
Academics as Orchestrators of Innovation Ecosystems: The Role of Knowledge Management

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Abstract

Organisations are increasingly shifting from innovation initiatives centered on internal resources to initiatives centered on sharing resources, knowledge and expertise in ecosystems. In these settings, most innovation efforts have to be designed and accomplished at an interorganisational level to produce outcomes. Drawing on the experience of an applied research center in Italy, we explain why academics are in one of the best positions to orchestrate innovation ecosystems. Two main rationales support this key role. The first is associated with the fact that academics are in an independent position, which is neutral and represents a middle ground between the different organisations that share knowledge to ignite and sustain innovation at an ecosystem level. The second rationale is associated with the levels of compliance and complementarity that academics have with the main purposes for which knowledge within an innovation ecosystem is created and leveraged. Two design choices seem necessary to materialise the potential key orchestrator role of academics: (i) the extensive use of multiple approaches of collaborative research; (ii) the creation and maintenance of a knowledge platform allowing academics to progressively diffuse and leverage the ecosystem-based learning mechanisms underlying each innovation effort.

Keywords – Innovation ecosystems, Orchestration, Knowledge management

1 Introduction

One of the reasons why most innovation initiatives fail is that organisations often lack a coherent ecosystem around them that is able to support and complement their innovation efforts (Adner, 2011). In fact, in the current hyper-connected world, firms are increasingly embedded in networks of interdependent activities carried out by external agents (Adner and Kapoor, 2010). On the one hand, these interdependencies underlie firms' ability to appropriate returns from investments in innovation (Adner and Kapoor, 2010). On the other hand, firms can exploit these interdependencies to sustain efforts of interorganisational innovation (Stadler et al., 2013).

It is therefore important to understand how to orchestrate innovation ecosystems—communities made up of multiple entities that collectively interact as unique systems to produce interorganisational streams of innovation (Kapoor and Lee (2013).

This paper draws on the experience of an applied research center in Italy to suggest a potential orchestrator role for academics within these settings. We begin by describing the research center, the collaborative research processes through which it accomplishes its activities, how it funds them, and the interorganisational results that it has achieved in seven years of practice. Reflecting on the experience of this research center, we underline not only the key role that academics can play as knowledge management experts, but also the specific research design allowing them to be effective in orchestrating ecosystem innovation.

2 The ICT in Healthcare Observatory

Healthcare is a paradigmatic example of an industry in which most of the innovation efforts have to be extended at an interorganisational level to be effective (Angst et al., 2010). Moreover, in healthcare there is no single actor able to create and extract value from the ecosystem around it (Dougherty and Dunne, 2011).

Within these settings, the ICT in Healthcare Observatory (IHO) is one the largest success stories in the relationship between Academics and the Italian healthcare stakeholders. Started in 2008 by a full professor of Politecnico di Milano and an ex Chief Information Officer of one of the most important healthcare organisations in Italy, the IHO is currently composed by academics only: two scientific directors (15+ years of experience in the field, one with a managerial background and the other with an informatics one), one project manager, two senior researchers (10+ years of experience in the field, both with a managerial background) and four junior researchers (having both a biomedical and managerial backgrounds).

Through its activities, the IHO has created a virtuous loop among research, training, consultancy and communication, that in few years has allowed it to: (i) align the different perspectives on ICT's role within the Italian healthcare domain; (ii) transfer the urgency of collaboratively working on ICT-driven innovation in healthcare; (iii) legitimate IHO as the leading partner to be involved in projects of ICT-based innovation in healthcare; (iv) enhance the collaboration between the supply and the demand side of the Italian healthcare industry; and (v) become a reference point for all the healthcare decision makers regarding ICT issues. Table A.1, in the Appendix, outlines the main innovation initiatives instituted and led by the IHO from 2008 to 2013. As depicted in the table, most of these initiatives (22 out of 32) have an interorganisational nature. Table A.2 outlines the main deliverables that the IHO produced as a result of its orchestrator initiatives in the same timeframe.

The IHO conducts its activities according to the process depicted in Figure 1. A longitudinal approach is framed into a set of annual research projects, with public presentations of achieved results each year (Pettigrew, 1990).

Every year, the IHO weaves two main streams of collaborative research (Pasmore et al., 2008). The first is a Semi-Qualitative Research (SQR) led by IHO's researchers, and enriched with the involvement of the practitioners in the gathering and analysis of the data pertaining to the research problem. In the second, the Italian healthcare stakeholders themselves are the change agent (Schein, 2008), and—in the process of seeking help—they engage in a reflective Clinical Inquiry Research (CIR) with the help of the IHO.

As depicted in Figure 1, research-driven SQR is more focused on formally inserting the tackled issues into the global discourse—with the aim of gradually switching from an exploratory (*theory generation*) to an explanatory (*theory confirmation*) perspective. The practitioner-driven stream is more focused on effectiveness during the practical implementation of the developing models, and aims to progressively expand its focus from *problem solving* to *change management*.

2.1 Clinical Inquiry Research Stream

CIR is a well-defined collaborative form of research developed by Schein (2008). Clinical refers to the role that academics must play in helping a healthcare stakeholder to (Coghlan and Brannick, 2005): (i) emphasise in-depth observations of change processes, (ii) emphasise the effects of change interventions, (iii) benchmark the findings, and (iv) build theory and empirical knowledge through developing concepts that capture the real dynamics of the system. Gummensson (2000) recognises that research conducted in this manner potentially enables the total solution to be studied rather than particular parts. Moreover, CIR can be used to initiate change and generate insights from theory development (Stebbins and Shani, 2009).

