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IMPROVEMENT OF OPEN INNOVATION PROCESSES:

CASE NOKIA

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ABSTRACT

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Open innovation is becoming increasingly popular in academic literature and in business life, but even if people heard about it, they might not understand what it really is, they may over-estimate it thinking that it is savior or underestimate it, concentrating on limitations and risks. Current work sheds light on most important concepts of open innovation theory. Goal of current research is to offer business processes improvement for both inbound and outbound modes in case company. It is relevant as open innovation proved to affect firms' performance in general case and in case company, and Nokia planned to develop open innovation implementation since 2008 but still competitors succeed in it more, therefore analysis of current situation with open innovation in Nokia and recommendations how to improve it are topical.

Case study method was used to answer the question “How open innovation processes can be improved?”. 11 in-depth interviews with Nokia senior managers and independent consultants were used to reach the goal of the thesis, as well as secondary sources.

Results of current work are as-is and to-be models (process models of today and best practices models) of several open innovation modes, and recommendation for case company, which will be presented to company representatives and checked for practical applicability.

АННОТАЦИЯ

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Ключевые слова: открытые инновации, входящие и исходящие открытые инновации, улучшение процессов, модели, Нокиа

Открытые инновации становятся все более популярными в научной литературе и в бизнесе, но даже если люди слышали об этом, они не всегда понимают, что это представляет собой на самом деле, они могут переоценивать, считая, что это спасение от всех бед, или недооценивать, концентрируясь на рисках и ограничениях. Наиболее важные понятия теории открытых инноваций затронуты в данной работе. Целью работы являются рекомендации по улучшению бизнес-процессов в сфере открытых инноваций для компании Нокиа. Тема актуальна, т.к. открытые инновации влияют на результаты компаний в общем случае, а также на результаты

компании Нокиа. Нокиа планировала развиваться в сфере открытых инноваций с 2008 года, но до сих пор не очень преуспела в этом, и поэтому анализ ситуации и рекомендации актуальны. Для исследования был использован кейс метод, чтоб ответить на вопрос «Как улучшить бизнес-процессы в сфере открытых инноваций в компании Нокиа?». 11 интервью с менеджерами компании, независимыми консультантами и обзор литературы были использованы, чтоб достичь цели исследования. Результатами являются as-is и to-be модели нескольких видов открытых инноваций, и рекомендации для компании, которые будут представлены менеджерам компании и рассмотрены с точки зрения потенциала применения на практике.

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I would like to thank Antero Kutvonen who was my teacher on open innovation in LUT and who enormously helped me to develop my knowledge of open innovation, build my thesis and gave me valuable contact for interview for my thesis, and most importantly - enthusiasm.

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Table of contents

List of symbols and abbreviations

IP – intellectual property

OI – open innovation

OS – operating system

R&D – research and development

ICT – information and communication technology

List of tables and figures

1. Introduction

1.1 Background of the study

Nowadays it is not enough to have strong R&D department – it is very difficult to maintain innovativeness utilizing only internal resources, companies started to form alliances to share R&D cost and to create synergy and attract users and suppliers in their innovation processes.

Open innovation paradigm is a new way of creating and getting value from company's intellectual property. It is opposed to closed innovation model where only internal IP is used in innovation process, while unused IP is stored and requires maintenance costs for patenting body, and on average firms use only around 10% of their own IP (Chesbrough, 2003). Also when company uses both internal and external sources and deliberately and systematically does that, it results in fewer reinventions of a wheel inside a company, which brings to higher R&D efficiency.

Big companies may ignore or respond too late to technological innovation with strategic importance, on grounds of lack of current strategic fit of that innovation (Christensen, 1997). Companies need to learn to be more flexible and closer to customers, by exploration (searching for new opportunities) and exploitation (refining existing procedures and capturing value from what is already known).

The report studies the utilization of open innovation paradigm and provides open innovation processes improvement in Nokia Corporation.

1.2 Research gap and research question

Despite many contributions to the field of open innovation, literature is not very abundant, especially on topic of outbound open innovation.

Research in this field is not lucrative, often having couple of articles on some particular topic, thus research has been more extensive rather than intensive, that also may give a ground to treat the whole field of open innovation is undercovered and hence it needs further research. Google Trends provide evidence that ‘open innovation’ was not searched before 2007 at all, Scopus database gives only max 40 hits for ‘out-licensing’.

Open innovation-aimed studies for Nokia are rather scarce – **few** case studies during last decade (4 according to EBSCO) and ending in 2010, so there is no current situation analysis. From theoretical perspective this study advances the understanding of open innovation paradigm (Chesbrough, 2001) and deepens our understanding of it.

Practical contribution of the study relies on **lack** of research devoted to business processes improvement in case of open innovation.

Research object is open innovation implementation, research subject - open innovation processes. Research **goal** - to offer OI processes improvement

Therefore **research question** is “How to improve open innovation processes?”which is divided into:

- What are best practices (=to-be models) of OI implementation?
- What are actual processes (=as-is models) of OI implementation in case company?
- What are hence recommendations how to improve?

1.3 Relevance of research

Firstly, there is theoretical evidence that OI affects overall firm performance (Lichtenthaler, 2008, Reed et al., 2012, Duysters, 2004,

Rivette et al., 2000, Pontikoski et al., 2010)

Secondly, among reasons of Nokia losing positions, lack of open innovation implementation plays important role (Santalainen, 2012, Kutvonen, 2012, Niiranen, 2012), while its competitors succeed more, also due to open innovation competences (Winter, 2012, Barwise, 2011, Nuttal, 2011).

Improving open innovation application includes improving competences, capabilities and processes of open innovation implementation, and in current work all those issues are touched both in theoretical and empirical parts, but most accent in empirical part is put on improving OI processes, as it is more dynamic issue than just improving competences and capabilities.

1.4 Structure of the study

Conceptual framework of the study is formed in Chapter 2. The framework comprises of open innovation paradigm, both inbound and outbound modes and related concepts. Chapter 3 presents the research design of the study. Chapter 4 provides the description of the case firm open innovation management and its competitors, as well as models which will analysed in 5 chapter. Chapter 5 presents the results of the study. Chapter 6 concludes the findings with theoretical and managerial implications.

1.5 Research design and methodology

Qualitative research method was chosen for this study in order to tap into

open innovation practices of case company. Major type of collecting most relevant information for empirical part is **in-depth interview**, allowing to give insight into company's practices and view from outside on company's practices, as well as into best practices, but secondary sources are also used.

2. Theoretical background of the study. Open innovation paradigm

2.1 Open innovation paradigm vs Closed Innovation paradigm

Global technological and economic development changes the way companies operate. Nowadays it is increasingly difficult to be innovative using only internal resources. Products and services become more complex, consumers want and can be valuable part of innovation process (von Hippel, 1996), and companies increasingly understand the value of collaboration. General idea how innovation should be done looked like this - ”Picking a man of genius, giving him money, and leaving him alone” , that are the words of Conant, president of Harvard (Conant, 2000)

Chesbrough (2003) described factors which led to erosion of closed innovation, they are:

1. Mobility of highly skilled workers, more international mindset and cheaper airlines

2. Development of venture capital market

3. Shortening product lifecycles

4. Closer supplier relationships

5. Diminished US hegemony

6. Improved knowledge markets

All those reasons led to distribution of knowledge in the value chain, geographically and abundance of educated individuals (Dahlander& Gann, 2010)

Other determinants of emerging OI are (Kutvonen, 2012):

- global connectedness (Internet, ICT), Instant exchange of knowledge and information, computers, e-commerce
- age of technology, abundance of knowledge and innovation
- increasingly educated and informed customers

For couple of decades alliances and collaborative R&D have been rather popular (Pontiskoski, 2010), but nowadays there is slight shift to even more open innovation model, embedding people outside of internal environment and alliances network. This is done by crowdsourcing, collaboration with universities, business incubators, open source (West, 2006), special sites where companies can publish their problem and ask for solution from community (Reed et al., 2012). Closed innovation does not allow free flow of knowledge and spillovers which may be needed to creation of new knowledge.

Scope of company's partners is not limited only to suppliers and customers, it is more of ecosystem including potential co-operation parties (Koivuniemi et al., 2008). In business ecosystem relationships become mutually beneficial, but they need to be maintained and this cost can be high (Olander et al., 2011).

Chesbrough (2003) offered companies to become more open to external world in both directions on every stage of innovation process – generation, development, evaluating and further, both inbound – welcoming external ideas into company's innovation process and outbound – transferring intellectual property if company does not need it or wants to establish industry standard (Grindley&Teece, 1997).

There is critique that OI concept did not bring anything new – alliances and user involvement exist for a long time, but Chesbrough presented

whole paradigm uniting intentional and systematic usage of inbound and outbound activities.

March (1991) argues that there should be balance between exploration and exploitation, by exploration he meant search, risk-taking, experiments, flexibility, discovery and ability to use that innovation, while by exploitation he meant refinement, efficiency, evaluating, executing.

Many scholars (March, 1991, Chesbrough, 2003, Cohen&Levinthal, 1990) say that internal and external sources should be balanced – there will be less reinventing the wheel if internal R&D employees are aware of external sources that already have it and this makes open innovation great R&D efficiency tool

Some companies like IBM or P&G achieved high return on their open innovation activities, IBM has around 14% of revenues fueled by out-licensing (Chesbrough, 2006). Some scholars state that open innovation is more of requirement rather than an option (Lichtenthaler, 2009, Rivette&Kline 2000, David&Harrison 2001). Some say open innovation has both negative and positive sides (Fosfuri, 2006),e.g. transaction cost which could eat out all positive influence (Arora et al. 2001), some say positive overweight negative (Rivette&Kline, 2000, Lichtenthaler, 2009)

Contrasting principles of closed and open innovation	
Closed innovation	Open innovation
The smart people in the field work for us	Not all the smart people in the field work for us. We need to work with them inside and outside of

	company
To profit from R&D we must discover it, develop it and ship it ourselves	External R&D can create significant value: internal R&D is needed to claim some portion of that value
If we discover it ourselves, we will get it to market first	We don't have to originate the research to profit from it
The company that gets an innovation to the market first will win	Building a better business model is better than getting to market first
If we create the most and the best ideas in the industry, we will win	If we make the best use of internal and external ideas, we will win
We should control our IP, so that our competitors don't profit from our ideas	We should profit from others' IP, and we should buy others' IP whenever it advances our business models

Table 1. Open vs closed innovation (adapted from Chesbrough, 2003 and Savitskaya, 2011)

2.2 Open innovation paradigm

Figure below illustrates open innovation paradigm. At research stage there are many internal ideas, and company can as well embrace external ideas and IP into its own innovation funnel. At development stage IP in-licensing and out-licensing could be utilized to make use of appropriate outside ideas and let out IP that is not supposed to be used as core technology. At commercialization stage company can create spin-off for project which is not fitting into current strategy but may be

strategically important.

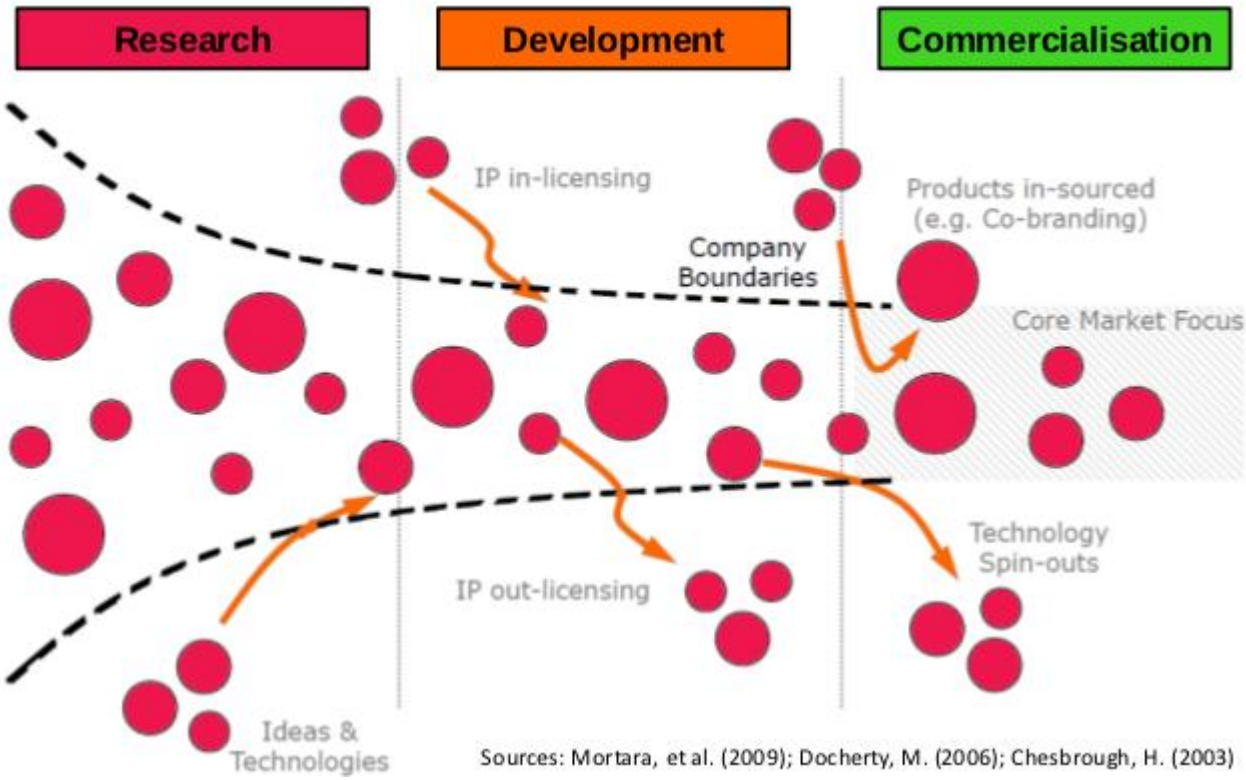

Figure 1. The open innovation model (Kutvonen, 2011)

Chesbrough was not the first to introduce the idea of collaboration with outer world, globalization of innovation (=collaboration), outsourcing of R&D (using external knowledge), supplier integration, user involvement and external commercialization of technology (Gassmann, 2006), though Chesbrough was first to use the term “Open Innovation” and who offered a paradigm uniting intentional usage of inbound and outbound knowledge flows with requirement of capturing value (Chesbrough, 2003), not just donating or using Linux.

Gassmann and Enkel (2004) introduced 3 types of processes:

- outside-in which implies the integration of external knowledge into internal knowledge base
- inside-out which is intended to increase cashflow from selling or out-licensing IP
- coupled process which implies both acquiring from external sources as well as disseminating knowledge.

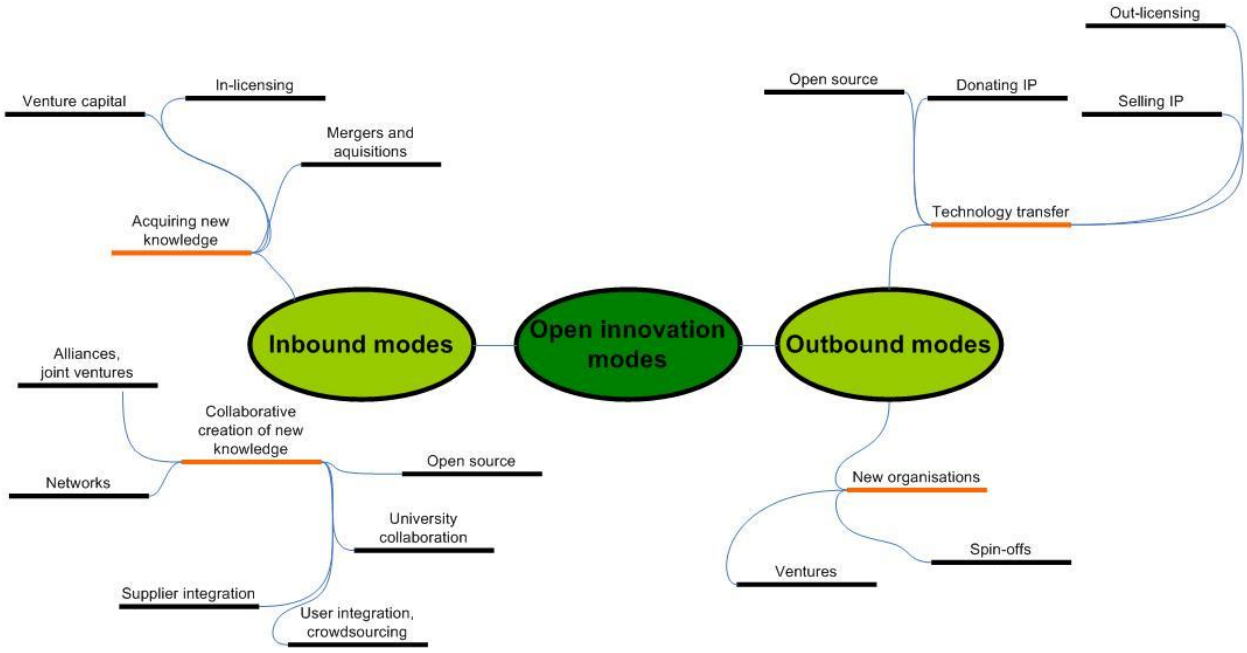

Figure 2. Open innovation governance modes (Adapted from Kutvonen, 2012)

Outbound open innovation is not that covered by academic research, unlike inbound (Lichtenthaler&Ersnt 2007). Using outbound open innovation modes firms can have extra cashflow from licensing, establish industry standards, but some companies are afraid to strengthen competitors by practicing opening up and selling IP (Rivette&Kline, 2000, Arora et al., 2001). performance of companies utilizing outbound open innovation depends on internal factors such as ability to understand, accept and use external IP, and external, e.g. company's environment (Gambardella et al., 2007), and Gambardella (2007) said that it is

impossible to make keep-or-sell decision with out knowing the environment. Lichtenthaler (2009) proved on sample of 136 companies that outbound open innovation has direct positive effect of company's performance, which does not comply with adherents of high transaction cost in open innovation (Gambardella, 2006). The higher the degree of technological turbulence, transaction rate and competitive intensity, the better is performance of outbound open innovation (Lichtenthaler, 2009). Lichtenthaler (2009) says that utilizing outbound open innovation has more marginal revenue than other additional activity.

Most internal IP is not used or commercialised (Chesbrough, 2006b), and Chesbrough (2006) outlines several reasons to let unused IP outside: it requires maintenance costs such as regular payments to patent offices, it decreases motivation of personnel that created it and finally it could be commercialised by some other company so that initial holder of IP may somehow benefit from it.

Growth of number of patents and importance of IP caused emergence of markets for technology – spaces where intellectual assets are traded or any company can publish unsolved task that requires solution, often for reward. Examples are such sites as innocentive.com, yet2.com, ninesigma.com, InnovationXchange which help to find a buyer for IP and find external ideas which could be used. They are also called technology brokers (Torro, 2007)

Inbound modes are divided into acquiring new knowledge via mergers and acquisitions, aimed at acquiring new knowledge or skilled personnel, and in-licensing, which is acquiring not whole company, but just license. Another type of inbound open innovation is collaborative creation of new knowledge, which includes alliances, networks, university collaboration, user and supplier integration and open source. All these modes were researched for decades, although not in context of open innovation.

Inbound modes provide innovative ideas, from all possible sources – universities, suppliers, users, partners, competitors, start-ups, scientists

2.3 Determinants of OI

To benefit from OI, companies should have not only absorptive capability, including employee attitude and trust (Lichtenthaler, 2009) but also managerial skills (David et al., 2001, Lichtenthaler, 2009).

