



# Recycling the unused ideas and technologies of a large corporation into new business by start-ups



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## ABSTRACT

The objective of this study is to investigate how the non-core ideas and technologies (IaTs) of a large corporation can be reused by start-ups. Many IaTs are not deemed valuable or useful for a parent corporation, so for various reasons, these IaTs remain unused and eventually perish as they become obsolete. However, there exists a possibility to create new business from these non-core IaTs. We discovered that an intermediary organization, acting as a catalyst, can be instrumental in bringing corporations with unused IaTs together with interested parties and reduce the information asymmetry between them. A funding mechanism is also crucial for appropriating non-core IaTs. Moreover, the underlying market and economic conditions play a natural role in the transfer of non-core IaTs.

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## 1. Introduction

Large corporations continuously generate a stream of ideas and technologies (IaTs) in order to offer their customers new products and services [29]. In reality, only a fraction of a large corporation's IaTs are launched to the market, with only a few of them being successful [34]. A large corporation accumulates numerous unused IaTs over time, because they are often considered non-core as they do not fit in with the corporation's existing business portfolios [3].

IaTs can be defined in many ways [30]. argue that commercially exchangeable goods, ranging from the immature to the mature stage, can be considered IaTs. Mature IaTs are mostly at the patented stage, whereas immature IaTs remain unpatented. The IaTs of a large corporation can be classified into core and non-core categories. As is the case with core IaTs, non-core IaTs can also range from the immature to the advanced stage. By non-core IaTs, we refer to the ideas and technologies that corporations are unable, or unwilling, to develop and bring to market. There can be several reasons for this. For example, a non-core IaT may lie outside the corporations current strategy. A corporation cannot develop each

and every idea, so it must prioritize certain areas. Some ideas may have simply become obsolete due to changing market conditions or the activities of competitors [28]. All too often, IaTs are doomed because their potential return on investment (ROI) is too low, because it would take too long to see a return, or simply because it is seen to be too risky [22].

In general, non-core IaTs do not contribute to a parent corporation's competitive advantage. Core IaTs, meanwhile, are important to a corporation because it can use them itself, possibly to protect it against competitors. In short, such IaTs are essential for a corporation to maintain a competitive advantage. There are various defined stages for IaTs, such as under-developed, ready for patent application, patent-pending, and ready for market. Immature non-core IaTs are typically less valuable than their mature counterparts [27].

Sometimes corporations consider non-core IaTs to be a burden, and they face a dilemma in how to deal with them. Transferring some of these non-core IaTs outside of a corporation brings no risk for its core strategy, but it may bring considerable benefits to the corporation in other ways, such as by benefitting standardization development. Moreover, these non-core IaTs could be valuable to other corporations, who can develop them further and commercialize them in a different market with a similar or new business model [18].

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Nokia Corporation's outbound open innovation approach is an example initiative that shows how to utilize non-core IaTs within a new ecosystem. Accordingly, this study aims to investigate how the non-core IaTs of a large corporation can be utilized by start-ups. As mentioned earlier, many IaTs are of little value to the parent corporations, as was the case with Nokia, too. In this study, we attempt to find answers to several questions: *How can large corporations distribute their non-core IaTs? What kind of support is needed to distribute these non-core IaTs? How can the transference of a large corporation's non-core IaTs be beneficial to business, and society?* By considering Nokia's model for transferring non-core technologies, this study provides new insight for scholars and practitioners about how to use the non-core IaTs of large corporations. Corporations, policy makers, and governmental organizations may well consider these findings useful.

### 1.1. Literature review

Some studies have explored how large corporations can capture value from their non-core technologies [45,52,53,54]. Even though transforming technologies into commercial goods has been studied from various perspectives [6,10], limited attention has been paid to non-core IaTs. Most studies deal with mature and apparently highly valuable non-core technologies [6]. The existing literature has therefore largely ignored how the non-core IaTs of large corporations can be used appropriately, regardless of the stage (mature or immature) they are in. Indeed, immature non-core IaTs could also be successfully commercialized with the help of a new business ecosystem. With suitable cooperation between various parties—such as state funding agencies, intermediaries, and start-ups—large corporations could adopt outbound open innovation approach [11] to offer their non-core IaTs to other parties.

