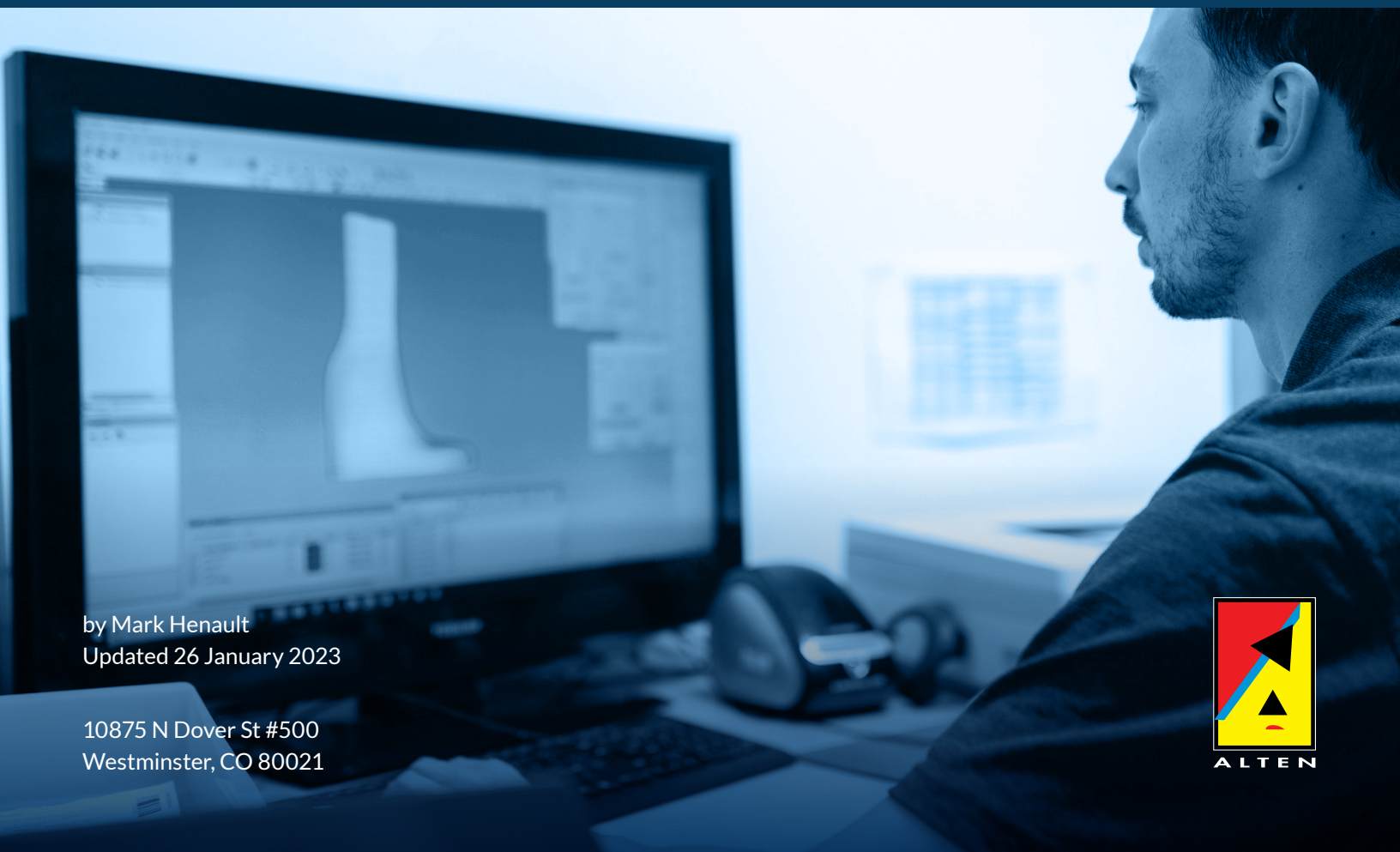
ALTEN TECHNOLOGY

SUCCESSFUL PRODUCT DEVELOPMENT

Part 3—Overcoming Product Development Productivity Pitfalls



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INTRODUCTION

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With clients asking more of products, and in turn more of engineers, productivity is a key driver for any product development (PD) project. Staying on track is no longer just a matter of project planning; it's a matter of ensuring your teams are operating effectively and using their allocated time to efficiently complete projects. In this white paper, we'll examine the many ways PD can affect team productivity, how to counteract some of those impacts, and how to effectively build a PD team using your internal resources.

In our previous series, we walked through how to calculate your product development-return on assets (PD-ROA) through understanding the true cost of your PD personnel and product revenues. We calculated the cost of PD personnel with the following assumptions:

- **A fully utilized resource is only 85 percent productive**: 2,080 x .85 = 1,780 net productive hours. This is calculated after considering vacation, sick, holiday, training, and personal days. In the case of internal resources, "productive" refers to hours utilized in support of a project. In the case of outsourced resources, this would be actual hours used and paid for by the client.
- **A full-time engineer earning an $80,000 annual salary costs 2.6 times that** after considering all overhead and burden costs; this amounts to an actual cost of $204,801.58 per year.

Understanding that 85 percent is the maximum productivity level for a single employee will give you the ability to understand the different ways your team is being productive and unproductive. Planning for that 85 percent productivity level allows you to maximize PD by outsourcing your PD efforts or strategically optimizing your internal team's productivity.

In this white paper, we identify six areas that can lead to a loss of PD productivity hours and diminish your PD-ROA. When you avoid these pitfalls, you can dramatically increase your PD-ROA.

PRODUCT DEVELOPMENT PRODUCTIVITY PITFALLS

To start making decisions concerning your team's productivity, we need to examine the commonly overlooked components of PD that can dramatically affect your team, workflows, and outputs. The PD team that foresees and plans for these pitfalls reaches the finish line to innovative products.