Lichtenthaler&Lichtenthaler(2009) offered capability-based framework of open innovation:

- Inventive capability (to generate new knowledge inside a firm, affected by prior knowledge and experience base in the field, a key capability for closed innovation companies)
- Absorptive capability (ability to explore and acquire external knowledge)(Cohen&Levinhtal 1990)
- Transformative capability (ability to retain knowledge) (Garud&Nayyar 1994)
- Connective capability (ability to connect and ensure access to external knowledge with an option to acquire)
- Innovative capability (ability to find markets for inventions)
- Desorptivecapability (ability to find opportunity and transfer knowledge)

Strong patent protection is not directly connected to performance of outbound open innovation (Lichtenthaler, 2009), even though it increases transferability of IP by embedding it from tacit knowledge into explicit (Arora et al., 2001). However the more patent protection is the higher is transaction rate of markets for technology (Lichtenthaler, 2009). Bhatia & Carey (2007) state that before letting IP out this IP should be evaluated thoroughly.

Determinants of OI.

Firm-level determinants (Kutvonen 2012)

- Capabilities (e.g. absorptive capability and other capabilities)
- Orientation (whether it is Customer-oriented or Technology-oriented or Growth-oriented -influences willingness for openness)
- B2C / B2B / other (B2C is considered by default in studies, but B2B puts some limitations, B2G – even more, C2C appeared recently and not much studied)
- Technology aggressiveness - proactive exploration, retention, and commercialization of radically new technological solutions (high degree of technology aggressiveness involves a strong specialization of R&D activities and a strong focus on radical innovations. Decreases inbound OI and increases outbound
- Culture (Not invented here syndrom or not sold here syndrom – lack of trust to external IP affects willingness to participate in open innovation projects)
- Competition vs. co-opetition – it affect the limits of partnership and possible results of collaboration
- Complementary assets (large asset bases may offer high degrees of synergies for integration of external knowledge)
- Strategic position & role (Leader − Challenger − Follower / Imitator –Nicher – choice of role affects OI implementation)
- Size, financial situation and ownership (Firm size may affect OI, e.g. because larger firms have larger technology portfolios)

- Internationalization level (internationalization indicates the level of competition and networks that the firm has - points to more openness)

Technology-specific determinants (Kutvonen 2012)

1. Technology itself
- Technological intensity (is it technologically complex)
- Asset specifity(does it use some specific assets)
- Technological life cycle
- Core / non-core technology (core technologies are unlikely to be involved in OI)
- Technological uncertainty (licensing can decrease uncertainty)
- Ease of transferring (if knowledge is embedded in people, it is difficult to try open innovation here)

2. Markets of technology

Industry lifecycle length(if it is short, any technology will be soon outdated)

Dominant design (is it possible to establish as dominant design?)

Network effect / externalities (are there network effects?)

Platform characteristics (if platform will support future technologies, then green light to OI)

From the Table 2 we can see that there are 3 major factors influencing open innovation implementation – structural, institutional and cultural. Structural is about market structure – intermediaries, transaction cost, information asymmetry, institutional is about regulations, public funding, property rights claiming, while cultural factor is about mindset and national attitudes.

FACTOR	COMPONENTS	IMPLICATION
STRUCTURAL	• Information asymmetry • Technological distance • Transaction cost and rate • Asset specificity • Development level of technology trade • Industry • Intermediaries • Competitive intensity/ Hostility • Technological turbulence	Openness as a result of lack of specific assets Openness is impossible in the closed by characteristic industries. The role of innovation intermediation is often performed by universities.
INSTITUTIONAL	• Regulatory policies • Appropriability • Property rights claiming • Norms • Coordinating role of institutions • Public funding	Openness as compensation for systemic failures. IPR contracts restrict use of surplus. Government can influence the level of openness in the innovation system through regulations, laws, fiscal measures and infrastructure creation. Lack of technologies on offer demonstrates the incompleteness of technology market-need for intermediation for innovation.
CULTURAL	• National culture: individualistic vs collectivistic • Mindset • Attitudes	The cultural attitudes can be leveraged through managerial structures and incentives inside the company.

Table 2. Levels of environmental influences on OI: classified by Kutvonen (Savitskaya, 2011)

2.4 Decision-making: collaborate or not

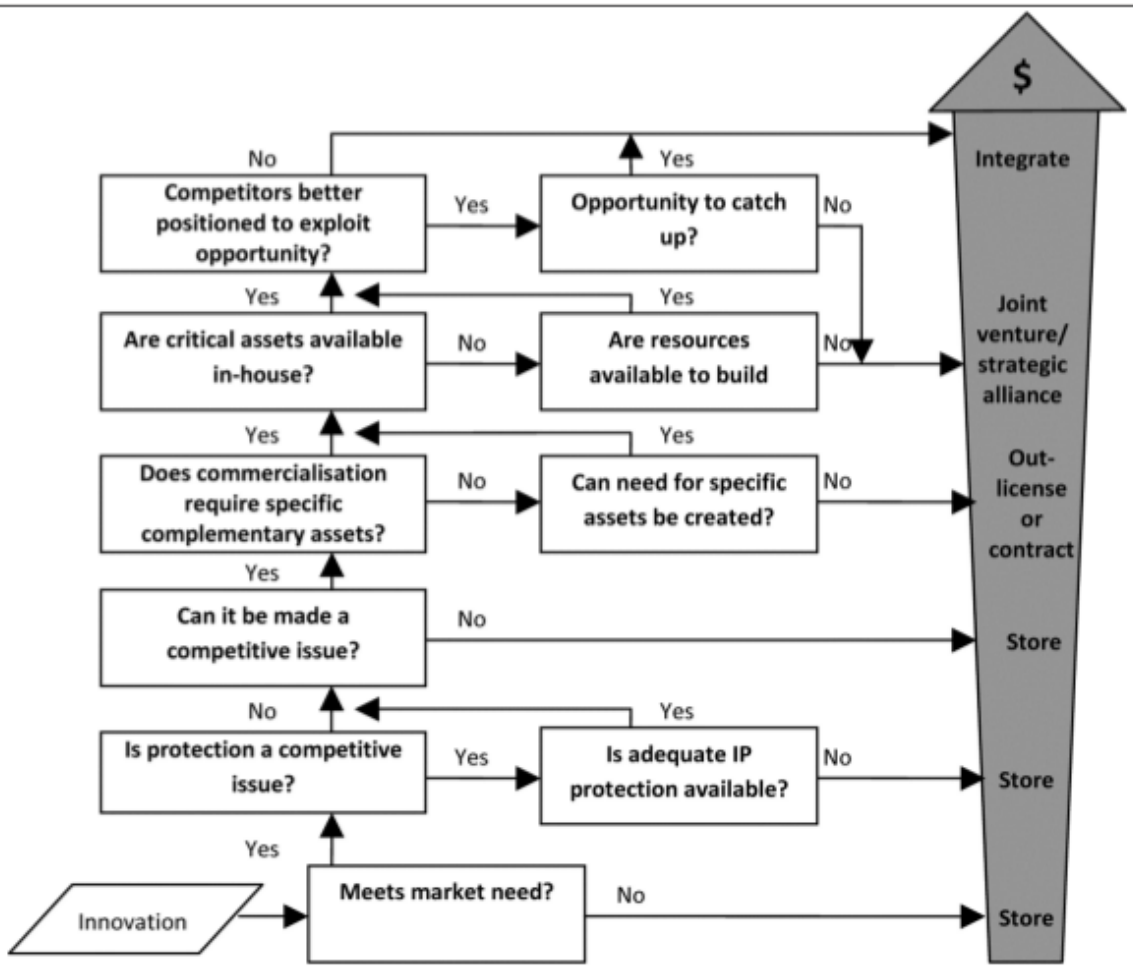

Figure 3. Decision-making scheme of ways of commercializing innovation (Sullivan and Fox, 1996)

Figure 3 shows decision-making process of developing technology with or without use of OI. Idea is out on hold if there is still no market need, if no IP protection available. Framework of Sullivan et al. (1996) offers to out-license or contract in case of inability to create specific assets required for technology, while in case of lack of critical assets it offers alliance. Only in case there is adequate IP protection, critical assets are

in-house and competitive situation is not hard, the framework on table 3 offers to start developing without external help.

Technology transfer effectiveness criteria

Effectiveness criterion	Focus	Relation to research and practice
"Out-the-Door"	Based on the fact that one organization has received the technology provided by another, no consideration of its impact.	Extremely common in practice, uncommon as an evaluation measure (except in studies measuring degree of participation in technology transfer).
Market Impact	Has the transfer resulted in a commercial impact, a product, profit or market share change?	Pervasive in both practice and research.
Economic Development	Similar to Market Impact but gauges effects on a regional or national economy rather than a single firm or industry.	Pervasive in both practice and research.
Political Reward	Based on the expectation of political reward (e.g., increased funding) flowing from participation in technology transfer.	Pervasive in practice, rarely examined in research.
Opportunity Costs	Examines not only alternative uses of resources but also possible impacts on other (than technology transfer) missions of the transfer agent or recipient.	A concern among practitioners, rarely examined except in formal benefit–cost studies.
Scientific and Technical Human Capital	Considers the impacts of technology transfer on the enhanced scientific and technical skills, technically-relevant social capital, and infrastructures (e.g., networks, users groups) supporting scientific and technical work.	A concern among practitioners, rarely examined in research.

Figure 4. Technology transfer effectiveness criteria (Bozeman, 2000)

Figure 4 shows technology transfer effectiveness criteria and how they are implemented in practice. Among these criteria are opportunity costs, possible increase in public funding or market share, and effect on skills and infrastructure (networks, user groups).

2.5 Open innovation capabilities

OI capabilities are even more important than having many modes of OI, they are actual sign of developed “Open” company.

OI capabilities:

- Inventive capability (to generate new knowledge inside a firm, affected by prior knowledge and experience base in the field, a key capability for closed innovation companies)

- Absorptive capability (ability to explore and acquire external knowledge)(Cohen&Levinhtal, 1990)
- Transformative capability (ability to retain knowledge) (Garud&Nayyar, 1994)
- Connective capability (ability to connect and ensure access to external knowledge with an option to acquire)
- Innovative capability (ability to find markets for inventions) (Lichtenthaler, 2008)
- Desorptive capability (ability to find opportunity and transfer knowledge) (Lichtenthaler, 2008)

2.6 Risks and limitations of OI

This topic is one of the biggest unsolved issues in OI theory (Gassman, 2006; West et al., 2006).

Open innovation approach cannot be applied everywhere and is not preferable (Torkkeli, Kock&Salmi, 2009), it is not best and it does not make internal R&D unnecessary. Chesbrough(2007) and Teece (1996) offer a framework helping managers to decide when to apply open innovation model and when – close, Reed et al. (2012) also provide some limitations. Businesses associated with high quality networks, including global networks, new business models, knowledge leveraging are likely to benefit from OI (Gassman, 2006). Those companies whose competitive advantage is based on experience curve, employee knowledge, differentiation, distribution channels and reputation can profit well from open innovation. If company's competitive advantage is driven by barriers of entry, spillovers, synergies, proprietary product design, it may be risky to use open innovation (Reed, Storrud-Barnes 2012)

NIH means that if technology was produced outside of company boundaries, it cannot be sure in quality, performance (Chesbrough, 2003)

Laursen & Salter (2005) argued that firms with high levels of absorptive capability (particularly skills and access to networks) are likely to be more open and Larger firms with heavy R&D activities are more likely than small ones to engage in collaboration with universities.

Risks

- Relying on OI, company may lose own R&D competences
- Finding right balance between sharing (so that to create something together) and not sharing (Restrict unwanted

knowledge flow so that not to dilute core knowledge)

- Cost of coordination may be high (Contracts may create trust, facilitate sharing when partners are sure in own IPR protection, but contracts may destroy trust. IPRs make knowledge more transferable, but it is quite costly,
- Relational mechanisms (Trust and relational norms, Signs of goodwill, Cognitive vs affective trust) may help in cases where contracts fail
- Relying on trust only is dangerous in terms of leakage and opportunistic behaviour
- Affective trust and prior personal relations are no guarantee of success
- Contracts are very important the earlier the better, before realizing value of outcome (Olander et al., 2011)
- Opportunistic behavior and associated IP protection (formal and written collaboration contracts about project schedules, engineering capability, cost drivers, pricing, IPRs (patents, copyrights, trademarks, designs, utility models and trade secrets), nondisclosure and confidentiality clauses)
- Ability to integrate, tap into is rare – absorptive capability – ability to understand and integrate external knowledge (Cohen&Levinthal, 1990)
- Ability to generate profit is uncertain (Chesbrough, 2007, Viskari et al., 2007)
- Any company can use open IP so there is need to build business *around* this open IP, not on (Reed et al., 2012, Koivuniemi et al., 2008)
- Reliance on individual skills is dangerous in OI context, so

> business should rely on many people, networks and synergetic effect of collective effort. Only company with multiple competitive advantages, strong OI management skills can profit from OI (Reed 2012)

Open innovation cannot be saviour from everything, it has costs and needs managing, for example to attract right people company needs to establish channels of incoming ideas, like sites or internet communities, check them regularly, also company needs to create personal relationships with especially valuable people to create and sustain trust, as without trust these people may not contribute, they need to be treated good, maybe sometimes paid, but probably more importantly be valued, so that they can feel as a part of a product and thus contribute to promotion among friends. As for payments, companies may need to pay their contributors and sometimes this may sufficiently erode profits.

Company should manage and try to control somehow open innovation, managers cannot just order and use hierarchy, and that is again when trust is needed. Companies should not think that they do not need to have internal R&D unit, otherwise reputation may suffer, and reputation is not just words, it is reason why people keep contributing and offering solution for the company, and that keeps networks tighter. Very important question is when marginal revenue from open innovation equal marginal costs? So what happens when MC>MR is that company already lost economy of scale and synergy in innovation due to adherence to open innovation.

2.7 Inbound open innovation

2.7.1 Motives for inbound open innovation

Primary motivations for conducting inbound OI (Kutvonen, 2012)

− Wider base of ideas for new products & services, hence higher degree of novelty and more viable innovations and greater effectiveness of R&D

− Ability to more effectively enter new markets

− Cost savings by utilizing external knowledge

− Time savings by avoiding ”reinventing the wheel”

2.7.2 Modes of inbound open innovation

Acquiring existing knowledge is done by:

Mergers and acquisitions (access to unique or scarce intellectual resources)

In-licensing - granting of rights to utilize proprietary knowledge to another, it is most popular in-bound mode (Arora et al., 2001)

Corporate venture capital is the investment of corporate funds directly in external start-up companies so that these start-up companies create some new useful knowledge. It is not corporate venturing which is nurturing internal projects with separate culture and goals

Collaborative creation of new knowledge

- Collaborative agreements
  - Joint R&D projects; R&D collaboration (less committed than strategic alliances, sometimes made between competitors, and motivated by risk & cost sharing, synergy and accessing the counterpart's knowledge)
  - Joint ventures (pooling resources of 2 or more companies and forming a new one to achieve some common goal using knowledge of all partners; Seen as effective means for transferring also tacit knowledge beyond firm boundaries (Kogut, 1988), but there could be cultural mismatch (Tidd et al., 2005)
  - Strategic alliances (risk of opportunistic behaviour and high coordination and trust-building costs (Khanna, Gulati&Nohria, 1998, Hagerdoorn et al., 1994))
  - Innovation networks and consortia (intended to share risks&costs and solve problem which is too big for one company (Tidd et al.,2005)
  - Co-patenting (Teece, 1997)

- Other collaborative forms of knowledge creation
  - University-industry collaboration (they are more focused on basic research and there is a delay between industrial practices and reflecting it in academic literature (Kutvonen, 2012))
  - Supplier integration to innovation process (risk of leaking information as suppliers work with competitors too)
  - User / customer involvement modes (user-generated content, e.g. Threadless.com where users help design T-shirts, lead users (von

Hippel, 1986))

- crowdsourcing (Huston & Sakkab, 2003) (open call to community to solve some problem) benefits are little cost, speed, tapping into wide range of talent, being close to customer, promoting product among contributors so that they feel a part of it and thus promote it further (Reed et al., 2012)

2.7.3 Challenges of inbound open innovation:

Among challenges of inbound open innovation are:

- Not invented here syndrome (Katz & Allen, 1985) or rejecting outer ideas due to lack of trust and different implementation
- Most firms partner mainly with companies that they have known for a longer time or that are directly referred, therefore it may decrease amount of novel combinations
- Absorptive capability needs to be high to make sure acquired knowledge is properly integrated and used to full extent
- Capability to connect partners (universities, research centres, incubators, business entities, users, suppliers), maintain good relationships with them and retain them in network so that to reach them when needed

2.8 Outbound open innovation

2.8.1 Modes of outbound open innovation

Outbound open innovation is activities aimed at external exploitation of IP, such as technology transfer (out-licensing, selling IP, donating, open source), venturing and spin-offs.

2.8.2 Motives for outbound open innovation

Motives for conducting outbound OI include monetary (generating cashflow by selling IP), compulsory (meeting legal requirements) and strategic (Lichtenthaler, 2007).

Strategic motives according to Lichtenthaler (2007) are:

- setting industry standards or dominant design,
- access to knowledge,
- freedom to operate,
- ensuring technological leadership,
- utilizing effects of learning curve,
- boosting reputation,
- strengthening networks

Kutvonen (2011) outlined the following strategic incentives for external exploitation

- gaining access to new knowledge plus finding entry to knowledge markets
- multiplication of own technologies (standard setting and profiting from network effects and maybe market expansion)
- learning from knowledge transfer (improving dynamic capabilities, building reputation)
- controlling technological trajectories (strategic technology planning leads to higher control of technological path)
- having external exploitation as core businesses model (for those

companies who want/can provide high development costs but do not have high commercialisation capability)

- exerting control over the market environment (defensive out-licensing and feeding entry barriers, creating ecosystems and maintaining technological leadership)

Out-licensing has changed from tactical issue to strategic concern (Viskari et al., 2008).

Motives for out-licensing are:

- establishing industry standard (Arora et al., 2001)
- getting profit from unused non-core IP
- preventing competitors from development of new technologies by licensing old ones to them (Gallini, 1985) and converting competitor into complementer
- reaching larger market, maybe even unfamiliar industries (Viskari et al., 2008)

Letting IP out could be done also by spin-offs, selling or donating.

Donating is giving licenses or other IP for free to establish reputation, help create spillover which could be beneficial for donating company, create ecosystem so that donating company can capture value from selling complementary IP or capture value from integrating add-ons better than others, even keeping it to itself (Olander et al., 2011). Reputation is not only merely nice for investors, it attracts employees, suppliers, partners and contributors – it is more interesting to contribute without being paid to a company with good reputation (Reed et al., 2012). Crowdsourcing is impossible for a company with no reputation.

2.9 Open source

Open source is what people always associate with open innovation, that is one of first thoughts coming to mind when they hear it. Open source really is part of open innovation, but not necessarily – only that open source innovation where value is captured. If it is not captured, then it is not open innovation.

Open source is “the phenomenon of co-operative software development by independent programmers who develop lines of codes to add to initial source code to increase program's applicability, or enable new applicants” (Gassmann and Enkel, 2004).Technology is created as a result of collaborative efforts and IP rights belong to everybody (West, Gallagher, 2006), though there is open source license.

Open source is not just free dissemination of code, but also collaborative efforts where every partner is equal – person, company, university (Huurinainen et al.,, 2007)

Open source can be both inbound and outbound – company can utilize open source software (inbound) and share its code or platform (outbound).

In open source development source code of software is shared on Internet freely so that any qualified person can fix bugs and offer new traits. Open source origins from 1960s when people had to share software code (how?) as commercial software was not available (Viskari et al., 2008). It got popular due to investments of big companies, collaborative efforts and user-centric approach (Lerner, Tirole 2002). Classical examples of open source are Linux OS, Apache server software, Mozilla browser (Hertel et al., 2003)

As knowledge is public, benefiting from this IP should be based not on IP itself, but around it (Viskari et al., 2008). Competitive advantage cannot be based on open source, it should be based on ability to integrate it and use it profitably, that is where strong R&D department is needed (Reed et al., 2012).