With many non-core IaTs, it is also profitable for the parent corporations to transfer them outside the company [17]. However, there are limited transactions for IaTs, even though there is evidence that this is growing [43]. Non-core IaTs can emerge in a number of ways, such as through: (a) the output of a project that turns out to be irrelevant to the current business focus; (b) a project that is cancelled before reaching its final stage; (c) the loss of a project's main driver; (d) an unintended discovery; (e) a change in management and business strategy; (f) mergers and acquisitions; (g) downsizing; and (h) the divestment of a business area.

The value of a non-core IaT largely depends on its position in a maturity chain, complementary assets, effective matching, rivalry, user reproducibility, the business model, and the organizations it is embedded in Refs. [9,16,36]. IaTs at the immature stage may not be worthy of patenting [30], and they may not offer any value or benefit for internal use.

Many large corporations—such as DuPont, Dow Chemical, Hitachi, Procter & Gamble, and Texas Instruments—have active licensing policies to earn revenue from their non-core IaTs [44]. Licensing is where a licensor transfers technology to licensees, giving them the right to exploit this technology in the long term in exchange for some agreed fees or royalties [54]. However, many non-core IaTs lack the value for licensing, but they can still be valuable to other ventures if they are modified or applied with a different business model.

Corporations have several options when dealing with their non-core IaTs. To name a few popular options, they can “put them on the shelf,” discard them for good, or donate or license them to another party. Non-core IaTs can be taken outside a business through creating a spin-off, selling off a division, or making various licensing arrangements. The emergent concept of open innovation emphasizes the transfer of technologies outside a corporation's boundaries [8]. Outbound open innovation represents an outward

technology transfer and suggests that corporations should explore the external environment when looking to commercialize technologies [11]. Corporations tend to prefer taking out their IaTs when the uncertainty of the transaction is low and the transaction cost is high, whereas they tend to prefer selling them when the opposite conditions prevail [50].

A key medium for the external use of non-core IaTs is licensing. A study by [46] found that nearly 75% of the intellectual property (IP) managers surveyed believed that they could increase licensing revenue without harming their competitive advantage. However, alongside the difficulty of finding licensees, a reluctance among business units [46] and conflicts within a corporation are often the chief causes of inefficient licensing [55]. Studies show that around a third of US corporations' patent portfolios remain unexploited [54], and a third of patents in Europe have not been applied in products [48]. Furthermore, [47] found that 10% of the patent portfolios of research-oriented corporations are being underexploited, so these corporations could increase their operating incomes by five percent through licensing.

The extent of the cooperation between an idea's owners and its adopters is a crucial element in the licensing process of non-core IaTs [23]. The commercialization of non-core IaTs by external corporations can generate value in many ways [4]. For example, a corporation can gain financial value and develop the ecosystem at the periphery of their core products, thus boosting the business ecosystem in which they operate. Non-core IaTs also provide opportunities to create new businesses, so customers can benefit from innovative products and services. Timing is important for a technology transfer, although the existing literature lacks any research into the timing of a technology transfer [35].

The licensing of non-core IaTs requires a high level of engagement on the licensor's part. Some corporations have a dedicated unit for their non-core IaTs, whereas others only consider it occasionally [49]. However, involving third parties in the evaluation of non-core IaTs for licensing can also be a feasible option [37]. For example, there is evidence that the internal units of corporations often have significantly different opinions to external experts when it comes to valuing non-core IaTs [31]. Additionally, a corporation can join with other corporations and establish common platforms and joint ventures when non-core IaTs are being centrally evaluated for licensing. Corporations can also use intermediaries to facilitate a match-making process with potential licensees. Recently, many intermediaries have emerged to connect technology and innovation developers with interested parties. Intermediaries such as InnoCentive, Yet2.com, IdeaConnection, and Innoget play a significant role in technology licensing and the idea business [19]. Consequently, the utilization of non-core IaTs is receiving more attention from scholars, practitioners, and policy makers.