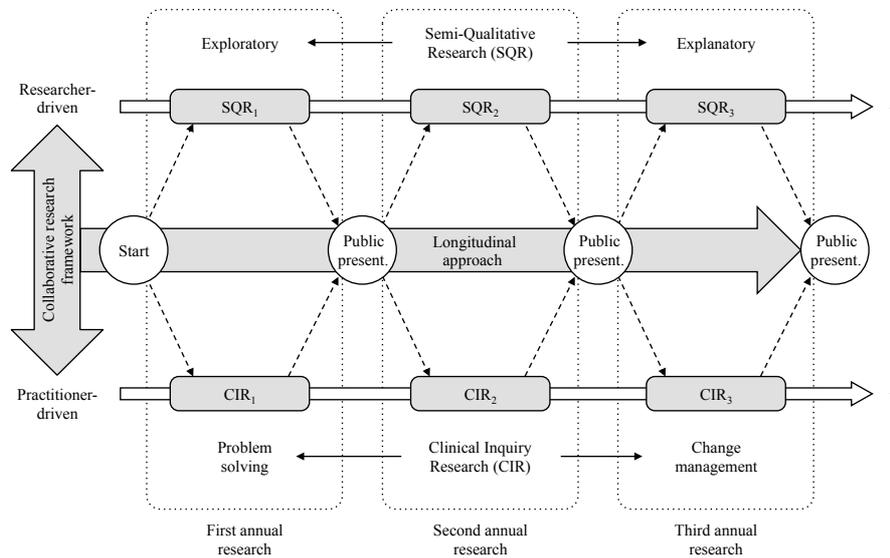


Figure 1 – IHO process to orchestrate the innovation ecosystems in Italian healthcare industry

A distinguishing characteristic of CIR is in the setting of the activity. Unlike most other collaborative research approaches, with CIR the learning opportunity arises in a situation led by the client who needs help and, because of this, is more likely to reveal important data (Schein, 2008). Acting as process facilitators, the researchers of the IHO help “clients” release resources through self-diagnosis and self-intervention (Stebbins and Shani, 2009). In order to attain a more suitable and sustainable research, the CIR stream of the IHO is framed into annual projects (CIR₁, CIR₂, etc.; see Table A.1 in the Appendix) that end with the presentation of the achieved results not only to the actor who needed help, but also in broader research contexts such as during specific SQR meetings between academics and healthcare stakeholders, called advisory boards (see §2.2.3).

Business process analysis and mapping (Womack and Jones, 2003), face-to-face interviews and multi-participant interactive dialogues (Mikaelsson and Shani, 2004) are the main collaborative mechanisms utilised in each CIR of the IHO. Moreover, many data are obtained through the involvement of the organisation assisted in the SQR process. Periodical meetings are performed in order to progressively share the achieved knowledge with the healthcare organisation, orient the SQR process toward more interesting goals, and discuss the empirical as well as theoretical implications of the achieved findings.

2.2 Semi-Qualitative Research Stream

Every year, the IHO uses a combination of a quantitative panel of dynamic electronic surveys, several qualitative case studies, a series of focus groups called advisory boards, and an online community. The overall process of their utilisation is depicted in Figure 2.

2.2.1 Electronic Survey

Every year, the IHO creates and delivers an electronic survey to a sample of more than 500 Italian healthcare CIOs from representative organisations of varying types, sizes and geographical areas. A response rate higher than 15% is always achieved (e.g. in the research process of 2012, 127 healthcare CIOs answered the survey—see Figure 2).

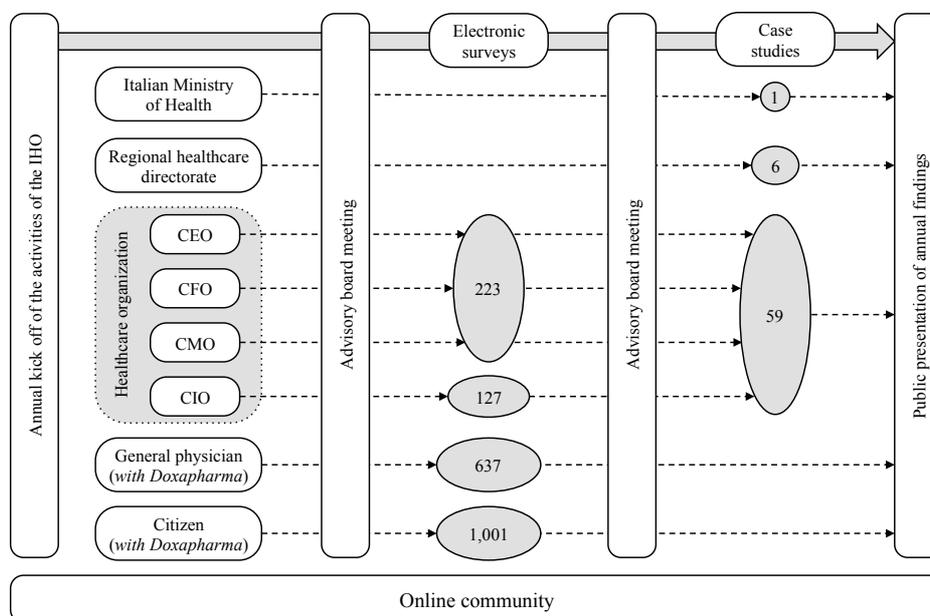


Figure 2 – Semi-Qualitative Research process adopted by IHO in the annual research of 2012

The survey is always designed with semi-closed questions, in order to balance usability and speed—with the possibility of expounding on each question. After positive results from pilot respondents and further refinement with the advisory board, the survey is made available via web in a form allows CIOs to nominate a collaborator able to answer a specific question (and to then review the answer given), and see specific sections of the survey only if specific threshold answers are provided. These dynamic features are responsible for higher response rates—even when using an extensive survey (e.g. 30 questions in 2012).

From a researcher viewpoint, the delivery through an electronic platform gives the possibility to analytically work on closed questions throughout data collection. The IHO is thus able to identify anchors to guide future data gathering, and detect connections between data for further theory generation (Forza, 2002). These preliminary concepts can be brought to the advisory board's attention, together with all the answers given to open questions.

Every year, the IHO delivers a second set of surveys to the Strategic Board—CEO, CFO and CMO—of the same healthcare organisations of responding CIOs, in order to cross-validate given responses. National and international healthcare associations, as well as technology suppliers in healthcare support IHO's research, and actively participate in its activities (Mohrman and Mohrman, 2011). Their contributions aim to not only economically sustain the research, but also push for a timely response on the part of the strategic board of the sample. The brevity of the survey given to CEOs, CFOs and CMOs allows a greater number of organisations to be used as a basis for conducting longitudinal research.

Starting from the annual research of 2012, the IHO has developed a partnership with Doxa-pharma, the branch focused on the healthcare sector of Doxa, the leading Italian institution in opinion pools, market research and statistical analysis. This partnership allows the IHO to run two yearly surveys on statistically-significant samples of general physicians (637 respondents in 2012) and citizens (1,001 respondents in 2012). The idea is that of progressively considering a comprehensive perspective on the topics tackled by the IHO.