West&Gallagher (2006) outlined 4 approaches to open source:

- pooled R&D/product development – collaborative project
- spinouts – separating from company due to deviation from strategy
- selling complements – core technology is open, but complements are a source of value for company
- donating complements – donations of complements to boost core product/technology

Motives for companies to participate in open source:

- shortening lifecycle of software (design-build-test) (Huurinanen, 2007)
- low cost of new releases
- wider pool of talents
- technological convergence
- ensuring compatibility

Motives for contributing to open source projects are:

- using that open source product in developer's company (Koivuniemi et al., 2008)
- learning, mastering skills

- personal fulfilment through seeing and showing own value as developer (West&Gallagher, 2006)

2.10 In-house evaluation of ideas

Although problem of evaluation does not seem to be a part of open innovation paradigm, author still considers it as a very important topic in open innovation context as there is clear need for good evaluation framework in case of both inbound modes – company needs to evaluate all incoming ideas, internal or external, and outbound – company needs to evaluate intellectual property before letting it out (Koivuniemi, 2008, Bhatia&Carey, 2007)

2.10.1 Formality of evaluation criteria

It is questionable which type is preferable – formal or informal, formal is considered limited and even potentially harmful (Loch, 2000, Koen et al., 2001; Nobelius and Trygg, 2002), while intuition is often quoted as important criterion (Hart et al., 2003). Formal evaluation allows to compare different project based on scores, draw diagrams to help decision-makers (Calantone et al., 1999; Koen et al., 2002; Montoya-Weiss), and it also may increase quality of evaluation as informed use of criteria may prevent managers from making mistakes in decision making thus allowing top-managers to control easier (Hart, 2003), while informal evaluation allows more creativity and leaves enough space for intuition which is often mentioned as important criterion (Henriksen and Traynor, 1999, Hart et al., 2003) .

Problem with formal evaluation is that it is difficult to embed in organization which is not used to it (Cooper, 1998), and often even if some formal tools are used, not much attention is devoted to them.

Quantitative study of Martinsuo and Poskela (2011) showed that formal system of idea and concept evaluation is not a value in itself, as it is associated neither with competitive potential nor with future business potential. McDermott and O'Connor (2002) offered that in radical innovation projects traditional project management issues as evaluation and control are not as important as managing uncertainty and risks, so it indirectly testifies against formal evaluation tools in case of radical projects.

2.10.2 Structuring evaluation

Idea evaluation tools could be unstructured, with open questions (Cooper, Edgett, and Kleinschmidt, 2002), or structured – e.g. structured scoring models (Henriksen and Traynor, 1999), mathematical and computer-based models (Martinsuo, Poskela, 2011), though main tool is discussion of managers (Englund and Graham, 1999), possibly based on prepared structured materials.

Structuring fuzzy front end is sometimes seen as limiting creativity, some companies even do not have formal processes in idea development, just discussion of several managers (Boeddrich, 2004).

2.10.3 Reasons of difference in criteria choices

Reason of why companies choose some particular set of criteria is not covered enough. Of course it depends on company strategy and human capital, e.g. personality traits of decision-makers and

Hofstede cultural dimension are addressed in study of Hoffmann et al. (2004), managers' functional background was already covered in study of Hart et al (2003). Lucas&Bush (1988) identified that there is difference between R&D and marketing personnel, which can negatively influence overall performance of the project as a result of their communication problem. As for decision-makers, analytic cognitive style is related to balance in portfolio management, e.g. use of bubble diagrams and other tools of helping to decide (McNally et al., 2009). Ambiguity tolerance is associated with strategic fit dimension, ambiguity intolerance may result in too short-term orientation (McNally et al., 2009).

Evaluation criteria may be more strategic, long-term or short-term, it depends on company. Companies are not only interested in immediate results, but they expect generation of future business potential (Shenhar et al,. 2001). They may want to diversify, enter new market and in this case evaluation criteria differ and tend to be less rigourous to support radical ideas, and alignment with strategy is not so harsh, idea is evaluated more on its own, rather than a part of portfolio (Shenhar, 2001, Martinsuo, 2011).

2.10.4 Importance of criteria at different stages

Companies tend to apply different criteria at different stages of innovation process. Rochford (1991) divided ideation into 2 parts, first, cheaper one, is about feasibility and compliance with strategy, while second part is devoted to spending more resources on investigation according to market, product, financial criteria and intuition. Past research aggregates all criteria into 3 groups – product, market and financial (Ronkainen, 1985). At first stage (idea evaluation) technical feasibility, market potential and intuition are more important, then at concept evaluation

product criteria are most important, while financial criterion is more important closer to launch (Hart, 2003, Carbonell-Foulquie et al,. 2004, Ronkainen, 1985). That seems logical as during feasibility study possibilities and threats are tested, and closer to launch it is easier and more reasonable to think about financial criteria.

There is small conflict in academic literature – according to one group of scholars more criteria are used in the beginning rather than in the end (McNally et al, 2007, Martinsuo&Poskela, 2011), but according to another quantitative study with large sample (Hart et al., 2003) same amount of criteria is used at the very beginning and right after launch, to test possible success and to check if this success happened.

It makes sense to assign weights to every criterion as obviously they are not equally important. Weights affect overall score in case of some scoring model, so additional attention should be put to assigningrelevant weights to each criterion at each gate, as same criterion can be used at several gates but with different weight (Cooper et al., 2001, Carbonell-Foulquie, 2004).

Salomo et al. (2007) showed that project risk planning, goal clarity and process formality were positively related to innovation success, while project planning did not.

Evaluation at different stages can be done using different techniques, such as perceptual mapping, conjoint analysis, Quality Function Deployment (QFD), A-T-R models, break-even analysis, and sensitivity testing , delphi analysis (Hart et al., 2003), but anyway companies first need to define which criteria they want to include in those techniques.

2.10.5 Most frequently used criteria

Most used criterion is technical feasibility (Hart et al., 2003, Tzokas et al., 2004), which is also most significant criterion in Martinsuo &Poskela study (2011), while Schidt et al. (2009) reports that he did not find an association between technical evaluation proficiency and product performance. Although technical criterion is important, companies tend to overestimate it and paying too much attention to it, underestimating market and customers, creating too stuffed product (Smith and Reinertsen, 1998). Over-emphasizing one dimension, e.g. making financial criterion main, is correlated with poorer results (Cooper et al., 1999). Market criteria are determinants of the go/no-go decision at the concept screening gate (Ronkainen, 1985).

Firms most frequently used customer acceptance, product performance, market potential and technical feasibility at concept screening. At business analysis gate market potential, sales and profit margin are are used most extensively (Hart, 2003) after the launch customer acceptance and satisfaction and sales are main criteria.

2.10.6 Proactive providing idea flow

Companies focus more on how to cut off bad ideas, implying that they got best possible array of ideas, and they put all attention on evaluation. Some companies try to be more active in search of ideas but there are only few and some attempts are not working properly, being more demonstrative rather than functional (Boeddrich, 2004). Meanwhile searching actively is no less important than weeding out

(Roelefsen, 2008). It is extremely important to make sure that offered for consideration ideas come from varied sources, that deliberate effort has been put to find or create ideas.

Boeddrich (2004) put his attention to methodology of internal idea generation and acceptance, he showed many hurdles on the way of employees offering ideas, and solutions how to remove those hurdles, e.g. by creating an IT platform for sharing ideas, such solution allows any employee freely offer something, and such involvement motivates employees, they like being heard and awarded. He also noticed that companies who have iterative process of reviewing ideas, are more innovative. That means that some ideas can be put on hold in some database and later reviewed in case they are more topical now, so called “creative idea loop”. Boeddrich (2004) also offered managers to be aware of employees capabilities, he made up a matrix with introvert-extravert along one axis, and creativity-linear thinking on other one. This matrix is supposed to help managers assign right people to right tasks.

3. Research design

Qualitative research method was chosen for this study in order to tap into open innovation practices of case company. The choice of case study is based on research question and nature of research – case studies are preferred when “how” and “why” questions are posed and when focus is on contemporary phenomenon. Major type of collecting most relevant information for empirical part is **in-depth interview** (Yin, 1994), allowing to give insight into company’s practices and view from outside on company’s practices, as well as into best practices.

The research process of the study has 3 main phases – building of theoretical framework, describing and analysing open innovation practices, and finally reflecting findings from theoretical and managerial point of view. Am empirical part of the study is divided into two subparts, first part – descriptive empirical study is used to describe and analyze open innovation practices of several giants, with more detail about direct competitors. Exploratory case study is used for researching Nokia's open innovation, particularly outbound open innovation practices in second part of empirical research, constructing to-be and as-is models of few OI modes.

Speaking of **delimitations** - current research examines an ongoing process of open innovation implementation in a given context under certain circumstances (laying off research personnel, changing economy, financial difficulties) rather than testing a hypothesis, i.e. resource-based view is applied in current research by default, so this might impose some limitations. Resource-based view is applied by default because Nokia is

in troubled position now – financial, HR, reputational, so research about Nokia should definitely include these limitations as it cannot attract many new resources, restructure quickly or change strategy. Methodological limitation is impossibility to generalize as goal of research is to show implementation in one company and industry rather than generally in the world. There is also interpretation bias as 8 out of 11 interviews were conducted in English – foreign for both interviewer and interviewees.

Nokia is considered to be a decent example of application of open innovation principles, though not as exemplary as IBM. Nokia has been involved in both inbound activities, such as collaboration with universities, open source, alliances, obtaining IP, including via acquisitions, as well as outbound, e.g. spin-offs, donating, out-licensing. What is more interesting and useful is to find pitfalls of their open innovation implementation and offer some recommendations, which is the goal of this research.

The study was conducted from January 2012 to May 2012, interviews – from February 2012 to May 2012. Descriptive research was conducted by obtaining data from secondary **sources** such as news and reports from academic databases, news and publicly available information on Internet. Second part, case study was conducted by means of semi-structured in-depth interviews with people in charge of evaluation, out-licensing and independent consultants. 2 senior managers of Nokia were interviewed – Timo Miettinen, Senior manager of Business development, and Kai Havukainen, Senior manager of out-licenisng, 3 partners of consulting companies – Julia Roelefsen, Jukka Niiranen and Antti Pellinen, Professor Timo Santalainen, PhD student Antero Kutvonen and IT specialists Semenov Nikolai, Kuznetsov Vyacheslav, Bekhterev Alexander, Lari Aro. All interviews were at least 30 minutes each and were based on semi-structured questionnaire (see Appendix 1). Interviews were analyzed and synthesized to compile as-is models of current situation in case company and modify to-be models.

Table 3 presents **how collected data matches goal and need for data**. There was need of insight into both inbound and outbound practices, more precisely - into modes of OI, into processes of outbound OI and process of evaluation of inward idea flow from insiders of Nokia and outsiders. From the table it is easy to see that data to construct actual models (as-is models) of OI implementation were collected from senior-level managers of Nokia, while independent specialists were used to construct best practices models (to-be models).

NEED	**INTERVIEW**
insight into evaluation of inward idea flow in Nokia	senior manager of Business development
insight into outward knowledge flow in Nokia: out-licensing, donation, open source	senior manager of Out-licensing dpt
independent overview	9 other people: 3 partners of consulting companies, a professor, PhD student, 5 ICT specialists

Table 3. Matching need for data and collected data.

4. Empirical part. Improvement of OI processes in Nokia

4.1 OI practice overview of several leading companies

4.1.1 Outbound modes

This part provides analysis of outbound and inbound open innovation implementation. Tables 4 and 5 below show whether companies do or do not have particular mode. It was built using publicly available information on Internet and interviews. Minus ("-") means that either found information is insignificant or not existing at all. "-+" means that company's particular OI mode is not very well defined and functioning, while "+-" means the contrary – that this particular mode is decently functioning.

	Out-licensing	Donating	Open source	Selling IP	Spin-offs / venturing
Nokia	+	+	+-	+	+
Cisco	+	+	+	+	+
DuPont	+	+	-	+	+
IBM	**+**	**+**	**+**	**+**	+
Intel	+	-	+	+	+
UPM	-	-	-	-	+
P&G	**+**	**+**	-	-	+
Philips	+	-	+	-	+
Sun	-	+	+	-	+
Google	+	-	+	-	+
Apple	+	-	+	**-**	-*
RIM	+	-	+	-*	-*
LG	-	-	+	+	-*
Microsoft	+	+	+	+	+
Samsung	+	-	+	-	+

HTC	+	-	+	+	+
Facebook	-	-	+	-	+

Table 4. Outbound modes of giants (source: author, based on company presentations, press-releases and other publicly available information, Hillesey, 2011, Gassee, 2010, Sherr, 2011)

* - company wanted to do it but have not done it yet

Table shows that most companies have most outbound modes to some extent, but this table does not provide deeper insight into scale of OI implementation, it just gives very brief overview of giants from different industries, that is why another table is built below, with level of OI implementation only for smartphone market players.

4.1.2. Inbound modes

	Alliances, networks	M&A	University collaboration	User integration /crowdsourcing	Supplier integration	Open source	Venture capital	In-licensing
Nokia	+	+	+	+	+	+	+	-+
Cisco	+	+	+	+	+	+	+	-
DuPont	+	+	+	+	+	-	+	+
IBM	+	+	+	+	+	+	+	-
Intel	+	+	+	+	+	+	+	+
UPM	+	+	+	+	+	-	-	+
P&G	+	+	+	+	+	-	+	+
Philips	+	+	+	+	+	+	+	+
Sun	+	+	+	+	+	+	+	+
Google	+	+	+	+	+	+	+	+

Apple	+	+	+	+	+	-	+	+
RIM	+	+	+	+	-	+	-	+
LG	+	+	+	-	+	+	+	+
Microsoft	+	+	+	+	+	-+	+	+
Samsung	+	+	+	-	+	+	+	+
HTC	+	+	+	-	+	+	+	+
Faceboo k	+	+	+	+	+	+	+	+

Table 5. Inbound modes of giants (source: author, based on press releases of companies, Dwan, 2004, Mishra, 2006, Lamberg, 2011, Mahr, 2007, Marshall, 2006, Kaiser, 2012, Greve, 2012, Sherr,2011, Patel, 2008, Gassee, 2010)

If we look at the table 5, we will see that judging by positive marks in most cells, majority of companies do well in inbound open innovation, but it is not necessarily right – the table does not provide level of each mark, is it strongly positive or slightly positive, so we will consider mobile phone industry players in more detail below, with ranging their open innovation modes implementation, same as for outbound modes.

Open source here is in both inbound and outbound modes, as it was explained earlier, and looks like all companies are using open source to some extent, but of course Samsung utilization of open source is much greater than of Apple. ‘Open source turns out to be a key part of what's moving the company forward.’ said Senior Technical Director for Open Software RIM, Eduardo Pelegri Llopart (Branscombe, 2012).

Cisco is practicing acquiring companies (often small start-ups) to tap into their knowledge.

DuPont started out-licensing since 1970s and nowadays they expanded

the scope of IP intended for out-licensing from just processing technologies to more complicated; they also donate IP to universities, hospitals and non-profit groups since mid-90s, and main reason for that is tax break and enhancing PR image (Viskari et al., 2007).

IBM has a large network of research partners among universities, research centres, and they hold the biggest patent portfolio in the world; also IBM is one of most successful examples of out-licensing (Viskari et al., 2007). IBM also practices open source, which is less expensive and allows IBM to profit from applications and service based on open source platform , as well as standardize IBM's architecture(Lamarca, 2006, Viskari et al, 2007). they invest over $1 billion in open source project annually (Lamarca, 2006)

Intel is actively collaborating with universities, scientists by sponsoring research, while Lucent has widespread practice of new ventures, as well as Philips, which is also utilising collaborative projects and out-licensing to increase R&D performance (Viskari et al., 2007)

Procter and Gamble is one of most known examples of open innovation as they promote this for many years – they started crowdsourcing in early 2000s when they faced deep crisis, but most imporantly they changed strategy from Research and Development to Connect and Develop – meaning that there is no need to elaborate inventions themselves to profit from them, and since then they strengthened inbound modes, adding “technology scouts” in major research institutions (Sakkab, 2002, Huston&Sakkab, 2004).

Sun Microsystems considers open source as future so it moved strongly towards open source development, examples are Solaris OS and OpenOffice, they even released one hardware project, which is outstanding event for open source movement; motivation for all these open source activities is getting more clients, developers, suppliers and

users, also using open source reduces cost and development time, while having more innovative and user-centric product (Lamarca, 2006).

4.2 Nokia and competitors: closer look

4.2.1 Market overview

Net sales of Nokia fell 29 per cent in the first quarter of 2012 and it made a pre-tax loss of €1.5bn, from a profit last year of €403m, with the gross profit margin on smartphones dropping to 15.6 per cent compared with a 28.9 per cent margin in the first quarter of 2011.In premium segment Nokia is behind Samsung and Apple, market shares are presented on Figure 5 and 6.

Nokia announced that its low-end 'feature' phone division is losing market share quicker that planned – sales decreased by 35% in 1Q. Windows-based Lumia which was expected to regain Nokia positions, failed to meet those expectations with sales of just 2 million units, while Apple sold 37 millions of iPhones. Feature phones stuffed with less technologies meant for emerging markets constitute around a third of Nokia's business, but China market share fell by 70% in Q1 2012. Sales in the wider Asia-Pacific region also dropped by 20%.(Q1 report, 2012), while this segment is supposed to provide some regular cashflow.

Although there is some hope as Nokia invested a lot in Lumia advertising (Nuttal, 2011).