### 1.2. Research methods

This is an explorative study with a qualitative approach, because this provides an opportunity to understand the context and benefits of the underlying phenomenon being studied. We considered a single case study approach to allow a deeper kind of understanding for a specific phenomenon [14], because the case study approach is generally suitable for answering the “why” and “how” types of questions [41]. Specifically, this single case study aims to establish how the non-core IaTs of a large corporation can be transferred to external companies, specifically start-ups [42]. argues that it is rational to choose a single case study when the studied phenomenon is unusual, rare, critical, or revelatory. We are confident that this study is concerned with a rare phenomenon that has received limited attention in the existing management literature.

Case studies can cover multiple cases or focus on a single case with different levels of analysis [41]. According to [25]; a researcher who studies multiple cases should investigate the cases separately and individually rather than try to average or pool the data across cases. Similarly [13], criticize the approach of using multiple cases as outlined by Ref. [15]; claiming that multiple case studies lack the richness of the classic single case study. While there are pros and cons to each of these two approaches and schools of thoughts, we took the decision to adopt a single case study approach.

Data were collected in several ways. Primary data sources included interviews with key informants, as well as personal communications and other informal discussions with other relevant persons. Secondary data sources took the form of press conferences, press releases, seminars, white papers, and webpages, along with other related documents that were published through various outlets. Multiple sources of data collection were used, as suggested by triangulation method experts. Triangulation is considered a powerful technique to increase the validity of data through cross verification from several sources [7]. Triangulation (i.e., combining different kinds of data from various sources) improves the accuracy of judgments and increases a study's reliability [51]. Scholars such as [41] and [12] emphasize the use of triangulation by combining different sources of evidence and shifting between analysis and interpretation.

The interview questions were mainly open-ended, as suggested by the epistemologically constructionist approach [40]. Open-ended questions are generally suitable when a study's aim is to explore a phenomenon in depth. The predefined interview structure is provided in an appendix to this paper. Potential interviewees were selected in advance from a pool of companies and organizations involved with this project. During the discussions, some interviewees identified additional key informants who could also be interviewed. We therefore updated our list of interviewees based on these suggestions. The choice of participants was based on the principle that information is best elicited from people who are involved in the phenomenon and possess significant knowledge about it [5]. In other words, the persons interviewed were those one might refer to as "key" or "elite" informants. Key informants are the persons in an organization who are apparently knowledgeable about the issue being researched and willing to discuss it [56].

Some of the questions that were employed in the interviews were common to all the various groups of actors. Additionally, we added specific sets of questions for particular groups to explore and understand the roles of these actors in detail. In total, eight interviews were conducted with key informants, including one from Nokia (the originator of the IaTs), one from Tekes (the national funding agency for research and innovation in Finland), a journalist at a national business newspaper (who has followed and reported this phenomenon), two managers from the intermediary, and the CEOs of three start-ups that had received funding for their initiatives. All but one interview were conducted face-to-face, with the remaining interview being conducted over the telephone. The duration of the interviews ranged from 30 min to 2 h. All the face-to-face interviews were recorded with the permission of the interviewees. A list of the interviewees, their functional roles, and the length of each interview are listed in [Appendix A](#). Due to confidentiality reasons, the interviewees are kept anonymous, as was promised to them. We also undertook some additional personal communications and informal conversations with some informants with substantial knowledge about the case. In order to clarify the information about some details, additional inquiries were extended to the relevant participants.

### 1.3. Case of the nokia innovation mill

This section provides empirical findings for the real-life case of Nokia's commercialization of its non-core IaTs. We provide an overview of this program, as well as a more detailed description of the underlying process. We also elaborate on the outcomes, achievements, and challenges of this project. The relevant issues and dilemmas are then analyzed in the discussion section.

