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Ecosystem advantage:
How to boost your success by harnessing the power of partners

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Abstract

Based on the observation of best practice and detailed case studies we observe that companies have started to organise themselves in loosely coupled networks, similar to the mediaeval 'commons', and which we call ecosystems. These are far less structured than joint ventures, but have at the same time a lower level of transaction costs than pure market systems. These ecosystems seem to be better adapted to respond to the demand for complex, integrated solutions, rather than standardised products and services delivered in homogeneous volume.

The imperative for gaining competitive advantage via these ecosystems is for firms to create sustainable ecosystems and for the lead firm how to capture the value created by the ecosystem. Based on a set of case studies we develop six keys to create the ecosystem advantage: the clarity about the creation of value added, the definition and structuring of the partner roles, how to stimulate complementary partner investments, the need to reduce the transaction costs, how to stimulate co-learning in the network and how to engineer effective value capture mechanisms.

Key words: ecosystem, value capturing, networks

The idea that a company's own success partly depends on the performance of its surrounding ecosystem – the network of firms, institutions and individuals with which it interacts – is by no means new. Studies of the woollen textile ecosystem in 14th Century Prato, Italy, estimated to involve some 24,000 people, for example, have shown how specific companies both contributed to and leveraged upon the mutual strength of their network[i]. Recreating a similar network many centuries later propelled the clothing company, Benetton, into the global market.

In other cases, such as the early battle in personal computers (PCs) between the "IBM-compatible" ecosystem of hardware, software and services suppliers and Apple's much more independent, integrated value chain, the ecosystem approach won out. But the lead firm (in this case IBM) struggled to achieve sustainable profitability in the business. Building a thriving ecosystem around you, therefore, seems far from sufficient to guarantee success. Equally critical, experience suggests, is finding the right way to engender, structure and manage your company's relationships within its ecosystem in order to harness its potential to improve your own performance. To build ecosystem advantage requires the creation of a network of relationships, interfaces and processes that can deliver value to the end customer more efficiently by connecting potentially complementary participants to each other, manage technological and market uncertainty among partners with different businesses models and who face different risks, and a way to capture a healthy share of the value created for your own company. The emergence of an ecosystem can be promoted by the actions of a "lead firm" – a company that controls one or more of the key ingredients of the value-generating activities required to deliver a product or service and the vision and capabilities to win the cooperation of other potential players. But building ecosystem advantage demands the lead firm to go far beyond "open innovation" to create a new form of economic organisation that transcends the traditional notions of industries, markets and hierarchies that have dominated corporate thinking for the last hundred years.

Learning to do these things well is becoming a high-stakes imperative. Witness the recent struggle between Sony's Blu-ray versus Toshiba's HDDV technologies in the quest for dominance in the market for next-generation consumer electronics. Today's battle between Nokia, Apple, Microsoft and new entrant Google in the market for smartphones is a clash of alternative ecosystems. At one end of the activity chain, Nokia has put together a network of partnerships to position the Symbian operating system in its defence against Microsoft's

attempt to put its software at the centre of tomorrow's mobile communications. Nokia's moves to add user-focused services such as email, maps and its Comes With Music offering rely on bringing together an extensive network of specialist partners. Apple, meanwhile, has stimulated an army of developers, from Electronic Arts (one of the world's largest producers of electronic games) through to individuals working in the garage, to create over 100,000 applications that sun on its iPhone. Google has built leveraged an ecosystem dubbed Open Handset Alliance involving a group of 47 technology and mobile companies to rapidly establish its Android operating system in the market for mobile devices. Google claims this ecosystem allows it to "accelerate innovation in mobile and offer consumers a richer, less expensive, and better mobile experience."[ii] In just over a year its software partners have created over 20,000 applications on the Android platform.

Likewise, IBM, Oracle and SAP, meanwhile, now talk about the strength of the business ecosystems as a decisive factor in competition for tomorrow's distributed world of so called "cloud computing" where software will increasingly be sold as a service, rather than a product.

In this article we begin by examining why capabilities in building and managing your business ecosystem will become increasingly important to securing competitive advantage in the future. We then go on to propose six key requirements for successfully leveraging potential ecosystem advantage. We conclude with the implications for corporate strategies.

The Growing Importance of Your Business Ecosystem

There are four reasons to believe that ecosystem relationships will become increasingly important in determining future competitive success. First, in the face of rising investment demands and increased costs of complexity, many companies are seeking to focus on fewer core activities. This enables them to target their capital expenditure on deploying the latest technology on their core processes and to concentrate on deepening their core competencies[iii]. The adage "focus and win" has become a popular catch phrase. But shrinking to a focused core of activities is at odds with customers who are increasingly demanding more complete solutions to their needs that bring together multiple products and services in complex, often customised, bundles. One answer to "shrinking core, expanding periphery" problem is to outsource more to partners[iv]. But it is impossible to deliver a complex solution bundle involving multiple technologies, capabilities, and services using the kind of subcontracting relationships familiar in traditional supply chains. Rather than outsourcing a few well-defined activities, delivering complex customer solutions requires the management

of complicated interactions and exchange of knowledge between many, co-dependent partners[v].

