

Developing a strong R&D structure to drive company growth



Introduction

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As pressure increases to meet new business targets, companies are looking for new solutions that can bring them additional revenue streams. An efficient R&D department can be a major source of this new growth. It can help companies to deliver innovative products and new technologies and support operational improvements that increase productivity.

The first thing to recognize is that R&D should serve many purposes (as illustrated in figure 1) and if well managed can provide sustained growth and market differentiation.

However, for R&D to perform well it needs an optimal and flexible organizational structure.

For many organizations the structure of the R&D department has evolved organically over a period of time. As a result the function can get locked in the past and can fail to respond effectively to rapid disruptive changes taking place in the market and so miss opportunities for new business development.

The design of this structure needs careful 'systematic' thought, based on the organization's needs. It should also take into account knowledge about what has failed in the past, both internally and externally, and what has worked well.

Figure 1: Overall purpose of research and development (R&D) and the four key activities

| Overall purpose of R&D | Named activity |
|------------------------|---|
| Track market | Research |
| | <ul style="list-style-type: none">_ Reduce uncertainty_ Explore future in advance of business needs (foresight)_ Build competencies for the future_ Proof of principle new technologies from outside |
| Service market | Development |
| | <ul style="list-style-type: none">_ Create new products efficiently_ Improve processes to enhance performance_ Current product modifications |
| Shape market | Innovation |
| | <ul style="list-style-type: none">_ Launch smart ideas_ Look for ways to disrupt in target markets_ Create new markets_ Solve problems in new ways |
| Maintain market | Support |
| | <ul style="list-style-type: none">_ Reduce product costs_ Solve process and line problems_ Current product modifications |

The need

The need for restructuring the R&D organization

We have seen an increase in R&D restructure activity over recent months driven by:

1. **Regulatory changes in markets** – this can be driven by legislation. For example FDA-approved labelling changes or for the need to meet the requirements of markets with very different characteristics such as China or Europe.
2. **Disruptive technology** – the emergence of new technologies that create dramatic shifts in the competitive environment. For example, digital convergence creates threats to existing technologies and opportunities for new types of services. Biomaterials are emerging as a new growth platform for a wide range of companies.
3. **An upturn in mergers and acquisitions** – purchasing a pipeline of new products or the attainment of technology can be a driver for acquisition.
4. **Collaborative research** – there is greater emphasis on Open Innovation and R&D collaboration to populate pipelines.
5. **Shareholder frustration** – the lack of new products and services emanating from R&D creates pressure for a restructure.

Industry examples of R&D restructuring

Merck and AstraZeneca recently restructured their R&D departments to achieve growth goals or improve productivity in their organizations.

Fujifilm Corporation dramatically restructured its R&D department in response to the changing nature of the technology in its markets, particularly the growth of digital photography. Fujifilm has set up a new structure that can respond effectively to present and future challenges.

DSM the Dutch based chemicals company, has a major growth platform initiative called “Enabling Structures for Innovation” central to this strategy is a program for new opportunity identification.

Smith and Nephew made two major acquisitions in the last two years as well as moving towards a more regionally-driven business model. This necessitated changed thinking in how local product needs are met and how R&D is delivered.

Collaborative research creates new demands on structure

Global companies are increasingly deploying collaborative “open innovation” business models through ecosystems and platforms.

However, such collaborative R&D business model innovation has been studied primarily from the perspective of the focal company or ecosystem orchestrator. The critical roles played by other companies and the dynamic interplays between them are often overlooked.

The shift to open innovation that many organizations expect from their R&D staff has brought about a fundamental change to the nature of their day-to-day work. Moving from inventing internally within the boundaries of the lab to working collaboratively with outsiders. This creates a huge challenge for many R&D scientists and engineers who may not have the skills to achieve the desired results¹.

Gaining value from M&A activity

Studies over the last 20 years showed that up to 83% of Mergers and Acquisitions (M&A) fail to produce real benefit for the shareholders, let alone employees, and more than half actually destroyed value².

Although acquisition of new products can be a major objective for the M&A, detailed information is often not available until a late stage of the process. A company's pipeline and patents are its most prized assets and are not revealed to competitors until the last moment in case the deal falls through.