2.2.2 Case Studies

The IHO performs a comparative analysis of more than 40 case studies every year (e.g. 66 in 2012). The selection of the healthcare organisations to be studied is based on: (i) the size of their ICT department (measured through the surveys, using the rate of Full Time Equivalents in the ICT direction over the total number of organisation employees), (ii) ICT strategic importance (measured through the surveys in budget terms), (iii) ICT projects—both those developed and those in progress—, (iv) advisory board suggestions.

Data is gathered through a series of semi-structured interviews given to the CIO of healthcare organisations of particular interest. A team of an experienced and a junior researcher of the IHO leads every interview, which is based on a consistent protocol, constructed according to survey responses, as well as an a priori analysis of the healthcare organisation. All the interviews are digitally recorded, transcribed verbatim, summarised and interpreted through periodic meetings of the IHO in order to test concept reliability, share visions, as well as to formally group and compare key issues. If any information remains

unclear and/or more data is needed, interviewees are re-contacted for additional clarifications. Finally, all interviewees are involved in reviewing the summarised interpretation.

A second panel of interviews is delivered to the strategic board of the same healthcare organisations of responding CIOs, in order to cross-validate the given responses (Yin, 2003). Moreover, the IHO analyses multiple sources of evidence: healthcare organisations' internal documents, ICT schemes, websites, white papers, etc. Due to the specific nature of the Italian healthcare industry—in which many decisions are taken at a supra-organisational level (Scalzo et al., 2009)—the IHO performs case studies on the directorate of important and representative regional healthcare systems (6 cases in 2012) and on the Italian Ministry of Health (see Figure 2). When the combination of these sources does not add particular insights to data interpretation, the IHO stops their collection.

2.2.3 Advisory Board and Online Community

The IHO benefits also from an advisory Board: a multidisciplinary focus group that advises and helps in directing the focus of SQR, in interpreting data, in anticipating future research issues and confirming results via social feedback (Mirvis, 2008). The group counts more than 50 representatives including: (i) C-levels of the main Italian healthcare organisations, (ii) national and international healthcare technology suppliers, (iii) professionals from national and international healthcare associations, and (iv) healthcare experts. The advantages of working with this heterogeneous group are not only the ability to gain a clear perspective of real sector problems, but also the creation of a community of interest formed around the study—with unique opportunities to bring together the industry supply and demand, and stimulate innovation initiatives.

From a research viewpoint, the advisory board helps in improving both construct validity and dependability of the findings (Yin, 2003). The annual contribution brought to the research by the advisory board is organised around three face-to-face meetings (Figure 2). The first one deals with informal discussion about annual research objectives and priorities in the data gathering process. In the second meeting, initial results are discussed, and the advisory board suggests potential best practices on which to perform the annual case studies. In the last meeting, overall results and explanations are discussed to test, review and confirm them. In all meetings a couple of cases of effective ICT management are presented to share best practices and discuss how to concretise the potential of specific ICT-based solutions.

With the aim of offering further opportunities to discuss ICT's role in the Italian healthcare industry, the IHO has started an online community, which is used not only to

discuss preliminary research findings, but also to share experiences, links and news on the topics of ICT and innovation in healthcare. The community helps the IHO in exploring new languages and new channels to be used in order to connect it to practitioners.

3 Academics as Orchestrators of Innovation Ecosystems

The IHO recognises that the interorganisational initiatives of innovation entail complex phenomena, which exceed the capacity of individuals and organisations to accomplish them (Porter and Powell, 2006). In this scenario, the IHO shows that academics can play an important role as 'orchestrators of innovation ecosystems'. There are two rationales supporting this consideration:

- The independence of academics within the innovation ecosystem;
- The compliance and complementarity that academics have with the main purposes for which knowledge within an innovation ecosystem is created and leveraged.

3.1 First Rationale: Independent Position

Academics have an independent position, which is neutral and represents a middle ground between the different organisations that have to cooperate in order to ignite and sustain interorganisational efforts of innovation. In fact, the IHO is composed of academics, and—as opposed to other stakeholders present in the healthcare industry—academics tend not only to have no hidden agendas related to the promotion of a specific ecosystem configuration, but also to hold significant expertise in building trust and in serving as secure intermediaries between the different actors. Literature has repeatedly shown that, instead of writing lengthy contracts and exercising litigation options, it is better to rely on social interactions to coordinate the activities of an ecosystem and activate streams of joint problem solving within it (Dhanaraj and Parkhe, 2006).

Conscious of these peculiarities, the IHO has invested in being progressively perceived as an impartial and autonomous entity to be consulted in case of fact-checking and evidence-based decision-making. Almost all the interorganisational initiatives listed in Table A.1 have been activated and led by the IHO thanks to its reputation as an independent accumulator of data able to manage privacy issues and help practitioners in accomplishing their innovation decisions. For instance, a big region in Northern Italy asked the IHO for help in developing the guidelines with which to orient and govern the implementation of the electronic medical records of all the 33 public healthcare organisations operating within it (refer to CIR₅ in Table A.1).

3.2 Second Rationale: Compliance to Innovation Ecosystems' Knowledge

The second rationale is associated with the levels of compliance and complementarity that academics have with the main purposes for which knowledge within an innovation ecosystem is created and nurtured. Leveraging on the works of Docherty et al. (2003), it is possible to identify four types of innovation ecosystems to which academics can contribute as knowledge management experts: professional, learning, transformational and strategic. In the rest of the paragraph we describe these ecosystems, why the IHO's experience suggests that academics can be valuable orchestrators of interorganisational initiatives of innovation within them, and the key role of knowledge management.

3.2.1 Academic Compliance to Professional Innovation Ecosystems

Professional innovation ecosystems periodically bring together practitioners who gain some benefit from exchanging knowledge with like-minded peers in order to keep abreast of the latest developments in their fields (Docherty et al., 2003). Indirectly, these knowledge exchanges catalyse collective reflections on how accomplishing organisational and interorganisational initiatives of innovation, and provide opportunities to realise them. There are many professional innovation ecosystems in the Italian healthcare industry. Associations, consultants, and developers of ICT-based solutions organise several meetings to encourage debates among healthcare stakeholders around innovation. However, these meetings tend to be over-focused on specific topics, which are connected to the application domain of the meeting organiser. Moreover, the participants in these meetings tend to share the same beliefs, the same values, the same experiences and the same perspective of the future. Thus, it is often necessary to find incentives of thinking 'outside the box', in order to really keep up the pace with the multiple opportunities available to practitioners.