### 1.4. Overview of the program and its main actors

This case study focuses on how Nokia Corporation has dealt with the ideas, technologies, and knowledge that do not fit in with its corporate strategy. The program for Nokia's transfer of non-core IaTs was started on May 6, 2009 and named the Innovation Mill (IM). Three main parties are involved in the IM program: Nokia (the corporation wishing to disclose its non-core IaTs), Tekes (the state funding agency of Finland), and Technopolis (the match-making intermediary). In addition to these major players, several municipal authorities (during the first phase of the project) and some third-party service providers were involved in the program. The basic assumption behind the IM program originates from the notion that corporations with considerable research and development (R&D) investment also have large pools of IaTs, many of which remain unused.

The IM program was taken through three distinct phases. In the first two phases, Nokia and Nokia Siemens Networks delivered non-core IaTs that were mostly related to the ICT sector, such as near-field communications, environmental and energy-related solutions, health care and well-being applications, location-based services, mobile security, and future internet services [24]. IM served as a vehicle to transfer the non-core IaTs of Nokia to Finnish start-ups, with fast-track funding being provided by Tekes, the Finnish national funding agency. The reason for funding only Finnish start-ups derives from the established mission of Tekes.

Nokia had previously realized that many of its non-core IaTs could be valuable outside of Nokia, with agile and motivated start-ups being able to actually base a business on them. Nokia could therefore transfer its unused IaTs to innovative start-ups and thereby give these IaTs a new lease of life. In fact, a growing number of employees at Nokia had already asked if they could begin developing their ideas further using Nokia's unused technologies [2], so the IM program was created to meet this apparent demand. One start-up CEO expressed his opinion about the IM program by saying, "*The worst thing to happen is the situation that a large amount of money (originating from public sources and from Nokia) is spent on a development project and then the project is just buried.*"

The main funder for start-ups in Finland is Tekes, which finances some 1500 business R&D projects and almost 600 public research projects at universities and research institutes. In 2012, for example, Tekes invested some \$740 million USD in the R&D projects of Finnish corporations and research organizations. The role of Tekes was also instrumental in the IM program. On perceiving Nokia's willingness to license its non-core IaTs, Tekes felt that fast-track funding for start-ups would help to create new businesses and therefore jobs.

Tekes often employs external partners to perform operational and administrative tasks. For the IM program, it put out a tender to find a service provider able to deal with Nokia's non-core IaTs, with Technopolis Ltd consequently being selected as the intermediary. Technopolis was a Finnish real estate company that also offered management and consultancy services at the time. The role of the intermediary included providing operative and administrative support to the start-ups. According to [24]; the role of intermediary also included third-party procurement, vendor short listing,

competition, selection, contracts, and funds transfer. Of course, an underlying motivation for this intermediary was to find new businesses to occupy its premises as tenants, but they also claimed to bring some broader perspectives to the IM program, such as support for innovation ecosystems. Due to subsequent mergers and acquisitions, three organizations worked as intermediary in this program. However, the founding intermediary participated in the IM program for three years. Several municipal authorities were also involved in providing funding and other logistical support.

### 1.5. The process of the IM program

The basic process of the IM program is depicted in Fig. 1. This starts with Nokia's disclosure of its non-core IaTs to the intermediary. Some teams actually had previous direct access to non-core IaTs, because they worked at Nokia or were otherwise well-informed about certain ones. In practice, the process involved a start-up or idea-seeking team contacting the intermediary, who then determined if any of Nokia's disclosed IaTs would be a good match for them. The intermediary also often consulted with teams inside Nokia about the potential to spin-off their projects. One start-up CEO expressed the importance of moving people for technology transfer by saying, "My personal opinion is that you cannot make technology transfer without moving people."

Once a potential match was identified, the intermediary then supported the relevant start-up with the practicalities, such as providing business consultancy to apply for Tekes funding. The intermediary was motivated to get as many start-ups as possible through the IM program, because its service fee was tied to the funding of these start-ups. When there were readily available teams inside Nokia with a willingness to spin-off an idea, it was naturally easier to support these rather than find and deal with new start-up teams outside Nokia.

