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Managing Your Growth Engine
Or
Grow Your Own

Abstract

In the competitive arena of low cost offshore producers, manufacturers need to rely upon radical, innovative technology to preserve their margins. This paper will explore technology development and address topics such as:

- Optimal focus of technology development
- Options for technology development
- Selection and motivation of staff
- Effective processes

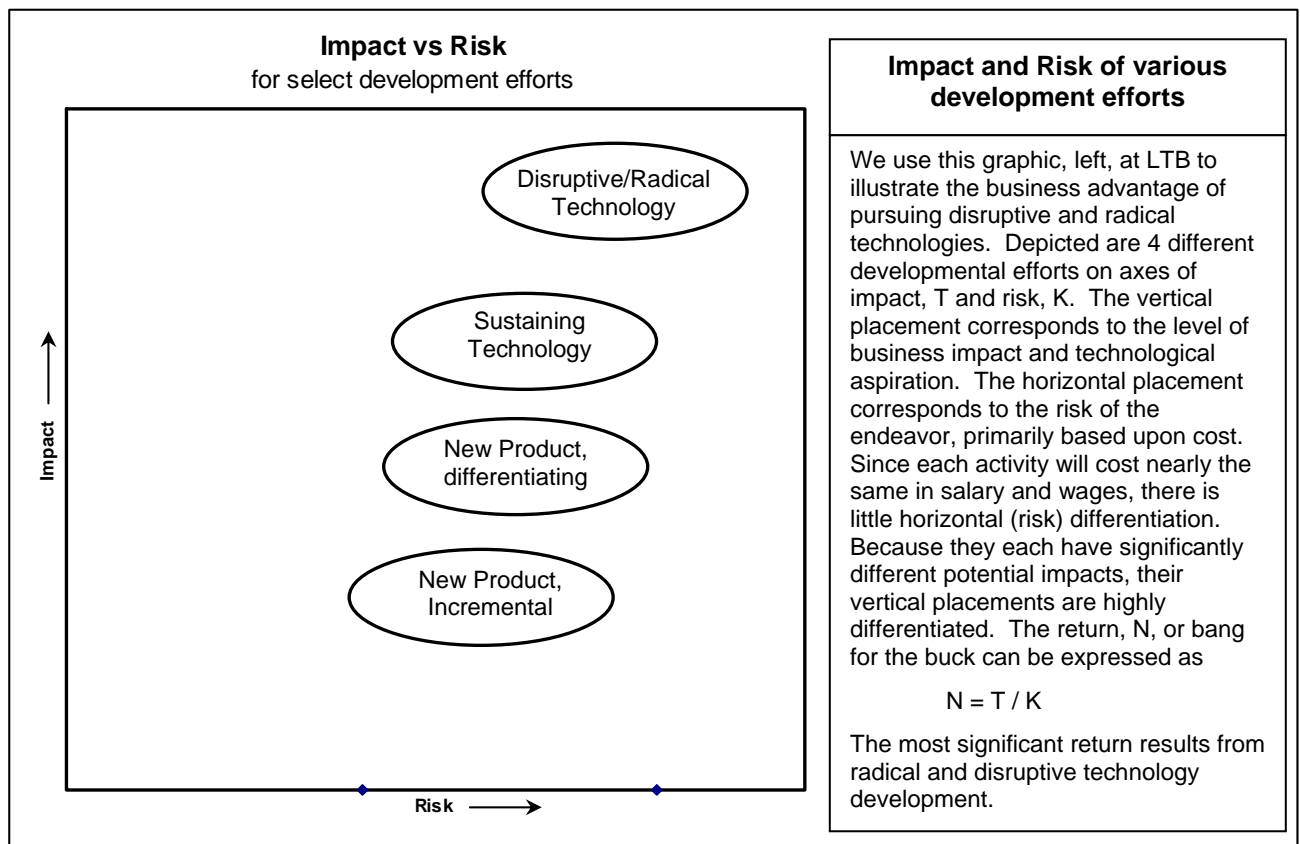
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Greg Lyon has over twenty five years in technology development. He has worked in research & development and new products development at General Electric, Leviton Manufacturing, Thomson Industries and American Standards Testing Bureau. He is the named inventor on 14 US patents and 6 applications. He is now the principal at LTB Engineering, a firm specializing in enabling American manufacturers to develop and leverage their technology base.

A center of technological innovation can be a growth engine for any manufacturing company. There are a number of strategies and management tools & directives that drive the engine effectively and repeatably. The keys include a focus on differentiated technology, a balance of internal/external resources, optimized staffing and communication and implementation of productive processes.

Technologically swinging for the fences is the road to superior cash generation and growth. For manufacturers in high-cost regions, it is the only guaranteed defense against low-cost offshore market intrusion. Properly exploited, proprietary, unique, disruptive technology is the single-most critical element in product success and business development. Of all possible technical endeavors, radical & disruptive technology development provides the best 'bang for the buck'.

