Corporations, Innovation Partners and Front End Innovation

How iP2Biz helps break up the Innovation Logjam

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EXECUTIVE SUMMARY

Several of iP2Biz' clients have asked how iP2Biz compares with the variety of competitors who now exist in the innovation space. While answering that question, a review of the research literature was conducted with two interesting results. First, few of the papers were informed by the kind of practical knowledge iP2Biz has collected since its inception in 2004. Second, it was apparent that although there are numerous research papers in this general space, there is no generally accepted nomenclature and taxonomy shared by all. Many companies are great at incremental or *sustaining* (Christensen, 1997) improvements because they have a formal process that guides and controls the path of a project on its way to implementation. These formal processes have many names including Launch, Commit, Stage Gate, and New Product Development and usually have very rigorous procedures, structures, forms, and rules for moving from step to step. The purpose of such formality is to assure clean execution of the steps. Most importantly, each project contains a well-formed estimate of increased sales or decreased costs (or both) relating to the project. This paper will call this process, "the Formal Process". Another, just as important, phase begins with the first gleam of an idea in someone's eye, the off-hand suggestion of a customer, the hunch of an executive just returning from a visit to another culture, or the push of the latest long-range plans that call for progress in a new space and continues until the idea is ready for the Formal Process. iP2Biz and many others[1] describe the process preceding the Formal Process as Front End Innovation (FEI). FEI has been written about for years (since at least 1990), but few companies act as if they recognize or truly understand it.

After proposing standardized definitions and terms, this paper turns to defining Front End Innovation in some detail so that senior executives may gain understanding of an often misunderstood and even more often mislabeled topic. Most important are the insights into the types of innovation partners (many authors use the term innovation intermediary) and the guidelines regarding how to utilize them most cost effectively. iP2Biz recognizes four types of innovation partners that support Front End Innovation. Their similarities and differences are summarized below.

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[1] After reviewing multiple articles, formal papers, and blogs written on the general topic of 'improving' or 'what's wrong with' FEI, it is clear that many of these sources mistakenly describe the first few steps of the Formal Process. Readers should observe caution to make sure of the definitions used by each author as there is no commonly accepted definition of FEI. Some other names for FEI are "Phase 0", "Stage 0", or "Pre-Project-Activities". The "Fuzzy Front End" has also been used by many authors.

Category	Connection Providers	Collaborators	Information Providers	Capital Providers
Purpose	Connect corporations and innovators	Work with corporations to add content value	Provide content value	Provide more proven technologies
Value added	Connections	Independent input as team member	Independent information	Reduced risk
Revenue model	Fees of various kinds (e.g. up-front and success based)	Fees for services	Fixed fees for reports and analyses	Risk-based value multiplier or stock appreciation
Competitive strategy	Bigger networks, better processes	Relationship with staff; customized results, reduced time to results	Quality results and insights, better experts	Finding and nurturing early technology

Based on experience iP2Biz has developed guidelines regarding when to use each of the four types of partner along with some strengths and weaknesses. Interestingly, some tasks can be accomplished in multiple ways.

Connection Providers – Connection Providers are best used when a specific solution to an engineering problem is being sought. There is a relatively low success rate, but those that do succeed are usually on a track to successful commercialization. Connection providers that build databases of available university research or available patents or independent 'experts' are not often successful as the most valuable research has likely not been disclosed and the most valuable patents have already been acquired. Connection providers that provide a social networking type of "meeting place" for searchers and providers come and go rather quickly.

Collaborators – Collaborators are best used early in the innovation process before or concurrent with the corporation's expert study of the candidate innovation. Best results are obtained when the collaborators become part of the FEI team. Time to results using the collaborators is regularly one-sixth to one-tenth the time required by internal staff to complete the same assignment. Collaborators that help corporations with the triage process of sorting FEI ideas can provide valuable and independent input. Collaborators who do not develop a close working relationship by becoming their clients' trusted advisor do not survive.

Information Providers – Information Providers are best used when information about a specific technology, patent claim analysis, general market study, general competitor information, or overviews of a market space is needed. Time to delivery is regularly much quicker than internal staff or collaborators could accomplish. The work is usually not customized. Information providers that simply reformat government statistics or publically available documents do not last long.

Capital Providers – Capital Providers are best used when a specific early stage technology has been identified and capital is needed to move the technology towards commercialization. Often the corporation can gain access to the results with little or no capital at risk. The cost to the corporation comes when it acquires the technology. Many corporations back away from this acquisition method and as a result few technologies are actually acquired in this fashion. The capital providers who try to emulate the Venture Capital model and form a complete company with full management find themselves, when their funds run out, holding a rather substantial bag with no takers. Incubators who think their assignment consists solely of providing funds and free office space do not fare well; "Most of them fail (Mitra, 2013)."

Hopefully, executives can make a more informed choice about which type of partner to utilize and when to acquire their services as a result of this analysis.

This paper also includes a detailed comparison of Front End Innovation with the Formal Process. While both processes are designed to support a company's innovation efforts, the two processes could not be more different. They require different management, executive support, people, and goals (Eric Almquist, 2013). Those differences are illustrated in the table below.