The intermediary first analyzed the disclosed non-core IaTs before seeking out viable teams and start-ups that could take these IaTs further. They then helped these teams and start-ups to establish a business (see Ref. [20] for more details). With the support of the intermediary, each start-up prepared project proposals along with supplementary documents. For funding applications, start-ups needed to estimate their costs in advance to receive funding. Each start-up was then invited to present and pitch its business plan to Tekes in order to solicit funding. The process was designed to be as least bureaucratic as possible. The normal processing time for Tekes start-up funding is typically in excess of three months, but the processing time for the IM program was fast-tracked to around two weeks. Under the IM program, start-ups received funding decisions soon after their pitches. What is more, funding from Tekes is dispatched quickly, so start-ups were able to launch their new businesses quickly after receiving funding. A start-up CEO expressed an opinion about the importance and necessity of the IM program by saying, "IM is like ... very tailored for young start-ups, and it provides plenty of support, so in that sense, it is good and clearly much better than starting without it".

The delivery of IaTs was arranged in such a way that a dedicated person from the intermediary received access to Nokia's portfolio of

non-core IaTs. The intermediary therefore acted as a matchmaker between the various actors. It is worth mentioning that negotiations for licensing agreements took place between Nokia and each start-up on a case-by-case basis. One interviewee expressed, "... but when it comes to the negotiations, my take is that it is a commercial business ... it is not charity ..."

The agreement rules with Nokia were such that a start-up could use non-core IaTs free of cost, with parallel usage rights and royalty free status being irrevocable and permanent [24]. However, the start-ups were forbidden from transferring non-core IaTs to any third party. Should two or more start-ups use an idea concurrently, neither would enjoy access to any further development of the idea by the other start-up. As per the requirements of Tekes, an applicant for non-core IaTs had to be an established start-up but less than eight months old. Any start-up interested in Nokia's ideas also needed to provide a clear business plan. As one manager from the intermediary expressed, "it is not a flea market." A start-up could get a maximum funding of €200,000 euros, but the average funding was €170,000 [33]. The time span for piloting, testing, and market researching an idea was typically six to eight months.

### 1.6. Challenges

Nokia disclosed that they had over 4000 potential non-core IaTs [33]. It had a small team to collaborate with other parties, such as the intermediary, funding agencies, and start-ups [19]. By 2014, 110 non-core IaTs had been transferred to start-ups [33], meaning that only 2.75% of its non-core IaTs had been transferred with funding.

The IM program encountered some organizational challenges. Three years after the program's introduction, it was transferred from Technopolis to a new organization called *Open Innovation Management*. After just a few more months, *Spinverse* (a technology consultant SME) acquired *Open Innovation Management*. The growth of the IM program slowed down, largely due to the two changes in intermediary in such a short period.

The start-ups from this program have yet to be successful in the market. Some notable exceptions aside, it takes time for a start-up to grow. There was also speculation that some start-ups just joined the program to get fast-track access to funding, and they were not planning to utilize the transferred non-core IaTs at all. However, the first intermediary planned to expand the IM program to other European markets, particularly to attract venture capitalists. After Technopolis divested its IM operations, the internalization plan never came into practice. Moreover, the present intermediary is also not actively expanding the program to the international market.

The detailed licensing process for IaTs was not made public. Due to non-disclosure agreements (NDAs), no involved parties could disclose details about the terms and conditions of the licensing agreements between Nokia and start-ups. It is worth mentioning that the IM program began at a time when Nokia's market performance was declining sharply. The company was therefore laying-off many of its employees, motivating many of them to leave Nokia and start their own ventures.

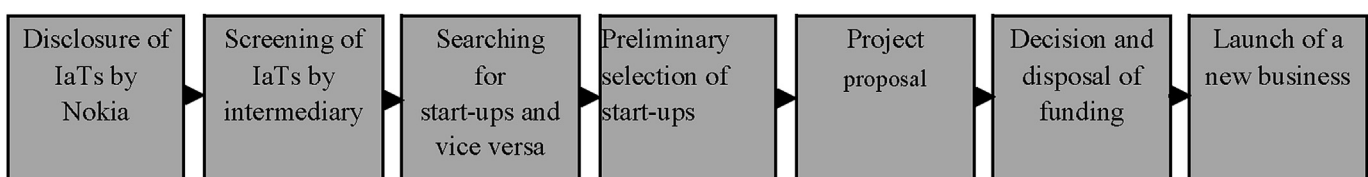


Fig. 1. The process for the IM program, from IaT disclosure to the launch of a new business.



