Introduction

As companies experience maturity in some areas of their new product development (NPD) processes, for example Stage-Gate® or portfolio management, they often begin to recognize gaps in other areas. This is actually good news and a normal part of any organization’s growth and development. Because each process within the full architecture of NPD has its own sub processes, an organization’s ability to implement end-to-end process management is dependent upon its ability to understand, integrate, and implement the sub processes. This recognition comes with maturity. However, if the implementation is not well planned and committed to holistically, organizations tend to face challenges across the business and at various points of the NPD lifecycle. Inversely, with a well-advised approach, the implementation can have profound impact and common mistakes (in particular, the seven identified in this paper) can be corrected or even avoided.
The Evolution of Full Architecture NPD Processes

The 1990’s was a banner decade for NPD; at least it was as far as organizational processes go. It was when the term “fuzzy front end” was coined by Preston Smith and Don Reinertsen. It was when Stage-Gate came into play with the helping hand of Bob Cooper (Cooper, 1988). It was when the notion of NPD portfolio management was introduced, pushed by Will Hill from Black and Decker, well before any book was written on the topic. In addition, the notion of product line roadmapping came into existence, escorted by the short-lived MATI academic-practitioner alliance. It was during this time that my colleagues and I introduced the concept of the full architecture of NPD processes that tie together all of these processes (Milton D. Rosenau, 1996). Experience has shown that systematically combining these processes is a key to realizing notable productivity improvement in NPD.

From a high-level view, there is nothing terribly complicated about the full architecture of NPD (see Figure 1). Business strategy leads to product line strategy, and product line strategy is tied intimately to product line roadmapping. Product line roadmapping creates targets for innovation that feed proactive concept generation and feasibility assessment. If feasibility is passed, concepts will be converted to actual NPD projects, and proceed through the gates and stages of development. All of this is wrapped into the two primary components of portfolio management: mix management and resource-throughput management.

When, and if, an organization streamlines the overall set of processes from business strategy at the beginning, to the retirement of products in the market at the end, the economic value can be tremendous. Why? The answer is simply because with a full architecture, all NPD projects being executed would fit perfectly within product line strategies, which would in turn fit perfectly with an overall business strategy. Management would also see resources allocated optimally across only those projects that should be worked on. All of this would then result in increased revenue, decreased costs, and quicker time-to-market and/or expansion into new markets. It’s a no-brainer and it is just that simple, right? Well maybe not. Of course, everything seems simple from the high-level view. But the real challenges begin when you come down to the ground level and dig into the inner workings and nuances of the sub processes; particularly when trying to integrate the processes into a full and unified process architecture.

It is always the case – not some mistake – that the full architecture of NPD can only be built out, and the sub processes integrated, as an organization’s overall capability maturity toward the sub processes advances; this is simply a change management challenge. As with other capability maturity models, such as the Innovation Management Maturity Model™, it is correct to think that each level of maturity must be achieved in the correct order, one before the other. While the pipeline flows from left to right, a company’s capabilities tend to mature from right to left (see Figure 1) with the initial focus on the lifecycle of a product and managing the product through gates. Therefore, a wise process implementation order, and the associated rollout of capability maturity, is established “simply” by moving right to left across the sub processes in the full architecture.

![Figure 1. Full Architecture of New Product Development (2004)](image)

1 MATI (Management of Accelerated Technology Innovation) a now defunct industry consortium which included such companies as Honeywell, Motorola and Lucent. MATI was assisted by faculty members of Kellogg School at Northwestern University.
Seven Common Mistakes

Because the need to develop and enhance process maturity is constant and ever present, what are some of the common mistakes or hurdles management teams might find themselves confronting when integrating sub processes into the full architecture of NPD processes? Here are seven mistakes that commonly occur and some tips to help you avoid or at least address them.

1. Failure to recognize the front end has different sub processes with different mindsets and orientations

Most managers recognize that activities, decisions, and the general mindset of people working in the front end of NPD are very different than what it is in the staged development process. But a mistake is commonly made in not recognizing that the processes within the front end are totally different from each other as well. Roadmapping is an independent process from concept generation, and both are independent from feasibility assessment. While it serves no good to roll these processes into one monolithic approach, many companies do. Instead, together, these processes must complement one another.

