceptical of how useful this is (the MS USRG) but if there is an expectation the School and individual have to contribute, I am happy to do this (School of Law)

Many of the senior academics appreciated the potential of the MS USRG, but did not find it specifically useful to their internal and external networks. This was very different from younger members of staff, who saw the value of interacting with a variety of people across the university.

The MS USRG has not had any effect at all for me, I can see that it makes it look like we are joined up but in reality I do not think we are ... If I want to work with someone I go and find it myself, but maybe it is because I have been here so long, maybe it is different for young lecturers (School of Engineering Sciences)

The MS USRG has made me realise how little I know about the university as a whole. ... I was staggered by how few people I know outside Humanities. ... internally the University needs to do more along those lines (School of Humanities)

While many appreciated the range of activities and the links created by the MS USRG, many commented on the fact that it could do more or enable further connections and opportunities, especially towards external engagement.

For the research group it gives us an opportunity to think about bigger projects, spanning humanities and ship science. ... for

example the museum has a collection of ship-plans, over 2 million, we had discussions involving ship sciences and historians (School of Humanities)

I have not seen any direct benefit yet from the MS USRG but there are possibilities of that, if you have a larger pool of expertise and if we need to access a larger infrastructure. ... the more knowledge we have of other people's capabilities then the better it is, so if we get approached by someone, we know who the right person to ask ... (School of Engineering Sciences)

4.2. External Networks and Knowledge Engagement and the Role of the MS USRG

During the interviews, academics provided a range of examples of external contacts. This provides an overview, although from a limited sample of 21 academics, of the range of sectors and interconnections experienced.

Table 2 provides an overview of the academics interviewed (identified only by their School of origin⁷) and their contacts (with the sector they belong to). As we can see, some academics mentioned up to 11 contacts (when asked for a sample of 10) but a few of them had fewer external (non-academic) partners; and one of the interviewees did not have any involvement with external organisations (apart from other universities). Overall, it is interesting to notice that each academic tends to work with a range of organisations, although some have strong private sector collaborations (such as number 2 or number 14) or not-for-profit partners (such as number 9), in most cases we can highlight that academics tend to work across sectors, engaging with private, public and not for profit organisations according to their research interests and topics.

Overall, private companies make up 41% of the external contacts, the public sector represent 34% of the external partners and the not-for-profit sector 23%, while business and professional associations represent just 3%. Different academics, specifically in relation to their research, identify different sectors and organisations as their relevant external partners. There is no judgement as to whether a public sector organisation is "better" to work with than a not for profit organisation. In relation to the specific field of the partner organisation, different advantages and disadvantages can be identified, so it is not always the case that the private sector is better or worse to work with.

Money is a big barrier at the moment, particular for small companies, they would love to throw some money at the project but they cannot do it at the moment (School of Engineering Sciences)

There are interesting opportunities here, it means we can tap into funding streams that we would not ordinarily be able to and vice versa, because they are a registered charity, and give us some flexibility (School of Humanities)

⁷ At the time of the research, the University of Southampton was organised in 3 faculties. However following a restructuring of the faculties in 2010/2011 the number of faculties has increased with schools remaining mostly the same and covering same subject areas.

Table 2: Academics and their external contacts.

School \ Division	Sector				Total
	Private	Public Sector	Charity / Not for Profit	Bussiness Association	
1) School of Engineering Sciences	4	2	1	2	9
2) School of Engineering Sciences	9	0	1	0	10
3) School of Law	1	0	0	0	1
4) NOC / School of Earth and Ocean Science	4	1	3	0	8
5) School of Geography	3	1	1	0	5
6) School of Engineering Sciences	0	0	0	0	0
7) School of Civil Engineering and the Environment	1	2	1	0	4
8) School of Humanities	0	3	0	0	3
9) School of Humanities	0	0	8	0	8
10) School of Humanities	0	4	2	0	6
11) School of Management	0	5	1	1	7
12) NOC / School of Earth and Ocean Science	2	2	2	0	6
13) School of Geography	2	6	2	0	10
14) School of Engineering Sciences	8	0	3	0	11
15) School of Engineering Sciences	1	0	0	0	1
16) ISVR	1	3	1	0	5
17) School of Chemistry	8	0	0	0	8
18) NOC / School of Earth and Ocean Science	4	6	1	0	11
19) NOC / School of Earth and Ocean Science	6	3	0	0	9
20) School of Humanities	1	2	1	0	4
21) NOC / School of Earth and Ocean Science	0	5	2	0	7
Total	55	45	30	3	133

Source: Authors

Many interviewees reflected on the role played by the MS USRG in their patterns of engagement with external collaborators.