Category	The Formal Process	Front End Innovation
Structure	Much	Little
Order of steps	Linear, none skipped	Iterative, unordered
End point	Clear and manageable	None apparent
Completion dates	Predictable	Very unpredictable
Number of ideas	Few	Many
Aligned with strategy	Highly	Sometimes not aligned
Measures of success	Milestone achievement	Concept strengthened, high % of ideas are discarded
Outside perspective	Not needed	Required
Revenue and cost estimates	Increasing accuracy with each stage	Often uncertain, including much speculation
Activity levels	Fixed organization with structured guidelines	Ad hoc teams with changing membership
Ideas from Executives	35%	65%

INTRODUCTION

In 2004, few companies served the innovation space. iP2Biz was formed that year to do just that. Inspired by the wide-spread publicity built by Open Innovation books and seminars (Chesbrough H. W., 2003), there are now hundreds of companies serving this general space. Many have branded themselves as supporters of individual pieces of a corporation's innovation efforts. Several of iP2Biz' clients have asked how iP2Biz compares with the variety of competitors who now exist. While answering that question, a review of the research literature was conducted with two interesting results. First, few of the papers were informed by the kind of practical knowledge iP2Biz has collected over the years. Second, it was apparent that although there are numerous research papers in this general space, there is no generally accepted nomenclature and taxonomy shared by all. Therefore, to explain how iP2Biz compares to others serving the space, a structure (or taxonomy) is proposed along with a set of definitions so iP2Biz clients can have a clear understanding of those serving the space. In addition, the two main phases of a company's innovation process are defined and described in order to demonstrate where iP2Biz and others fit in Front End Innovation (FEI). Table 1 begins that process by offering definitions for some commonly used innovation terms.

Table 1: Types of Innovation

Type of Innovation	Definition
Sustaining Innovation	Sustaining innovations include cost reductions, improvements to existing products, additions to existing platforms, and repositioning of existing products. Incremental and evolutionary innovations are alternate names for sustaining innovations.
Breakthrough Innovation	Breakthrough innovations are new to the company or new to the world and offer a significant improvement in performance, cost, price, or combinations of those. Breakthrough innovations are normally sold to current consumers. Transformational and revolutionary innovations are alternate names for breakthrough innovations.
Disruptive Innovation	Disruptive innovations create new markets, new value networks, and new consumers, but eventually go on to disrupt existing markets and value networks (even though the disruption may take years). Disruptive innovations are often not recognized as such by entrenched incumbents.

A few historical examples can be used to understand the distinction between the different types of innovation. The then dominant provider of long distance telegraphy, Western Union declined to acquire Bell's telephone patents as telephony was seen as only a short-distance technology, not the disruptive innovation it was. If Henry Ford, Thomas Edison, and Alexander Graham Bell were alive today, the first two would not have much trouble recognizing their inventions and the infrastructure developed to serve those inventions as both have suffered through a long series of sustaining innovations. However, because of the extensive series of disruptive innovations in telephones, Bell would not easily recognize what his invention has morphed into.

Innovation Processes

All companies struggle to add new, exceptional, differentiating products to their portfolios; however, some companies perform better than others. Most companies are good or remarkable at managing innovations that are incremental in nature such as a change in packaging, new ingredients or materials for current products, or cost reductions due to process improvements.

Such companies are great at these incremental or *sustaining* (Christensen, 1997) improvements because they have a formal process that guides and controls the path of a project on its way to implementation. These formal processes have many names including Launch, Commit, Stage Gate, and New Product Development.

These formal processes usually have very rigorous procedures, structures, forms, and rules for moving from step to step. The purpose of such formality is to assure clean execution of the steps. Most importantly, each project contains a well-formed estimate of increased sales or decreased costs (or both) relating to the project. This paper will call this process, "the Formal Process".

Another, just as important, phase begins with the first gleam of an idea in someone's eye, the off-hand suggestion of a customer, the hunch of an executive just returning from a visit to another culture, or the push of the latest long-range plans that call for progress in a new space and continues until the idea is ready for the Formal Process. iP2Biz and many others[2] describe the process preceding the Formal Process as Front End Innovation. FEI has been written about for years (since at least 1990), but few companies act as if they recognize or truly understand it.

> "I have many ideas for innovations, but my staff says they are 'impossible'. They may be right about some, but I am sure they are wrong about some."
> - *An example of the Innovation Logjam as seen by an Executive Vice President leading an $8 billion division*

iP2Biz has observed that FEI is particularly useful for breakthrough or disruptive innovations. In contrast to the Formal Process, very few companies have formalized this phase and even fewer do it well. Simply put, FEI contains all the activities that lead up to entry into the Formal Process. Sustaining innovations typically do not require much (or any) activity in this phase. As such, many companies are fabulously successful at sustaining innovations without acknowledging that another phase to the innovation process exists. Companies and executives engage in front end activities quite

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[2] After reviewing multiple articles, formal papers, and blogs written on the general topic of 'improving' or 'what's wrong with' FEI, it is clear that many of these sources mistakenly describe the first few steps of the Formal Process. Readers should observe caution to make sure of the definitions used by each author as there is no commonly accepted definition of FEI. Some other names for FEI are "Phase 0", "Stage 0", or "Pre-Project-Activities". The "Fuzzy Front End" has also been used by many authors.

often. However, the lack of recognition that FEI exists and the lack of leadership for the required efforts have led to something very familiar to almost all senior executives, The Innovation Logjam.[3] A recent paper (Cooper, 2013) adds data to iP2Biz' field experience by showing that innovation portfolios are increasingly weighted towards sustaining innovations and away from disruptive or breakthrough innovations.