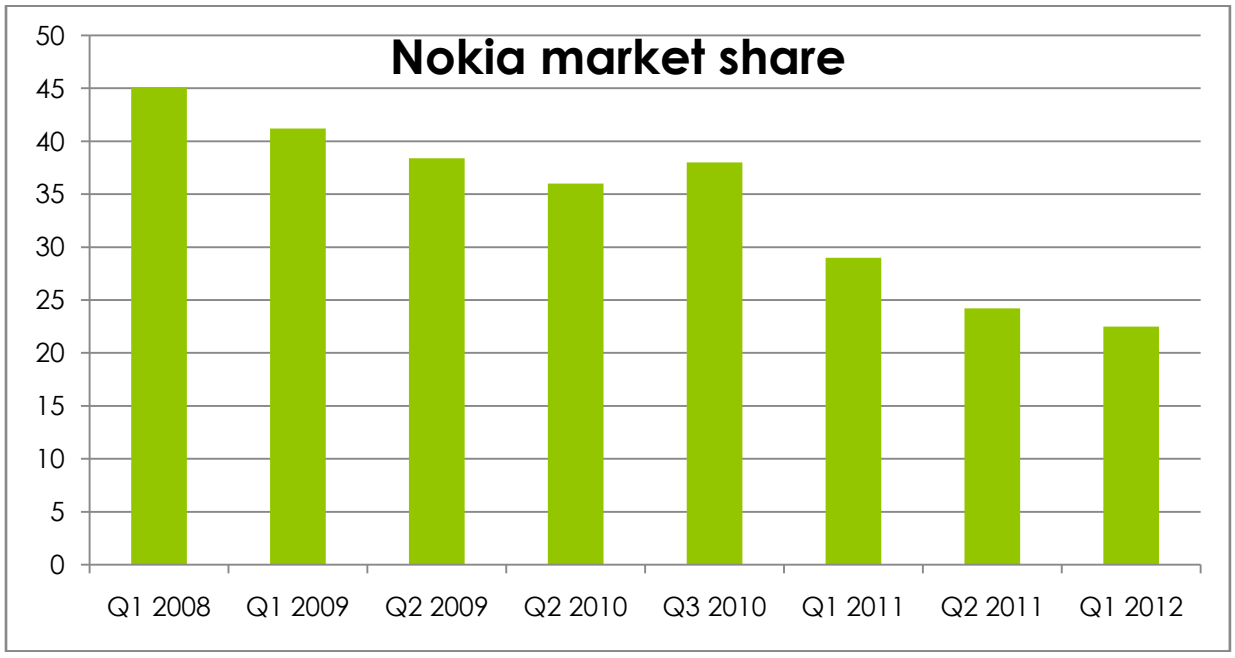

Figure 4. Nokia market share from Q1 2008 to Q1 2012 (source: author, based on Nokia reports)

Figure 4 shows that Nokia's market share has been constantly falling

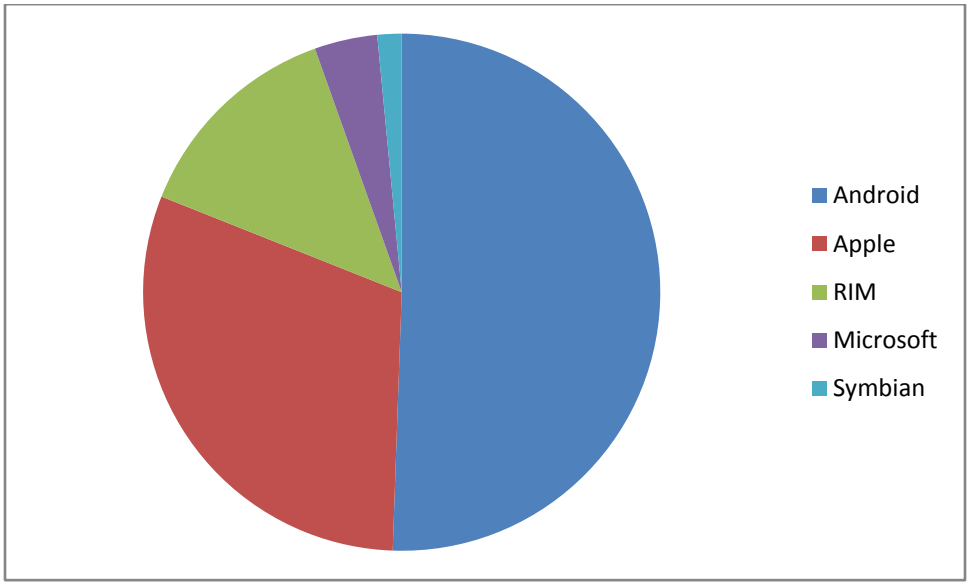

Figure 5. Market shares in February 2012 (source: author, based on comScore Reports 2012)

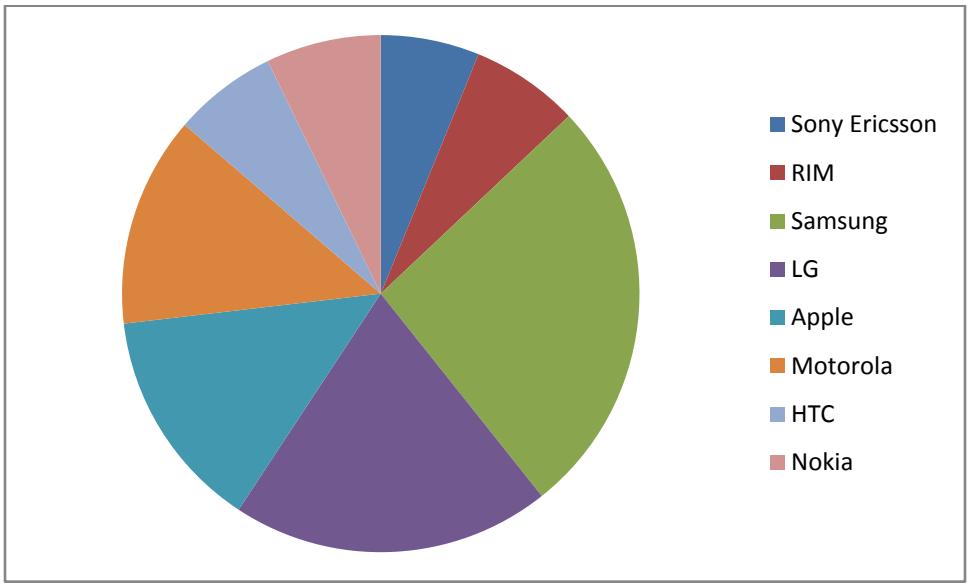

Figure 6. Smartphone market shares.(source: author, based on comScore Reports 2012)

Figures 5 and 6 show that Nokia's market share is very small, compared to 50% few years ago and compared to competitors.

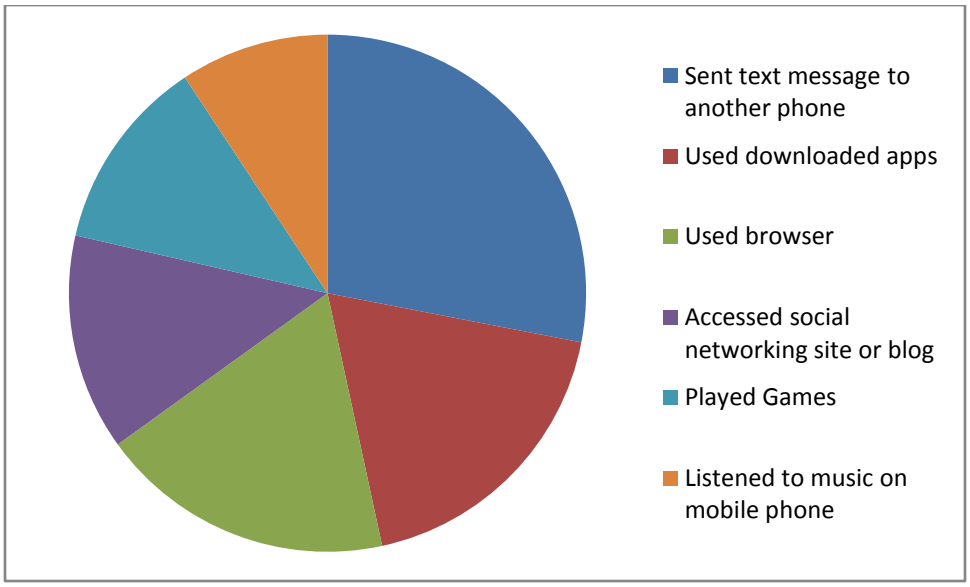

Figure 7.Usage of mobile services (source: author, based on comScore Reports 2012)

Figure 7 shows what mobile services are used among users, which

allows us to see that not all user need games, music, apps. Pie chart does not mean that all these modes of usage naturally compile 100%, author combined all of them to pile up to 100% to see which modes of usage are most popular. This figure is important to understand that even if case company lags behind competitors in apps and games, it does not mean that all consumers want it and future of case company is dark.

Nokia's shares dropped by 20% the week after quarter results reaching lowest since 1996 level. The cost of insuring its debt soared, in other words Nokia is now almost among junk (Hill, 2012). Some analysts think partnership with Microsoft was a big mistake as it left Nokia no flexibility, some think it is the only hope (Hill, 2012). Due to lack of cash Nokia maybe will have to sell some of assets like low-end mobile phone business or some patents. Some analysts say Nokia may face hostile takeover as its shares are very cheap.

Some analysts say chances of regaining positions are 50:50 (Laporte, 2012, Hill, 2012)

Not very long ago Nokia was the disrupter. Motorola was major mobile phones provider in 1994, looking positively in the future, but by 2000 its market share shrunk from 45% to 15%, while Nokia got 31% and became market leader (Barwise, 2011).

Nokia was better in design, technologies, user interface, brand-building, it quickly adopted 2G technology and made almost perfect supply chain management system, it quickly understood needs of emerging markets, and it was among the first to understand the importance of user-friendly interface and nice product design (Barwise, 2011).

Motorola missed most of these market trends, was slow to invest in digital technologies and did wrong things concentrating on designs of unnecessary technologies. Problems of Motorola were piling up in vicious

circle and it end up badly. Now it tries to regain positions but only as a small player (Barwise, 2011).

During success time for several years Nokia too lost touch with market trends, for example mobile internet and touch screen were ignored, application shop was too late, operating system was not changed or modified on time, Android adoption was not considered but now it is too late to create another Android smartphone – it is harder to differentiate (Barwise, 2011).

While Nokia's positions leave much to be desired, Apple's new products did not provide enough newness to customers, and Apple should be beware not to become complacent to success. Apple had mistakes in the past, e.g. with out-licensing. Two Apple executives admitted that there was a mistake when they did not out-license Mac OS (Nuttall, 2011)

"If Apple had licensed the Mac OS when it first came out, Windows wouldn't exist today" - Jon van Bronkhorst, Robertson Stephens analyst,"If we had licensed earlier, we would be the Microsoft of today."—Ian W. Diery, AppleExecutive VP,"In order to protect our hardware profits, we didn't license our operating system. That was a mistake. What we should have done was calculate an appropriate price to license the operating system. We were also naïve to think that the best technology would prevail. It often doesn't."—Steve Wozniak, Apple cofounder, "I was never for or against licensing. I just did not see how it would make sense. But my approach was stupid"—Jean-Louis Gassee, ex-CEO of Apple – all of those opinions offer that Apple could have benefited more if they applied more open innovation practices, which is another evidence proving relevance of open innovation to modern world.

Analysts say Steve Jobs was major competitive advantage and now

when he is gone who knows how Apple will proceed, butTim Bajarin, head of Creative Strategies research company says Apple might have prepared a roadmap under Steve Jobs for few next years and 2012 could be surprising customers again (Nuttall, 2011).

Apple's loss of big competitive advantage maybe is a chance to Nokia to regain some of positions, that is why author considered mentioning Apple's mistakes in OI application.

Reasons why Nokia has been losing market share

Reasons why Nokia has been losing market share are divided into connected and not connected with open innovation, to prove that improving open innovation processes improvement is **relevant** to Nokia performance.

Reasons:

Connected with OI

- Not staying in tune with customer, no asking customers what they would like to see in phones = no user integration (Winter, 2011, Niiranen, 2012)
- No open-door policy, no access to Nokia employees (Winter, 2011)
- Low OI capabilities, e.g. absorptive, transformative, connective, desorptive capabilities

Not connected with OI

- Engineer logic=not consumer oriented (Aro, 2012, Bekhterev, 2012)

- Poor leadership (Hill, 2012), too big, curse of leader (Niiranen, 2012, Pellinen, 2012)
- Complacency of success (Hill, 2012)
- Late to change, inability to adapt to market trends (Hill, 2012, Niiranen, 2012, Pellinen, 2012)
- Over-consensual culture, bureacracy (Hill, 2012)
- No dialog between layers of hierarchy before Elop, unclear accountability (Hill, 2012)
- Employee frustration about Microsoft (Hill, 2012) and leaving Nokia (Miettinen, 2012)
- Ignoring US market (Storgran, 2011)

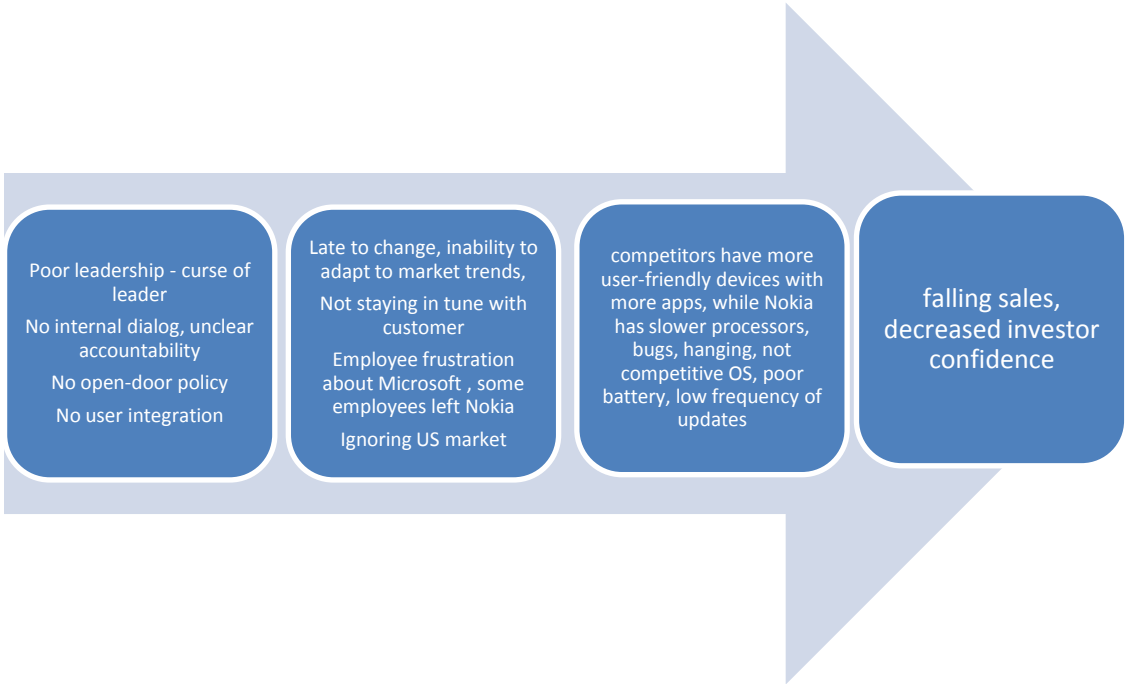

Figure 8. Sequence of reasons of Nokia losing positions (source: author, based on secondary and primary sources listed above)

4.3 Open innovation modes of Nokia, Samsung and Apple

Nokia

Open innovation modes of Nokia are presented below, with providing some company names, though it is not full list of OI modes as it is not goal of research to provide comprehensive list of alliances.

Brief description of Inbound modes

- Alliances (source: Nokia presentations)
    - Hardware –Intel, Cisco, Qualcomm, Texas Instruments, IBM, Toshiba, Siemens, Sony, Smart, KONE
    - Software–Microsoft, PayMate, Capgemini, Intuit
    - Apps –Groupon, Yahoo, Nordea, Visa, Sampo bank
    - Services–Accenture, TietoEnator, New Alliance
    - Mobile networks - Vodafone, AT&T, BT, Radiolinja, Elisa
- M&A - rather active, many deals for all years of existence, conducted with aim of buying intellectual property of acquired company (Miettinen, 2012), so acquisitions replace in-licensing which is almost not existing
- universities - more than 10 partnerships, Demola project, where Nokia still has the rights even if students elaborated some knowledge (Kutvonen, 2012)
- open source – Symbian is “father” of most OS now - Nokia’s open source had a huge impact on open source development, thought nowadays Nokia does not see open source in its nearest future (Niiranen, 2012)
- user integration – even though it is stated on Nokia site that there is some user integration and crowdsourcing, actual implementation is far from ideal (Niiranen, 2012)

- supplier integration – it is rather well implemented, and Nokia is quite harsh with them to maintain cost efficiency (Niiranen, 2012, Pellinen, 2012)

Brief description of outbound modes in Nokia

- open source – around 10 small projects, Symbian will be used for cheaper feature phones, recent projects are closed or downsized (Havukainen, 2012)
- spin-offs – popular mode among Nokia employees who establish their own company, there is an established procedure(Miettinen, 2012), supported by Nokia itself in order to generate strategic benefits
- donation - only Nokia Technopolis Innovation Mill since recently, it is a technology broker company managed by Technolopis which finds Finnish companies willing to take some Nokia's undeveloped intellectual property and develop it on their own (Roelefsen, 2012, Havukainen, 2012)
- out-licensing – reactive out-licensing mostly, with some proactive, driven by establishing standard, fuelling ecosystem or preventing competitor from developing by licensing him soon-outdated technology (Havukainen, 2012)

Apple

Apple has 15% share of smartphone market (February 2012 report of comScores)

Brief description of Inbound modes of Apple
Alliances (Apple site)

    - Hardware - Intel(chips), IBM, Foxconn and Inventec (producers in China), Motorola, Samsung (displays)
    - Software – Microsoft, Adobe
    - Mobile operators - AT&T
    - Apps –Disney and many others
- M&A (35 deals from 1988 to 2012)
- University collaboration (e.g. recent Siri project was done with 8 universities)
- User integration (small-scale)

Brief description of Outbound modes of Apple

- Out-licensing (very scarce due to long-time company policy)
- Open source (Apple had to reveal code to attract apps developers)
- Spin-offs – no
- Selling IP - no

  (sources: Mahr, 2007, Marshall, 2006, Kaiser, 2012, Greve, 2012, Sherr,2011, Patel, 2008, Gassee, 2010)

Samsung

Samsung Electronics had 24% of market share of smartphones in 2012 (comScore reports 2012)

Brief description of Inbound modes (source: Samsung site)

- Alliances:
    - Open Handset Alliance which is most famous for Android (Google, HTC, Sony, LG, T-mobile, Nvidia, Dell, Intel, Motorola, Qualcomm, Texas Instruments, etc)
    - Open Mobile Alliance which is just ensuring compatibility of mobile standards

    - Verizon and LG - on wireless Internet and high quality multi-party video conferencing
    - Compaq – hi-end processors
    - Suwon – LED displays
    - And many more
- Open source - Android
- M&A
- University collaboration
- In-licensing

Outbound

- Open source – releasing open source – Android
- Out-licensing
- Spin-offs

Comparison of smartphone industry players by open innovation application

	Alliances	Open source	User integration	University collaboration	M&A	In-licensing	Venture capital
Nokia			-				
Apple		-				-	
Samsung			-				
HTC			-				
LG			-				
Sony							
RIM			-				-

Table 6. Inbound modes of smartphone market players (source:

author) (based on press releases of Nokia, Dwan, 2004, Mishra, 2006, Lamberg, 2011, Mahr, 2007, Marshall, 2006, Kaiser, 2012, Greve, 2012, Sherr,2011, Patel, 2008, Gassee, 2010)

Table 6 shows that alliances are rather well managed in all smartphone players companies, but Apple and Samsung have most developed network and they build their competitive advantage on alliances too. Open source is well used in companies using Android, while Nokia's open source is not so well implemented. User integration is either non-existing or negligible, though publicly available information on Internet may not be most reliable source. All of companies have collaboration with universities and M&A, while in-licensing and venture capital are not widely used. Venture capital is investing in young companies to be able to control their technological path and acquire their IP if it is interesting for company, while corporate venturing, which is outbound mode, is creating new organizations under the umbrella of main company, similar to spin-offs.

So we can see that companies assign different weights to importance of inbound OI modes, for Apple alliances and networks are most important, for Android-based OEMs – open source, while other inbound OI modes are not very developed. Although having OI modes does not guarantee success, it depends on OI capabilities, such as ability to understand and integrate acquired IP, create, maintain and retain good relationship with providers of IP.

	Out-licensing	Donating	Open source	Selling IP	Spin-offs / venturing
Nokia					
Apple		-		-	-*
RIM		-		-*	-*
LG		-			-*
Samsung		-		-	
HTC		-			

Table 7. Outbound modes of smartphone market players (source: author) (based on Hillesey, 2011, Gassee, 2010, Sherr, 2011)

* - company had plans to do this but still have not done it

Table 7 shows that outbound modes are relatively poorer presented in these companies compared to inbound modes, open source is most developed mode here. Open source can be both inbound (using open source) and outbound (e.g. revealing code to attract apps developers). Donating and selling IP are almost non-existing, as well as spin-offs and venturing.