Recourse: First, do not assume senior managers all understand the uniqueness of each sub process and how they all come together in the full architecture. Executive briefings should be orchestrated to share such knowledge in the context of the value proposition of the full architecture. The idea is to share knowledge interactively and in such a way as to complement or add to the currently accepted view of how product development does, and does not, work within the organization. Here, meaningful diagnostics and assessments can be enormously helpful. This may include one-on-one interviews, surveys, and an analytical break down of past and current product development performance.

Second, communicate visually. With processes and process flows, pictures can be worth a thousand words. When communicating with senior management there is usually no need to detail such flows, however, enough detail is needed to demonstrate why they will work. By seeing the processes in relation to one another, you will be giving management a simple way to comprehend the uniqueness and value of each process. This matters.

2. Lack of recognition that product line roadmapping not only lays out the path for the product line, but it also must generate desirable targets for innovation before moving into the concept generation sub process

Most managers recognize product line roadmapping as the act of creating a plan for carrying out the product line over time. But, often such roadmaps or plans fail to create defined targets for innovation, for new technologies, and/or for new creative approaches toward a market. Product line roadmapping does not need to generate the final concept, but it should define the desirable targets for innovation. There is a rich history to support the desirability of such targets, both in practical use and in academic research (Crawford, 2011). Failing to set up such targets or, better stated, a portfolio of such targets, is a critical shortcoming. Without these targets there can be little connection between roadmapping and concept generation.

Recourse: It is important to introduce and convey an understanding of, and engage the use of a new object into the full architecture: Product Innovation Charters (PICs). PICs are a well thought-out set of new opportunity targets (aka innovation targets) that enable organizations to invest in well-defined and strategically purposeful front-end concept generation activities (see Figure 2 below). The PIC is a key output of smart product line roadmapping. To clarify, PIC is not the definition of a concept. Rather, the PIC is the defined target for innovation, whereas the concept is the potential bundling of attributes and how to achieve such attributes that “hit” this target or, stated otherwise, resolve the product innovation charter. All PICs coming from product line roadmapping would, by default, be “on-strategy”.

PICs (Product Innovation Charters)*

PICs are targets for innovation, not solutions.

PICs have four key elements
- Statement of objective
- Statement of strategic purpose within product line
- Guidelines and criteria
- Consensus economic size of opportunity

Figure 2. Product Innovation Charter (PIC)
3. Creating a product line strategy apart from a strong “leverage-ability” platform

If you look at the full architecture diagram you will see that product line strategy is called out. Too often, though, product line strategies (in terms of how they will “play out” against the competition) are either nonexistent or so weak as to be nonexistent. Unfortunately for many businesses, organizational inertia seems to push activities along with only indirect consideration of in-market consequences and competitive reactions.

**Recourse:** There are good product line strategies and bad product line strategies, and many in between. Just because someone has declared a set of actions and/or intentions as a strategy, does not mean it is a good strategy. For most organizations, the first task of product line strategizing is to determine what platforms exist and whether these platforms actually provide sufficient leverage to win against competitors. In fact, the fundamental test as to whether something actually is a platform is to determine if it enables an advantage over the competition, i.e., does it yield leverage? This “leverage-ability” or power of the platform from which new product offerings are created is perhaps the single most important aspect of a product line strategy. This is admittedly a heady topic, but an incredibly important one for anyone responsible for product success to decipher. My advice in this area is: understand the concept of platforms, how that should be interpreted to fit your company, and then leverage expertise to facilitate a platform assessment and recraft the strategy accordingly. (To dig in deeper to this concept, read “Strategizing, Roadmapping and Executing the Product Line.”) Bottom line, there is no point in ramping up product development productivity through a full process architecture when, in fact, the underlying platforms and strategies are inherently weak.

4. Employing creative thinking only in concept generation and leaving it out of product line strategizing, roadmapping, and staged development

Creative thought and concept generation go hand-in-hand. But a common mistake is to deemphasize creativity and over emphasize analytics and analytical thinking throughout other sub-processes. For example, within product line strategizing and roadmapping, much information and data come into play around such topics as market segmentation, market trends and value chains. An analytical approach to the information and data can be insightful. But much greater value can be realized through creative manipulation of the insights and ingeniously admixing them with other insights derived from product platform and technology analysis. Space, time, and resources need to be carved out for such creative exploration.