Front End Innovation versus the Formal Process

iP2Biz has learned that lack of attention and appropriate executive leadership for FEI are two of the most important reasons for the Innovation Logjam. For the purposes of clarity and objectivity of understanding, many papers were reviewed and several other competitors in this space were interviewed. What follows are some proposed 'standard' definitions and much more additional detail regarding FEI and how it is best handled.

Figure 1 shows the two phases in time sequence along with some of the activities that usually take place in each phase. There is a whole set of activities that are part of the Formal Process in some companies but not in others since there is no general agreement on where, or in which step, FEI ends. This misunderstanding has resulted in some companies inserting what should be the last few phases of FEI into their Formal Process.

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[3] The Innovation Logjam is the situation in which senior executives are frustrated with the lack of progress in bringing to the market breakthrough and disruptive innovations. All senior executives have, either in their heads or written down, a list of potentially great ideas that they would like to have pursued. The frustration arises when there is little or no progress on the list.
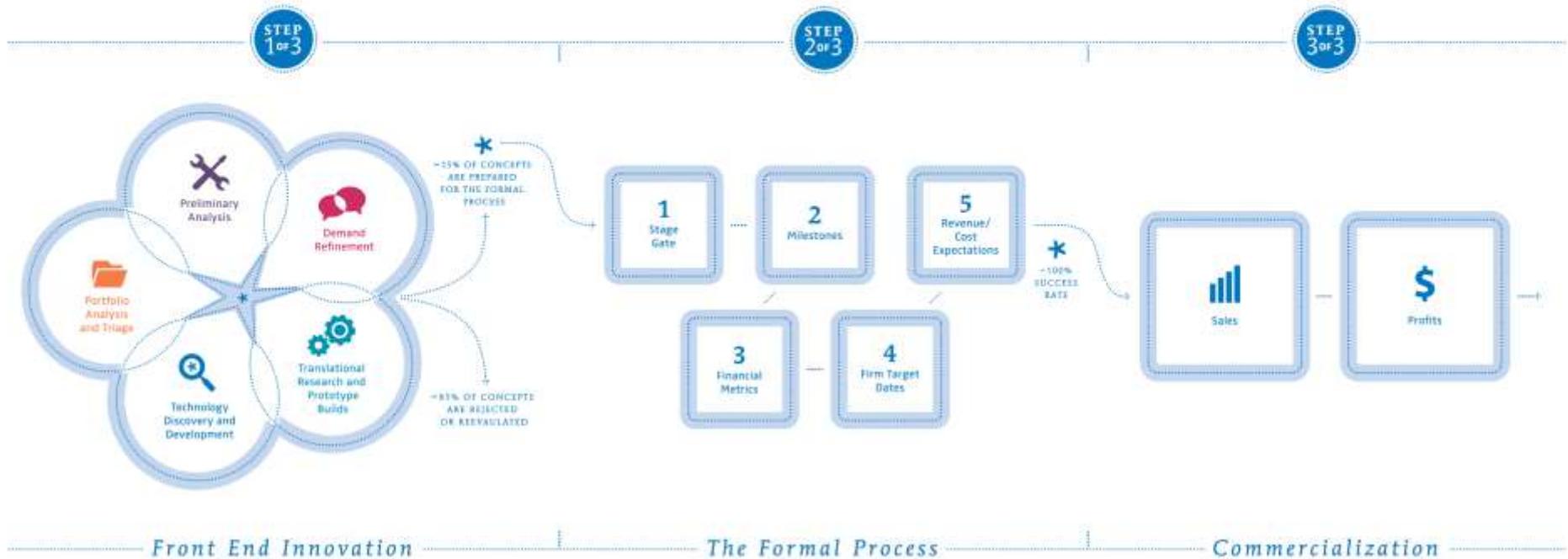
the
TOTAL INNOVATION PROCESS

Figure 1: A visual representation of the total innovation process in a corporation. The process begins with Front End Innovation and continues into the Formal Process (Koen, 2007)**.**

Front End Innovation

Front End Innovation is complex and is comprised of 'adaptive innovation' structures that create, evaluate, analyze, and prioritize many new ideas to provide clarity and a common language to the 'fuzzy front end' (Koen, 2007). Only a small percentage of ideas should go to the Formal Process; iP2Biz estimates the number to be no more than 15% of ideas considered. Ideas considered during FEI are not always aligned with corporate strategy or current customer needs since brand new (to that company at least) ideas regularly surface in FEI. Importantly, not all FEI projects result in disruptive innovation - most will be sustaining or breakthrough innovations. Almost all new ideas, proposals, etc. should go through this phase, even though some of them may move very quickly to the Formal Process. Front-end ideas work on a project and opportunity basis, not a calendar basis. Thus, FEI projects may be out of sync with the company's financial calendar. Budgets are hard to predict and in fact some steps can be boot-legged financially and carried forward with essentially no separate budget for part of the FEI process. There is little structure (nor should there be) regarding how and in what order evaluation and analysis should take place even though there are some common tools that can be used during the evaluation and analysis. Simple gains, such as understanding more about how a concept does or does not fit in a company's portfolio, are important interim milestones for FEI. Finally, there are few formal criteria for the steps required before entering the Formal Process even though the documentation required by the Formal Process is very clear and precise. Normally, few employees are on the payroll solely to manage or execute FEI. Unfortunately, it is difficult, if not impossible, for one person to handle the myriad of tasks required in FEI. Ad hoc FEI teams guided by an executive appear to be the best choice.

> SIMPLY STATED, FEI does _not_ end until the IDEA is discarded or a PRODUCT can be defined _and_ a decent financial projection can be completed.