It gave me an opportunity to go beyond the world of museums, the MS USRG is useful for the business side of things, in humanities this is much more difficult to deal with, it is a problem area for us, but through the MS USRG we have a route through this and there were some events where we showcase projects and brought in a range of partners, and talk with people from the MoD and local business, I would not have been able to do this, in ship-science they probably do it every day but not for us, we can plug into a wider range of partners (School of Humanities)

The MS USRG has given me the opportunity to make contacts, but also to present humanities to the rest of the University, that interface is sometimes difficult, we have lots of things going on, we are doing these things too, and that has been hugely appreciated, it has provided a vehicle where the MS USRG allowed us to make visits as group and talk about a range of issues and collaborations with external partners. (School of Humanities)

While many academics appreciated the role of the university in creating further opportunities for external engagement, there was also the recognition that this can never be forced and that the individual academic retained the choice and ability to engage or not in these possibilities

To be honest, when it comes down to meaningful external engagements, it comes down to individual academics with individual research interests, that is the bottom line but the MS USRG can make opportunities for this to happen (School of Humanities)

The MS USRG is going to open up new opportunities, avenues where we can do cross-discipline research, there is going to be a lot of cross over, which means that the industrial pool we can tap in is going to grow and the MS USRG can help bring this together (School of Engineering Sciences)

Some of the younger members of staff suggested that the MS USRG could play a role in fostering and supporting younger academics in their efforts to establish external contacts. The MS USRG was therefore perceived also as a potential useful platform for cross-learning in the reference to external engagement.

The MS USRG could hold an event dedicated to the extent to which we already have established relationships outside the academic sector and a forum about how one develops in the maritime context these new relationships, so people that have already been successful in establishing new relationships could share their experience with others who are thinking of doing the same thing (School of Ocean and Earth Science)

5. Conclusions

The paper has used the case study of the University of Southampton's Maritime Studies University Strategic Research Group to consider the role of knowledge networks and collaboration in establishing collaborative engagement both within academia and beyond.

The data presented were collected as part of the HEFCE funded employer engagement initiative (EED). This sought to develop relationships with employers to create professional development opportunities for their staff. Given the strengths of Southampton as a research university and the wish to build on existing synergies and relationships, the MS USRG offered an ideal basis for this study. In relation to the objectives of HEFCE, the study also offered a potential for the development of the research group both internally and externally. The intention was to highlight where connections were strong, to suggest where close collaborations might be possible (if not already taking place). Additionally, to highlight where there were few or no connections, but where there might be an opportunity for strategic development.

In reference to internal academic networks the findings suggest that the MS USRG – as an intra-University knowledge infrastructure – has created awareness, across different Schools and disciplines, of broader research issues and knowledge and expertise within the University. While this awareness does not guarantee a specific practical outcome (in reference to income generation or actual collaborations being established), it was seen as positive by most academics. The MS USRG was seen as enabling a better understanding of the strengths and range of expertise available, as well as giving academics confidence in the possibility of establishing new relations.

Alongside collaborative research networks within the university, the interviewees seemed to place a strong intrinsic value on collaboration with external partners. Academics consider this collaboration a two-way exchange; and they value the knowledge, expertise, values and technology outside the University. Academics' main motivation to work with the outside is to have a more complete and often more grounded understanding of their research as part of the real world. Alongside this main motivation, academics perceive benefits for teaching (creative opportunities for the School and students), for bringing in funding and for influencing public policy (or industry practice).

The research results highlight a variety of different practices and approaches towards employer engagement within the University. Some of the differences relate to School infrastructure, some to the nature of the research undertaken and the kind of external partners that can be involved and some others relate to the level of experience and career development of the academic. These differences seem to reflect a range of approaches necessary to address engagement in a flexible and adaptive way by different department and academics rather than being the results of institutional structures. In fact, the motivation, benefits and rationale to engage with the outside seem to be shared amongst academics across the whole institution.

Most academics were satisfied with the degree of freedom they had to establish external relationships. They saw relationship development as something not imposed by the University or School, but a matter best left to their personal and professional judgement. However, particularly for the younger members of staff, there was a need for support, in order for them to be able to maximise their external engagement and to develop further professionalism in interacting with external organisations. Many identified the MS USRG, the multidisci-

plinary knowledge network infrastructure, as a potential vehicle to establish and facilitate collaboration internally and externally. Time was mentioned as a barrier in a number of ways, in terms of the time needed both to develop and maintain a relationship, or time taken to process external requests.

Overall, the paper offers an insight into understanding how academics engage internally in Maritime Studies multidisciplinary research and with external organisations.

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