### 1.7. Outcomes and achievements

Initially, Nokia cited corporate societal responsibility as a driver for the program. Later on, however, its business downfall led to outplacement becoming an important aspect of the process. Mr. Esko Aho (a former prime minister of Finland) acted as Nokia's Executive Vice President of Corporate Relations and Responsibility during the creation of the IM program. While he considered the IM program to have been successful, Mr. Aho indicated that there were plenty of question marks about the process during its early stages. Mr. Aho was also a member of IM's executive board from the beginning. A basic objective of the IM program was to have a fast decision process. For any new business, raising funds is a daunting task, but in the IM program, funding was readily available with decisions being made very quickly. Moreover, Tekes had a positive attitude about further funding should the program's performance be satisfactory.

In four years, 110 non-core IaTs have been funded, with 81 of them being in new start-ups and 29 in existing start-ups [33]. The Innovation Mill program has raised €84 million in funding, including €42 million from Tekes, and created over a thousand new jobs [33]. In terms of the number of start-ups launched, the IM program has been reasonably successful. From a policy-making perspective, a fundamental reason for favoring the IM program was supporting the IT industry's re-structuring during an economic downturn. According to [1]; "... the goal was to support Finnish innovation ecosystem." In addition, the IM program also seemingly provided an outplacement option for Nokia. Around 65% of start-ups were founded by teams from Nokia, with only 35% originating from outside the company [2]. There were several key reasons for the IM program's success [24], argues the following points: (1) the traditional innovation system was too slow and weak to support this kind of IaTs transfer; (2) the business environment was supportive as Nokia had ample unused IaTs and a willingness to put them forward; and (3) several start-ups and other teams were eager to exploit these IaTs.

[1] believes that the initiative exceeded its expectations. He expressed, "... in Finland, we are good at making strategies; this initiative is a part of the National Innovation Strategy. Sometimes it is worth investing outside Finland to get added value to Finland, too." He argues three main reasons for IM the program's success. *First*, there was the ICT re-structuring, because there were many experts available and this program offered new opportunities for them. *Second*, the value of IPRs had been increasing, and this initiative made it possible to refine non-core IaTs. *Third*, the timing was good for digital innovation, not just in ICT and its related sectors but also in many other sectors. The IM program therefore had great potential.

[2] revealed that the program's overall results have been moderately successful. One start-up has achieved very dramatic growth, while nine other start-ups were able to increase their revenues and profits. As we know, start-ups in any industry experience extremely high failure rates, so one very successful start-up and nine other prospering start-ups indicates that the IM program serves as a viable model for other large corporations looking to transfer their non-core IaTs.

The participating start-ups were generally very happy with the rapid decision-making process of Tekes in the IM program. As the CEO of one start-up noted, "This has been a good program; it fits well into its purpose and it was important to us and a good thing." [26] points out that a main benefit for start-ups was how they could perform a range of activities with the funding. These included the technical specification for the new product, user interface design, demo, proof of concept, production plan, agreement check, market study, competitor analysis, sales and marketing, business plan,

project implementation, financing plan, partnering negotiation, contract templates, and other legal studies/planning. Additional benefits for start-ups came in the form of media coverage. One Finnish business magazine followed the program and published several articles about it. In addition, some international TV crews filmed documentaries about the program. As a whole, the stakeholders concerned were happy with the achievements of the IM program.

It is therefore reasonable to surmise that transferring non-core IaTs outside a parent corporation can benefit the parent corporation, small businesses, and society through the creation of new business and employment.