A good example is the so-called "smart grid" – an electricity distribution grid that has been upgraded to incorporate information sensors, digital meters and a communications network that can avoid outages, optimise energy allocation, and incorporate fluctuations in the supply from green technologies such as wind, wave and solar power generation. IBM aspires to be one of the lead companies in this arena with its "Smarter Planet Initiative". But to accomplish the necessary combination of technologies, capabilities and infrastructure necessary to deliver the smart grid, IBM recognises that it "needs friends – lots of them" interacting intensively and in ever-changing configurations. So it kicked off the initiative with eight charter members including a group of power utilities along with Johnson Controls, Honeywell Building Solutions, Cisco and Siemens. The goal goes far beyond research collaboration. Instead IBM seeks to launch a new business model that integrates their technologies with a complex set of products and services from the ecosystem partners dubbed "The Green Sigma Solution"[vi].

Increasingly, therefore, shrinking the core and expanding the periphery calls for the capabilities to create and manage efficiently an extensive and complex business ecosystem.

Second, the rising knowledge content of many business activities and increasing number of "knowledge workers" in most industries means that fewer of the interactions between businesses in the activity chain involve simple, standardised physical interfaces. Instead more complex knowledge needs to flow between partners, grey boundaries of responsibility need to be managed, as does the claim to intellectual property generated in the course of business. Consider the example of the French software company Dassault Systemes (DS). They are leading specialists in providing solutions for Product Life Cycle Management. Whereas the basic principles of modelling and design of products and processes may be common to many industries, effective software solutions need to incorporate in-depth knowledge of an industry. To access this knowledge DS collaborates with hundreds of partners, including system integrators, customers and suppliers. Many of these development partners are granted managed access to the internal DS social network. It is this ecosystem of partners that enables DS to be relevant and successful in 11 different industries and to gradually increase its market share in PLM systems. This suggests that as knowledge management becomes increasingly central to competitive success, the capabilities to build

and manage an extensive ecosystem with the right set of relationships between partners will be critical.

Third, technologies subject to increasing returns – such as the "network benefits" to any individual customer of widespread adoption of everything from software to mobile devices – are arguably playing an ever-larger role in many industries[vii]. The strength and reach of a company's ecosystem is an important determinant of its ability to benefit from the potential for increasing returns.

This may be even more important when technologies with considerable network effects are still in development and confronted with a high level of uncertainty. Additional uncertainty can often be better absorbed in an eco-system where the partners can co-develop and co-experiment compared with a traditional hierarchy or subcontracting relationship where deliverables have to be precisely specified in advance. The diversity in the eco-system may also offer access to additional creativity in the creation of solutions.

Fourth, advanced information and communications technologies (ITC) are enabling business ecosystems that marshal diverse, and increasingly global, resources to create value to become cost effective. In the past, potentially valuable networking between diverse and dispersed partners was often thwarted by the prohibitive costs of ITC required to facilitate ongoing interaction and knowledge exchange. The technological advances and falling unit cost of remote communication, while it will not be a complete substitute in the near future for face-to-face interaction, is enabling ever more complex and dispersed ecosystems to become economically viable. Take the example of the animation studio Wild Brain. It uses independent writers based in Florida, London, New York, Chicago and Los Angeles. The animation of the characters is done by specialist companies in Bangalore with edits in San Francisco. A single film involves eight teams in Bangalore matched to eight counterpart writers working in parallel using a virtual private network that allows every participants to share feeds of sound and images from the recording sessions, real-time script and all the animation designs from every location simultaneously[viii]. ITC is dramatically narrowing the efficiency gap between traditional corporate hierarchy and an ecosystem comprised of diverse and dispersed partners.

Prominent among the many impacts of these forces has been the adoption of "open innovation" strategies by many companies. Open innovation is the idea that: "firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology"[ix] But this is only one aspect of building

ecosystem advantage. Creating a business ecosystem involves re-configuring the entire activity chain to harness the capabilities of complementary partners in ways that create more value for the end customer. This typically involves designing a broad-based multi-company network that brings together different product and services to create a more complete solution for customers, stimulating complementary investments by partners in everything from production capacity delivery and distribution infrastructure, market making, tools and training, and after-sales service, as well as R&D and innovation.

