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Letter from Industry

The Evolution of Open Innovation

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Abstract. This paper describes the evolution of open innovation and the emergence of a new paradigm Open Innovation 2.0 (OI2) which can help drive development of shared value solutions which can drive changes far beyond the scope of what any one organization could achieve on its own. OI2 is based on principles of integrated collaboration, co-created shared value, cultivated innovation ecosystems, unleashed exponential technologies, and focus on adoption. The paper reflects on the fact that the basis of competition is moving from competing organizations to competing ecosystems and the importance of shared vision which allows the collective intelligence of actors across the value chain to be leveraged. As the sharing economy emerges where information technology allows better distribution, sharing, use and re-use of products and services, OI2 will become more mainstream helping create better and greener cities, safer transportation and more efficient energy systems. Patterns are generally reusable solutions to commonly reoccurring problems and opportunities and the paper briefly introduces twenty patterns observed in this new non-linear paradigm, adoption of which can help with faster and better innovation progress.

Keywords: Open Innovation 2.0, Patterns, Adoption, Shared Value, Quadruple Helix Innovation.

1. Introduction

The discipline of Innovation is constantly evolving and we are now arguably at a strategic inflection point where a new paradigm of innovation is emerging. In the last century often it was a brilliant scientist at a Bell Lab or IBM lab which drove new inventions and subsequent innovations. Then along came Open Innovation which was neatly conceptualized by Henry Chesbrough (2003) and concerns a systematic process where ideas can pass to and from different organizations and travel on different exploitations vectors for value creation. Open Innovation was based on the idea that not all of the smart people in the world can work for your company or organization and that you also have to look outside the organization for ideas. At this point Open Innovation was still seen a linear process which had an emphasis on licensing of technologies. Procter and Gamble are frequently referenced as a role model for practicing open innovation and their 'Connect and Develop' open innovation strategy has resulted in almost fifty percent of their new products emanating from ideas and innovations which started outside of the company.

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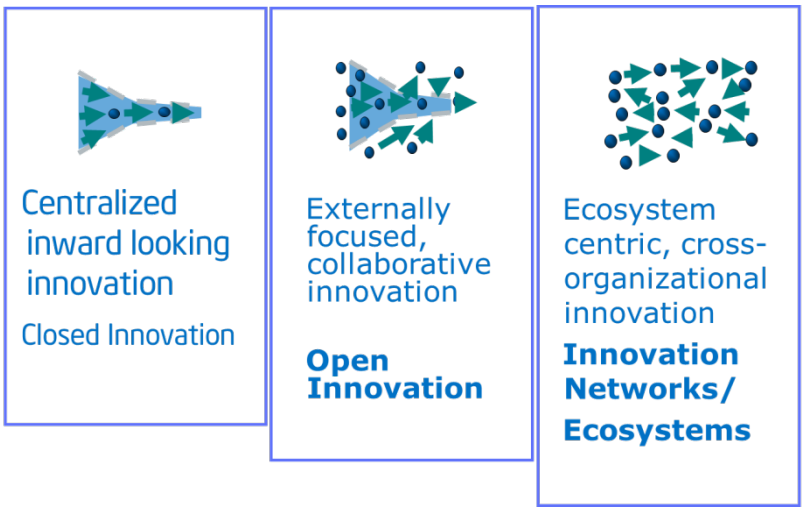

Fig. 1. The evolution of Innovation, Bror Salmelin, EU OISPG

Much of today's progress is driven by collaborative and open innovation. As we move forward new products and services are often new intelligent combinations of existing and emerging technologies and companies cannot afford to do it all on their own. Indeed the unit of competition is changing in that it is often no longer about how good an individual company or organization is but the strength of the ecosystem in which they participate in is often the differentiating factor for great success, mediocrity or even failure. A seminal paper in Harvard Business Review in 2004 called "Strategy as Ecology" (Iansiti and Levien, 2004) introduced the idea of the ecosystem being central to competitive advantage. As the importance of the ecosystem has grown, a new paradigm Open Innovation 2.0 (OI2) is emerging which spans boundaries across organizations, disciplines and stakeholders and is often non-linear and synergistic in nature. In parallel to the organic emergence of OI2, the development of the new paradigm is being stewarded by the EU Open Innovation Strategy and Policy Group (EU OISPG) a cross-functional working group which advises on Open Innovation.