In this respect, the IHO shows that academics can be helpful in: (i) offering opportunities to share knowledge and expertise; (ii) initiating effective collaborative discussions about individual experiences; (iii) summarising and formalising the knowledge generated through peer interactions; (iv) guiding and bringing value to discussions; (v) helping to think outside the box; and (vi) maintaining the focus on mutual organisational interests. As an example of these capabilities consider the advisory boards periodically organised within the annual semi-qualitative research of the IHO (SQR₁–SQR₆ in Table A.1). These meetings are exploited not only to orient the research process of the IHO, but also to provide the Italian healthcare industry with unique opportunities to bring together its supply and demand side, and create moments to stimulate interorganisational initiatives of innovation.

3.2.2 Academic Compliance to Learning Innovation Ecosystems

The organisations in a learning innovation ecosystem aim to increase their knowledge by focusing on innovative sources of inspiration within the ecosystem to which they belong. Usually they interact through private/public meetings, purposefully reflecting on theirs and others' knowledge to identify learning opportunities related to organisational and interorganisational innovation issues. Progressively, formal and informal consortia emerge from this continuous reflection. These consortia influence existing knowledge management systems by creating a safe psychological climate that allows the learning anxiety behind the resistance to change to be overcome (Schein, 2002). The Italian healthcare industry can be seen as a compound set of learning innovation ecosystems. It is sufficient thinking to the several work groups through which the Italian Ministry of Health coordinates the sharing of best practices among its regional healthcare systems.

The IHO suggests not only that academics are natural enablers of the learning processes underlying these groups, but also that the higher the moderation of academics, the more effective the activation of multiple streams of unbiased reflection around the practitioners' knowledge at both the organisational and the interorganisational level. With reference to the semi-qualitative research streams activated by the IHO, the number of participants in its workshops and public presentations (Table A.2) emphasises IHO effectiveness in rendering as salient the learning potential related to the cases discussed within these events.

Practitioners can organise and lead learning innovation ecosystems as well—especially consultants and the supra-organisational entities like the Ministry of Health. However, the learning atmosphere that they create is less of a safe psychological climate than the one created by academics, who, in addition, are particularly effective in understanding the idiosyncrasies of the specific reality being addressed, in embracing a broad perspective, and producing more effective interorganisational knowledge. The advisory boards of the IHO are so effective in capitalising on the past to better shape the orientation of IHO thanks to the safety perceived by the participants of these “closed events”, which are progressively exploited to present organisational and interorganisational cases of innovation in order to freely discuss them without the risk of public judgments.

3.2.3 Academic Compliance to Transformational Innovation Ecosystems

Transformational innovation ecosystems aim to transform their participants, whose development in terms of innovation is seen as integrally linked to the development of the ecosystems of which they are a part and/or with which they interact. Thus, the ecosystem acts as a

tightly-coupled peer system, in which participants collaborate on directing, developing and deploying the knowledge that is necessary to enable the transformation processes. In Italy, all regional healthcare systems establish themselves as ecosystems of players focused on developing joint transformational processes of innovation. These processes are of course oriented towards sharing professional knowledge (§3.2.1) and/or obtaining learning outcomes (§3.2.2), but their main emphasis is put on having the best conditions to ignite and sustain interorganisational initiatives of innovation.

The IHO shows that, in these cases, the healthcare stakeholders form transformational innovation ecosystems, and that academics can play key orchestrating roles within these ecosystems as knowledge management experts. For instance, the surveys that each year are delivered to all Italian healthcare C-levels, provide the IHO with updated data regarding the overall priorities in ICT investments. During 2010, these priorities represented a common base for the development of an ICT-driven innovation plan for a regional healthcare system in Northern Italy (see CIR₆ in Table A.1). This plan has been developed with the healthcare directorate of the region, and the IHO provided this last one with critical interorganisational knowledge regarding how to effectively enable and sustain the progressive digitalisation of the whole regional healthcare system through: (i) the definition of the functional ICT areas and governance initiatives to be kept under control; (ii) a prioritisation of the main interventions; and (iii) a set of indicators to monitor the impact of each intervention on the objectives of the regional healthcare system.

Academics are effective in leading an interorganisational transformation because they have strong competences in systematically identifying potential directions along which to guide any joint transformational paths of the innovation ecosystem. These competences are the results of incessant literature analyses and of the exposure to other sectors' practices.

3.2.4 Academic Compliance to Strategic Innovation Ecosystems

Strategic innovation ecosystems are formed to add value to business processes through mutual dependence on exchange relationships. As part of the strategic ecosystem, organisations engage in goal-oriented activities around shared problems, with the aim of dynamically achieving innovation objectives through the reduction of transactional problems. Starting from this viewpoint, it is possible to think of Italian healthcare also in terms of as a set of inter-related strategic ecosystems aiming to find an overall configuration that allows the whole industry to disrupt its services without compromising the quality offered to patients. The complexity of the decisions taken within a strategic innovation ecosystem necessitates the creation of ecosystem knowledge by: (i) decoding the choices made by each actor; (ii) as-

sessing their efficiency and effectiveness; and (iii) integrating it to the interorganisational knowledge system of the ecosystem. The process is oriented to the production of explicit evidence, valuing mutual dependence during interorganisational relationships.

The experience of the IHO shows that academics can play key orchestrator roles within these settings. For instance, and with reference to CIR₁₉ in Table A.1, the IHO leveraged on its unique knowledge of all the 33 public healthcare organisations operating within a big region in the North-western Italy to assess the maturity of their information systems according to a model jointly developed with the healthcare directorate of the region (CIR₁₃), and based on a systematic literature review. The assessment has provided both the region and its public healthcare organisations not only with information regarding specific intra- and inter-organisational ICT-based functional areas requiring further development, but also with the joint objectives of: (i) progressively homogenising the ICT-based solutions present in the healthcare system; (ii) reducing the costs of ICT management; and (iii) improving the quality of the regional healthcare system through an ICT-based integration of its different care pathways. These ecosystem objectives are the result of an innovation process that academics easily activated and sustained thanks to their capabilities of realising systematic literature review, maintaining a continuous relationship with different actors, and supporting the whole strategic innovation ecosystem in knowledge creation, extension, conversion and integration.