## 2. Discussion

Most start-ups in the IM process comprised teams that formerly worked at Nokia, so we are left wondering about the actual openness of this innovation program. Active marketing activities were not conducted to disseminate the IM program. For instance, it did not have a homepage. It therefore seems that outcomes depended on the intermediary's level of activity. Nokia allowed start-ups to take over non-core IaTs, but teams were sometimes also allowed to take an "entire business" with an existing customer base, providing a significant boost for the underlying business. In addition, some suspicious observers held the opinion that some start-ups joined the program merely to get fast access to funding, with no plans to ultimately utilize the transferred non-core IaTs.

Large corporations are clearly eager to utilize this type of open innovation program when they are planning to shrink their operations and downsize their workforce. One interviewee put it this way: "During the growth years, Nokia was in quite an expansive mode, and then one was able to study and research plenty of things and do plenty of stuff, but when there are less resources then one must concentrate ... and it is quite natural in an innovation activity that one studies more than actually utilizes."

When organizations are not suffering economically, they are in a better position to try out new initiatives and experiment with different business models. This can yield additional benefits too. For example, one start-up CEO expressed his belief by saying, "The program is very much (corporate) social responsibility, but in our case especially, there is also a clear connection to standardization work concerning the underlying technology. It is meaningful (for Nokia) that there is a firm that develops and participates in technology standardization, at the same time when Nokia is forced to focus on its current core business."

The pool of non-core IaTs was not publically accessible to start-ups or other interested parties. Rather it was accessible only to authorized personnel at the intermediary. Due to this accessibility restriction, many non-core IaTs with good potential may remain unused. There was also other criticism toward the program. For example, could Nokia not open up at least part of its pool of non-core IaTs to the public? That would have increased the public profile of Nokia as an innovative corporation and served as a marketing tool toward partners and investors.

If non-core IaTs were good for the ecosystem of Nokia, then what prevented these non-IaTs from being fully disclosed? One interviewee believed that the amount Technopolis was paid as a service fee was relatively high when considering its actual workload. Moreover, the IM program was not in-line with the core strategy of Technopolis. Consequently, there was some discontentment from start-ups about the service quality provided by Technopolis, especially during the initial stage.

**3. Conclusion and outlook**

This study demonstrates that large corporations can benefit from transferring their non-core IATs. Corporations can engage directly with start-ups interested in using their non-core IATs, or they can use an intermediary as a go-between. In short, large corporations can utilize their unused IATs by creating joint ventures with existing start-ups or investing in new start-ups to expand their portfolios, enabling them to establish if some of these ideas can actually be turned into successful businesses.

IATs are not typically disclosed to the public, as was the case with Nokia. As such, the information asymmetry represents a challenging issue [32]. Idea seekers will always be limited in their awareness of non-core IATs and their potential if they do not have access to them all. In the IM program, for instance, external teams and other potential developers had little idea if there was something of interest to them. In this respect, the IM program could have benefitted from been more open to a large ecosystem of innovation networks, because this could have provided a vibrant platform to increase the exchange of ideas and knowledge in an open environment. This has also been emphasized by Ref. [2]. Such openness would have enabled a larger number of actors to explore the non-core IATs, resulting in a much greater business potential.

Organizational restructuring during recessionary periods forces organizations to downsize their operations, naturally resulting in new opportunities for entrepreneurial individuals and teams to create new start-ups. In contrast, when corporations are expanding their operations and recruiting new people, they are less inclined to see their talent leave. They therefore may be less willing to engage in programs that involve the transfer of non-core IATs.

Large corporations could consider the option of boosting their idea “recycling” by taking a multi-actor development approach, perhaps by inviting organizations with complementary assets to develop and co-create better business models. In the USA, for example, the Defense Advanced Research Agency has already initiated the Vehicle FORGE program, where the global community of experts designs and rapidly manufactures complex systems together.