This creates considerable issues for the R&D leadership tasked with making it work. At nu Angle we have seen, for example, how one company acquired another without realizing that, as the new company was in a different market sector, it would require different R&D design rules.

The head of the department also lacked the experience of leadership skills to spot the problems until almost too late. The issue of the wrong R&D structure was only seen after the R&D was badly under performing.

A major issue is that expectations over timescales are often unrealistic

During a merger, R&D departments are the last to combine and this process can take up to nine months. This is inevitably highly stressful and time consuming for management and employees. In fact this time period may only cover the structural elements, definition of roles and responsibilities. It may not address establishing the working model; to create the new internal personal networks needed to make the team effective.

Integrating two large R&D groups also requires considerable skill. Often the combined R&D structure can be very different from either of the two separate R&D groups.

A round of optimization may well be needed. As a result new projects, building on the combined strengths or synergies will not be undertaken in this period, nor will any major hiring decisions be taken beyond that of the existing employees of the merging firms. This in effect can destroy value in the short-term and hence the longer-term aspects of R&D integration are very important.

Change management in R&D requires great sensitivity and good leadership skills. Without a clear strategy the company could lose key staff to its competitors. Unfortunately, companies often fail to prepare for the pitfalls that can result from reorganizing.

The pitfalls of reorganizing the R&D structure without an implementation plan include:

- ★ Weakened ideation networks and loss of good scientists and technologists.
- ★ Lost institutional knowledge.
- ★ Lack of established working relationships between central R&D and local centres.

The business case

The business case for R&D transformation

R&D spending is an imperfect measure of innovation – it fails to capture how well the money is spent and how R&D is being structured to capture high value growth. Improved performance is down to R&D internal management: how experienced it is and how outward looking it is.

Management needs to ask itself the very serious question:

“Are we part of the problem?”

“Can we do this ourselves or
do we need help?”

At nu Angle we help international organizations to generate greater value from their R&D investment. Our analysis of high performing R&D departments has shown that they share key operational attributes and strategies. At the core, they focus on flexibility, balancing demand and supply, generating choice and maintaining a sustainable pipeline flow.

They also look outside of their own organization for solutions, particularly in the face of increased regulation, heightened M&A activity and greater complexity in technology.

We have found that by aligning the R&D structure with the company's strategic objectives, these companies are able to simplify their R&D organization and restore discipline to development processes and R&D culture.

Benefits of managed R&D restructure

There are many benefits from taking a careful look at the R&D structure and making changes, these include:

- ★ Improved organizational alignment and decision-making – creating a quantifiable framework for R&D provides a common platform for decision-making. It improves visibility into demand and the translation of expectations into reality therefore ensuring that speed is in the right direction.
- ★ Creating a sustainable pipeline flow – a focus on generating a sustainable and scalable pipeline improves quality and choice of products. Resources can be adapted to the changing needs and demands placed on R&D.
- ★ Access to external knowledge – improved access to partners and external science provides a platform for sustaining innovation, access to expertise and risk sharing. This also provides the ability to tap into innovative technology sources that evolve with changes in the market place.
- ★ Improved asset utilization – a simplified network structure reduces complexity and improves effective utilization of assets. Emphasis on a flexible cost structure allows for variability and effective reallocation of resources.

R&D design

Seven Areas Framework for successful R&D design

nu Angle has developed a good practice framework for thinking about R&D design.

The Technology Management Architecture defines a strategic intent for R&D – it establishes a clear and common view for the R&D strategy and its scope of action. This provides a basis for answering questions such as:

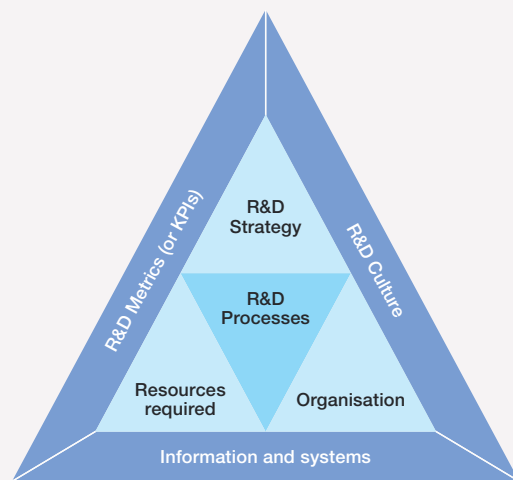
“Which markets should be a priority for R&D?”