**Recourse:** What makes product development such an exciting and fun area to work in is getting the chance to add value by combing thoughts and interjecting new ideas. Throughout each sub process, activities should be orchestrated so as to encourage and facilitate creative thinking. The good part about designing processes from the ground up is that the organization can build creativity directly into the process without mandating any specific technique or approach. The advice is simple: make sure each process encourages and facilitates creativity.

5. Not recognizing the advantage of and need for information system support for each process, and integrating these systems to make the processes seamless

In the full architecture of product development there are distinctly different sub processes; each with many activities and decision points. At any given time, many projects can be underway within each sub process, with each project at different points toward completion. All too often, organizations fail to understand what is underway and the state of each project. This simple “state awareness” is an early component specific to each sub process. The problem that management teams confront is that to achieve this, earlier maturity level requires real-time information and analytics. The mistake is made when the management team maintains that certain sub processes, such as concept generation or roadmapping, should be carried out manually. The problem is that a manual approach creates a very steep slope for advancing capabilities.

A variant of this mistake is often made by keeping the sub processes totally isolated from one another, both in terms of organizational process flows and in terms of systems integration and the handoff of “objects” from one sub-process system to another. While disparate and isolated processes may seem easier to establish, implement and manage, the reality is that without integration across all sub processes, each sub process can be at odds with the others and delays between them will greatly devalue the ultimate goal of the full architecture, which is getting the most valuable products to market as quickly as possible.

**Recourse:** Blueprinting the bespoke systems view of totally integrated sub processes is a notable task. But it is not necessary before the manual creation of the sub processes. What is important, however, is laying out the primary objects across the full architecture, their primary
characteristic/fields, and how they relate to one another and to the underlying processes. Consider, at just the highest level for example, such objects as:

- Product line roadmapping initiatives
- Product line platforms
- Product innovation charters
- Product development concepts
- Product development projects
- People and their time

These are the primary objects within the full architecture that need to be managed and facilitated from beginning to end. A purpose-built system needs to do this seamlessly.

6. Using process-myopic metrics such as time-to-market, where the begin time and end time all take place within a single sub process

Establishing KPIs and tying implicit and explicit rewards and losses to these measures is standard procedure when implementing any process. While a key tenant to KPIs is to keep it simple, a mistake is made if the approach to “keeping it simple” is to silo them within a sub process and/or resist extending them to incorporate a newly introduced sub process.

**Recourse:** The metrics or KPIs of product development productivity fall into three categories: speed, strategic impact, and resource use efficiency (plus combinations thereof). In the full architecture, measures need to cut across processes. For example, speed or time-to-market needs to reflect the duration from the declaration of a product innovation charter in roadmapping to the breakeven point after launch. Similarly, resource use measurement versus output (efficiency) needs to reflect resources used in both – through staged development activities plus front-end roadmapping and concept generation.

7. Limiting who is involved in sub process implementation

Perhaps the most common mistake made by organizations when implementing a sub process is simply to assign a person to the sub process implementation and give that person sole responsibility for pulling it off. The reason that this is a mistake is that all processes are cross organizational with unique work flows, decision flows, and information/data flows. To get it right requires the involvement (actual participation measured in man hours) of the people who will use any one of the flows.

**Recourse:** The big deal in the full architecture of product development is that often the decision flow within a sub process will require participation in its design and implementation by top managers – those who will use the decision flow. This is particularly true regarding the linkage between sub processes. For example, it is top management who should make decisions regarding what passes from roadmapping to concept generation and from feasibility to staged development. Their thinking needs to be designed into the full architecture and, as such, requires their participation. My advice is to secure top management’s participation, not just their blessing.

### Best Practices for Integrating Processes

It is possible to put steps in place to avoid or, if you’re already down the path, fix the potential mistakes made when establishing the full architecture of the NPD process. If you are just getting started, here are a few key considerations to keep in mind:

1. **Learn and share the knowledge:** The first step and the best recourse to potential mistakes is to gain and share knowledge and awareness of the full architecture of new product development, and the why, how, and when of the sub process design, deployment, and integration. Process integration requires both a top-down and a bottom-up perspective. The idea is to take a holistic approach first, enabling top and middle management to gain understanding of the full architecture. With this understanding, top management can lead the organization through the advancement of cross-organizational capability maturity, while middle management can embark on the design and detailing of the sub processes and their integration.