3.2.5 Potential Orchestrator Roles of Academics

The experience of the IHO demonstrates that academics can play several orchestrator roles in all innovation ecosystem types. More specifically, the main orchestration role of academics within an innovation ecosystem tends to change according to its nature:

- In professional innovation ecosystems academics provide meeting occasions for ecosystems actors, and help them in recognising the innovation opportunities available within the ecosystem by enhancing the diffusion of ecosystem knowledge;
- In learning innovation ecosystems academics reduce the learning anxiety behind the resistance to change that each actor of the ecosystem tends to manifest, and help in arranging knowledge in order to better framing innovation opportunities at an ecosystem level;
- In transformational innovation ecosystems academics support the different innovation processes activated in the ecosystem through the constitution of the best conditions necessary to accomplish them and the systematisation of interorganisational knowledge;

- In strategic innovation ecosystems academics orient each innovation process towards common valuable objectives, and contribute in actualising each synergy present among all ecosystem actors by constituting an independent ‘knowledge hub’.

4 Two Prerequisites for an Effective Academics’ Orchestration

Even if academics have a tremendous potential to orchestrate innovation ecosystems, most of their initiatives are neither oriented toward achieving this goal (Knights et al., 2008), nor effective in attaining it (Bartunek and Schein, 2011). In fact, industries and universities are governed by different belief systems, practices, and institutional logics, which comprehensively tend to ignite several tensions between academics and practitioners who try to jointly realise innovation. The basic step to manage these tensions is the nurturing of a continuous knowledge exchange between the two actors. However, this exchange is difficult to initiate and maintain due to the presence of diverse goals, motivations, and planning horizons. According to the experience of the IHO, two design choices seem necessary to materialise the potential key orchestrator role of academics:

- The extensive use of multiple approaches of collaborative research, not only to increase the influence of academics in practice, but also (and especially) to support knowledge creation and exchange at both organisational and ecosystem levels;
- The creation and maintenance of a knowledge platform allowing academics to progressively diffuse and leverage the ecosystem-based learning mechanisms underlying each interorganisational effort of innovation.

The next two paragraphs deepen these choices, and start outlining a framework for clarifying the orchestrator role that academics can play within an innovations ecosystem.

4.1 Extensive Use of Multiple Collaborative Research Approaches

The IHO shows that the orchestration of innovation ecosystems requires academics a relentless exposure to large number of practitioners coming from different domains. In these complex, interrelated settings, the generation of knowledge no longer occurs—as historical happen (Christensen et al., 2009)—only in the academic domain, but rather in a more distributed manner (Mohrman and Lawler, 2011). Thus, IHO researchers are increasingly becoming just one of the many players through which the actors of the Italian healthcare seek to find actionable knowledge to govern innovation initiatives.

The experience of the IHO suggests that an extensive use of multiple approaches of collaborative research allows the achievement and maintenance of a dynamic equilibrium providing academics with the capabilities to orchestrate innovation at an ecosystem level.

4.1.1 Why Collaborative Research?

Collaborative research implies research efforts that include an active involvement of practitioners in (Van de Ven, 2007): problem formulation, theory building, research design and problem solving. The engagement of practitioners in all these phases forces academics to extensively deal with them throughout the research process, not only providing opportunities to legitimise academics' orchestrator role, but also allowing them to aspire of having an impact on reality. For instance, the IHO started its online community to increase its dialogue with practitioners, gather research interests from a broad group of stakeholders, periodically stress the importance of following the suggestions derived from its findings, and provide tailored answers to the practitioners willing to adopt the models developed in its research processes.

Moreover, pushing academics outside themselves—to obtain and be informed by the perspective of practitioners—collaborative research fosters the generation and the validation of actionable knowledge, which not only provides a solid theoretical background through which supporting the development of an innovation ecosystem, but also simplifies the alignment with practitioners that is necessary to influence their actions towards common goals.

Finally, collaborative research is based on the value that knowledge production and action are not set apart as two separate processes, but synergistically support each other. In fact, collaborative research aims to understand the influence in complex systems of behaviours, actions, and purposeful design choices that are intended to manage the systems toward intended outcomes (Pasmore et al., 2008). Thus, academics can use collaborative research in multi-stakeholder settings to orchestrate innovation ecosystems (see Table A.1).

Collaborative research	Informed research	Insider/outsider research*	Design/evaluation research	Action/intervention research
Description	Academics conduct and control research activities with advice of practitioners	Teams composed of insiders and outsiders co-produce knowledge	Academics develop and evaluate policies or programs for/with practitioners	Academics implement change to solve a practitioners' problem
Purpose**	Describing	Describing	Controlling	Controlling
Perspective***	Dethatched outsider	Attached insider	Dethatched evaluator	Immersed change agent
IHO's examples****	All surveys and case studies in SQR ₁ –SQR ₆	All advisory boards in SQR ₁ –SQR ₆	CIR ₅ , CIR ₆ , CIR ₈ , CIR ₁₃ , CIR ₂₁ , CIR ₂₂	CIR ₁₄ , CIR ₁₉

* Van de Ven called this typology of research "collaborative"; we have preferred the terms "Insider/outsider research" not only to avoid a potential terminological confusion, but also because it captures the real aims of these research efforts: developing joint teams, in which one or more members are relative insiders to a setting and one or more members are relative outsiders, to conduct a collaborative study (Bartunek, 2008)

** Focus on whether the collaborative research is being undertaken to describe or control the innovation ecosystem

*** Refers to the degree to which academics relate to the research domain as external observers or internal participants.

**** Refer to §2 for a description of the specific Semi-Qualitative Research (SQR) and Clinical Inquiry Research (CRI) streams

Table 1 – Typologies of collaborative research's approaches utilised by the IHO

4.1.2 Why Multiple Approaches of Collaborative Research?

Collaborative research contemplates a wide variety of approaches characterised by different degrees of collaboration. At one extreme, collaboration may be limited to access to an organisation for data collection. At the other extreme is research that seeks not only to produce knowledge but also to transform a system. In between these extremes there are several forms of collaboration that can be exploited by academics to orchestrate innovation ecosystems.

From this viewpoint, the IHO shows that multiple levels of collaboration are necessary, and that the more different approaches of research are combined and simultaneously pursued, the greater the orchestration of interorganisational efforts of innovation. In order to explain why, it is necessary to generalise Van de Ven (2007), and classify the collaborative research approaches depicted in Table A.1 according to their purposes and perspectives. The intersection of these two dimensions generates four different approaches of research (Table 1), which the IHO concurrently uses to orchestrate innovation ecosystems.