Despite the potential benefits of reconfiguring your company's value chain to harness the power of a business ecosystem, we should not lose sight of the very real benefits delivered by the alternative of the traditional organisational hierarchy: a structure that internalises the linkages between different activities and specialist competences inside the firm. These include the advantages of lower transaction costs, the ability to maximise alignment between different specialist activities and players and optimise the interface, and to reduce risk and uncertainty through direct control[x]. The success of Intel's vertically integrated business model or the closed and tightly controlled way in which Apple designs and develops its core hardware platforms (such as the iPod, MacBook or iPad) are important reminders that building an ecosystem is not always the optimal strategy. Other things equal, business ecosystems usually impose a cost penalty over traditional organisational forms. And as we have seen in the case IBM-compatible architecture in PCs, strategies based on ecosystems expose the lead company to the risk that most of the profits will leak away to partners. The critical question, therefore, is: How can a company shape the structure and workings of its business ecosystem to simultaneously *create* and *capture* value, while minimising the detrimental effects of surrendering hierarchy, vertical integration and direct control?

Six Keys to Ecosystem Advantage

Business ecosystems differ markedly in their scope, structures, and the nature of the relationships and processes on which they depend. But by examining many ecosystems and their impacts on the ongoing success of the lead companies at their core, we have discerned a set of common patterns.

Companies that are successful in leveraging the potential of ecosystem advantage begin with a change in mindset. "Not invented here" prejudices need to be jettisoned. They start from the premise that knowledge is abundant and widely distributed both internally with their organisation and in the external world so the task is to harness this potential. They

understand that intellectual property (IP) gains value when it is connected to the complementary IP and knowledge of many others so as to unleash the power of network economies, not by locking it away in an impenetrable safe. And that the ultimate key performance measure (KPI) is the value you create for the customer – whether directly jointly through others, not the volume of activity, the number of people or the accumulation of internal assets you control.

Once a company's senior management has adopted this perspective, the task is to turn these insights into a profitable business model. We have distilled six keys required to unlock this new type of ecosystem advantage.

1. Creating Added Value

Much of the discussion around business ecosystems focuses on how value is shared between the various parties involved. Certainly it is an important principle that participation has to be attractive to those involved, if a thriving ecosystem is to be sustained. But it is equally critical to remember that all the costs and profits within the ecosystem have to be covered by the ultimate customers for the network's products and services. Customers' willingness to pay depends on recognition of incremental value from the ecosystem over and above that offered by an alternative, vertically integrated supplier.

This incremental value can be created in many different ways. Take the case of ARM Holdings Plc, a major supplier of intellectual property to the semi-conductor industry. ARM is a pivotal player in the ecosystem of Reduced Instruction Set Computing (RISC) chips, Its designs, for example, power 98% of the world's mobile telephone handsets. By being part of ARM's ecosystem, handset makers such as Nokia or Samsung can share the costs of developing a flexible platform on which to build their devices across virtually the entire industry, enabling them to concentrate their resources on developing their own proprietary technologies on top of ARM's base to make their products such as a mobile phone to be more attractive to their customers. Being part of the ecosystem also allows handset makers to choose from a wide range of semiconductor manufacturers who use the same standard designs, rather than being locked into proprietary technology. And it improves their chances of finding supply when an upswing in the semiconductor cycle led to shortage. As a result, end customers benefit from improved reliability, lower costs and faster access to technological advances. ARM summarises its strategy as follows: "create a partnership with our customers and broader community of third parties, to enable the creation of end products

more efficiently through ARM than from any other source". Google's Open Handset Alliance, meanwhile, brings together 47 technology and mobile telephony companies working with the "Android" operating system to: "Offer consumers a richer, less expensive, and better mobile experience by accelerating innovation".

The first step toward nurturing a successful business ecosystem, therefore, is to pinpoint exactly why it will create extra value for the end customer who ultimately pays the bill.

2. Structuring Differentiated Partner Roles

An ecosystem has the potential to create additional value for end customers because it brings together a set of differentiated partners with complementary capabilities and different economies. Realising the potential of an ecosystem, therefore, requires the lead firm to create a structure and the incentives necessary to align partners with different roles and to manage the overlaps and possible conflicts between them. Apart from being the lead firm in the ecosystem any partner can play at least one of six roles within it. These include traditional supply chains roles of providing components of a solution, operational capacity, sales channels, or complementary products and services. But partners in an ecosystem can also act as an important source of technology and competence or market and customer knowledge for the lead firm. Whenever ARM grants a license to use its technology, for example, it develops a reciprocal relationship with the licensee. The aim of this relationship is to gain insights into the licensee's process technology roadmaps and access to emerging applications, becoming a two-way partnership. Under this arrangement, ARM's partners thus not only boost ARM's sales, they also provide market knowledge and insights that would help ARM to design chips better suited to future market and application needs and to developments in chip fabrication and design technologies.