Nokia also has an idea crowdsourcing program called Idea-sProject in place, but its focus is on collecting new ideas rather than donating them. There was also another initiative where a group of students and unemployed professionals engaged in developing Nokia’s ideas together, with the intention of starting businesses based on these. Large corporations could also consider crowdsourcing to find better options to utilize their IATs externally [21]. For example, it is clear how open innovation intermediaries (OIs)—such as IdeaConnection, InnoCentive, and Yet2.com—help to exchange valuable IATs between two or more parties [19]. The exchange of non-core IATs could offer additional value for OIs, so large corporations could engage OIs to find a (better) match for their non-core IATs at the global level.

In summation, this study provides primary evidence for how the non-core IATs of large corporations can be used in novel ways. However, additional studies into other large corporations with similar initiatives are necessary to strengthen the body of knowledge about the transfer of non-core IATs.

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**Appendix A. Interviews**

Role	Organization	Position	Length (min)
IATs Delivery Corporation	Nokia Corporation	Director, Tech out-licensing	120
Financier	Tekes	Director, Start-up companies	80
Intermediator	Open Innovation Management Ltd	Manager (ex- technopolis employee)	45
Intermediator	Technopolis	Manager (ex-technopolis employee)	41
Journalist	Kauppalehti Ltd (an industry magazine)	CEO	47
Start-up	Sports Tracker Ltd	CEO	30
Start-up	Quuppa Ltd	CEO	40
Start-up	Wellmo Ltd	CEO	39

**Appendix A. Sample questionnaire**

Name of the Interviewee: -----,  
 Position: .....  
 Organization:  
 Interview Time: -- to --.  
 Interview Date: -----.  
 Interview Duration: .....  
 Language used in the Interview: .....  
 How is Recorded: .....  
 Name of the Interviewer: .....  
 For IM Personnel

1. Any there any academic publications on this initiative if you happen to know?
2. Are you aware of any similar initiatives in other countries?
3. What is Technopolis’s role in this process; please describe your own words?
4. How do you measure the success of this initiative?
5. How does IM get ideas from Nokia? I mean, does Nokia provide just whole basket of their non-core ideas or screening is done before giving to IM?
6. What kind of information does Nokia provide for each ideas?
7. What is the main reason for you not to publish all the selected ideas for anybody to see/use ... ?
8. What is the contractual procedure and what are the KEY TERMS in contracts between parties?
9. Is it possible for us to familiarize ourselves with materials that are used in communication between parties (we promise not to disclose that and we will also let you to re-view the article(s) before submitting so that no confidential info will be revealed to outsiders).
10. After screening around 4000 ideas, only 45 corporations including 26 starts-up have been emerged. Therefore, success rate is very low. Your Opinion!
11. When does Nokia consider an Idea as Non-core (time after its inception). If it varies widely from one idea to another what is the usual range and average time)
12. How is the figure of using single idea by several corporations simultaneously?
13. How many start-up have stopped working on an idea after their inception?
14. Do you think IM would be successful even without any funding from Tekes?

15. Are there any plans to make this initiative more international and try to reach out other countries (both for larger start-up pool and funding-wise)
16. Is there any funding source from other than Tekes? How is the proportion of other sources of funds?
17. What kind of study was done so far to measure the overall success of start-ups? What is the next plan to study them?
18. What are the fundamental strengths and weaknesses of IM?
19. Are there any plans to try to encourage students to apply for IATS or is IM purposely only targeted towards seasoned professionals; Do you think there are any possibilities for this kind of experiment in future?
20. Does Nokia get some benefits even though ideas are claimed to be given as charity? If so, how is that: monetary, image value, device supporting application, etc.?
21. Can we get contact details of SMEs so that we can interview some of them?
22. What are the criteria for start-ups to be selected that can utilize anchor corporations ideas and IPR?
23. Do you see any potential dispute among corporations that would like to see the ideas but they are not selected?
24. How could IM be improved in future if possible?
25. How do you feel about joining of several big companies, how effective in getting ideas from those companies?
26. What made IM to turn into a spin off? What are the advantages and disadvantages of the spine off?
27. Nokia is not a good position for several years. How do you find its willingness to continue for this project?
28. Contact details of the people from Nokia, who are directly involved with IM initiative!

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