“Should we dedicate more time to research or to development activities?”

We have defined seven elements within the architecture (see figure 2)

- 1. R&D strategy** – helps the company to position its innovation efforts internally and externally by defining where to place emphasis and the direction for R&D.
- 2. R&D process** – ensures that the right inputs and outputs are available to support functions such as product development, research, technical service, marketing and manufacture. There is also a balance to be struck between process bureaucracy and responsiveness.
- 3. Resources** – developing the capabilities to encourage innovation; includes tools, people, techniques and facilities.
- 4. Organization** – selecting the right structure for R&D allows processes and resources to work as efficiently as possible. Structures can be based on competencies, products, services or disciplines.
- 5. R&D culture** – the values and behaviours that contribute to the unique social and psychological environment of an organization. Inevitably R&D redesign will require change and the most fruitful approach is to begin with leadership tools that include a vision or story of the future based on a sound R&D strategy. Change can be consolidated with management tools, such as role definitions, measurement and control systems.
- 6. Information systems** – ensuring that the right information is collected, sifted, analyzed and communicated. R&D teams need to communicate in teams that are dispersed across the organization and may include partners, universities and technology consultants.
- 7. R&D metrics (or Key Performance Indicators)** – KPIs are part of the Research & Development Dashboard or Balanced Scorecard. There are two main types of indicator:
 - _Lagging indicators** – these are easy to measure, but hard to do anything about. Examples include patents granted, expenses, revenue, R&D spend and inventory turnover.
 - _Leading indicators** – these are difficult to measure but more important to R&D performance as they signal future events and show where you are heading. Examples include patents filed, ideas created, new technologies identified and development time spent.
 - _Leading indicators often change prior to large market or technology adjustments and, as such, can be used to predict future trends. But lagging indicators give you the benefit of a rear-view mirror of R&D observations to confirm that a pattern is occurring or about to occur.**

Figure 2: The R&D seven areas framework



Developing the right R&D structure

Using this framework we are able to diagnose and make changes to R&D structure so that it is more productive and future-proof the business.

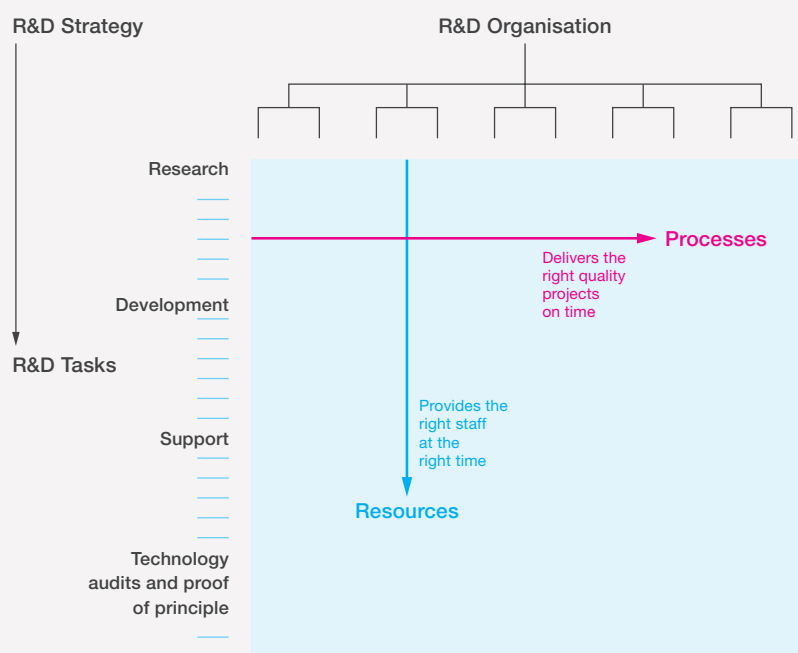
Good R&D structural design requires good data, logic and objective (not political) choices to be made. There are very good benchmarks and techniques available for designing R&D, which can be used against this set of principles.