Where do the ideas come from?

iP2Biz estimates that most FEI ideas (65%) come from senior executives who have developed nuanced market knowledge over their careers and experiences. Other large percentages of the ideas come from the formal strategic planning process (15%) whose goal should be to outline potential new initiatives, mid-level managers (10%) and from employee suggestions and ideas (5%). Current customers (3%) and current non-customers (2%) make up the remainder.

What are the phases of FEI?

The phases of Front End Innovation can be any of the following:

- Describe
- Improve understanding
- Prioritize
- Unearth
- Demonstrate scalability
- Build or buy prototypes
- Evaluate or test
- Investigate
- Challenge
- Refine, and more (Cooper R.G., 2008)

There are no set paths for FEI projects. Management of FEI projects requires the willingness to experiment and the ability to potentially map out a different path for each project.

Not all of the above steps must be accomplished for each innovation initiative. They can be followed in any order and the order is unpredictable. FEI is an iterative process that does not follow a calendar since its goal is to try to find a fit or a version that works. The phases should include a lot of informality and face-to-face interchanges. Figure 2 illustrates the iterative nature of FEI and how ideas may flow around in the process.
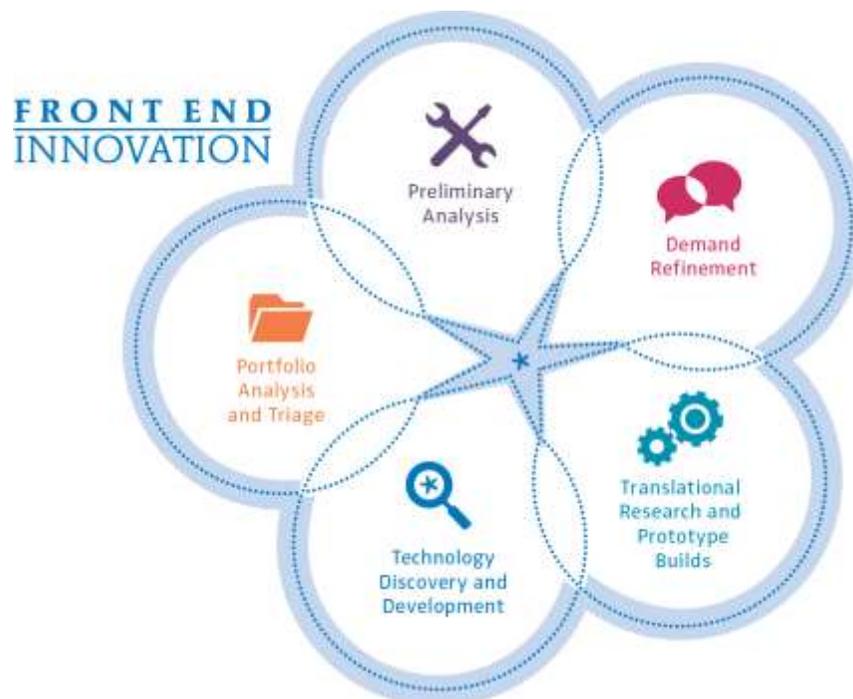
Figure 2: Generic steps of FEI as examples. The steps in FEI do not follow a particular order.

The five generic steps of FEI represent the variety of tasks that are undertaken during FEI and are not meant to be restrictive. There are probably many ways to try to organize and describe the steps involved in FEI. Preliminary analysis includes high-level market, technology, and industry assessments. Preliminary analysis is not market research as the latter includes more focused investigation of market size and market segments. Demand refinement includes customer discovery, voice of the customer, and other related research. Translational research includes building prototypes and performing translational research designed to demonstrate a key aspect of an otherwise early stage technology. Technology discovery and development includes finding early stage technologies and testing product concepts. This phase can be achieved via early focus groups and other early product trials as well as process concept testing completed through test runs on current equipment or equipment owned by others. Portfolio analysis and triage includes an examination of each potential innovation with criteria that differ substantially from the numerical analysis required by the Formal Process. The main goal of the portfolio analysis is to prioritize potential innovations and ask questions designed to increase understanding of the concept. The final step is the preparation of the product definition and detailed analysis required for entry into the Formal Process. In practice, there are dozens of potential tasks that might be undertaken in order to better understand the potential of an FEI idea.

In summary, some possible process and technology needs throughout FEI include, but are not limited to, the following:

- Build relationships with the technical community to gain basic knowledge
- Develop a taxonomy for describing a market place or a technology space
- Unearth and acquire early stage technologies through scouting or other means
- Brainstorming sessions looking for adjacencies and enablers
- Industry and competitor assessments
- Market analysis
- Close examination of a university spinout company with potentially valuable technology
- Investment in translational research to demonstrate value of early stage technology
- Prototype development
- Customer discovery (aka demand identification)
- Voice of the customer feedback
- Analysis of potential new business models and/or new routes to market
- Field tests of portions of a new product
- Skunk works projects

Thus, while it is difficult and unwise to specify a linear structure for FEI, it is possible and desirable to develop some common tools and approaches to the otherwise unstructured FEI process.

The Formal Development Process

The Formal Development Process consists of operational structures that fully prepare a limited number of ideas for commercialization. The steps are linear and are almost always the same for all projects. Almost all (95+%) projects are successful in the sense that they are brought to

commercialization. The Formal Development Process is a highly structured, calendar driven process with very specific criteria for completion of the process. Increased sales or reduced cost goals or both are almost always attached to these projects. The process is guided by very structured preparations, interim reports, and post implementation criteria that are thoroughly documented and practiced rigorously.