Partners can also act as "market makers" for the ecosystem. Their operations or reputations may help gain acceptance of a product or technology in the market and this stimulate additional demand. In pursuing sales of their own products and services they may "pull through" demand for the complimentary offerings of the ecosystem. Likewise by training users of their own products they may generate demand for compatible products offered by the ecosystem among those who see an advantage in leveraging their investment in new skills.

Ideally the lead firm should aim to promote an ecosystem that combines a set of specialist niches, each of which makes a different contribution to value creation and that create a positive spiral by generating new knowledge or additional demand as they interact. One or more partners may profitably inhabit each niche – which itself may be large in terms of volume and revenues. In the case of ARM's ecosystem, for example, wafer fabrication forms such a specialist activity, as does the creation of electronic design automation tools. Both are inhabited by tens of partners. Competition within each niche may generate benefits for the ecosystem by encouraging rivals to improve efficiency or drive innovation in that activity. Overlaps between the way in which each niche contributes to the overall value the ecosystem delivers to the end customer, by contrast, are likely to be detrimental to the ecosystem's performance. This is because if the niches, and hence the tasks, overlap the interfaces between the elements will become blurred. Duplication, uncertainty and confusion will result. The lead firm's aim, therefore, is to assist the emergence of a structure where each bundle of value-creating activities is clearly delineated from the next, so as to form a neat jigsaw of niches. Each of these niches would be "plug-compatible" with the others so that customers could choose to reconfigure the particular set of delivery partners in accordance with their specific needs without disrupting the ability of the ecosystem to seamlessly deliver its end product.

As we will see below, lead firms need to be able to manage the process of co-learning in ways that maintain the delineation and compatibility between the different niches as the ecosystem evolves.

The set of niches comprising the ecosystem also needs to be complete – in the sense that all of the necessary tasks required to deliver the value proposition to the end customer need to be covered. This may seem obvious, but important gaps can sometimes be overlooked. In businesses characterised by "network effects" – where the user benefits only when a critical mass of others adopt the same technology, for example – market making will be an essential ingredient for value creation even though it is not technically required to deliver the product or service. To ensure these gaps are filled both at the outset and the contribution of different niches is maintained, the lead firm therefore needs to find ways of stimulating the partners to make complementary investments to underpin the ecosystem. By stimulating co-investment by partners a lead firm can also create a multiplier effect, enabling exponential growth in the ecosystem for each incremental investment of its own resources.

3. Stimulating Complementary Partner Investments

A prerequisite for co-investment by partners, of course, is the prospect of building a profitable business. The lead firm therefore needs to consider how it can create value propositions for potential partners as well as end customers[xi]. Google Maps is a successful example. Their proposition to partners is that: "Google Maps and associated infrastructure acts as an innovation hub where potential partners can create new applications that incorporate elements of Google functionality. Partners can easily test and launch applications and have them hosted in Google World that has 150 million customers globally."

If the partner value proposition is weak, or the niches created turn out to be chronically unprofitable, the ecosystem will be unable to solicit the necessary partner investment to underpin stable growth. Likewise if the lead firm routinely encroaches on profitable partner niches by seeking to bring them in-house, partners' willingness to invest will be undermined. In some cases, the evolution of technology may demand that the lead firm incorporate a niche into its in-house activities so as to improve the value delivered to end users. Such was the case, for example, when Intel incorporated wireless capabilities that were formerly provided by partner firms that supplied the PCIMA cards into its Centrino chip to improve the performance and convenience of wireless applications. In a healthy ecosystem, however, this should be a rare event. Even then, it is preferable if the lead firm is able to open up new niches that existing partners might migrate into in order to maintain the willingness of current and future potential partners to invest in the ecosystem.

More broadly, high levels of uncertainty will dissuade partners from investing. Coping with uncertainty in an eco-system is hard because of the diversity in the partners' objectives and culture. This diversity increases the risk that individual partner investment decisions follow divergent, or even conflicting, paths. It also means it is difficult for individual partners to understand the causality of what is happening in the eco-system. This increases the risk of a breakdown of "sense-making", so that even well intentioned investments in the ecosystem may prove useless, or even destructive. To promote the ongoing success of an ecosystem, therefore, the lead firm must act to reduce this uncertainty dramatically by providing a clear roadmap of the future technology platform on which the ecosystem is built.

In a fast-moving industry with rapidly changing technology or customer needs and behaviour we argued that it is also critical that the "roadmap" for the future development of

the ecosystem is made transparent to participants (some of whom, as in "open source" activities, may not even be known to the nodal firm). Such a roadmap has an important role in reducing uncertainty and promoting convergence of efforts towards the effective development of a coherent set of ecosystem offerings. Without it, the ecosystem risks becoming divergent. This would undermine the ability and willingness of participants to make long-term investments necessary for the future prosperity of the ecosystem. At the same time, the roadmap's prescriptions need to be sufficiently broad to allow for the ecosystem to adapt to changing circumstances – a requirement that leads to our final key to ecosystem advantage: building in flexibility.