Equal importance is given to all, but some parts need to be put in place to start with. For example, without having a coherent R&D strategy that describes the scope and direction it is difficult to design the organizational structure and identify the right current and future resources required.

The R&D strategy generates the vision, purpose and ambition in line with business strategy, the balance of R&D projects and the type of tasks and their priorities over time (see the vertical axis in figure 3).

The R&D strategy will also identify the optimum technology portfolio required to maintain the business growth. The technology portfolio will be very different for companies working in different sectors. For example, companies that are heavily reliant on new emerging technologies as a means of staying ahead of the competition e.g. chemicals, aerospace, electronics are more likely to be organized around classical science disciplines whereas FMCG companies less reliant on technology may be organized around applied technologies or even categories.

Figure 3: The structure of R&D



The R&D processes then act to deliver the tasks

These may be research programs, new product development e.g. stage gate, support to production or marketing and technology proof of principle.

Tasks could be to generate new capabilities for the future. Monitoring the R&D portfolio and pipeline is also an important part of the R&D process.

It is only when the R&D strategy and R&D processes are documented and communicated can the correct resources and R&D structure be drafted. The R&D structure will, for example, be dependent on the type, number and distribution of tasks, the importance given to the various R&D processes and the R&D resources required.

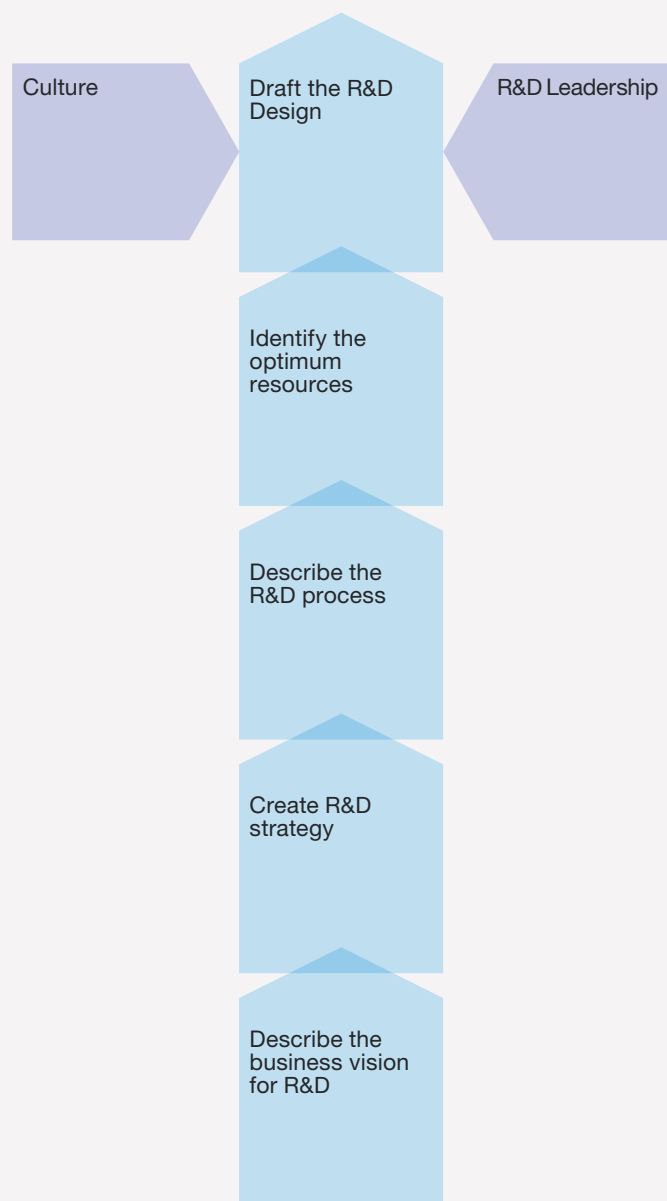
Once a draft organizational structure is in place it has to be implemented and it can then start to deliver at a higher performance level.