Where do the ideas come from?

Based on experience, iP2Biz estimates that the Formal Process gets many of its ideas from current customers (10%), current non-customers (5%), mid-level managers (30%), and employees (20%). This core group is the most involved with today's business and has the best understanding of today's issues. Any front-end process or hunches and insights from senior executives (35%) make up only a small portion of the projects presented to the Formal Process.

What are the phases?

The phases of the Formal Process are highly structured and usually have names that relate to the activities. The level of documentation required to enter the process is carefully defined. The phases are sequential and no phases are skipped as each step is an important part of the commercialization effort. The time needed to complete all the phases can be predicted accurately and the phases can be budgeted with increasing accuracy. Typical phases include discovery, scope definition, business case building, development, testing and evaluation, and launch. These phases may be segmented into many sub-phases (Product Development Institute Inc, 2013).

Some possible process and technology needs for the Formal Process include:

- Financial analysis including NPV calculations (and others)
- Project management
- Vendor sourcing
- Process detailed design
- Inventory run-out plans
- Detailed product design
- Packaging design

The Formal Process is very effective for implementing all innovations once they are defined enough to meet the rigorous criteria for entry. Usually, there are people on the payroll whose job is to ensure that the Formal Process runs smoothly. For innovations that are not as defined, but still worthy of a company's time and efforts, there is another, just as valuable, process.

COMPARISION OF THE INNOVATION PROCESS

While both processes are designed to support a company's innovation efforts, the two processes are very different (Table 2) and require different management, executive support, people, and goals (Eric Almquist, 2013).

Table 2: Comparison of the Formal Process versus Front End Innovation.

Category	The Formal Process	Front End Innovation
Structure	Much	Little
Order of steps	Linear, none skipped	Iterative, unordered
End point	Clear and manageable	None apparent
Completion dates	Predictable	Very unpredictable
Number of ideas	Few	Many
Rate of dropout	Very low	85% or more
Aligned with strategy	Highly	Sometimes not aligned
Measures of success	Milestone achievement	Concept strengthened, high % of ideas are discarded
Outside perspective	Not needed	Required
Budget	Fixed, committed	Small increments, total not known
Revenue and cost estimates	Increasing accuracy with each stage	Often uncertain, including much speculation
Climate	Little room for error	Rewards for pivots, 'outside the box thinking', and low % output
Activity levels	Fixed organization with structured guidelines	Ad hoc teams with changing membership
Work type	Disciplined and goal oriented including a project plan	Chaotic, unpredictable, some 'eureka' moments
Staffing	Some full time employees	Few full time employees
Type of thinking required	Left brain	Right brain
Ideas from Executives	35%	65%
Ideas from formal strategic planning process	n/a	15%
Mid-level management ideas	30%	10%
Employee suggestions and ideas	20%	5%
Current customer ideas	10%	3%
Current non-customers ideas	5%	2%

Total Innovation Process

The Total Innovation Process of a corporation consists of its FEI processes (however informally managed) and the Formal Process. The fundamental and strategic approach to innovation must include excellence in both phases. Combined, the phases are essential to the company's innovation results and therefore its growth. Companies that have all of the fundamental building blocks of innovation have more success with their innovation efforts (Bain Insights, 2013). The building blocks are the same no matter the specific industry of the company and include:

- Senior executives set a clear, specific *strategy* for innovation.
- Senior executives build an *organizational culture* that nurtures new products and processes and applauds failure at the early stages.
- Senior executives create effective processes for *idea generation and development*.
- Senior executives know how to manage a *diverse portfolio* of innovation that has the appropriate size, shape, and speed.

- Senior executives are effective at *scaling* new business ideas by supporting them with the right level and type of resources.

These building blocks are essential to any company wishing to succeed in FEI.

Measuring a company's FEI

It is hard for any company (or outsiders) to measure results of FEI because the best measure of results (sales from innovative products) is sometimes delayed by 5 or more years because new products need time to reach the market. Many other variables occur during that lengthy time period that render almost any measurement as suspect. However, there are a few shorter-term measures that demonstrate either the right culture or good early steps.

> Reducing uncertainty should be the **primary result** of most FEI projects. Management should applaud and reward projects that result in significant reductions in uncertainty.

The first and most important measure of FEI effectiveness is the climate established by senior executives around the entire process. The innovation climate must accept that most ideas in FEI will not be accepted and yet still reward those who bring forward new, albeit unaccepted ideas. A second short-term measure of effectiveness is a count of how many ideas are not accepted. Effective FEI processes evaluate a large number of potential candidates and move many of them aside. Third, for FEI to be effective, a small number of potential breakthrough or disruptive innovations should be making their way towards or through the Formal Process. This count represents another useful measure. Fourth, as some research has started to show (Carbone, 2011), corporations who have effective FEI processes also search out and embrace input from independent third parties of all types. It is relatively easy to measure how much outside input has been sought out and accepted. Finally, senior executives, who are the source of many of the innovation candidates, must be involved in the process in more than a pro forma role. A CEO recently described his expected level of engagement as, "I expect my direct reports to embrace innovation, and that doesn't mean showing me three slides at the quarterly review" (Anonymous, 2013). This last measure is likely to be an "I will know it when I see it" measure.

For any one project, the best measured result is that the level of uncertainty is reduced. Management should applaud and reward projects that result in significant reductions in uncertainty.