A shared roadmap for innovation, even if it is not very detailed, will enable the partners in the network to make sense out of unforeseen events and enable them to keep on making investments that strengthen the ecosystem. The case of the Nano, the low cost car developed by the Indian industrial giant Tata is a good example of the role such a roadmap needs to play. Ratan Tata, the chairman of Tata Motors, initiated the development of the Nano as the world's cheapest car in 2003. Contrary to speculation that it may have become a four-wheeled rickshaw, it was developed against all odds and industry wisdom as a well-designed car that could be manufactured efficiently using modern technologies. In order to achieve this Tata constantly sought new design approaches from its international supplier network. The car was designed in Italy, and many components were made by major automotive suppliers such as Bosch, ContinentalAG, Delphi, GKN, St. Gobain and many others. Many of them had to push the technological limits in order to design a low cost component. The mere fact that the Nano's development was a success was to a large extent due to the clarity of Ratan Tata's vision and ambition, which acted as a roadmap to guide the network of suppliers as they pushed the boundaries of accepted designs and technologies.

Depending on the industry and technology, however, the roadmap communicated by the lead firm may need to be more specific. In May 2008, for example, enterprise application software provider, SAP, unveiled a roadmap for enabling its customer relationship management (CRM) software to interface with mobile devices and so called "Web 2.0" applications. This roadmap provided ecosystem partners such as Research In Motion (RIM), the Canadian wireless communications provider behind the development of BlackBerry mobile devices, and smaller software companies developing software to work with Apple's iPhone both the information protocols and the certainty they needed to make investments in

providing mobile services to sales people whose companies use SAP's CRM software as part of their core IT infrastructure.

ARM, meanwhile, hosted an annual ARM Partner Meeting annually over three days in Cambridge. Although the criteria for inviting partners had varied over the years, invitees included the OEMs and providers of complementary products and software as well as ARM's direct customers. At this event, ARM's current roadmap was presented and discussed with a wide range of partners.

Once the lead firm has established appropriate conditions to stimulate investments by ecosystem partners that are aligned in ways that promote the overall success of the ecosystem in creating value as well as benefitting the individual partner, it must also concern itself with enabling the interactions between partners to operate as efficiently as possible by finding ways to reduce ongoing transactions costs.

4. Reducing Transactions Costs

One of the inherent disadvantages faced by an ecosystem relative to a single, vertically integrated organisation is the high transactions costs that result from having a multitude of relationships, some of them loose and incompletely defined and regulated. If these are not controlled they can rapidly come to outweigh the extra customer value the ecosystem generates.

A lead firm within the ecosystem can, however, act to reduce these transactions costs by developing and sharing a set of tools, protocols, processes and sometimes legal contracts, that systematise and codify interaction between participants within the ecosystem.

The appropriate mechanisms for reducing the transactions costs in any particular instance will depend importantly on the nature of the interdependence between the parties in relationship and the risks to which each is exposed. Designing the right kinds of interfaces between partners in the ecosystem enables an understanding of the amount and nature of knowledge that must be exchanged and how this process of knowledge exchange can be made more efficient. Some interactions within the ecosystem will be asymmetric -- such that one party depends on the performance of their partner, but that partner's success does not depend on interaction with the recipient. In this case, contracts with performance measures and incentives are likely to provide the most efficient way of organising the interaction, provided the partner's responsibilities can be precisely defined and performance is observable. But in an eco-system it is only rarely possible to detail all the necessary tasks and

responsibilities. Worse still, the performance of a partner is often difficult to observe and measure directly. Take the case of “market making” where success or failure may reflect the inherent attractiveness of the offering rather than the quality of the market making efforts of the partner. In this case the respective reputations of the partners will be important in fostering the trust required to reduce transaction costs and make the relationship sustainably productive. This kind of interaction will, therefore need to be designed so that both parties put their reputations on the line (for example, by lending their brands to the joint initiative) rather than by trying to devise a performance contract.

In other cases dependence in the relationship is symmetric (so that success for both parties depends on the quality of interaction as well as the input by each). Here an effective working relationship can only be developed by experimentation (or “learning by doing”) through working together. The interaction between the partners, therefore, needs to be designed so as to give adequate opportunities to learn from each other and experiment with join activities before launching high-risk initiatives in the open market.

Given the dynamic nature of the eco-system many of the agreements governing partner interaction will need to be flexible, avoiding imposing a straightjacket of excessive detail. The lead firm can also play a role in develop standardised interfaces to govern the interaction between different partners where possible. Just as in as in standardised commodity or financial markets, these standard interfaces and protocols reduce the transactions costs, eliminate uncertainty and increase flexibility by avoiding the need for developing complex new agreements each time the ecosystem is reconfigured or specific partners alter their activities or roles. Where non-standard agreements are required to handle the complexity of a particular situation, they should focus on collaborative activities and be designed to encourage shared problem solving.