2. Open Innovation 2.0

Open Innovation 2.0 is a new paradigm based on principles of integrated multidisciplinary collaboration, co-created shared value, cultivated innovation ecosystems, unleashed exponential technologies, and focus on innovation adoption. In parallel there is increasing recognition that innovation can be a discipline practiced by many, rather than an art mastered by few. Over the past five years at the EU Open innovation strategy and policy group (OISPG) we have published more than ten studies on the evolution of open innovation and we have observed twenty key patterns of this new phenomenon (See figure 1).

Fig. 1. Open Innovation 2.0 Key Patterns; source M. Curley and B. Salmelin, OISPG

At the core of OI2 is the idea of a compelling shared vision which different stakeholders commit to and collaborate to create a reality and shared value. When a quadruple helix innovation (see below) configuration is deployed the possibility exists to drive real structural change and add value.

Another central tenet of OI2 is idea of the user and indeed citizens participating in the Innovation process. Indeed the innovation process is being turned on its head and the OISPG report on the socio-economic impact of open service innovation (Meijer and Sarsygan, 2012) has conceptualized this as the reverse innovation pyramid. Rather than innovation being something that is done for or to a user, the user co-participates in the innovation process as well as profiting from its outcome. The Lego ideas platform where children help create new designs for Lego products is a good example of this. Experimentation and rapid prototyping are other key characteristics of OI2 where failing and learning fast accelerates the time to market for a new offering.

Another key pattern in OI2 is the use of an Innovation platform which forms the basis for integrated collaboration and co-creation. The Apple App store is arguably a good example of an innovation platform and the reverse innovation pyramid at work where the momentum of many independent application developers helps drive Apple's overall business forward. A key advantage of an innovation platform is that both experimentation and scale-out costs are often close to zero so that the return of investment on successful innovations can be very high.

Cultivating and orchestrating innovation ecosystems are important parts of OI2. It is increasingly clear that innovation ecosystems can be created and transformed by creating a shared vision and reinforcing the vision with active social network management and orchestration. Active orchestration of ecosystems result in efficient and effective platforms for emergence and then delivery of new innovations.

3. Shared Vision, Value and Values

OI2 is not just about the 'how' of Innovation but the 'what'. Innovation capacity is most powerful when it is mobilized in the context of a compelling shared vision. In a successful multi-stakeholder innovation initiative a shared vision which will yield shared value (Porter and Kramer, 2011) is crucial to success. In parallel where participants or ecosystem players share similar values then the probability of success is heightened further.

One candidate over-arching vision for OI2 is 'Sustainable Intelligent Living' (SIL) where innovation efforts are focused on delivering intelligent innovations. Using the ever increasing power of information technology a SIL vision results in new products and services that are people centric and are better than previous offerings, easier to use and very importantly are more resource efficient than previous generations of products. Systematic development and adoption of SIL innovations in different domains can lead to real sustainable living. We have all seen how IT has transformed the music and book industry led by companies such as Apple and Amazon for example. Imagine the possibilities if we could deliver similar transformations in our cities, healthcare, transportation and energy systems. While these transformations are much more complex the OI2 paradigm and methodology are targeted exactly at enabling these kinds of transformations.

The invention, development and of the Universal Serial Bus (USB) technology is a good example of the use of some of the core OI2 patterns. Prior to the creation of USB the connection of different peripherals to computers was difficult, customized and often created driver conflict. While the USB technology was invented by Ajay Bhatt and others at Intel, Intel created a shared vision and initial USB ecosystem with other companies such as Microsoft, Digital, Compaq and IBM to drive a standard way to connect peripherals. In parallel this created a new innovation platform which spurned multiple new products and innovations. USB enabled everything from smartphones, scientific instruments, and webcams to connect seamlessly to computers while also making software and hardware development easier for developers which enabled a whole new wave of innovation. The invention and adoption of USB created shared value and both significant economic and societal benefits with the shipment of more than 10 billion USB equipped devices a very tangible measure of its success.

4. Quadruple Helix Innovation

A core pattern of the OI2 paradigm is the use of the quadruple helix model where government, industry, academia and civil participants work together to co-create the future and drive structural changes far beyond the scope of what any one organization or person could do alone. When all participants commit to a significant change such as transforming a city, or an energy grid, by collaborating together everyone can move faster, share risk and pool resources.