According to the experience of the IHO, the greater the concurrent presence and the balance among these research approaches, the greater the possibilities of exploiting the synergies among the relative orchestration modes. In fact, the interplay among the different collaborative research approaches provides multiple ways and levels to engage with practitioners in a comprehensive manner, which triangulates the relative knowledge according to the specific emphasis of the innovation ecosystem. For instance, most of the orchestration efforts of the IHO are placed not in enabling but rather in supporting interorganisational initiatives of innovation. To successfully support these initiatives, each year the IHO weaves semi-qualitative and clinical inquiry research streams. The combination of these different forms of research allows the progressive assembling of a transformational innovation ecosystem able to jointly assess, investigate and realise the strategic role of ICT within healthcare.

Adopting multiple collaborative research approaches, the IHO gradually understands the right emphasis to place on these different research activities, in order to combine their strengths and avoid their weaknesses based on the specific domain under consideration. The end result is a combination of real-time observations and retrospective analysis, which not only maximises the probabilities of discovering short-lived factors that have a significant influence on the orchestration performance, but also provides the advantages of: (i) getting the “big picture” of the innovation ecosystem, and (ii) avoiding overcomplication and oversimplification during knowledge orchestration (Van de Ven, 2007).

4.2 A Platform to Manage the Network-based Learning Mechanisms

The IHO suggests that the configuration of a knowledge platform allowing academics to manage and progressively diffuse the ecosystem-based learning mechanisms underlying each interorganisational innovation increases the effectiveness of academics in orchestrating an innovation ecosystem.

4.2.1 Why a Platform?

The collaborative approaches adopted by IHO are highly difficult to control in an experimental sense (Bartunek et al., 2011). In fact, the research accomplished in multi-stakeholder settings tends to exceed individual research capabilities, and asks for multiple research perspectives, researchers, methods and resources (Mohrman et al., 2008).

From this viewpoint, a promising avenue that the IHO is exploring is the constitution of a knowledge platform—a socially-engineered knowledge framework (Stebbins and Valenzuela, 2004) able to: (i) constitute a critical mass of researchers to convey several perspectives on the same innovation stimuli; (ii) jointly overlap different theoretical and empirical frameworks to successfully tackle these stimuli; (iii) manifest a unique identity during the interaction with practitioners; (iv) push academics out of their comfort zone, which tends to be over-focused on peer citation logics; (v) engage academics with practitioners in each phase of the collaborative research processes underlying an orchestration effort; and (vi) convey the innovation initiatives present within an ecosystem at a systemic level.

The IHO suggests three motivations to establish a knowledge platform in the context of orchestrating innovation ecosystems. The first motivation is related to the fact that a knowledge platform strengthens the effectiveness of collaborative research in supporting any academic orchestration. In fact, a knowledge platform allows to easily work on the six motors proposed by Tenkasi and Hay (2008) to foster academic-practitioner collaboration (Table 2), collects in a meaningful, circumscribed niche of inquiry the efforts of academics, allows to efficiently allocate their resources, prioritise the different interventions, seize all exploitable synergies, and easily convey the innovation efforts at a systemic level.

Motor	Definition	Relating theory to practice	Relating practice to theory
Scaffolding	Identifying problems of double relevance by including a platform that, while leading practical actions, ensures theoretical outcomes	Development of an annual research agenda derived from a detailed literature analysis	Adding practical elements exceeding the needs of the stakeholders helped through each CIR project to increase theoretical outcomes
Framing	Using theory to give direction to a broadly expressed innovation mandate, and practice to frame a niche in which to test/develop a theoretical model	Considering ICT as a lever that a healthcare system can use to overcome the conflict between quality improvement and cost rationalisation	Slight adaptation of the research agenda according to practitioner needs (mostly in terms of focusing on specific ICT-based solutions)

Influencing and legitimising	Using theory to influence and legitimise the need for certain kinds of actions, and using practice to legitimise a certain kind of theoretical model	Fostering the usage of ICT as a lever to dynamically balance exploration and exploitation within healthcare	Leveraging the idiosyncrasies of the different regional healthcare systems in Italy to study the variables moderating the significance of ICT
Sense making	Using theory to make sense of practice, and practice to re-inform theory	Paradoxical thinking to explore the necessity of balancing exploration and exploitation in healthcare	Necessity to switch from an organisational to a network-based unit of analysis to not conduct an abstract research
Demonstrating	Using theoretical rigor to demonstrate that a solution is empirical successful, and practical impacts to provide evidence supporting the veracity of a theoretical model	Quantification of the benefits (in terms of quality and cost) associated with the investments in ICT in healthcare	Application of an ICT adoption model developed through a group of cases on another group of healthcare organisations in order to refine the model and test its veracity
Turns	Reframing a theoretical element to make it more palatable to a practitioner audience; and reframing an empirical element with similar aims for an academic audience	Graphical and interactive presentation allowing healthcare practitioners to understand the frameworks of paradoxical thinking	Legitimising the methods used by IHO – with a specific emphasis on the collaborative and qualitative ones (e.g., definition of the strategies to reduce informant bias)

Table 2 – *Motors used by the IHO to engage practitioners and orchestrate CI ecosystems*

A second motivation for exploiting a knowledge platform concerns the possibility to increase the dialogue between academics and practitioners. Periodically, the IHO brings the two together to discuss research findings and their practical implications, to identify key emergent problems, and to facilitate networking, so that healthcare stakeholders can share their experiences and learn from one another. The IHO serves as a hub, providing a structure and a process by which practitioners and academics can continuously co-interpret interorganisational issues. By adhering to the IHO, practitioners and academics agree on committing to attending regular meetings, confronting on a periodical basis, and cyclically reflecting on interorganisational innovation issues. Literature (Van de Ven, 2007) suggests that this form of collaboration is especially effective: (i) in learning from past experiences, (ii) in adopting a shared vocabulary for capturing multiple dimensions of a phenomena, and thus, (iii) in orchestrating interorganisational innovation ecosystems.

A final motivation for establishing a platform to orchestrate innovation ecosystems is related to the creation of an adequate research rhythm. The IHO shows that if academics aim to play a substantive role as interorganisational orchestrators they have to undertake rapid research processes, which balance rigorousness and timeliness. A platform like the one established by each IHO substantially helps in truly excelling at both these competing demands. In fact, on the one hand, a platform provides academics with resources and time to collectively reflect on interorganisational issues, compare alternative network solutions, and explore different orchestration strategies. On the other hand, it forces academics to

train their capabilities of conducting collaborative research more quickly, and in a way that addresses the changing realities faced by practitioners.