Implementing these flexible agreements that focus more on the process of collaboration than on the actual tasks to be carried out, requires a balance between the investments, risks and rewards accruing to each partner to be maintained. In an eco-system partners will almost certainly have to swallow undesirable changes, or have to perform unwanted extra activities for the benefit of the ecosystem as a whole. Partners will often need to make irreversible investments or other kind of commitments based on the expectation that they will draw benefits from the ecosystem in the future. The participants in an ecosystem therefore face “moral hazard” – such as the risk that some of their partners will try to free-ride on others or try to renegotiate the relationship after their partners have already

committed capital, effort or technology to the ecosystem[xii]. The lead firm must control the risks of moral hazard, by promoting transparency in interactions and by imposing sanctions or even exclusion for those who refuse to "play fair".

More generally, the risks associated with committing to ecosystem will only be accepted when the modus operandi involves real listening to each others' objections and opinions, that changes are transparent and clearly explained and that there is no suspicion of hidden agendas. This fair process must be embedded in an ongoing building of the relationships. Mutual adjustment, the willingness to go the extra mile and to change one's own way of operating in order to facilitate cooperation with the partners, a common interpretation of events as they unfold, enhances the trust in the eco-system and can create a self reinforcing cycle that helps partners through inevitable crises and hiccups in the network[xiii].

5. Flexible Structures That Can Evolve Through Learning and Co-learning

Few ecosystems can expect to be static in terms of their structure, partner roles and relationships. Indeed, one of the attractions of a network of partners compared with a vertical integrated organisation is its potential for dynamic re-configuration – sometimes even on the basis of "self-organisation" – and accelerated learning by bringing together a diversity of partners with different capabilities and experiences[xiv]. It is important, therefore, that the realisation of this potential is encouraged rather than being thwarted by the imposition of an inflexible structure.

Compare, for example, this objective with the intent and operation of a traditional joint venture. Joint ventures are usually optimal when the magnitude of contingencies facing a potential relationship are such that writing detailed performance contracts or service agreements between the parties would be impractically complex. A joint-venture structure side-steps this problem by binding the parties into a tight, long-term relationship in exchange for a share of unknown future profits, but which is mostly non-specific as to be precise contributions and performance requirements on each party. In other words, at its core, a joint venture agreement might be characterised saying that "the various parties share a common goal, will make best endeavours to contribute to the achievement of that goal, and will share the resulting (uncertain) profits." The only way that the risk of free riding and moral hazard can be controlled is to force all parties to make a substantial investment in the joint venture

and to be jointly responsible for its liabilities. Avoidance of complex contracts on contribution, performance and rewards by the parties, therefore, comes at the cost of a highly inflexible structure. Such a structure often limits the joint venture to evolve beyond its original mandate.

In a business ecosystem, these tradeoffs about where to place the constraints and responsibilities on the various parties look very different. The objective is to engender a structure that can be constantly re-configured (possibly even without direct intervention by the lead firm) in response to developments in its market and technological environment. Ecosystems are designed to create a momentum for co-learning. As a result, the trade-off between flexibility around performance versus structure is likely to fall at the opposite end of the spectrum from a joint venture. Take the example of the Boeing 787 that required partners to cope with the high levels of uncertainty associated with a radically new aircraft design and to experiment and learn jointly. Yet it was run by a mix of hierarchy and traditional, market-bases subcontracting – which proved inadequate to the task. Boeing needed to build a more sophisticated business ecosystem.

The optimum is generally a highly malleable structure combined with somewhat tighter specifications on contribution and performance (including sanctions for failure). Thus a company wishing to nurture a successful ecosystem around its business will impose minimal specification of how the ecosystem is structured (apart from, perhaps, differentiated niche roles between players backed by a degree of boundary protection).

On the other hand, ecosystems should be dynamic in their composition and renew themselves constantly. The lead firm should actively manage requirements for key partners to join the ecosystem by means, for example, of certification in exchange for minimum investments of cash, technology, or in training of staff. The “club” is probably an appropriate analogy -- with its requirements to gain membership, the need to contribute an annual fee to maintain membership, and peer pressure and the sanction of expulsion for inappropriate or poor quality behaviour.

Within a club, of course, there can be differentiated levels of membership and roles with some members accepting more responsibilities and making larger investments in exchange for certain privileges, while other “associate members” having a much more limited relationship.