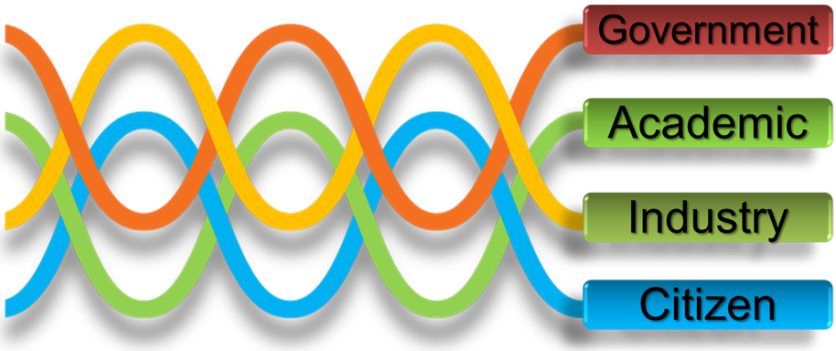

Fig. 2. Quadruple Helix Innovation

Together government, industry, academia and civil participants work together to co-create the future and drive structural changes far beyond the scope of what any one organization or person could do alone. For example in Ireland, Intel Labs Europe are working together with a leading electrical heating company Glen Dimplex, the National Grid, Utilities and home owners to co-innovate a new Electrical energy operating model which will optimally take advantage of renewable energies, new technologies and maximize efficiencies while lowering costs for all involved.

Europe's FP7 and now Horizon 2020 are arguably the world's largest open innovation and research funds and Horizon 2020 is increasingly adopting an OI2 posture. In Horizon 2020 we are increasingly seeing Quadruple Helix Innovation configurations arising where the use of users and citizens as co-innovators and participants in Living Labs is actively promoted and incentivized. For example Intel participates in OrganiCity which is a new Horizon 2020 project with € 7.2m in funding that puts people at the centre of the development of future cities with 3 leading smart cities London, Santander, and Aarhus as living labs. The project uses a number of key OI2 patterns including co-creation and innovation platforms, with a thriving ecosystem around it to support scalable Quadruple Helix innovation. As part of the project, €1.8m, one quarter of the entire budget, is reserved directly for collaborative citizen-driven city experiments.

5. Innovation Culture

Not everything in a company needs to be done in an open innovation fashion. A company's secret sauce may well continue to be developed internally but development of different applications of the use of the product or service may be done in an open innovation mode. It is important to consider the importance of culture within a company, particularly to consider a company's appetite for innovation. Where the culture is supportive of innovation there is more likely to be success with open innovation and also increased likelihood of a breakthrough innovation.

A key aspect to helping a company or indeed a society adopt open innovation 2.0 is culture. Peter Drucker often said that 'Culture eats strategy for breakfast every time' so it is important to make sure the culture is open to innovation. In the adoption of any innovation, explaining the benefit of adopting the innovation is very helpful and this also applies to the adoption of open innovation. When people see the benefits of co-creation they generally are stimulated to adopt it. However it would be a mistake to see open innovation as some kind of panacea and when adopting open innovation

one needs to carefully consider the intellectual property implications of open innovation.

6. Intel Labs Europe as an Exemplar of OI2 in action

Intel Labs Europe (ILE) is both a practitioner of and a thought leader in Open Innovation 2.0. Across Europe Intel has built a network of European labs and development centres with several thousand European R&D employees. But the real power of what we do is achieved by an ecosystem of hundreds of research and innovation partners who are aligned with us around shared visions. By working together we can amplify and accelerate the collected efforts of all concerned. A great example of the fast progress is our collaboration and living labs in the cities of Dublin and London where we partner with the cities, universities, state research organizations, other companies and citizens to envision and quickly prototype solutions which have the potential to transform quality of life and the environment while helping the cities run more efficiently and effectively. An example of this is the deployment of our air quality monitoring systems in the borough of Enfield and linking these to traffic management systems. Or our work in Brixton, where school children have helped design an app to encourage parents and students to walk to school, helping children stay healthier while ameliorating air pollution.

ILE has participated strongly in the EU FP7 program and are continuing to invest and participate in the follow on program Horizon 2020. The open labs in Ireland, Munich and Istanbul serve as portals to the broader network of European R&D labs. Additionally we have created co-labs with companies such as BT and SAP where using a shared agenda we were able to move much quicker together.

Together with ILE, Dublin City itself is an active driver and user of the OI2 methodology. Recently Intel and Dublin City Council announced a collaboration to create an infrastructure which will sense distributed city parameters such as air quality, local weather conditions and enable new innovations from other stakeholders. In London the task of creating a smart London vision was crowd sourced to ordinary Londoners and dozens of suggested visions were suggested by citizens which were synthesized to create a compelling smart vision for London. At the core of the Smart London plan is the idea of putting people and businesses at the heart of the plan so that Londoners can help propel the innovation that will make London an even greater city and change people's lives.