4.2.2 Why Ecosystem-based Learning Mechanisms?

Learning, in one or more variations, is an integral part of any innovation initiative. Starting from this consideration, each innovation ecosystems underline the comprehensive character of the learning endeavours, which academics can foster and use. More precisely, it is possible to distinguish between learning 'in' and 'from' an innovation ecosystem (Huzzard and Gregory, 2008). In fact, this last one can acquire not just the declarative knowledge of its specified learning target, but also procedural knowledge about the management of the ecosystem itself: its setup, maintenance and survival. For instance, the IHO generates insights of interest for the entire Italian healthcare industry both through the data collected by its surveys/cases as well as thanks to its events, which provide opportunities to jointly reflect on the best way to collaborate on shared innovation issues.

The IHO suggests that the effectiveness of a knowledge platform in orchestrating innovation ecosystems is connected to its capability to design, implement, spread, and leverage mechanisms through which to learn 'in' and 'from' the ecosystems themselves. In fact, the learning issues are often not formally given a clear priority on the management agenda in most organisations, and—since interorganisational learning is effective if its conditions and process are systematically designed and implemented (Shani and Docherty, 2003)—academics are among the best designers and developers of 'learning mechanisms'.

At the most basic level, learning mechanisms are formalised strategies, policies, guidelines, methods, tools, routines, and any other arrangement that is designed to promote and facilitate learning (Lipshitz et al., 2007). Although learning mechanisms can apply at individual, group, organisational and ecosystem levels, most of the literature on the topic assumes an organisational perspective, and identifies three main learning mechanisms: cognitive, structural, and procedural (Fredberg et al., 2011). Starting from this viewpoint, it is possible to talk about three Ecosystem-based Learning Mechanisms (ELMs), which the IHO concurrently uses in orchestrating innovation ecosystems (see Table 3 for some examples).

- *Cognitive ELMs*: language, symbols, theories, values and concepts for creating an understanding among all innovation ecosystem on the character, need, and priority of a new ecosystem status as well as the changes required to realise it (Docherty and Shani, 2008).

- *Structural ELMs*: interorganisational infrastructures that encourage practice-based learning within an innovation ecosystem—housing and enabling the knowledge exchange required for interorganisational innovation (Shani and Docherty, 2006).
- *Procedural ELMs*: institutionalised procedures, routines, and methods that facilitate ecosystem knowledge exchange, and establish the core routines to effect innovation.

The experience of the IHO emphasises that a knowledge platform that focuses on nurturing a tapestry of different types of ELMs has greater possibilities to ignite and sustain ecosystem innovation. The higher the interrelatedness of the ELMs, and their coherence to the specific purpose of the innovation ecosystem, the more effective the orchestration by academics.

Ecosystem type*	Cognitive ELMs	Structural ELMs	Procedural ELM
Professional	Report with quantification of healthcare ICT budgets (derived from surveys) ^[FROM]	Online community and public presentations ^[IN]	Benchmarking among hospitals and among regional healthcare systems ^[FROM]
Learning	Report with investment priorities of healthcare CIOs (derived from surveys) ^[FROM]	Advisory boards and annual public presentations ^[IN]	Regional guidelines for EMR implementation ^[IN]
Transformational	ICT-driven innovation plan for a regional healthcare system ^[IN]	Public presentations and online community ^[IN]	Regional guidelines for healthcare information system homogenisation ^[IN]
Strategic	Regional governance model of the shared healthcare services ^[IN]	Advisory boards (and their safety climate) ^[IN]	Maturity model of healthcare information systems ^[IN]

* For each EML we have emphasised if it has realised its potential through an analysis of the actors/dynamics characterising the innovation ecosystem (learning FROM the ecosystem) or through an interaction with it (learning IN the ecosystem)

Table 3 – Examples of Ecosystem-based Learning Mechanisms (ELMs) enabled and led by the IHO

5 Conclusions, Limits and Further Research

Organisations are increasingly shifting from innovation initiatives centred on internal resources to those that are centred on sharing resources, knowledge and expertise in ecosystems (Adner, 2011). In these settings, most innovation efforts have to be designed and accomplished at an interorganisational level to produce outcomes. The experience of the IHO suggests that academics can effectively orchestrate these initiatives. In order to concretise their orchestration role, academics have to extensively engage with practitioners, and leverage on their independence/compliance to the different types of innovation ecosystems.

The best way to accomplish these tasks seems to be the organisation of a knowledge platform combining multiple approaches of collaborative research. This platform: (i) increases academic possibilities of activating virtuous cycles between research, communication and community management, (ii) allows academics to effectively serve as knowledge management experts, and (iii) conveys the different innovation efforts at a systemic level.

Of course these are just preliminary results, which have to be deepened through further research. For instance, it would be interesting to understand if IHO's approach works also in industries characterised by the presence of other actors with the willingness and the capability to orchestrate interorganisational innovation efforts. In this way it would be possible to understand if academics have really peculiar characteristics setting them apart in any orchestration efforts, or if IHO's approach and the idiosyncrasies of Italian healthcare are the main reasons explaining the effectiveness of IHO's academics in orchestrating innovation ecosystems.

Moreover, this paper focus on the orchestration of the processes through which several actors adopt ICT-based solutions that are already fully developed. The logics and the mechanisms making effective IHO's platform could not work if one focus on the preliminary phase in which these solutions are actually developed and preliminary tested. In this phase, due to intellectual property issues, the perspectives of practitioners and academics change dramatically, and the latter could no more being perceived as an independent player within the innovation ecosystem. Further research is necessary to understand if and how academics can orchestrate interorganisational efforts of innovation in these settings.

Finally, IHO's experience emphasises that interorganisational orchestration is effective only if there are mechanism "forcing" all ecosystems actors—both academics and practitioners—to exit from their comfort zones to explore alternatives and indirect approaches of value generation. More research is needed to understand how managing these approaches, as well as the underlying conflicts. IHO shows that academics can play a key role in this game.

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Appendix

Table A.1 contains the main innovation initiatives instituted and led by the IHO. Table A.2 outlines the main deliverables that the IHO produced as a result of its orchestrator initiatives since its inception.