While there is very little formal research (Carbone, 2011) available that attempts to measure the value of an effective FEI, the little that is available points to a strong correlation between effective FEI processes and more effective Formal Process results.

CAUSES OF FRUSTRATION WITH FEI

When senior executives are frustrated with the lack of progress towards breakthrough, iP2Biz has noticed a consistent pattern related to those efforts. First, senior leadership gives little or no support

to FEI initiatives and does not put in place a culture that supports innovation. Microsoft is one of the classic examples of a very profitable company that struggled with disruptive innovation under Gates and Ballmer (Ovide, 2013). Executives who do not request updates on FEI efforts or fail to fund FEI probes are sure to find themselves with the Innovation Logjam. Second, these corporations do not accept that a relatively small number of FEI ideas will ever see the light of day. These corporations do not "fail" early and often enough with early ideas and do not iterate quickly on the few ideas that do show merit. Some do not even measure how many ideas are moved aside. Third, resources are not assigned to FEI efforts due to conflict with short-term goals and quarterly shipments. iP2Biz has observed many internal staff members in corporations reassigned from an innovation project to the task of fighting "daily fires". Fourth, the analysis process is plagued by a lack of objective and/or data-driven input; rarely is such a process supported by outside, independent input. It is surprising to iP2Biz how often groups inside a corporation do not share a lexicon of the technology and other terms that help ensure that a proper analysis is conducted. Fifth, as Cooper (2013) points out, the overuse of rigorous tools can cause these early stage ideas to be rejected prematurely. And finally, some corporations have not made a clear distinction between FEI and the Formal Process; worse, they may force all ideas through the Formal Process.

Bureaucracies and FEI

Bureaucracies are developed to repeat a relatively fixed set of procedures with high quality but with little human or emotional input. By definition (Bureaucracy, n.d.), a bureaucracy is described by:

> *"Professional corporations of officials organized in a pyramidal hierarchy and functioning under impersonal, uniform rules and procedures. Its characteristics were first formulated systematically by Max Weber in 1904… Robert Merton emphasized its red tape and inefficiency due to blind conformity to procedures…"*

From the earlier definition of FEI and the use of terms such as "iterative", and "unpredictable", it is easy to recognize that a bureaucracy is exactly what is NOT needed to be effective with "adaptive innovation structures". This is not to say that FEI cannot be organized or structured to a certain extent, but this *IS* to say that over-organization and over-controlling (e.g. insisting that all ideas begin at Step X or complete a specific form or have results in time for this year's budget cycle or have a sales estimate) will surely hinder (or destroy) the effectiveness of FEI.

A successful FEI process needs outside input

In the systems perspective of innovation, co-operation between several different types of actors (that are essentially impossible to house in one corporation) are seen as a key to successful innovation (Carbone, 2011). Because some of these actors are not required on an ongoing basis and because independent input is essentially impossible to generate from within a corporation, the research literature in this area persistently points out the need for organizations to employ the assistance of independent outsiders or intermediaries (Carbone, 2011). More practical reasons for utilizing outside help include the autonomy and objectivity of intermediaries that exists because these intermediaries are not part of their client's corporation. Since intermediaries do not have the same dozens of competing priorities as internal staff members, outsiders regularly complete assignments faster than could ever be accomplished by internal staff. Finally, given that FEI does not require and should not have regularly assigned staff, the use of outsiders minimizes interference

with ongoing internal operations and priorities. In addition to independence, most outside support can be acquired for far lower cost than the internal cost of extra staff to complete the same work.

An outside support group for the innovation process is known as an "Innovation Intermediary" (Howells, 2006). iP2Biz prefers the term innovation partner and will use that phrase in this paper.

INNOVATION PARTNERS

Innovation Partners (aka Innovation Intermediaries) (Nambisan S. a., June 2007) are companies that provide services to improve a corporation's innovation results. Note that consultants that sell and/or install an innovation process are not considered by iP2Biz to be in this grouping. McKinsey and Company is an example of this innovation process type of consultant. To build and expand on previous research efforts (Vanhaverbeke, 2009) with added clarity, the innovation partners that serve FEI are organized into four groups based on the value they provide (Table 3). Also, note that any one company might operate in one or more of the subgroupings depending on their various service offerings. Of course, there are other types of innovation partners that support the Formal Process, but they are not considered in this paper.

1. **Connection providers** – The purpose of connection providers is to connect corporations and potential innovation providers. They may also provide connections for corporations to other entities that are innovation-related or might be influential regarding innovation policies. These connection providers do not themselves add content value. Their value is in the connection. They receive payment through service fees, subscription fees, and success fees.

2. **Collaborators** – The purpose of collaborators is to work with corporations to add content value. Their work is customized and unique because of the collaborations. Working as a team member, the collaborator is in the middle of key discussions and decisions. The partner and the corporation work together to share current research and to develop solutions. Their added value is in the collaboration process as well as the unique information generated. Collaborators draw conclusions based on how the data relate to the corporation's specific issues and problems. Prioritization of the innovation portfolio, market, industry and technology analyses, and detailed patent analysis are examples of services that could be completed collaboratively. They receive payment for services.

3. **Information providers** – The purpose of information providers is to provide content value in a form that might be sold to multiple corporations. Their work is not customized. While the corporation might make a specific request, the deliverable would look about the same regardless which corporation would have requested it. These providers tend to have experts in specific domains on their staffs. Their value is in gathering information and presenting it in a form that is attractive and understandable to multiple clients. These experts thoroughly research and present information regarding market, industry, and technology. While conclusions may be drawn, they are not drawn with the specific corporation's situation in mind. They receive payment for the reports and analysis they provide.