4.4 Improvement of open innovation processes

In current work not all inbound and outbound modes processes are considered, as some of them are well implemented in business life and well covered in literature, while some of modes are not that developed. Open innovation is a new concept but it unites existing ways of doing business with new motives, e.g. out-licensing existed long ago - Procter&Gamble started it in 1970s (Huston et al., 2003), but only this decade companies started to out-license proactively as a good source of revenue and strategic benefits, to establish industry standard or maintain ecosystem. Literature review suggests that outbound modes are relatively undercovered compared to inbound modes (Lichtenthaler, 2008). Among outbound modes technology transfer is more novel and hence less covered than spin-offs and venturing. That is **why** author pays **more attention to outbound modes**, technology transfer in particular. Moreover, **first part of case study suggests that technology transfer in Nokia is one of least developed open innovation modes**, unlike spin-offs and inbound modes, therefore technology transfer modes will be analysed in more detail

Technology transfer consists of out-licensing, donating and selling intellectual property, but author will not consider selling IP as it is very similar to out-licensing, while out-licensing will be divided into proactive and reactive, as they are different

Inbound modes are well presented in both business life and academic literature – alliances, collaborative knowledge creation, users and supplier integration exist long time. University collaboration has very extensive history, but nowadays this collaboration should be deeper and more large-scale. Although there is general issue for all inbound modes – how to evaluate all incoming ideas and even though there is plenty of literature on this topic, it is still unresolved matter as the way it is done

depends on company specifics, culture, strategy, so in every case it is different. Given the abundant literature on the topic, it is easy to compile to-be model according to best practices and then compare to case company evaluation process. **Even though evaluation of incoming ideas does not directly concern open innovation, it does concern indirectly – evaluation is aimed at cutting off ideas, while inbound OI is aimed at attracting as much ideas as possible, so they should be reconciled**, - evaluation framework should be constructed with open innovation bearing in mind.

So evaluation process improvement of inward idea flow stands for improvement of inbound OI, while processes of inbound modes of OI are not considered as they are rather established.

Therefore author suggests to-bemodels of out-licensing, donating and selling intellectual property, as well as to-bemodel of incoming ideas evaluation process.

Outbound modes	Proactive out-licensing
	Reactive out-licensing
	Donating IP
	Selling IP
Inbound OI	Evaluation of inward idea flow

Table 8. Plan of to-be and as-is models (source: author)

4.4.1 Open innovation processes (to-be models)

This chapter presents to-be models of few open innovation processes. Figures are inserted in this chapter, but they are as well presented in Appendix 2 as it may be hard to read small font

Proactive out-licensing to-be

1. Adopt corporate culture welcoming outbound open innovation with proper understanding of risks and benefits, make sure personnel is supportive
2. Assign person/people responsible for proactive out-licensing and ensure his/her connection to company's technology experts
3. Check intellectual property portfolio whether there is unused IP, IP which would bring more benefits than risks if transferred outside and IP which would bring only benefits in case of establishing industry standard or making competitors use outdated technology
4. Think who could be interested in this IP
5. Find some interested party through networks or technology brokers (e.g. websites)
6. If through networks – direct contact
7. If though technology broker – pay him fee and contact
8. Discuss technology transfer with client
9. Evaluate technology internally in order to assign licensing fee
10. Make an agreement stating IP rights and possible limitations of usage, as well as sanctions for breaking the contract
11. Think/plan how to embed this IP into buyer's business, help to integrate it in the beginning and later during adoption because it is in company's own interests to bring maximal value so that client

makes full use of IP and maybe creates some benefits for source company

12. Maybe enjoy results such as cash inflow, technology spillover from client company, enrichment of company's ecosystem

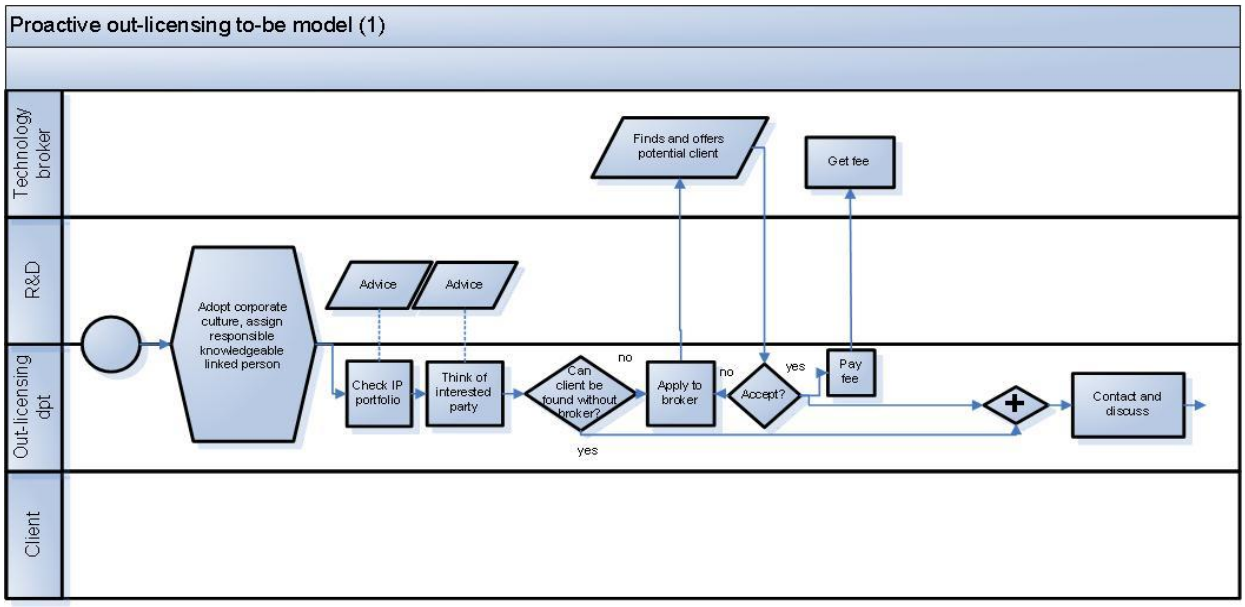

Figure 9. Proactive out-licensing to-be model (1) (source: author, based on literature review, Lichtenthaler, 2003, Lichtenthaler, 2007, Kutvonen, 2010) (see Appendix 2 for larger font, same applies for the rest of figures)

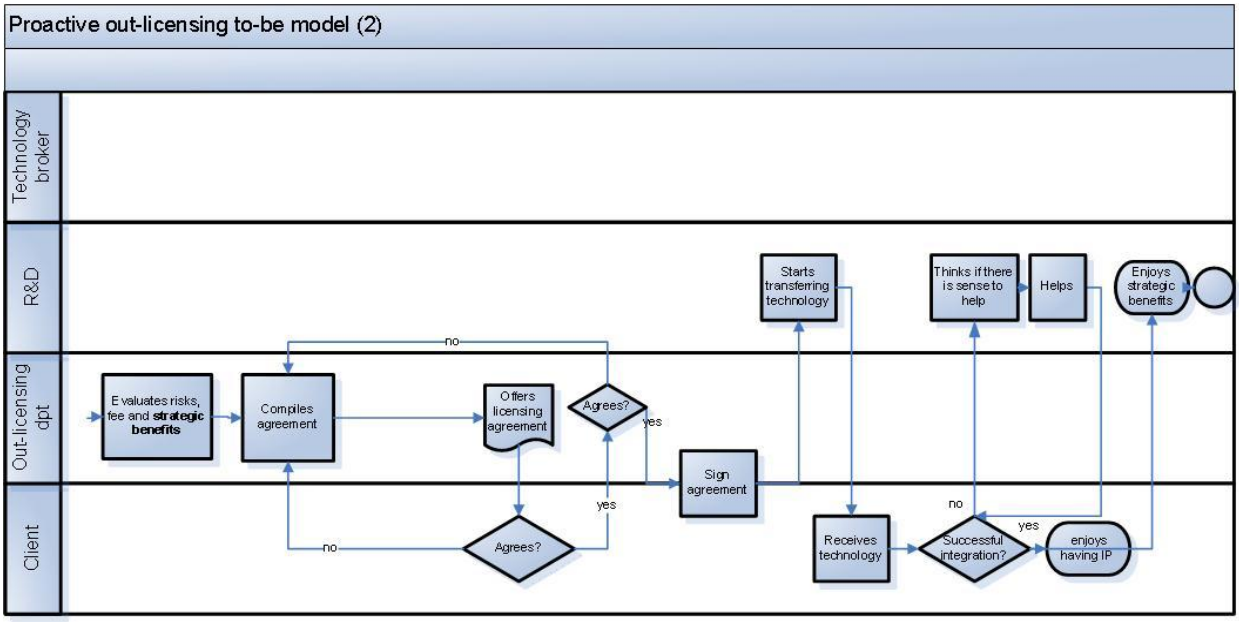

Figure 10. Proactive out-licensing to-be model (2) (source: author, based on literature review, Lichtenthaler, 2003, Lichtenthaler, 2007, Kutvonen, 2010)

Reactive out-licensing to-be

1. Assign person/people responsible for reactive out-licensing and ensure his/her connection to company's technology experts
2. When some company asks for some technology, evaluate risks of diluting competitive advantage in case of leakage and probability of leakage
3. Check whether this technology is very important IP by contacting technology expert and whether it is better not to out-license it.
4. Make an agreement stating IP rights and possible limitations of usage, as well as sanctions for breaking the contract
5. If client company needs help and source company is ready to spend some resources on that – then help

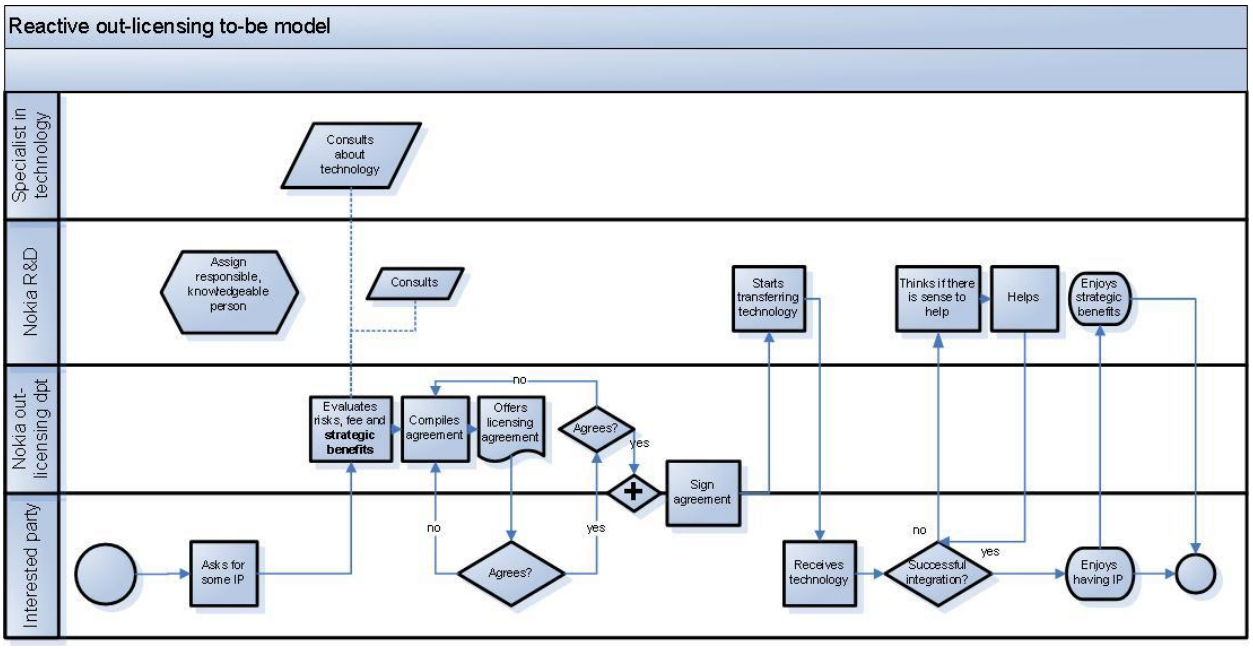

Figure 11. Reactive out-licensing to-be model (source: author, based on literature review, e.g. Lichtenthaler, 2003, Lichtenthaler, 2007, Kutvonen, 2010)

Donating to-be

1. Adopt corporate culture welcoming outbound open innovation with proper understanding of risks and benefits, make sure personnel is supportive
2. Assign person/people responsible for IP donating and ensure his/her connection to internal and external technology experts and open innovation community
3. Check intellectual property portfolio whether there is unused IP, IP which would bring more benefits than risks if donated and IP which would bring only benefits
4. Think who could be interested in this IP
5. Find some interested party through networks or technology brokers (e.g. websites)

6. If through networks – direct contact
7. If though technology broker – pay him fee and contact
8. Discuss technology donation with client
9. Evaluate technology internally in order to outline mutual benefits
10. Make an agreement stating IP rights and possible limitations of usage, as well as sanctions for breaking the contract
11. Think/plan how to embed this IP into buyer's business, help to integrate it in the beginning and later during adoption because it is in company's own interests to bring maximal value so that client makes full use of IP and maybe creates some benefits for source company
12. Maybe enjoy results such as technology spillover from client company, enrichment of company's ecosystem and reputation boost as technology leader with open mindset

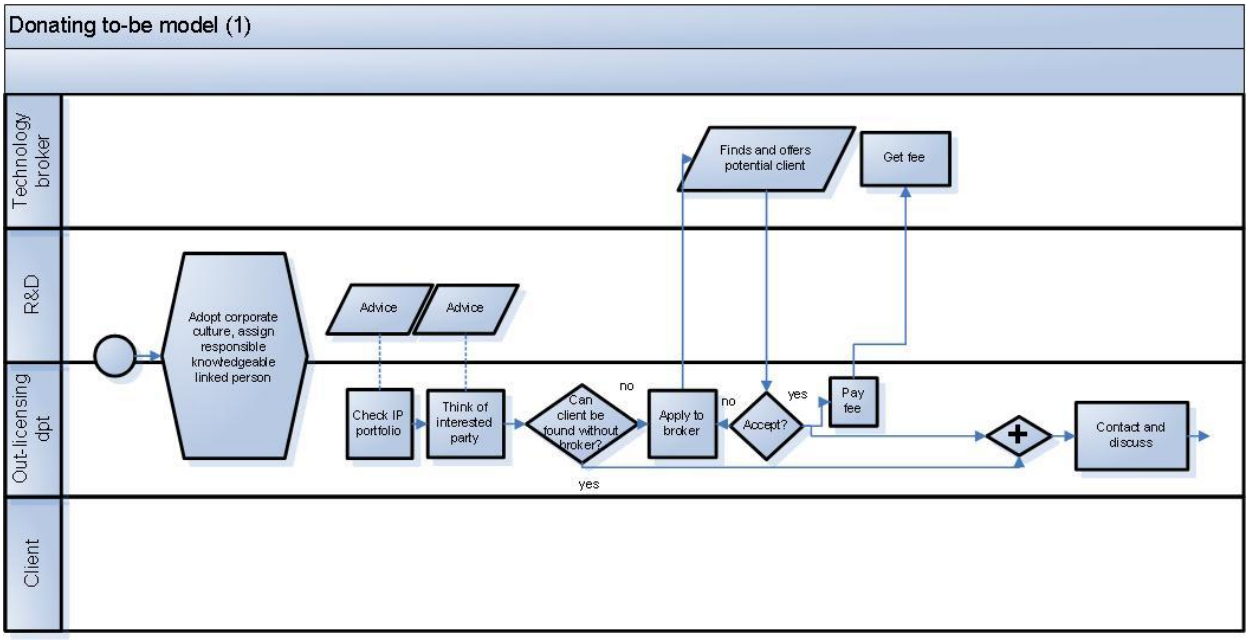

Figure 12. Donating to-be model (1) (source: author, based on literature review and Roelefsen, 2012)

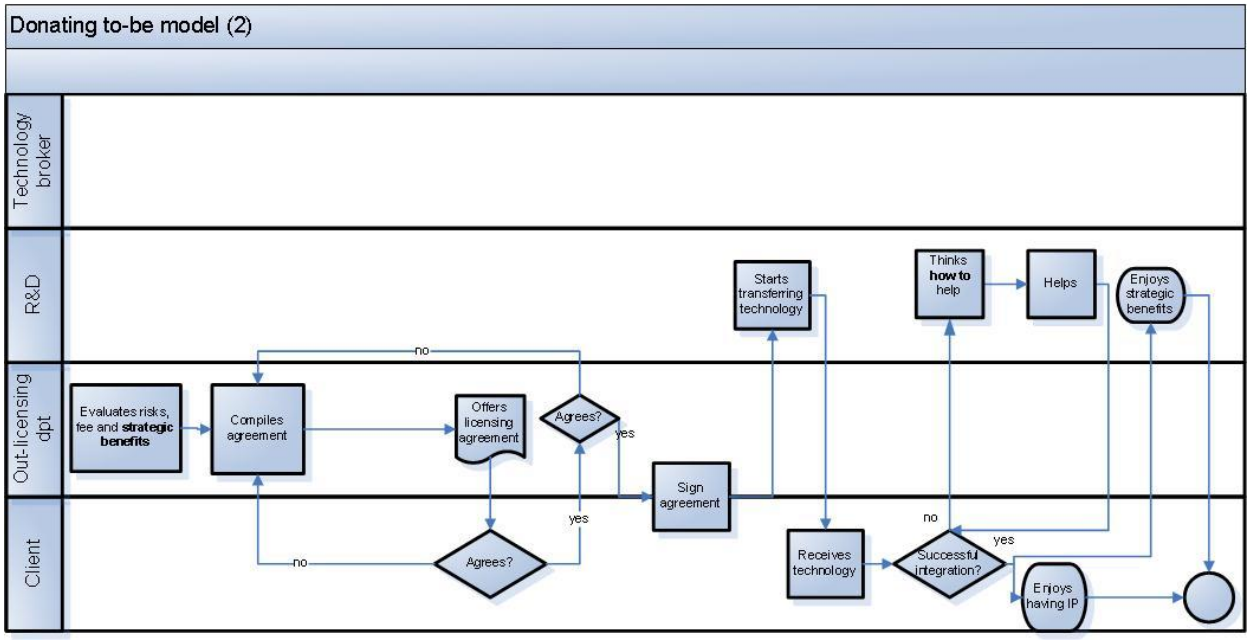

Figure 13. Donating to-be model (2) (source: author, based on literature review and Roelefsen, 2012)

Evaluation to-be

1. Ensure maximally possible idea inflow from various sources (all inbound modes), really concentrate on attracting as many as possible ideas, and spend same efforts on that as on cutting ideas off
2. Be both short-term and long-term oriented, both on incremental and radical innovations in evaluation and ensure different backgrounds of people who evaluate
3. Evaluate market potential (size of market, competition level, timing), value proposition of technology/idea, person/people who offered the idea (knowledge, teamworking skills), resources needed to develop the technology (money and complementary knowledge), strategic fit, evaluate always case by case

4. Do evaluation regularly to weed out unpromising ideas, put them on hold/waste and to re-allocate resources to more promising ones

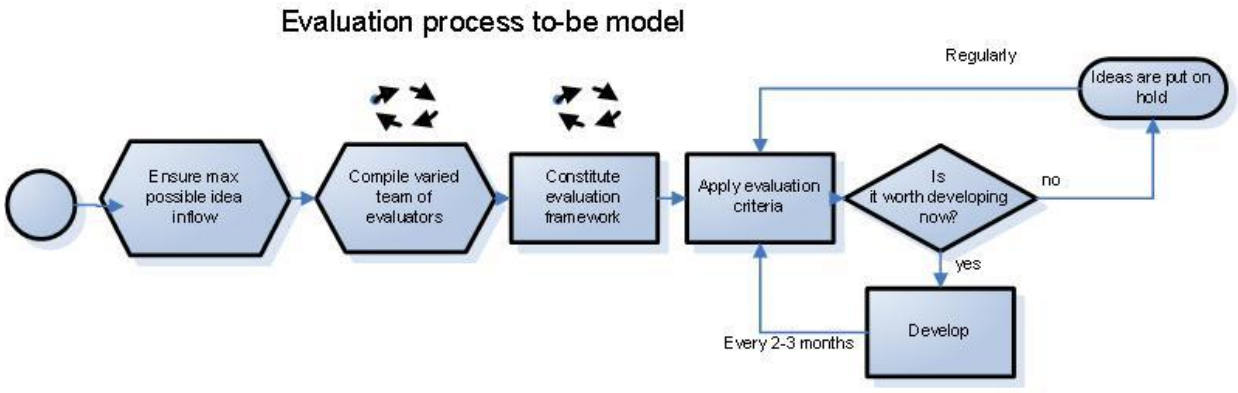

Figure 14. Evaluation process to-be model (source: author, based on literature review, e.g. Tzokas, 2004, Schmidt, 2009, Ronkainen,1985, Rochford, 1991, Lucas, 1988)