Clearly the right R&D leadership is required to make the triangle work and to ensure effective improvement in R&D performance. The leader identifies the needed change, creates a vision to guide the change through inspiration, and executes the change with the commitment of the R&D group members.

Leadership capabilities dominate and should be in place before embarking on a change program. Strong leadership is essential so that the necessary cultural changes are made to avoid loss of key staff and innovation performance while the new structure is bedding in.

To conclude there is usually a logical series of events as shown in Figure 4.

Figure 4: The generic sequence of events to design R&D



Conclusions

Next steps

Creating a good R&D structural design requires good data and assessment, logic and objective (not political) choices to be made.

The underlying issue that we see time and again is that the R&D strategy has not been defined and yet this is crucial if the structure is to deliver against the business objectives.

As with all business decisions there is an element of 'gut feeling' with innovation and the strategy should not be so prescriptive that it removes this element.

However a systematic approach can complement the skills of an experienced R&D director and provides an objective assessment of the root causes of issues that a company is facing and form the basis for an action plan to move forward.

Figure 5: **Issues and possible actions**

Is my R&D performing as well as it could be?

- _ Benchmarking
- _ R&D Audit against known measures
- _ Restructure R&D
- _ Is the R&D leadership as good as it could be?

I'm not sure of the right direction for R&D

- _ Generate a R&D strategy
- _ Do we have a robust technology strategy and plan using external input to avoid self-justification?

Some parts of my development process do not generate the right quality new products within the right time frame

- _ Examine the Product Development Process, (e.g. are the Stage Gates right)

We are not generating many smart new products

- _ Embark on innovative management program

We are not good at looking outside

- _ Put in place a technology scouting and intelligence program
- _ Re-think the way you integrate technology from outside
- _ Examine the process for using external partners
- _ Are we using the right external experts?

We are not good at looking outside

- _ Carry out a foresight driven technology roadmapping exercise
- _ Use external experts to assist (some from outside own sector).



About the author

Dr Steve Bone started his working life as an industrial chemist and materials scientist before becoming a business director for the sensor division of Thorn EMI. For the last 25 years he has occupied leadership positions in leading technology, innovation and strategy consulting firms – namely PA Consulting Group, Arthur D Little and the Monitor Group – before forming nu Angle with Peter Allen.

Steve has helped clients grow their businesses through innovation and technology management in a wide range of sectors – chemicals, pharmaceuticals, consumer electronics, biotechnology, and fast moving consumer goods. He is also a recognised thought leader having written papers on trends towards virtual R&D (before ‘open innovation’), technology strategy and applying core competency thinking to R&D. He has worked on developing the approaches and thinking to technology strategy, growth platforms and technology business incubation whilst working at nu Angle and is now applying them to very successful assignments in Europe, USA and China.

About nu Angle

nu Angle helps clients capture real value from innovation. Since it was founded by Dr Steve Bone and Dr Peter Allen, nu Angle has established an enviable international reputation for excellence.

A core team of experienced consultants is supported by a virtual network of technology specialists. This offers the agility to create a bespoke team of industry experts for each client, reducing overheads and giving clients access to the insights of international experts. This includes access to relevant technology as part of an open innovation program.

It is the most experienced single group of technology and innovation management specialists in Europe; bringing together over 150 years accumulated experience of helping clients grow through innovation.

nu Angle believes in creating lasting value. Its passion to share capability and transfer it to client teams means that clients continue to enjoy transformative success far beyond our initial engagements.

nu Angle specializes in helping clients to:

- ★ Connect brand direction, ideas, and technology for sustainable innovation
- ★ Decide technology direction aligned with commercial priorities
- ★ Implement processes and systems that help deliver on choices
- ★ Create value from ideas and innovation.
- ★ Build client capability around technology and innovation management.

Services offered by nu Angle include the following

- ★ R&D strategy – analysis and design
- ★ Innovation and technology management
- ★ Innovation growth platforms
- ★ Technology road mapping
- ★ Innovation audit.
- ★ Foresight and technology watch.



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