Figure 1: Technical endeavors as functions of impact and risk



Compared to incremental product development, the pursuit of radical innovation has a far better impact and return. New products will naturally flow from the new technology; the reverse can't be stated. The expenditure of resources on non-differentiated product can be extremely dangerous. The company is now faced with toe-to-toe competition with overseas manufacturers who have proven to be very effective incrementalists, and are

starting at a lower cost structure. It is by swinging for the fences and hitting the technological home run that the American manufacturer can change the playing field to its advantage.

There are alternatives to development:

1. Farm out technology development
2. Develop internal technology development capabilities
3. Introduce resources to leverage your existing technology base

Farming out technology development has its own set of pros and cons. This can sometimes be accomplished through working with academia or with so-called think tanks. While the caliber of the developers may be quite high a significant degree of control and ownership is usually sacrificed. Further, there can be a lack of a sense of urgency, making for frustratingly long delivery times.

Internal technology development is the historical norm, typically performed by an R&D team or the like. When functional and motivated, this is the most exciting place in the whole of the company. The rewards of internally developed technology include ownership and control. Technology development is not, however, without its challenges, including risk and cost.

The challenges are sufficient that many manufacturers have abandoned their internal pursuit of technology innovation. The process and management of technology development are unique in business and requires a special set of tools.

Maintaining a self-sufficient internal R&D function can be expensive. Salaries for talented developers tend towards the top end of any specific discipline. A further component of cost is the infrastructure, consisting of labs, prototyping facilities, etc. Other deterrents to internal development include elements of risk; return on investment is not guaranteed. Some manufacturers, squeezed by a number of commercial pressures have decreased staff and resources directed towards technology development. This can add further difficulty to re-establishing a technology development foothold.

The injection of external resources to help leverage your existing technology base can be highly efficacious, both technically and economically. This approach is especially advantageous when the remaining technology base is well versed in the present technology. The resource, though exceptionally knowledgeable in the underlying sciences, should ideally not have the same experience set as the incumbent technology base; it's this difference of background that produces new ideas. The resource introduces a number of challenging new approaches that contrast against the conventional technology. The conflict that ensues is almost sure to produce unanticipated solutions. This process is usually hugely rewarding and results in a re-invigorated team always on the hunt for new ways.

Outside resource 101

A manufacturer of bellows and expansion joints was trying to break into a new manufacturing process, especially to pursue small volume quick runs. One challenge was the 'state of the art' tooling which had some impediments. First, it was patented, and the assignee expected significant licensing fees. Second, the tools were both expensive and a single sizing adjustment could require up to one day. Working collectively with the process engineers and toolmakers we developed substantially simpler and less expensive tool designs that do not rely upon the aforementioned patent. In trials, the tools demonstrated a sizing adjustment of less than thirty seconds. This new, proprietary tooling design is the subject of a US patent application, the first for this manufacturer.

The manager of the development group has a strenuous but tremendously rewarding challenge ahead of him or her. From an employee management standpoint, the manager will usually need to be a successful developer in order to earn the respect and trust of the staff. Ideally, the manager should work as a resource for each developer for the developer's project. From the project management standpoint, the manager needs to be able to persevere past the inevitable development pitfalls and keep a clear, communicable vision of the likely outcomes. Development projects tend to be fluid, so flexible project management skills are a must.

The placement of the development team need also be carefully considered. In many manufacturing organizations, the R&D function is placed in the overall engineering function. This has some benefits, but great restraint must be applied lest the R&D function become support for the other engineering tasks. This is a very talented pool and the temptation is great to assign them to sustaining and incremental jobs. Other placements include the marketing function, but similar comments apply. Consider

Varied backgrounds are helpful to increase the number of sources of ideas; another advantage of an external resource. Successful staff developers tend to be young; they are less inhibited and haven't yet learned 'the way' to design something. They will be independent, usually preferring to work as an individual than in a consensus building team. Obviously, the successful developer is usually of extraordinary intelligence, comfortable with the underlying science in a number of disciplines and is capable of producing quantities of solution ideas to given sets of problems. They will have a tendency to 're-ask' the question to look for loop-holes and to change the rules. This intelligence, creativity and independence sometimes make the developer a difficult employee to manage.

Outside resource 102

The new management at a producer of gas transducers wanted to explore new ways of accomplishing proportional electronic control of pressure in a range of environmental stresses. The engineering department, though a fraction of its on-time max, was extremely well-versed in the technology. LTB, integrating itself into the engineering function, proved to be a catalyst. Present technology development is directed towards order-of-magnitude cost reduction, and elementally new approaches. One patent is pending (the first in ten years), and (at least) three other endeavors are patentable.

placing the development function at the top line of reports to a senior executive; president, COO or CEO. While this places yet another report to an already burdened manager, it places this strategic function precisely where it needs to be guided. It also provides the senior executive with first hand knowledge when the time comes to supersede corporate protocols to allow a new technology to flourish. The external resource can be of significant assistance to the senior executive for perspective.