4.4.2. Open innovation processes in case company (as-is models)

Proactive out-licensing as-is

1. Understand need for establishing standard or prevent competitors from growing by licensing them outdated technologies
2. Find possible licensees
3. Make a contract
4. Benefit from spread industry standard and lagging competitors

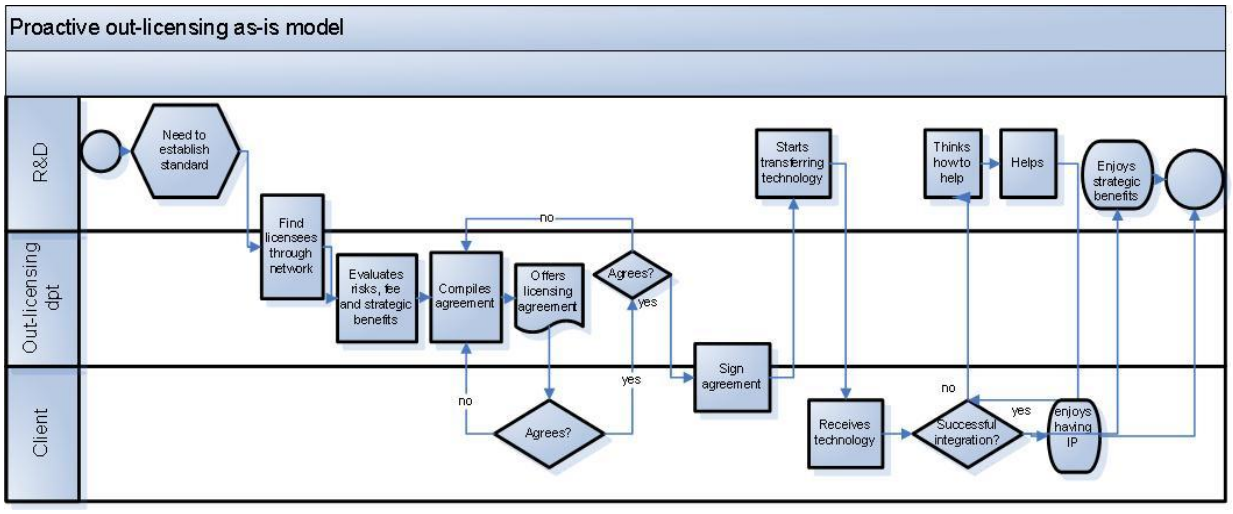

Figure 15.Proactive out-licensing as-is model (source: author, based on Havukainen, 2012)

Reactive out-licensing as-is

1. Nokia asks supplier to develop something
2. Supplier asks for technology needed to develop it
3. Nokia out-licensing department checks importance of technology, whether it is trade secret, they assign price tag
4. They make contract

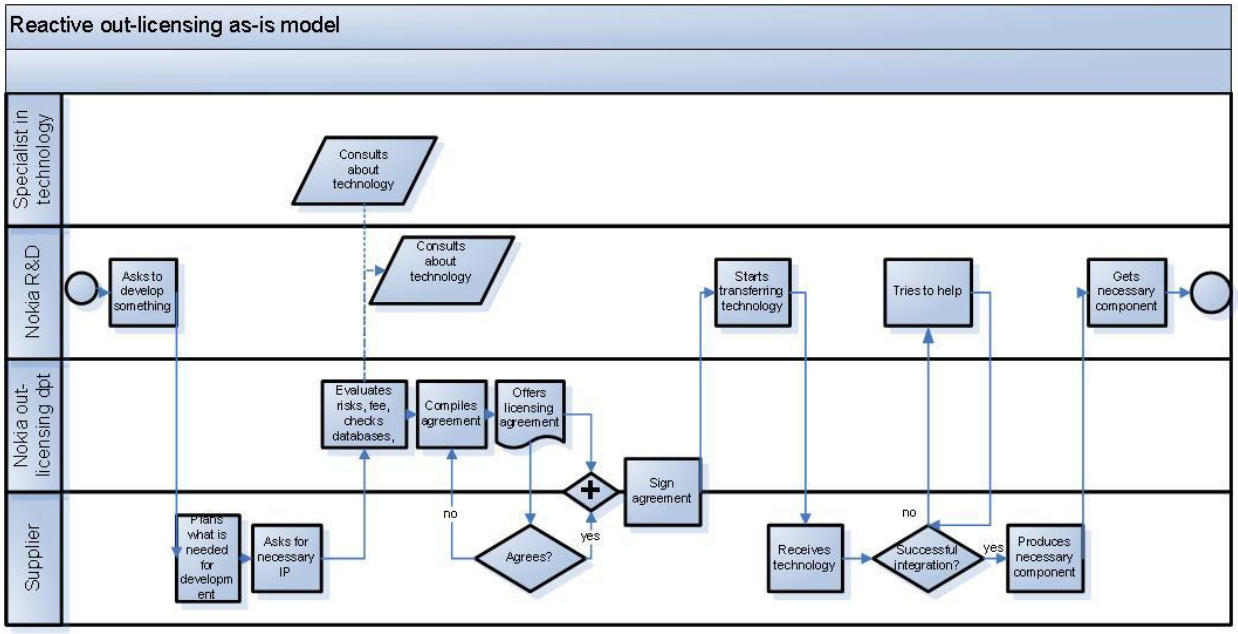

Figure 16. Reactive out-licensing as-is model (source: author, based on Havukainen, 2012)

Donating as-is

1. Check IP portfolio for IP which is unused for years and never will be used inside Nokia
2. Offer them to specially established Nokia Technopolis Innovation Mill to Finnish companies
3. Interested companies make a contract about limitations of usage and IP rights
4. IP is transferred, maybe Nokia supports it somehow, maybe not, but it wants to benefit from donating by enriching ecosystem and enjoying spillovers

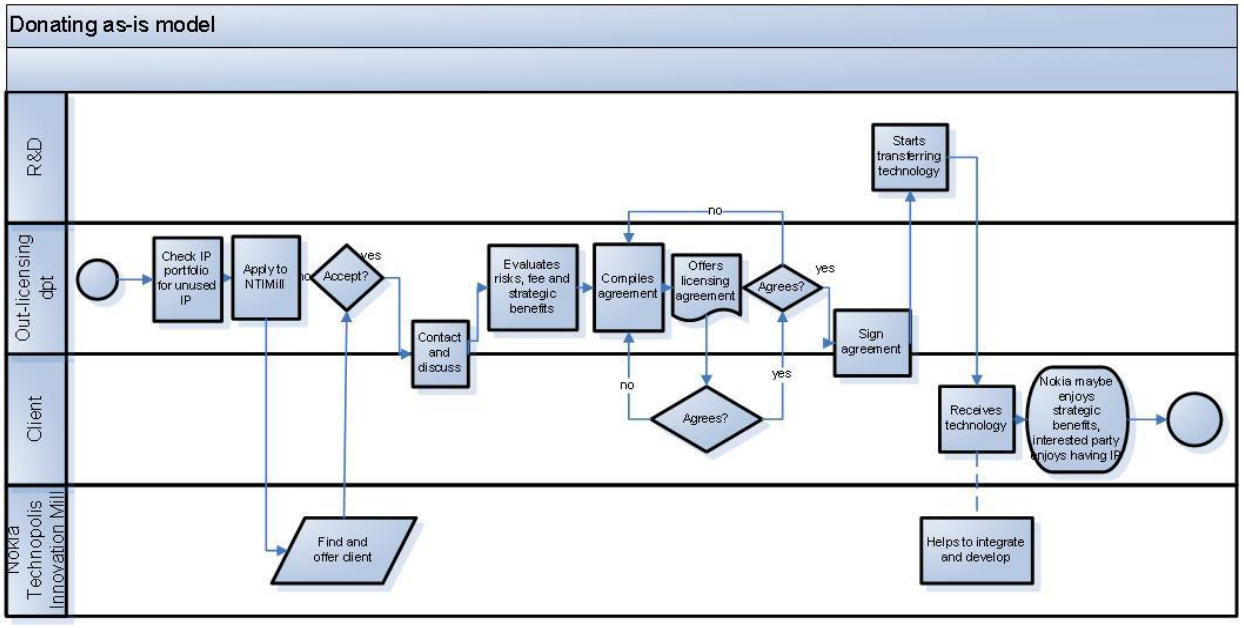

Figure 17. Donating as-is model (source: author, based on Havukainen, 2012)

Evaluation as-is

1. Collect ideas from universities, suppliers, users, internal R&D department, alliances
2. Ideas undergo very strict evaluation aiming at radical innovations only, with 10-12 projects a year.
3. Evaluate firstly market potential (size of market, competition level, timing), value proposition of technology/idea, resources needed to develop the technology (money and complementary knowledge), person/people who offered the idea (knowledge, teamworking skills, but it is secondary as Nokia can hire anyone to develop the idea), strategic fit, evaluate always case by case
4. Do evaluation every 3 months to weed out unpromising ideas, put them on hold and re-allocate resources to more promising ones
5. Promising but not fitting to strategy or resources ideas may continue life in spin-offs

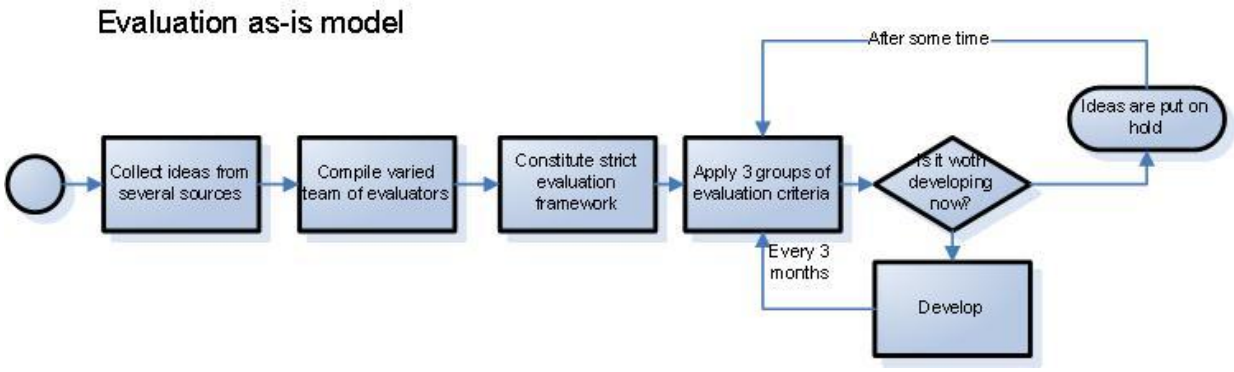

Figure 18. Evaluation as-is model (source: author, based on Miettinen, 2012)

5. Analysis of results

Analysis of proactive out-licensing

	To-be	As-is
Adopt culture	+	-
Understand all strategic benefits	+	Not all
Proactively check IP portfolio	+	-
Use technology broker	+	-

Table 9. Analysis of proactive out-licensing (source: author)

Table 9 shows that as-is model is very far from to-be model, so these 4 points (adopt culture, understand all strategic benefits, proactively check IP portfolio and use technology broker to widen possible choice of partners) should be improved, and all of these points are executable. The only problem from resource-based view is that it should be done by top-managers, but they might share the understanding of value of open innovation, so first they need to educate themselves, which is hard given workload of operational issues.

Analysis of reactive out-licensing

	To-be	As-is
Thinkabout strategic benefits	+	+

Help with transferring	+	-+

Table 10. Analysis of reactive out-licensing (source: author)

Table 10 shows that reactive out-licensing in case company is rather well executed, only offer is to help with transferring technologies more, which may be difficult from resource-based view due to limited amount of qualified specialists free from operational workload.

Analysis of donating IP

	To-be	As-is
Adopt culture	+	-
Understand all strategic benefits	+	- +
Proactively check IP portfolio	+	-
Use technology broker	+	Only one

Table 11. Analysis of donating IP (source: author)

Table 11 shows that donating IP leaves much to be desired. We can see that donating IP is very similar to proactive out-licensing, because they share similar motives. These 4 points (adopt culture, understand all strategic benefits, proactively check IP portfolio and use technology broker to widen possible choice of partners) should be improved, and all of these points are executable. Although here it is even harder to approach to-be model as benefits from donating might be less visible and

understandable than in proactive out-licensing, and top-managers need to initiate corporate culture change, which is enormous task, as many people need to be convinced of benefits.

Analysis of evaluation of inward idea flow

	To-be	As-is
Ensure max possible idea inflow	+	-
Regularly review evaluation framework	+	-+
Apply variety of evaluation criteria	+	+
Allow not fitting ideas to live	+	-+
Be ambidextrous in evaluation	+	-+

Table 12. Analysis of evaluation of inward idea flow (source: author)

Table 12 shows that evaluation of inward idea is flow is close to ideal, except for couple of issues. Nokia does not review evaluation framework regularly, but evaluation is always case by case, meaning that even though there is list of criteria, it is more guidance than requirement (Miettinen, 2012). Another point is that evaluation framework is rather strict

Allow not fitting ideas to live = help them develop in spin-offs or donating them or deciding to spend some resources on them and then sell or out-license

Ambidextrous= both radical and incremental, balancing between cutting bad ideas and not cutting good, (preventing false positives going further and false negatives to be cut off)

OI capabilities

Capabilities	To-be	As-is
Inventive	+	+
Absorptive	+	-
Transformative	+	+-
Connective	+	-+
Innovative	+	-
Desorptive	+	-

Table 13. OI capabilities comparison (source: author, based on analysis of primary and secondary data)

Table 13 shows that Nokia's OI capabilities are quite far from ideal, and this is real problem, because it is easier to have more OI modes, but that

would not lead to success as OI capabilities are harder and longer to change.

6. Conclusion

Objective of research was to offer improvements of open innovation processes. **Relevance of research question** ('How to improve open innovation processes?') is based on theoretical evidence of importance of open innovation to firm's performance, and empirical evidence of importance of open innovation, especially for smartphone industry and case company in particular. Research was conducted using qualitative method with 11 interviews, including 2 Nokia senior managers.

Open innovation changes innovation management, with many companies becoming open to worldwide markets for technology. Inbound modes of open innovation are more discussed in literature and better applied in business life, while benefits from outbound modes are less visible and understandable.

Looking at current mobile phone market, we can say that it is converging, thanks to open source, and applying open innovation principles is becoming essential for companies, and those who ignore, e.g. user integration like Nokia, will reap their results. Author does not invite all companies to have all open innovation modes as it is possible to succeed without all of them (like Apple without technology transfer at all), but we do put accent on developing open innovation capabilities.

A very good reason for open innovation is that nowadays there is obvious need for innovative products – hence more quality ideas are needed, and companies understand that it becomes increasingly difficult to deal with it by themselves. Collecting as much ideas as possible could be achieved using only internal resources but easier done using external too. Integrating users is nowadays not proud thing to do but necessity, as well as properly managing networks.

With due attention outbound open innovation modes can bring

substantial benefits – monetary and strategic, e.g. preventing competitor from developing by licensing soon-outdated technology for him or establishing dominant design or industry standard. Out-licensing, donating, selling IP and open source – that is technology transfer – enriches ecosystem by allowing other parties to create new knowledge on basis of transferred technology and allows to benefit from indirect sources, like advertising money from open platform and controlling large share of market, like Google wants to benefit from Android. Open source can be inbound and outbound depending is company using it or sharing it. Open source is still not well understood topic, and mechanisms of extracting profits from it is unclear too, but for sure companies who use open source and do not invest there as much as originator (like Google), can benefit very well (like Samsung using Google's Android).

Inbound modes are more developed and generally companies understand the value of inbound modes – alliances became popular and essential for every company years ago. Although several modes still require development, such as university collaboration, user and supplier integration, as companies still do not pay enough attention to them.

What is overlooked in literature and in companies trying to benefit from open innovation - open innovation capabilities. Company may have all inbound and outbound modes, but still unable to integrate and get use of ideas from there. Companies that want to have sustainable competitive advantage utilizing open innovation principles, should have several capabilities such as ability to connect to knowledge sources and keep them, retain knowledge, find markets for products and intellectual property, to transfer knowledge and to integrate it. One of greatest capabilities is ability to create welcoming atmosphere, culture inside company and visible to outside, reputation of Open company, so that employees are more motivated, outer people are willing to participate in crowdsourcing, networks are easier managed, start-ups apply for funding

and attention due to reputational effects and bargaining power. In open innovation reputation is crucial, so it makes sense to invest in small companies, support them, donate patents, and reputation will pay off. Cultural change should be done upside-down – it is top management problem to bring understanding of open innovation, its risks and benefits.

To sum up, author **recommends** Nokia to educate managers on open innovation benefits and risks, to enlarge the scale of application of user integration, technology transfer and collaborative co-creation in general, which is linked with developing open innovation capabilities - most of them should be developed, including building reputation and corporate culture.

Results of current work are 4 To-be models (how OI should be done) based on literature review and primary data and 4 As-is models (how OI actually is implemented) based on primary data from case company, and resulting recommendations how to improve open innovation processes in case company. Just 4 because those modes were outlined as weakest in case company in current research and hence needing more attention.

Managerial outcome is both practical and theoretical: constructing and analyzing to-be and as-is models of few OI modes, giving insight on open innovation practices in one of most innovative companies in the world, recommendations for case company, which will be presented to company managers – for practical contribution, while for theoretical – enriching open innovation literature by analyzing and offering business process improvement for few open innovation processes, and some market research of smartphone market.

Current work has some **limitations** such as analyzing deeply only few open innovation modes and not developing extremely important concept of open innovation capabilities.

As for ideas for **further research**, it would make sense to construct and compare to-be and as-is models for all open innovation modes of some company, with deeper analysis. Another idea is to dip into open innovation capabilities of some case company and to explore their importance and ways of development.

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Interviews (2012):

Antero Kutvonen
Timo Miettinen
Kai Havukainen
Jukka Niiranen
Antti Pellinen
Lari Aro
Alexander Bekhterev
Vyacheslav Kuznetsov
Nikolai Semenov
Julia Roelefsen
Timo Santalainen

Appendix 1. Qustionnaires for interviews

Interview with Kai Havukainen:

How out-licensing is done in Nokia?
What are Nokia's motives for conducting out-licensing, donating, spin-offs?
What is scale of out-licensing, donating, spin-offs, cross-licensing? (negligible or significant?)
Who decides what to out-license and donate? when it happens, on what stage of product development?
How many people work in out-licensing?
How buyers/licensees are found? any Internet platform?
Who does the valuation of technology for out-licensing? and how?
What are criteria for IP intended for out-licensing and donating?
How many % of own IP is used in Nokia?
How much % of revenue out-licensing brings?
Is there "after-sale" service for those companies who bought/in-licensed Nokia's IP? Helping to integrate, counselling?
Has Nokia dealt with any negative consequences of out-licensing?
Is there any other donating except for Nokia Technopolis Innovation Mill?
How do you estimate future of Symbian?
As MeeGo is terminated now, are there any other open source projects?
How donating IP is organized in Nokia Technopolis Innovation Mill?

Interview with Timo Miettinen:

How ideas are evaluated in Nokia?
How many projects are given green light annually?
What are criteria of evaluation?
Is there any difference of evaluating internal R&D ideas and external

ideas?
How would you range criteria by importance?
How many people evaluate and how often?
Is there regular re-evaluation?
Is evaluation framework rigid?