2. **Be willing to make the investment:** The value proposition for the full architecture of NPD processes can be extraordinary, but realizing this value first requires investment of both time and money. Indeed, investing in the sub processes and their integration should be like feeding and nurturing the goose that lays the golden eggs. This is particularly true during design, deployment, and early capability maturity levels. Value cannot be realized without spending the time and money needed.
3. Get the help you need to recognize the value quickly: Organizations do not have to tackle this challenge alone. There is considerable experience with the full architecture and the integration of sub processes accrued by many consulting experts in the field. Because the implementation and integration of these sub processes are so critical, organizations would be wise to consider engaging such expertise to facilitate and guide design, deployment, and integration work. The idea is to leverage a consultant's expertise so as to move up the learning curve faster, avoid the pitfalls, and build cross-organizational capability quicker. Because the value proposition suggests a many-fold return on a full architecture of product development with integrated sub processes, the best objective is to realize the value as quickly as possible and using outside expertise will go a long way toward this effort.

4. Put the right systems in place: Many organizations have implemented a software system, such as the Planview solution, to enable portfolio and resource management while streamlining staged development work. This type of system should be of top consideration for product line roadmapping, concept generation, and feasibility assessment. Once in place, these sub process software applications should themselves be integrated, yielding a bespoke front-to-back solution in support of the full NDP architecture. This is important because as capabilities mature, top management will want to view and optimize portfolio and resource utilization across the full architecture. The NPD portfolio will extend beyond just the staged development process to include project and resource assignments related to product line roadmapping, concept generation, and the back-end (i.e., in-the-market) activities. The integration of the software will enable many changes as process capability matures, providing management with much needed cross-process data and rolled-up analytics to address a multitude of new and beneficial items. For example, the central question about portfolio balance becomes a more dynamic and informed discussion. Access to “strategic fit” criteria and “on roadmap” criteria allows managers to see if the portfolio carries out the product line roadmap. Additionally, KPIs on speed, resource use efficiency, and strategic impact is no longer just a measurement of item outcomes related to stages and gates, but encompasses a full architecture orientation.

5. Establish a reasonable implementation timeline: It is important to gain agreement across all levels of management on a practical timeline for implementing a full architecture of NDP and integrating the sub processes. This timeline should reflect both the design and deployment work needed as well as the time to achieve capabilities advancements across the organization. As you plan your implementation and integration of NDP processes and/or seek to correct missteps along the way, you’ll find there are resources as well as experts that can assist you. Once you’ve gained the knowledge you need and put a plan in place, have the confidence to move forward and seek assistance in areas where you recognize gaps. The sooner you get started, the quicker you’ll experience the significant value of the full architecture of NDP processes.

Additional Resources

FRAMEWORK

Innovation Management Maturity Model

This framework helps companies assess their innovation program, encompassing the people, process, and tools needed to speed time-to-market.

WHITE PAPER

Strategizing, Roadmapping and Executing the Product Line

This whitepaper provides a comprehensive look into the process for establishing and executing product line strategies and roadmaps.

ARTICLE

Maturing NPD Practices Beget New Processes

Gain insights on the new processes and practices that are being introduced as the field of NPD matures and how they impact your organization.
About the Sponsor

Planview is a portfolio and resource management company that helps organizations maximize business opportunities by optimizing the capacity of their finite people and financial resources. Planview’s software helps product companies support the entire product lifecycle from idea to launch, and through the in-market analysis to sunset.

This end-to-end product portfolio management approach is supported by leading process and analytics technologies, for a complete planning and execution solution built to the exacting specifications of product development organizations.

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About the Author

Paul O’Connor, founder and managing director of The Adept Group, has been a major force and a creative voice in the field of new product development (NPD) for 25+ years. During this time, he has developed and implemented a number of innovative approaches to creativity, innovation, and productivity in NPD, and is a leading expert on product line roadmapping. He currently teaches a wide range of master courses and workshops, and consults for a variety of clients across the globe.

Paul served as president of the Product Development and Management Association (PDMA), the leading advocate for best practices in NPD, from 1990 to 1992, and played a major role in shaping the development of the first certification test for professional recognition in product development. His writings have been published widely in peer-reviewed journals and business publications and was among the original contributors to PDMA’s first Handbook of Product Development (1996) and has continued to contribute to other PDMA publications. Paul is a past contributing editor to R&D Magazine and his work has also appeared in the highly respected Journal of Product Innovation Management.


Works Cited