With the team in place the process of innovation is really straightforward. Again, an outside resource is very effective in getting the ideas to flow. Innovation can be taught and developed in each of us. With practice it becomes habit and a way of working. The key is the right motivation and impetus in the right culture and environment.

A challenge is an effective impetus to start the creative process. One example is to challenge the developers to produce one new idea, documented in a lab notebook, per day. This should be a regular part of their duties, complementing their current projects. Make sure the manager and senior developers, including any external resources are always ready for impromptu brainstorms, which are always an opportunity to add excitement to the effort. Encourage approaching every aspect of the working environment with the attitude of 'how else can that be done?' It is in the ideas that new solutions will be imagined.

The ideas should not be limited to new product technologies. They should include new processes, new analytic techniques, new distribution channels, new test methods, new materials, etc. The more varied the ideas sets, the more innovative the ideas.

Food for thought:

The most successful ideas generation machine I have seen was based on Friday in-house lunches; Ideas Sessions. After a company supplied lunch, the lab notebooks came out and each participant would explain the ideas of the past week. The adjacent participant would witness and sign, see sidebar on lab notebooks. The group ranged from entry level through chief engineers. The dynamics across these strata were remarkable. At first the younger members were very hesitant to proffer ideas, but once they did, they frequently astounded the experienced engineers with the novelty of their thoughts. Hence the present conventions were challenged, the chief engineers could respond, and all would get the benefit of their experience. What a great and fun way to learn! Good ideas invariably generated a frenzy of additional ideas. Over a period of about three years with five participants we developed a total of 3,200 ideas, 800 of which were catalogued for future reference or use.

The emphasis must be on the quantity of ideas. Assume for a moment there is one best solution to any problem. Now try to envision that one solution; that's nearly impossible! Now imagine that you have thought of every possible solution; you have by definition envisioned the best. Now find it! Like anything else, with repetition, it will become easier; invention becomes a way of life. Imagine a group of only 3 developers operating to this standard. If they achieve 50% of this goal and 10% of those are remarkable ideas, you will have 36 pearls to choose from every year.

On Laboratory Notebooks and Patents

Under the U.S. patent system, an application for a patent must be filed in the name of the actual inventor(s). In the event multiple inventors independently come up with the same invention, only the first true inventor will be awarded the patent.

In most cases, a properly maintained inventor's laboratory notebook is the first evidence of conception. The notebook itself should have permanently bound, consecutively numbered pages and be used by a single person. In making entries in the notebook, it is extremely important to describe the facts supporting the invention(s) in clear and concise terms, including as much detail as possible. In addition, care should be taken to make legible entries in permanent ink and relatively close in time to the work being discussed, preferably the same day.

At the bottom of each page, the notebook owner must sign their full name and enter the date. No changes or additions can be made to the entry after signature. If changes or additions are deemed necessary, they should be made on a new page.

Finally, in order to properly and legally corroborate the entry, each page of the laboratory notebook must be witnessed by a co-worker who is competent to understand the entry and who is not a potential co-inventor in the entry. Witnessing should be done on a daily basis and certainly no less frequently than weekly.

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The most effective method for motivating the generation of ideas is rewarding the inventor with sincere interest from his or her peers and superiors. This is so easy to achieve and so rarely executed. It's the interest, not the praise that's key. The quality of the ideas is a direct reflection of their perceived importance.

Once conceived, the ideas will be filtered through a battery of tests on their way to implementation. The disclosure and witnessing is first filter. The disclosure should include enough detail to stimulate ideas from others. Only the ideas that pass a very simple test should be catalogued. On occasion, the idea may not make the catalog, but could be encouraged to go back for more consideration.

The radical/disruptive technology is the best path to growth and business development. It affords new products, markets and profits in positive, discontinuous trajectories. It is simultaneously the best weapon to assure unique technology offerings in contrast to low-cost offshore product lines. Technology innovation development is easy – provided the right conditions are met and resources applied. This requires the implementation of a few special management skill sets. Once the innovation/growth machine is turned on, the results will be nothing short of startling.

What to do now:

If you would like to explore the possibilities of how you can exploit new and disruptive technologies for growth and cash generation, we want to talk to you! We would be thrilled to provide a complimentary consultation to discuss how disruptive technology can be developed and tailored to suit you.

Click here for our website: www.ltbeng.com

Or here to send an email: ltbeng@ltbeng.net

We look forward to hearing from you!