Interview with Jukka Niiranen and Antti Pellinen:

Why Nokia is losing market share?
How would you estimate future of open source in Nokia? Is it possible to upgrade Symbian to competitive level? Is it possible to combine 3 platforms to diversify? How to differentiate from competitors?
How would you divide users who need apps, music and fun in smartphone and users who need majorly phone itself and maybe Internet?
How do you see future of Nokia? Do you have any idea how it can regain positions?
How Nokia treats its suppliers?
Is there any user integration?
How do you see future of Android and Apple?
What technologies will be soon in smartphones?
How do you estimate partnership with Microsoft?

Interview with Timo Santalainen:

What are open innovation modes in Nokia? How well they are implemented?
Did lack of open innovation application affect losing market share?
Will open innovation help Nokia regain its positions?
How do you estimate partnership with Microsoft?
Is Nokia going to be more ‘open’?

Do top-managers of Nokia understand the need for open innovation?

Interview with Julia Roelefsen:

How donating IP is organized in Nokia Technopolis Innovation Mill?
What are criteria of picking ideas for a company, for business incubator, for TEKES-funded organizations?
What are common mistakes in evaluating ideas?
What you can say about Nokia's open innovation implementation?

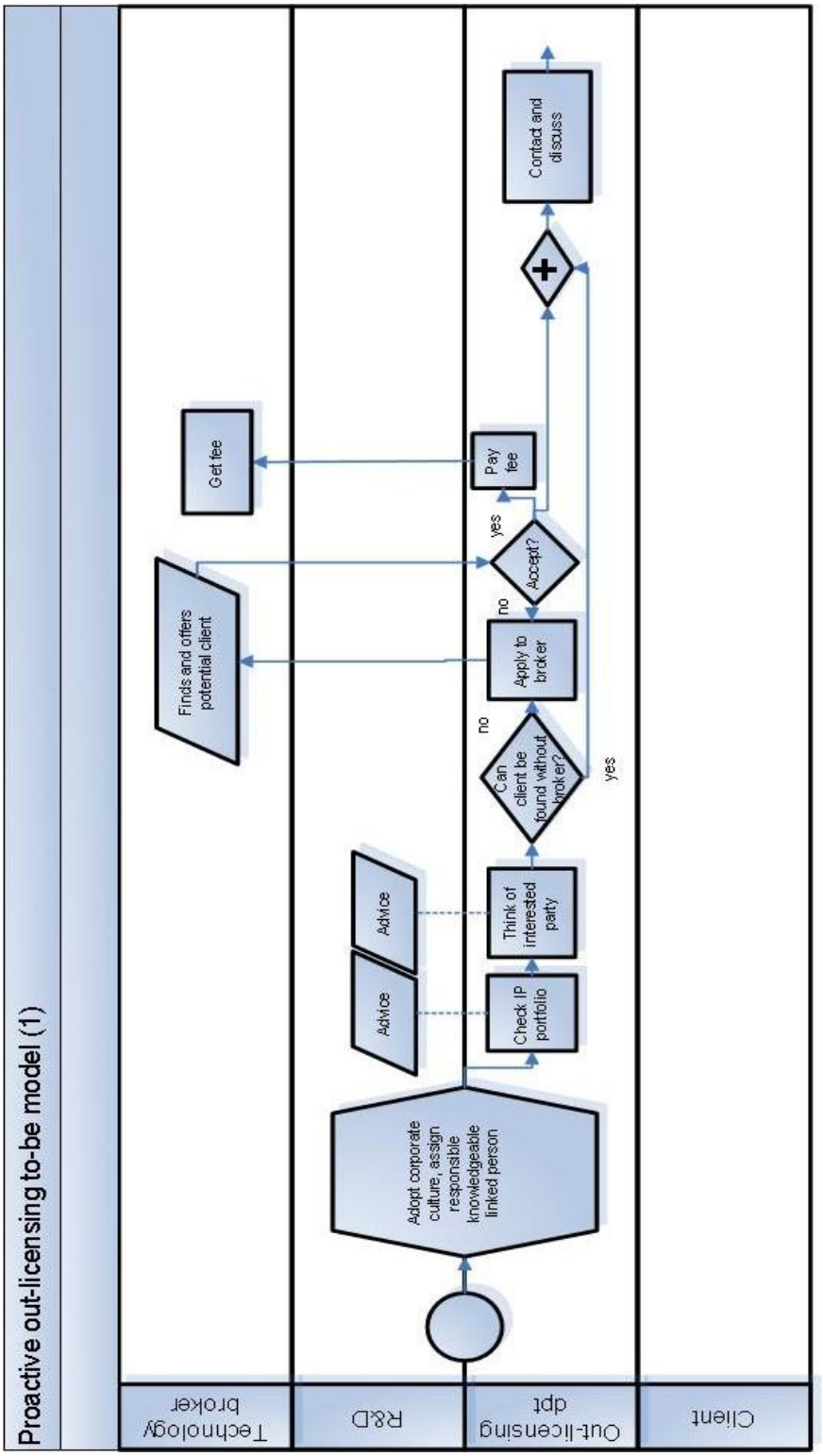
Interview with Nikolai Semenov, Alexander Bekhterev and Vyacheslav Kuznetsov:

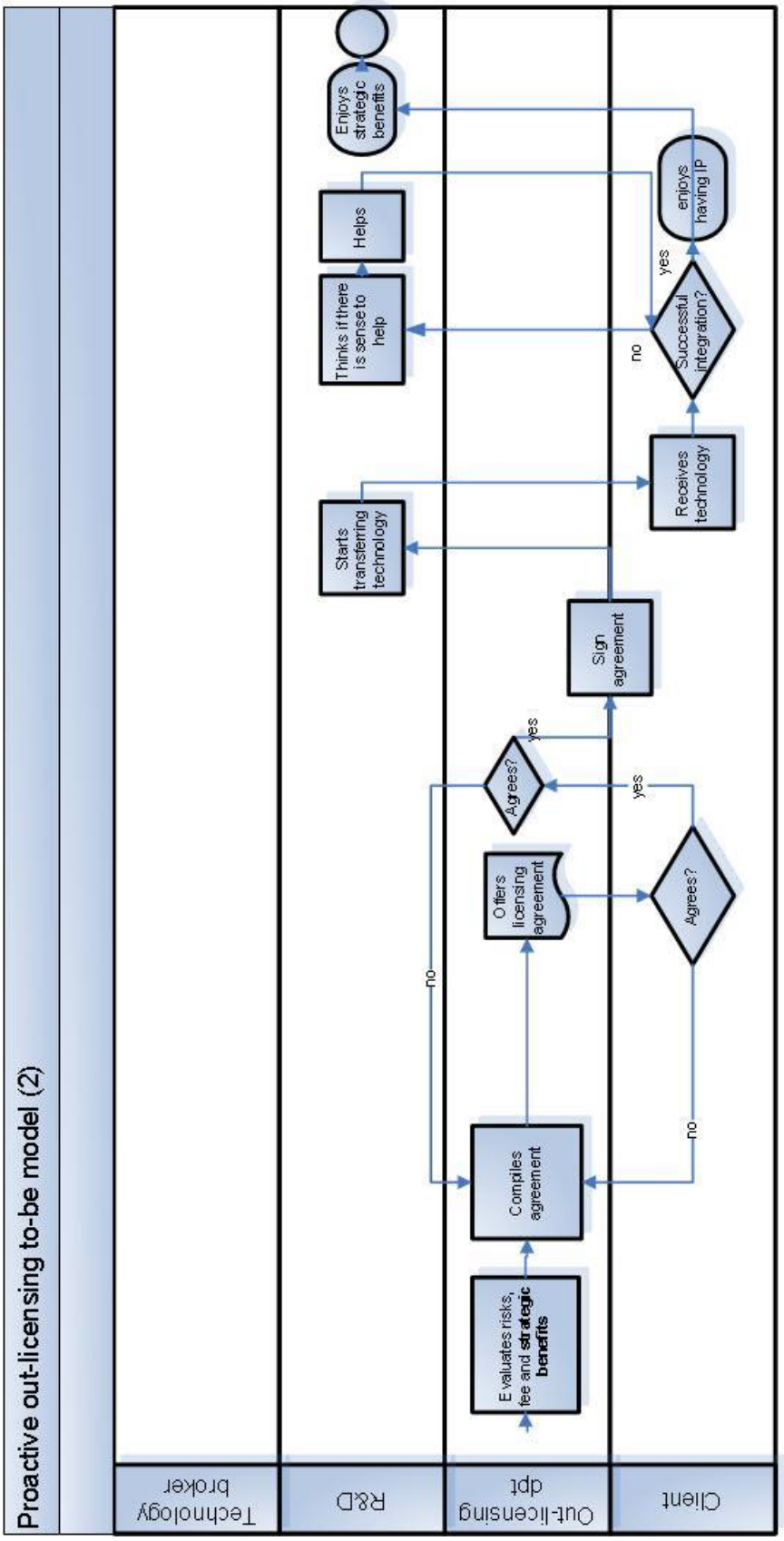
How companies profit from open source?
Why Nokia failed to benefit from open source?
How Nokia treats its suppliers and subcontractors?
Can Nokia have 3 platforms? Can Nokia have Android? Which platform is easier to deal with from subcontractor's point of view?
What is the future of Nokia in technological path?

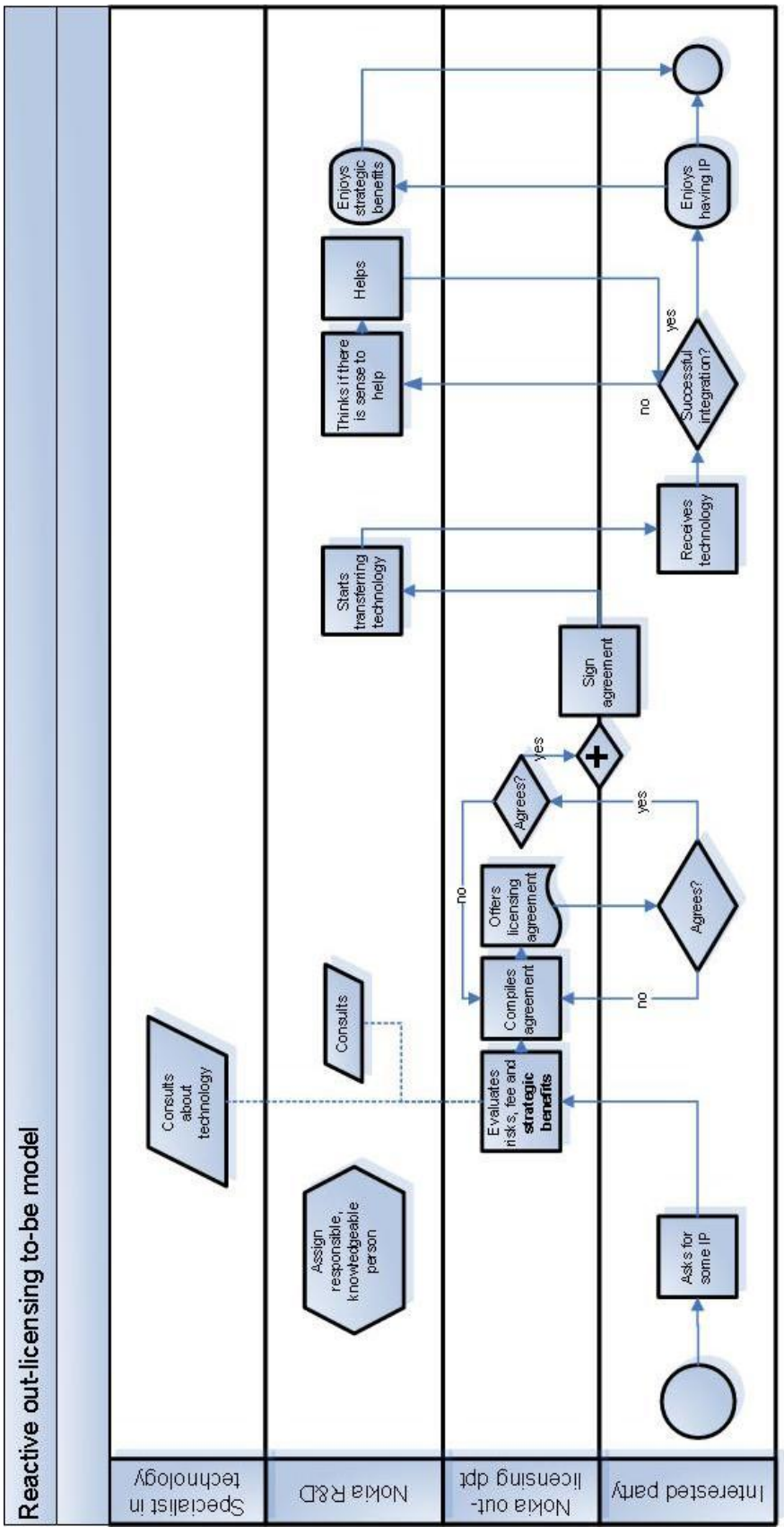
Interview with Lari Aro:

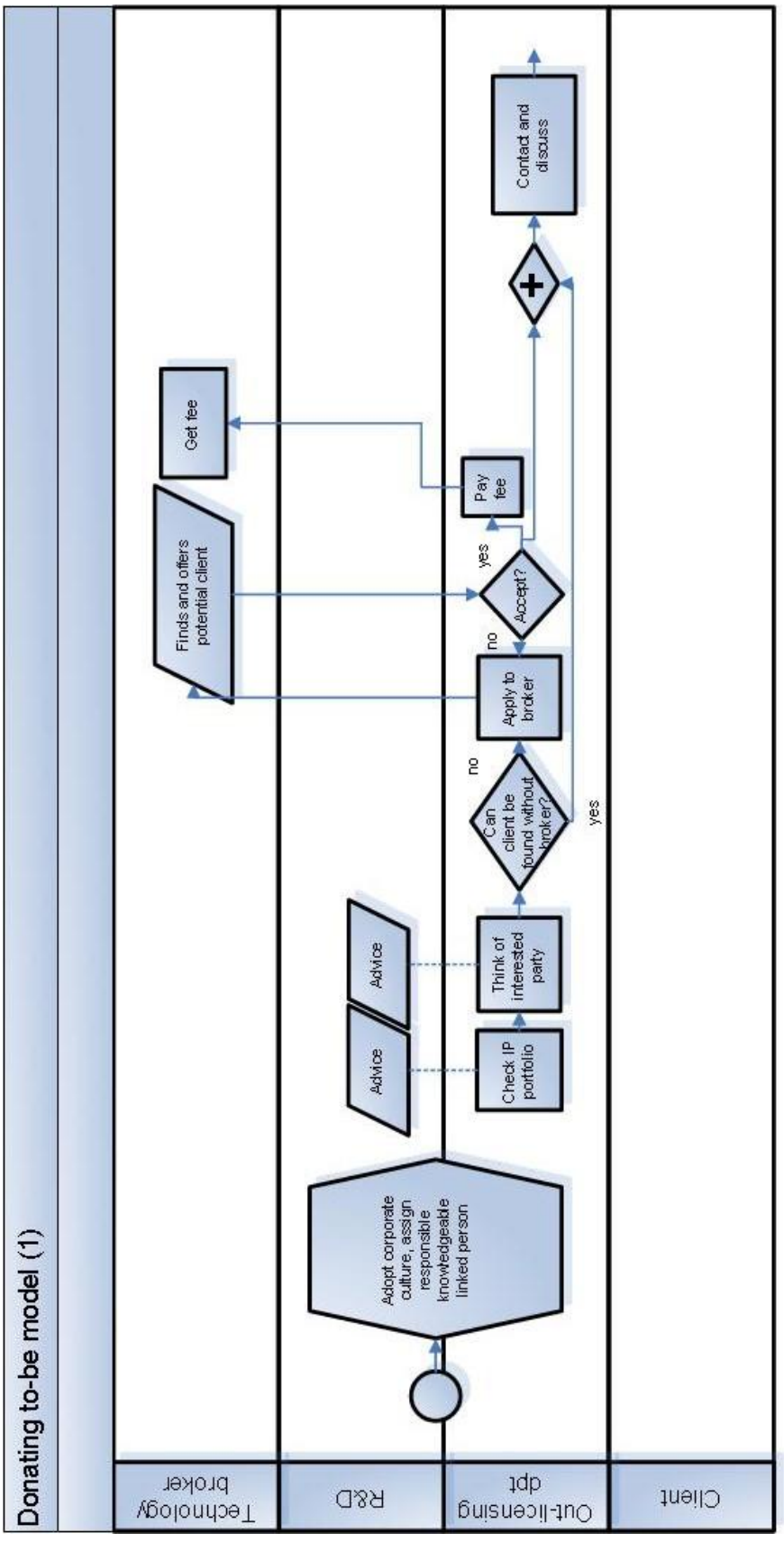
What are reasons of Nokia losing market share?
Why users switch to Nokia's competitors? What is better there?
What is wrong technically with Nokia smartphones?
What you, as life-long user of Nokias, like and dislike in Nokia phones?
How would you offer Nokia to regain positions? Is there even chance of it?
How do you estimate partnership with Microsoft?
Is brand loyalty for Nokia in Finland really high?