Year	Id*	Innovation Initiative
2008	CIR ₁	Development of the strategic specifications of an electronic medical record system in a small (200 employees; 80 beds) private hospital
	CIR ₂	Strategic assessment and re-organisation of the ICT insourcer of a big (10 million citizens) region (emphasis on the healthcare practice)
	SQR ₁	Nation-wide collaborative reflection of the results of IHP surveys and the case studies
2009	CIR ₃	Assessment and strategic reconfiguration of the ICT department of a large-sized (3,450 employees, 1,200 beds) general hospital
	CIR ₄	Strategic reconfiguration of the ICT department of a medium-sized (170,000 citizens) local authority
	CIR ₅	Development of the guidelines that a big (10 M citizens) region uses to orient and govern the implementation of the EMRs of all the 33 public healthcare organisation operating within it
	SQR ₂	Nation-wide collaborative reflection of the results of IHP surveys and the case studies
	CIR ₆	Development of the ICT-driven innovation plan for a big (4.5 M citizens) regional healthcare system
2010	CIR ₇	Strategic reconfiguration of the ICT department of a large-sized (1,100 beds) general hospital
	CIR ₈	Development of the guidelines that a big (10 M citizens) region uses to homogenize the information systems of all the 33 public healthcare organisations operating within it
	SQR ₃	Nation-wide collaborative reflection of the results of IHP surveys and the case studies
2011	CIR ₉	Design of the ICT-based system used by a large-sized (1,000 beds) hospital to interact with patients
	CIR ₁₀	Strategic analysis of the benefits associated with the development of a computerized drug management system in a large-sized (3,450 employees, 1,200 beds) general hospital
	CIR ₁₁	EU project to implement and scale up 7 pilots based on the concept of secure and user-friendly online access by citizens to their health data
	CIR ₁₂	Comparison of 3 EE regional healthcare systems to improve the treatments delivered in rural areas

	<u>CIR₁₃</u>	Development (and pilot test) of a model that a big (10 million citizens) region uses to assess the maturity of the information systems of all the 33 public healthcare organisations operating within it
	<u>SQR₄</u>	Nation-wide collaborative reflection of the results of IHP surveys and the case studies
	<u>CIR₁₄</u>	Strategic design of an inter-organisational community connecting administrations of 5 hospitals
	<u>CIR₁₅</u>	Joint reflections on the role of ICT in the support of fragile/elderly patients, and strategic analysis of the business models of a telemedicine service with a medium-sized (700 employees) ICT provider
	<u>CIR₁₆</u>	Strategic reconfiguration of the ICT department of a large-sized (3,800 employees) general hospital
2012	<u>CIR₁₇</u>	Preparation of the technical specifications of a tender through which developing the new information system of a medium-sized (1,800 employees; 600 beds) general hospital
	<u>CIR₁₈</u>	Pilot (in Italy) of a benchmarking survey that will be run by the JRC of the European Commission to analyse the eHealth deployment of all the EU countries and identify good practices to be shared
	<u>CIR₁₉</u>	Assessment and benchmarking of the maturity of the information systems of all the 33 public healthcare organisations operating within a big (10 millions of citizens) region
	<u>SQR₅</u>	Nation-wide collaborative reflection of the results of IHP surveys and the case studies
	<u>CIR₂₀</u>	Development of a model to assess the maturity of healthcare business intelligence systems and tracking of the progress of 5 Italian public hospitals over this model
	<u>CIR₂₁</u>	Development of a plan that a big (10 million citizens) region uses to centralize and govern the ICT-based services that can be shared among the 33 public healthcare organisations operating within it***
	<u>CIR₂₂</u>	Strategic analysis of the benefits associated with the development of a electronic medical report in a large-sized (3,900 employees, 1,100 beds) general hospital
2013	<u>CIR₂₃</u>	Strategic analysis of the benefits associated with the development of a computerized drug management system in a large-sized (3,500 employees, 1,700 beds) private hospital
	<u>CIR₂₄</u>	Development of a plan that a big (5 million citizens) region in South Italy uses to centralize and govern the ICT-based services that can be shared among its public healthcare organisations
	<u>CIR₂₅</u>	Strategic analysis and improvement plan of the organisational models and the ICT-based solutions characterizing the socio-care services delivered by a local health authority to 340,000 citizens
	<u>CIR₂₆</u>	Development of an evolutionary plan of the organisational models and the ICT-based solutions characterizing the socio-care services delivered by a local health authority to 1,000,000 citizens
	<u>SQR₆</u>	Nation-wide collaborative reflection of the results of IHP surveys and the case studies

* We have underlined the CIR or SQR that have an interorganisational nature

Table A.1 – Overview of the innovation initiatives initiated and led by the IHO

Deliverable	2008	2009	2010	2011	2012	2013
Practitioner-oriented events	1 main conference (326 participants)	1 main conference (705 participants)	1 main conference (352 participants)	1 main conference (522 participants)	1 main conference (550 participants)	1 main conference (450 participants)
	7 workshops (60+ participants each)	4 workshops (100+ participants each)	9 workshops (50+ participants each)	4 workshops (100+ participants each)	4 workshops (80+ participants each)	4 workshops (100+ participants each)
Practitioner-oriented reports	1 free paper-based report distributed to all conference participants	1 free paper-based general report	1 free paper-based general report	1 free paper-based general report	1 free paper-based general report	1 free paper-based general report
		4 electronic reports on vertical topics	1 electronic reports with detailed results	1 electronic reports with detailed results	1 electronic reports with detailed results	1 electronic reports with detailed results
General press articles	6 articles (4 in significant newspapers*)	12 articles (5 in significant newspapers*)	78 articles (12 in significant newspapers*)	86 articles (13 in significant newspapers*)	82 articles (25 in significant newspapers*)	136 articles (50+ in significant newspapers*)
CIR projects	2 organisational	2 organisational 1 interorganisational	1 organisational 2 interorganisational	2 organisational 2 interorganisational 1 European	3 organisational 2 interorganisational 1 European	2 organisational 5 interorganisational
					6 conference papers	6 conference papers
Academic-oriented publications	—	1 conference paper	5 conference papers	2 conference papers	2 chapters in international books	1 chapters in international books
			1 chapter in an international book	1 paper in a peer reviewed journal	4 papers in peer reviewed journals	3 papers in peer reviewed journals

* A newspaper is considered significant if it has more than 400,000 copies/day

Table A.2 – Deliverables and findings dissemination of the IHO