An interesting example of such a quasi club is the informal organisation of the entrepreneurial cluster in Cambridge, UK. A detailed analysis of the high tech start-ups in

Cambridge indicates that they are not the initiative of a number of individual entrepreneurs. On the contrary they are often started and led by small teams of entrepreneurs that are a constant reconfiguration and recombination of the 40 odd serial entrepreneurs that were at the origin of the cluster. Many of these entrepreneurs meet each other regularly in formal organisations e.g. the Cambridge network or a group of Cambridge Angel investors, but also in many informal encounters created by the entrepreneurial community or the University of Cambridge. In these networks they are key players, and scientists, MBA graduates, outside venture capitalists and managers float in and out. The constant formal and informal interactions allow for a continual reconfiguration of small teams that are prepared to develop business plans around new technologies and share the risks of the new ventures.

Similarly, ARM's ecosystem involves different "levels" of membership what is today analogous to a club of over 400 regular members and thousands of loose affiliates. ARM identified a small set of "strategic partners" -- judged to have the ability to influence the technological direction of the industry, either because of their market power or technological prowess. The top twenty strategic partners were assigned to one of ARM's directors (the CEO and his direct reports) to manage the overall relationship.

The second level is managed by ARM's "segment marketing" organisation and was created for each end-use applications area: Wireless, Storage, Imaging, Automotive, Consumer Entertainment, Networking, Security and Industrial. Each segment marketing team would identify their own "top twenty" partners who were key influencers in the likely future evolution of technologies and products in their applications segment. In the case of Samsung, for example, the segment marketing person would be responsible for building relationships with the wide variety of individuals in different parts of Samsung to develop a picture of their evolving needs for (say) future mobile phones.

Partnerships with early stage and start-up companies, meanwhile, are handled through a "light touch" relationship focused on provided them with the tools and the other support necessary to integrate ARM technology into their products. It also offered a flexible licensing model based on providing per-use licenses, in recognition of the fact that building a product prototype was the primary focus on such partners. This reduced the hurdle to using ARM technology, while allowing fledgling companies to focus resources and improve their credibility by using proven technologies, supporting design tools and software from ARM. Encouraging start-ups to attach themselves to the ARM ecosystem in this way had the potential to pay handsome dividends if and when these fledgling companies succeeded.

Finally, ARM's ecosystem also involves a broader community numbering tens of thousands of developers and other participants. These partnerships were facilitated by the on-line "ARM Connected Community" website. Managed by a dedicated ARM executive, this on-line community provided free access to extensive resources for developers, a forum for developers and engineers to exchange ideas and support from within the ARM ecosystem, and company and product listings classified by product category, market application and ARM technology—all linked to partner sites.

The key aspect of this kind of structure is its ability to facilitate co-learning as the partners interact. Again, the lead firm usually needs to play an important role in promoting learning within the ecosystem. It is clear that most of the relationships described above in ARM's ecosystem are designed with an eye toward facilitating knowledge creation, not only for ARM itself, but also for its partners – including new entrants to the ecosystem. Once key decision makers for product and technology roadmaps were identified, detailed discussions were initiated with them on how ARM align their development efforts. The partner-management team also tries to identify if they work with any other ARM ecosystem partners. If any such relationship exists, further work is co-ordinated with semiconductor vendors and other influential players within the ecosystem, as well as other teams within ARM so as to maximise co-learning system-wide. New knowledge is, of course, also created during these interactions partners, the ownership of which has to be agreed upon and monitored, not least because ownership of IP is critical to who is able to extract value from an ecosystem.

6. Engineering Effective Value Capture Mechanisms

Amid the hype around "open source" and the exponential growth of web-based communities one might be forgiven for the impression that being at the centre of a vibrant ecosystem must be inherently good for a company's performance. Of course that it not necessarily the case. Witness the experience of Sun Microsystems, recently acquired by Oracle. Sun played an instrumental role in spawning and then developing a hugely successful ecosystem around its Java language. But it has continually struggled to parlay that successful ecosystem into higher profits for its own shareholders. It is clear from Sun's experience and also that of IBM in PCs, that controlling the overall "architecture" of the ecosystem is insufficient to guarantee that significant value will be captured in the form of profits for the lead firm. In order to reliably capture value, the nodal firm needs to contribute a component

or activity on which the overall value of the ecosystem to the customer depends and which is difficult to replace with a substitute offering. This component or activity should not be available on the open market, and should be difficult and costly to imitate. The lead firm also needs to engineer a mechanism to monetise that unique contribution, such as licence fees, royalties, expanded margins, or profits on higher sales volumes. The level of value captured (and profitability) will be enhanced if this contribution also enjoys increasing returns.

Take the case of Procter and Gamble (P&G), an acknowledged leader in "open innovation". P&G has over 50 "technology entrepreneurs" drawn from all of its business units that are searching the world for new ideas and solutions at conventions, and through supplier-group networks and the Internet. P&G also uses the Internet to broadcast problems for which it is seeking solutions, inviting "open source" contributions from companies or individuals anywhere in the world. It estimates that today 35% of its new ideas, products and technologies come from totally outside P&G and its target is to get to 50%. While it successfully built an open innovation ecosystem, however, P&G keeps tight control of the levers by which it captures value from this co-innovation. It maintains a tight grip on its brands, distribution and global scale in manufacturing – the tollgates at which it extracts value from the its new, networked business model.