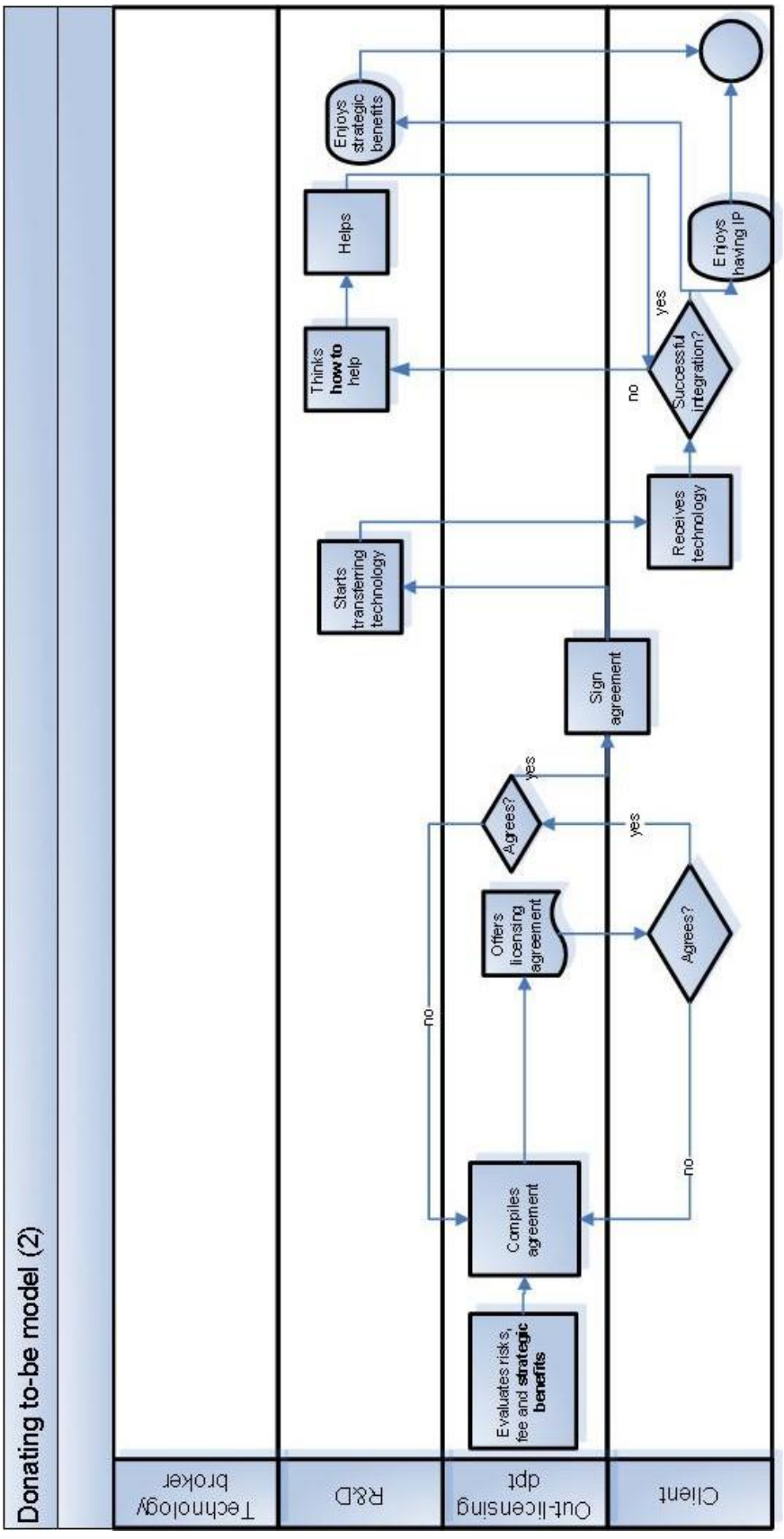
Appendix 2. Figures of to-be and as-is models (as they appear in paper)

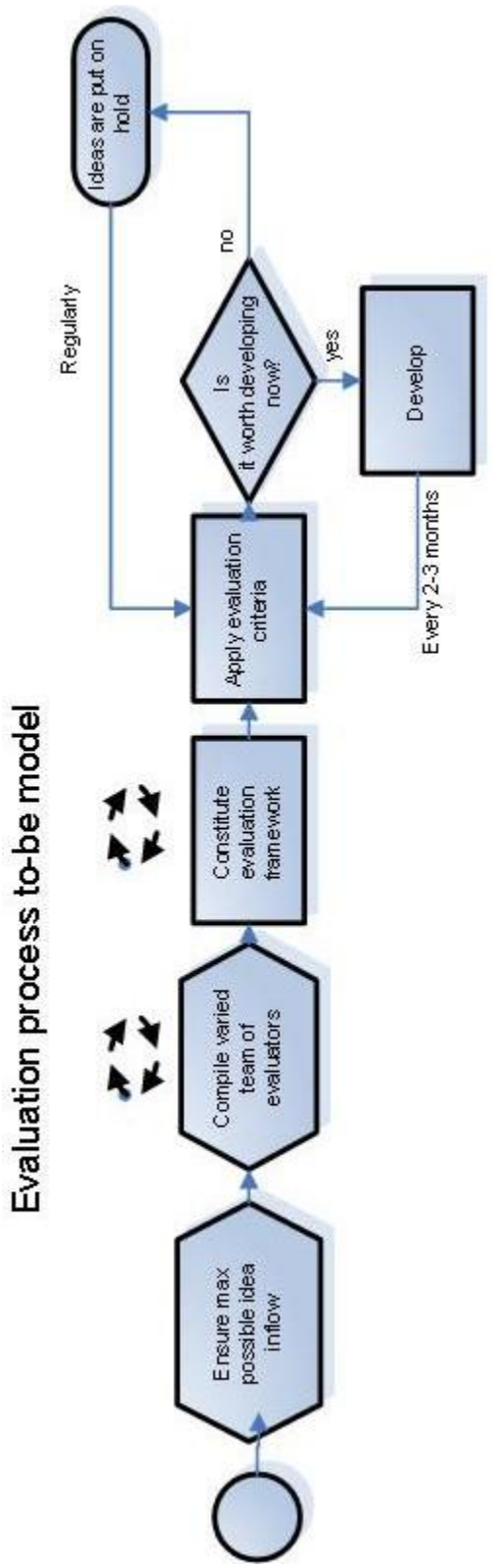


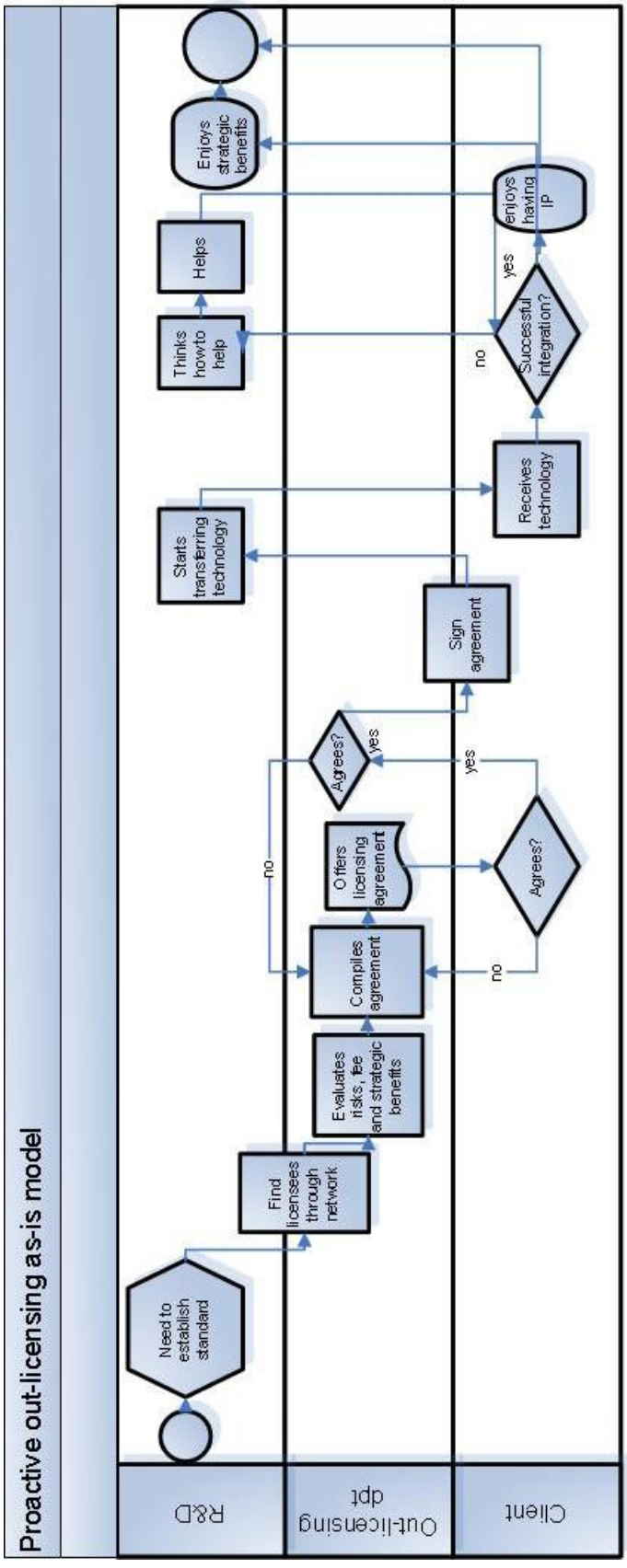

Proactive out-licensing to-be model (2)
Technology broker
R&D
Out-licensing dpt
Client
Enjoys strategic benefits
Helps
Thinks if there is sense to help
Starts transferring technology
Receives technology
enjoys having IP
Successful integration?
yes
no
Sign agreement
Agrees?
yes
Offers licensing agreement
Agrees?
yes
no
Compiles agreement
no
Evaluates risks, fee and strategic benefits

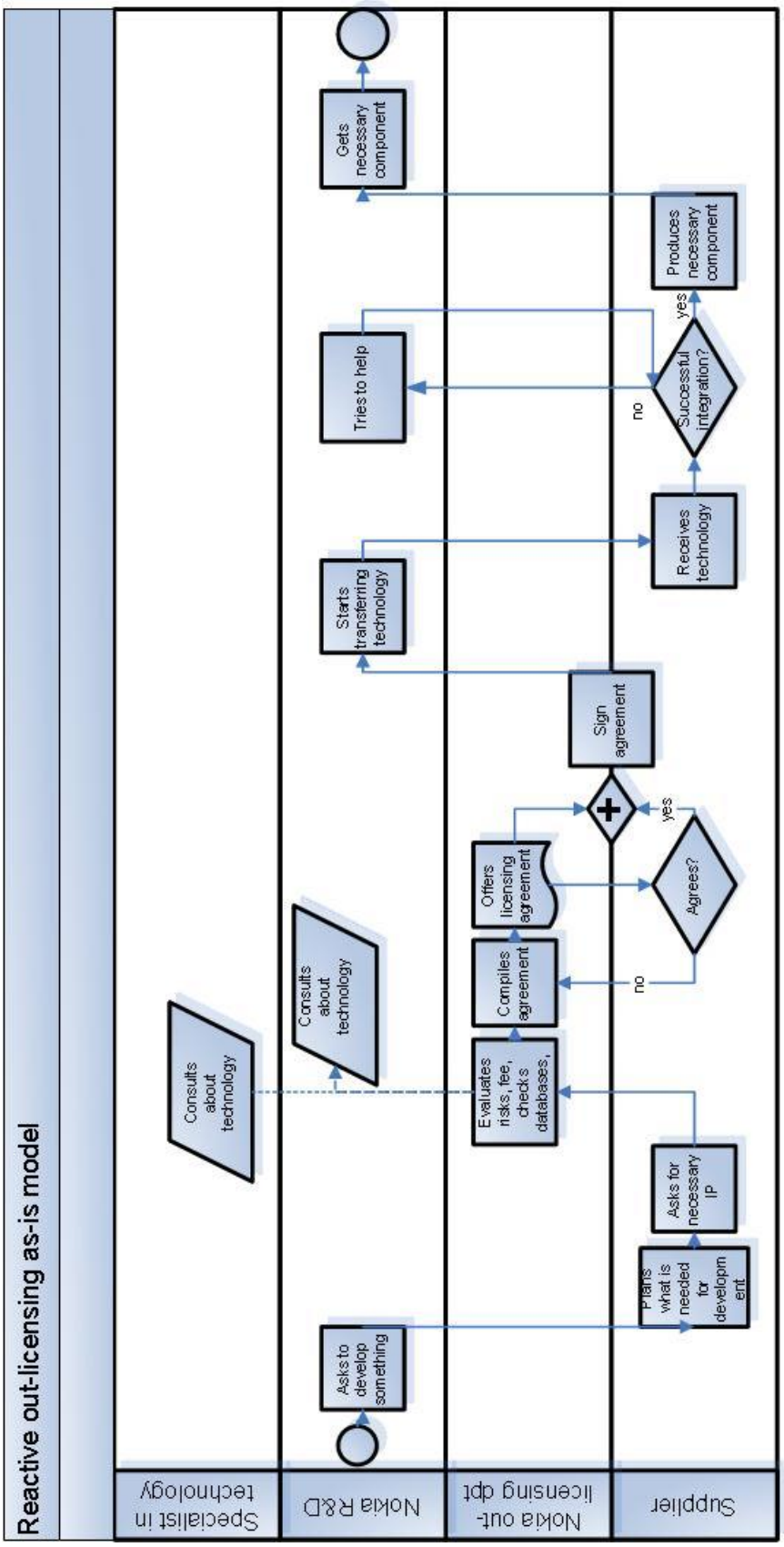

Reactive out-licensing to-be model
Specialist in technology
Nokia R&D
Nokia out-licensing dpt
Interested party
Consults about technology
Assign responsible, knowledgeable person
Consults
Evaluates risks, fee and strategic benefits
Compiles agreement
Offers licensing agreement
Agrees?
no
yes
Sign agreement
Starts transferring technology
Thinks if there is sense to help
Helps
Enjoys strategic benefits
Asks for some IP
Agrees?
no
yes
Receives technology
Successful integration?
no
yes
Enjoys having IP

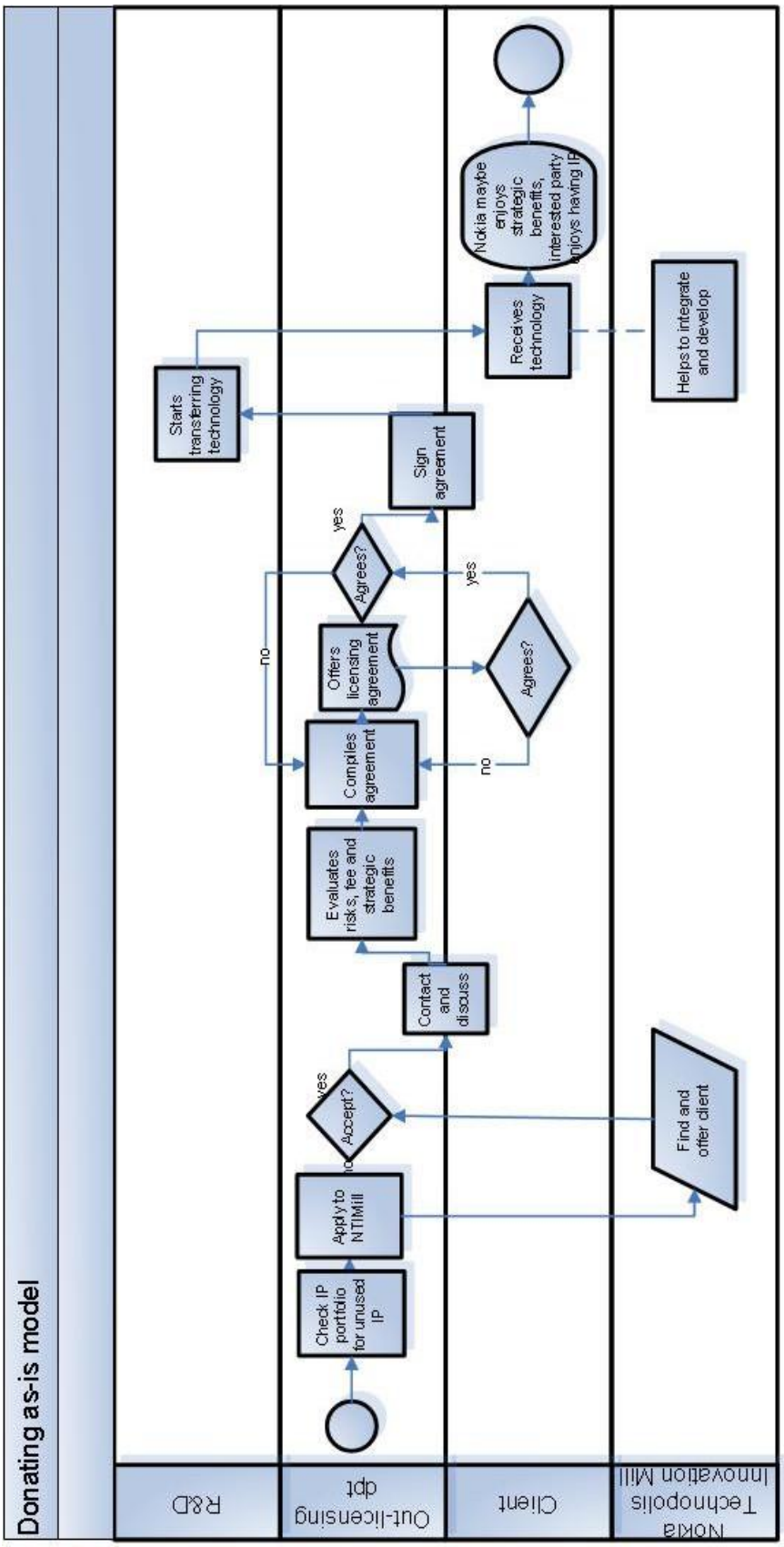

Donating to-be model (1)
Technology broker
R&D
Out-licensing dpt
Client
Adopt corporate culture, assign responsible knowledgeable linked person
Advice
Advice
Check IP portfolio
Think of interested party
Can client be found without broker?
no
yes
Apply to broker
Finds and offers potential client
Accept?
no
yes
Pay fee
Get fee
Contact and discuss

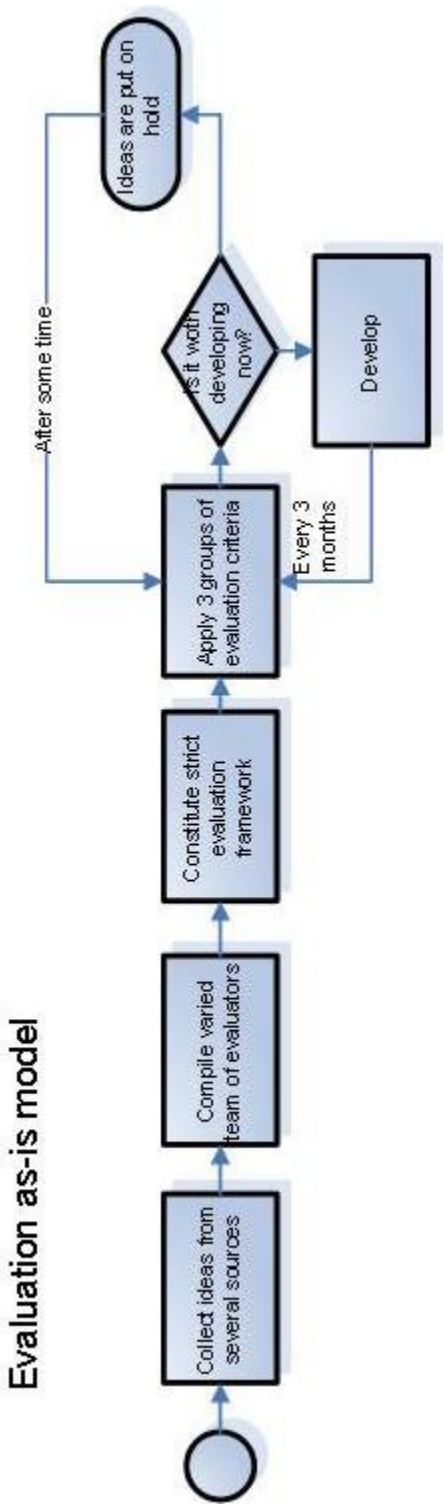

Donating to-be model (2)
Technology broker
R&D
Out-licensing dpt
Client
Evaluates risks, fee and strategic benefits
Compiles agreement
Offers licensing agreement
Agrees?
Agrees?
Sign agreement
Starts transferring technology
Receives technology
Successful integration?
Thinks how to help
Helps
Enjoys strategic benefits
Enjoys having IP
yes
no
yes
no
yes
no


Evaluation process to-be model
Ensure max possible idea inflow
Compile varied team of evaluators
Constitute evaluation framework
Apply evaluation criteria
Is it worth developing now?
no
yes
Develop
Every 2-3 months
Regularly
Ideas are put on hold


Proactive out-licensing as-is model
R&D
Out-licensing dpt
Client
Need to establish standard
Find licensees through network
Evaluates risks, fee and strategic benefits
Compiles agreement
Offers licensing agreement
Agrees?
no
yes
Sign agreement
Starts transferring technology
Receives technology
Successful integration?
no
yes
Thinks how to help
Helps
enjoys having IP
Enjoys strategic benefits
Agrees?
no
yes


Reactive out-licensing as-is model
Specialist in technology
Nokia R&D
Nokia out-licensing dpt
Supplier
Consults about technology
Consults about technology
Asks to develop something
Plans what is needed for developm ent
Asks for necessary IP
Evaluates risks, fee, checks databases,
Compiles agreement
Offers licensing agreement
Agrees?
no
yes
Sign agreement
Starts transferring technology
Receives technology
Successful integration?
no
yes
Tries to help
Produces necessary component
Gets necessary component


Donating as-is model
R&D
Out-licensing dpt
Client
Nokia Technopolis Innovation Mill
Check IP portfolio for unused IP
Apply to NTIMill
Accept?
Find and offer client
Contact and discuss
Evaluates risks, fee and strategic benefits
Compiles agreement
Offers licensing agreement
Agrees?
yes
no
Agrees?
yes
no
Sign agreement
Starts transferring technology
Receives technology
Helps to integrate and develop
Nokia maybe enjoys strategic benefits, interested party enjoys having IP


Evaluation as-is model
Collect ideas from several sources
Compile varied team of evaluators
Constitute strict evaluation framework
Apply 3 groups of evaluation criteria
Is it woth developing now?
Develop
Ideas are put on hold
After some time
Every 3 months