7. The Innovation Value Institute as an OI2 exemplar

In 2006 Intel and the National University of Ireland, Maynooth joined by Boston Consulting Group established the Innovation Value Institute (IVI). The shared vision of the IVI is to drive a structural change in the way organizations get value from Information Technology Innovation. Many organizations struggle to realize the full potential of information technology and IVI was formed to help codify and co-create the best IT management and IT innovation practices. The IVI has created a reference model and a body of knowledge called the IT Capability Maturity Framework (IT-CMF) (Curley and Kenneally, 2012) which has been adopted and used by hundreds of organizations worldwide. About one hundred organizations, big and small are members of IVI and hundreds of their employees have contributed to the research and co- development of the IT-CMF. Organizations use the IT-CMF to assess their overall IT capability or a specific capability such as Innovation Management or IT Governance and then can draw best practice recommendations to improve their

capability and the value they create. IVI uses the OI2 approach with six different types of organizations participating in the research ecosystem with many competitors collaborating together such as Boston Consulting Group, EY and Bearing Point. With over fourteen hundred research wiki contributors, over two hundred thousand man hours contributed by members of the ecosystem, more than 500 formal assessments of organizations completed and thousands of professional learners the OI2 approach has proved to be a very effective one for IVI.

8. OI2 and Innovation Measurement

Andy Grove once said "if you can't measure it, you can't manage it' and historically it has been difficult to measure Innovation performance at both national and firm levels. OI2 attempts to take a more holistic approach to innovation measurement than relatively crude innovation input measures such as percentage of national gross domestic product spent on research, development and innovation. A significant innovation in Europe has been the creation of the Innovation Union Scorecard (IUS) which evolved from the European Innovation Scorecard (EIS) and leveraged the output of the high level panel on Innovation Measurement (Mas-Colell et al, 2010) sponsored by Commissioner for Research Maire Geogeghan Quinn. The creation of this instrument gives an opportunity to measure the relative strength of the different components which make up each national research and innovation ecosystem and then apply interventions to strengthen each ecosystem. The EIS consists of three broad categories of indicator measurements, enablers, firm activities and most importantly outputs. Enablers track the basic building blocks which enable innovation to take place – finance, human resources, and support and research systems while Firm activities track innovation efforts in European firms such as investments, linkages, entrepreneurship level and intellectual assets. Finally outputs measure the collective impact of the innovation efforts for example increased employment, exports and sales.

At Intel Labs Europe we have created a research yield index (RYI) which helps provide a holistic relative measure of innovation performance which not only values research results such as successful proof of concepts or patent filed but also values strategic impact, revenue enabled, improved reputation or an expanded research ecosystem. The RYI index consists of weighted measures of the different measurement dimensions, whose weightings can be changed based on what type of impact is most important at a particular time in the cycle of the business.

9. Conclusion

Innovation itself is changing faster than a speeding bullet and a new Innovation paradigm is emerging arising from the collision of three mega trends, increasing digitization driven by the increasing power of IT, mass collaboration and sustainability. These three mega trends create the conditions and resources which enable a new kind of Innovation mentality and methodology where deep integrated collaboration and exponential technologies result in co-created innovations which are rapidly adopted and results in new products, solutions and services which deliver both financial and societal wealth.

The emergence of OI2 does not mean that other types of innovation such as incremental innovation, disruptive and indeed regular open innovation will cease, in fact it will create more opportunities to accelerate these kinds of efforts. OI2 will just create a different order of Innovation where new processes and environment can help

better create and manage disruptions which can drive significant structural changes across different types of integrated societal systems. If properly orchestrated these disruptive innovations can deliver very significant outcomes for both the innovation creators and adopters, creating both economic and societal wealth.

The kind of outcomes which are delivered can be characterized by Ramaswami's (2014) 3Ws, "Wealth, Welfare and Wellbeing'. Isn't this the kind of Innovation outcomes we should all aspire to? Ones which will deliver sustainable intelligent living. Imagine the possibilities if governments, universities, companies, students and citizens were to collaborate together in a quadruple helix innovation fashion aligned around a common vision. Shared visions could include creating cities with the best quality of life in the world, countries with the best healthcare, transportation systems which work efficiently always and where nobody gets injured or killed on roads. This is all possible we just need to decide to do it.

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