ARM's chip IP is another example. As we have already seen, it is an important contributor to the value provided to the end customer. Switching to an alternative would involve high fixed costs of reinvestment in training and related tools and processes by participants in the ecosystem, rendering substitution an expensive proposition. ARM's chip design is proprietary and to imitate it would require not only access to a large stock of accumulated knowledge, but also access to complex knowledge about the technological roadmaps of handset makers and semiconductor manufacturers that is only available on the basis of close and trusting relationships that are slow and costly to build. Moreover, the more users of its IP ARM accumulates, the lower its unit costs and the higher the value to users through network effects – both of which generate increasing returns for ARM. These contributions by ARM are monetised through one-off license fees paid by ecosystem participants, as well as customers, for the right to utilise the firm's proprietary IP. In addition, ARM also profits from overall growth of the ecosystem's output by charging a royalty on every unit of product that embodies its IP.

Total transparency is obviously not always optimal for a company that wishes to maximise the leverage it gains from its business ecosystem. Particularly in knowledge-intensive businesses, asymmetric information can be an important source of power and competitive advantage and possibly the key to value capture. At the same time, as we have already seen, failure to share information necessary for ecosystem to create value or reduce its transactions costs will clearly impair the overall profit pool. In achieving the right balance between these forces a useful principle is to "share information on the interfaces, but to keep the inner workings of your contribution to the ecosystem proprietary and non-transparent".

Conclusion: Gaining Ecosystem Advantage

Ecosystems are a natural way of organising economic activity, already evident in 14th Century Prato, the management of "common land" in Mediaeval Britain and probably long before, because they preserve individual incentives, a degree of autonomy, and maintain flexibility, while enabling complementary capabilities of different partners to be jointly leveraged. But from the late 19th Century, the quest to reap economies of scale became the driving force of business and organisational structures followed[xv]. Standardisation of processes and of procurement of materials favoured hierarchical firms over networks of individualistic firms, especially in an era where the primary demand was for rapidly increasing volume of standardised goods and services. The benefits of increased specialisation, meanwhile, could be maximised by creating a few large, well-located units. And in a world where technology for communications and knowledge exchange was primitive, corporate hierarchies offered the most efficient way of reducing transactions costs and synchronising of supply and demand between these specialist units.

Given the available technology, the viable alternative was a market: comprising large numbers of participants independently (and often myopically) responding to price and volume signals and lacking mechanisms for coordination and co-evolution of their specialist capabilities.

In the twenty-first century, however, both the demands of consumers and the technologies available to satisfy them have changed dramatically. Customers increasingly demand complex, integrated solutions, rather than standardised products in services delivered in homogeneous volume. At the same time, the necessary knowledge and capabilities to satisfy it no longer reside just in a few, large-scale specialist units. Instead, in more and more

industries the relevant knowledge and capabilities are abundant and widely dispersed so it is difficult to bring them all under the umbrella of a single, vertically integrated firm.

The dramatic fall in the costs of information technology and communications (ITC) now means that widely dispersed capabilities and knowledge can be effectively and economically co-ordinated. In some cases this co-ordination can be achieved by open market mechanisms. But many of today's products and services depend on the exchange and sharing of complex, messy knowledge – a task that the market, which works most effectively for the exchange of simple, standardised and certain commodities, is ill equipped to facilitate, leading to market failure.

Today the imperative is to achieve economies of scope, by harnessing the potential of partners with different knowledge and capabilities by allowing these assets to be focused on a common goal and dynamically coordinated to drive innovation and improvement. The creation of an ecosystem offers the potential to reap these economies of scope and therefore to fill the widening gap between businesses where vertical integration and open market are the optimal organisation.

Companies such as Apple, ARM and Google are showing the power of ecosystem advantage in today's environment. Building this advantage starts with a recognition that the technological and market landscape has changed, that knowledge is abundant and widely distributed both internally with their organisation and in the external world must be harnessed, that IP gains most value when it is connected to the complementary IP and knowledge of many others so as to unleash the power of network economies, and that the ultimate test of success is the value you create for the customer not simply your scale.

Building an ecosystem to thrive in this environment is not simply a matter of opening the floodgates to open innovation. It requires careful design and continual adaptation by a lead firm in order to build a complete and sustainable business model around an ecosystem that can leverage its own internal capabilities and magnify its revenue and profits. In capturing this new ecosystem advantage, maintaining a continual focus on value creation for the end customer, structuring differentiated partner roles, finding ways to stimulate complementary partner investments, acting to reduce transactions costs, establishing flexible structures that can promote and respond to co-learning, while engineering and protecting your own value capture mechanisms, are the keys to success.

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