4. **Capital providers** – The purpose of capital providers is to provide content value in the form of proven (or partially proven) technologies. They add value because they reduce the risk for corporations by spending the capital provider's own funds to develop a specific

innovation. Most are trying to execute a business model that starts with locating interesting innovations and then providing those innovations with a small amount of capital to launch them on their way or to demonstrate their value. Many of these providers also provide management expertise by managing the entity that they fund. Regularly, they sit on the board of these entities. Some of these capital providers fit the definition for Innovation Capitalist (Nambisan S. B., 2012), (Chesbrough H. , 2006). The best of these must fight the urge to create full companies and instead focus on demonstrating technical capabilities. Included in this category are the more than 7,500 global incubators that provide funds and support to startup companies. Corporations then pay the capital provider some multiple of the business value to reward these providers for the risk they undertook or, alternately, the Capital Providers accept stock for their efforts in the hope that the small company ultimately is sold at an attractive value.

Table 3: Summary of the four types of Innovation Partner.

Category	Connection Providers	Collaborators	Information Providers	Capital Providers
Purpose	Connect corporations and innovators	Work with corporations to add content value	Provide content value	Provide proven technologies and customer demand
Value added	Connections	Independent input as team member	Independent information	Reduced risk
Revenue model	Fees of various kinds, up-front and success based	Fees for services	Fixed fees for reports and analyses	Risk-based value multiplier or stock appreciation
Competitive strategy	Bigger networks, better processes	Relationship with staff; customized results; reduced time to results	Quality results and insights, better experts	Finding and nurturing early technology

Each of the four types of intermediaries can and does provide valuable services. Corporations may now choose from dozens of options depending on their particular needs. Table 4 places some known companies in the Innovation Partner space onto the taxonomy developed by iP2Biz. It is unlikely that this table contains a representative sample of FEI partners, but that is not the purpose. The purpose is to show where they fit. Hopefully, the reader can easily place any partners not on the list. The most common partners by count are the Connection Providers since those connection platforms are relatively easy to construct and many university technology transfer offices adopt them as an attempt to improve their results. Information Providers are equally common because the experts on the staff of these providers are relatively easy to acquire. Collaborators are many and numerous ranging from one-person firms to global corporation; they are hard to count. Many one-person providers supply services to one corporation because of an established relationship with a senior executive and do not attempt to market themselves on a wide scale. Likely, there are fewer Collaborators than either of the first two types. Capital Providers are not common; those without a direct connection to senior executives offer interesting, partially developed technologies that will never be accepted by their target corporations.

Current providers vs. the iP2Biz taxonomy

Table 4 categorizes competitors of iP2Biz by Innovation Partner type. iP2Biz has not attempted an in-depth qualitative evaluation of these providers. Most of the information has been gathered from their websites, although there are informal connections with several of these companies.

Table 4: Table of companies serving in some form as an Innovation Partner.

Company	Connection	Collaborators	Information	Capital
Frost & Sullivan			√	
IBIS			√	
Idea Connection	√			
Innocentive	√			
Innovation Focus		√		
IP Analysis Companies			√	
iP2Biz		√		√
Law Firms			√	
Lux Research			√	
Maven	√			
Mindforce Consulting		√		
Nerec			√	
Nine Sigma	√			
Perception Partners			√	
PreSans	√		√	
Prescouter		√		
SRI International		√		
Strategic Allies Ltd.	√			
Strategyn		√		√
University Patent DBs	√			
Yet2Come	√			
YourEncore		√		

When to use each of the innovation partner types

Based on experience iP2Biz has developed guidelines regarding when to use each of the four types of partner along with some strengths and weaknesses of each. Interestingly, some tasks can be accomplished in multiple ways. One example is technology scouting. Each of Connection Providers, Collaborators, and Information Providers could take on a technology scouting assignment. Although the minute details may differ, the results produced by these providers would not appear different based on a high-level analysis. Another example would be "voice of the customer" information. Each of Connection Providers, Collaborators and Information Providers could take on this assignment. Their methods and their results would differ significantly, but each has its place.

Connection providers – Connection providers are best used when a specific solution to an engineering problem is being sought. The more precisely the engineering problem can be defined, the better the obtained results. There is a relatively low success rate, but those that do succeed are usually on a track to successful commercialization. Connection providers that build databases of university research or available patents are not often successful as the most valuable university research has likely not been disclosed and the most valuable patents have already been acquired. Connection providers who represent corporations' "unused" patents are soon forced to realize that, for the most part, the unused patents are unused for a good reason. Connection providers that provide a social networking type of "meeting place" for searchers and providers come and go rather quickly.

Collaborators – Collaborators are best used early in the innovation process before the corporation's experts have studied the candidate innovation. Best results are obtained when the collaborators become part of the FEI team. While most companies' internal staff could complete the assignments delivered by the collaborators, typically these staff members simply do not have the time. Time to results using the collaborators is regularly one-sixth to one-tenth the time required by internal staff to complete the same assignment. Deliverables from collaborators are customized based on the team's needs and regularly reflect insights developed during team meetings. Collaborators that help corporations with the triage process of sorting FEI ideas can provide valuable and independent input. Collaborators who also attempt to sell their own innovation process instead of fitting in with their client's process tend not to be successful. Collaborators who do not develop a close working relationship by becoming their clients' trusted advisor do not survive.

Information Providers – Information providers are best used when information about a specific technology, patent claim analysis, general market study, general competitor information, or overviews of a market space is needed. Their deliverable is generally available in a report form and can be very useful in FEI. Time to delivery is regularly much quicker than internal staff or collaborators could accomplish. The work is usually not customized and is not specifically related to the company's situation and is available (generally) to anyone else who wants the same information. Information providers have expert staff members who can and do provide valuable insights and value additions. Information providers that simply reformat government statistics or publically available documents do not last long.

Capital Providers – Capital Providers are best used when a specific early stage technology has been identified and capital is needed to move the technology towards commercialization. The results are a proven or at least partially demonstrated technology. Time to completion varies from as low as six months to as long as two years. Often the corporation can gain access to the results with little or no capital at risk. The cost to corporation comes when it acquires the technology as the capital provider will require a variable multiple ranging from 5 to 100 times their investment for their risk-taking efforts. Many corporations back away from these multiples and as a result few technologies are actually acquired in this fashion. The capital providers who try to emulate the Venture Capital model and form a complete company with full management find themselves, when their funds run out, holding a rather substantial bag with no takers. Incubators who think their assignment consists solely of providing funds and free office space do not fare well; "Most of them fail (Mitra, 2013)".

Where do iP2Biz services fit?

iP2Biz is an Innovation Partner that offers unique services in the collaboration section and the capital provider section. Since 2004, iP2Biz has been effective at precisely those tasks best accomplished by external partners: independent analysis, providing autonomy during early searches, providing an outside perspective on markets, technologies and industries and, most importantly, producing results in far less time than the client's internal staff could possibly accomplish. All iP2Biz services are in support of FEI and support the iterative nature of the process. Clients call the iP2Biz staff, "our trusted advisors". iP2Biz has developed an entire suite of services designed to improve the results of the client's FEI process and has several new services in the pipeline. Importantly, iP2Biz does not require that clients adopt a new "innovation process", as iP2Biz services adapt to meet the client's needs. The current iP2Biz services are described below.

Innovation Portfolio Assessment: iP2Biz leads an assessment of the client's development portfolio. The team uses a structured method to assign values and weights to parameters of breakthrough innovation projects. The result is a jointly prepared prioritized list of potential projects that can be used for future resource allocations.

Opportunity Assessment: iP2Biz provides a quick and independent look into an opportunity in a way that engages the client team. In 30-40 days the client receives a high level review of markets, technologies, and industries developed by proprietary methods. Opportunity Assessments always include a recommendation.

Innovation Pathway Scout^{SM}: IPScout is a comprehensive scouting service that places unearthed technologies in a business context. It is a directional service, augmenting the innovation process based on experience in rapidly moving early stage technology toward commercialization. With IPScout, companies gain visibility into research universities where developing technologies may be found relevant to their current projects. Promising technologies are analyzed to verify those that are deemed ready for further investment.

ProofCo®: The primary method to move technologies along the commercialization continuum quickly is a joint Proof of Commercialization (ProofCo) project — a clearly defined, precisely positioned, and tightly managed project that delivers clean intellectual property to clients while reducing their time and cost to market. iP2Biz shares the investment and the risk with clients. This joint investment capability is unique in this space.

Innovation Forum: iP2Biz leads a one to two day discussion around one disruptive innovation topic. Participants include client management, researchers and developers, iP2Biz senior staff, and external subject matter experts selected by iP2Biz. The results include detailed notes from the discussions, next steps and, regularly, breakthrough innovations.

Prototype development: As designs are considered, clients' prototypes are developed by an outside source under iP2Biz supervision and complete client anonymity. iP2Biz finds and coordinates with an outsourced vendor while keeping the ideas and designs of the client at heart. Although led by iP2Biz, the client is involved and active throughout the entire prototype development process.

Project management: Ensures internal development team is not distracted with an extra burden of managing an external partner excessively. iP2Biz will, as an external partner, manage ongoing projects while collaborating with client executives and management.

Annotated monitoring service: iP2Biz offers an extensive monitoring of technology, market, and industry, and includes an annotated analysis of said monitoring. A detailed description of each annotation is more important than a simple description of a current field. iP2Biz provides the detailed information to clients in deliverables that contain actionable value.

Table 5 demonstrates where in the proposed taxonomy each of the iP2Biz services falls.

Table 5: iP2Biz service offerings organized by where they fall in the four types of Innovation Intermediaries.

iP2Biz service offerings	Connections	Collaborators	Information	Capital
Innovation portfolio assessment		√		
Opportunity assessments		√		
Innovation Pathway Scout[SM]		√		
ProofCo®				√
Innovation forum		√		
Prototype development		√		
Project management		√		
Annotated monitoring service		√		

Conclusion

Research papers studying FEI are fragmented, and they are not always useful to a corporate executive trying to understand the space. However, it is clear that corporations that employ FEI intermediaries wisely will gain significant value. This paper includes a complete set of definitions covering a corporation's Total Innovation Process to bring structure and clarity to the discussion of intermediaries for Front End Innovation. Also included are some reasons to choose (and reasons to be careful) regarding each of the four types of Innovation Intermediaries serving FEI. Hopefully, executives can make a more informed choice about which type of partner to utilize and when to acquire their services. Finally, the paper has indicated where the current suite (and those soon to be announced) of iP2Biz services fits in the proposed taxonomy.

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