Here are six areas commonly affected by productivity pitfalls in product development:

- **Net productive hours:** Most companies fall short of even the 85 percent benchmark of 1,780 productive hours per employee per year. Numerous distractions keep internal resources from focusing on PD work, and they dramatically reduce workers' effectiveness and decrease the ROA.
- **Managerial capabilities:** Middle managers are commonly overburdened because of the high demand for their attention and the direct staff they manage being pulled in multiple directions simultaneously. When senior staff or project managers are inefficient, they directly reduce the effectiveness of the engineers below them. The solutions to managerial limitations aren't always easy to implement, but they are possible.
- **Required skills matching existing resources:** In most companies, many of the specialized skills required to complete PD projects like analysis, high-end electrical design, or software optimization are in short supply. Engineers without the proper skills, however, tend to be more readily available. This can lead to engineers without proper skills being placed on PD projects simply because of their availability. When this mismatch of skills occurs, productivity suffers.
- **Access to design tools:** Many companies find that they have a core set of software and hardware tools available for PD. Although this is sufficient for most PD, having specialized or advanced tools outside of this core set would enable faster PD and optimized designs in some instances. However, because these advanced tools may only apply to PD for a single product, it can be difficult to get approval to purchase them.

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- **Cost/schedule control:** When productivity is hindered, costs increase and schedules become delayed. Failure to manage project costs and schedule effectively drastically affect PD productivity and ROA. Increasing costs can also creep into development efforts if you aren't an expert in the type of component being designed (e.g. assuming parts will be produced with injection molding without having a good grasp on mold costs, production minimums, and piece part pricing). Also, beware of regulatory requirements and the associated paperwork. Programs in heavily regulated industries can incur higher costs for testing and certification than the cost of designing the product itself.
- **Process/requirements management:** Productivity is reliant on efficient processes and understanding the product requirements from the start. It can be easy to overlook processes or fail to fully identify requirements when starting a new project because the to-do list can become long and tedious to manage. However, effective PD firms focus on managing processes and requirements for their projects. It's not uncommon for companies to rush into developing a new product without fully understanding the requirements or processes necessary for success. This can lead to multiple changes in the design direction, rework of major areas of the program, and a lot of late changes—all of which can contribute significant schedule and cost challenges to the development effort. It may be better to go slow at the beginning of a project in order to go fast later.

Taking the time to fully understand what you need to develop is almost always worth the up-front investment in time and resources.

Although it's important to be aware of these common pitfalls, it's even more valuable to understand how to avoid them. The Productivity Pitfalls Chart (Table A) outlines these six problems in product development and their corresponding solutions. When you fine-tune your PD process, you can increase your team's productivity immensely.

TABLE A. PRODUCTIVITY PITFALLS CHART

Productivity Pitfalls	Problem (P)/Solution (S)	Problem (P)/Solution (S)	Problem (P)/Solution (S)
Net Productive Hours	**P:** Day-to-day distractions draining resources	**P:** Insufficient training on tools or processes	**P:** Meetings diminishing time for projects
	S: Allow flexible work hours. Set aside times without meetings to allow dedicated time for PD work. Dedicate resources exclusively for sustaining engineering of existing products..	**S:** Plan training hours into project kickoff. Identify gaps in team skills before beginning the project to plan for hiring, outsourcing, or training.	**S:** Set aside times without meetings to allow dedicated time for PD work. Make effective use of meetings to support productivity. Use stand-up meetings to quickly cover the most important topics.
Managerial Capabilities	**P:** Insufficient manager time	**P:** Knowledge gaps in skills needed for completing a project	**P:** Difficulty with personnel management
	S: Train senior engineers to act as technical leads to help new or junior engineers stay on task. Hold daily stand-ups to stay focused and eliminate blockages. Delegate day-to-day tasks to project coordinators.	**S:** Prioritize the skill sets of each contributing team member. Discover gaps early and implement training before the project begins. If training is not feasible, project managers need to line up external resources to help with deficiencies before starting the project.	**S:** Provide manager training or self-improvement courses for leaders. Understand team personalities—this helps manage employee reactions to the many changes in PD. Help teammates understand each other's personalities to reduce conflict within the team.
Skills Matching Resources	**P:** Errors due to some parts of a team being well-equipped and others lacking the skills necessary to complete a project	**P:** Staffing inconsistencies—when specialized skills are only needed sporadically	**P:** Learning stagnation—PD requires an abundance of skill sets. It can be easy to get stuck focusing on one industry or skill set
	S: Match up resources early on and optimize teams to prevent errors due to unbalanced resources. Understand team deficiencies early on and plan for outside resources to fill deficiencies.	**S:** Plan early and use a resource planning dashboard to organize each team member and their skills, allowing project managers to allocate resources. Determine core skills and outsource non-core skills to save time and money while optimizing your team to use their core skills.	**S:** Set aside time for training and new resource optimization. Attend trade shows for similar industries to learn new processes or tool sets to drive improvements in your industry.
Access to Design Tools	**P:** Lack of funding—the tool is too expensive to purchase	**P:** Lack of funding—the tool is too expensive to purchase	**P:** Difficulty getting started due to not having all tools available
	S: Use an outside partner who already has the tool or software, saving the cost of purchase and time for training.	**S:** Consider leasing the tool. Many analysis tools can be leased for a monthly or quarterly period. If you can lease it, evaluate whether you have a skilled user on staff to use the tool.	**S:** For a proof-of-concept prototype, start with simple tools such as basic model making, fabrication, and 3D printing. Engineering prototypes will require machining.
Cost/Schedule Control	**P:** Increasing costs	**P:** Delayed schedule	**P:** Delays due to regulatory requirements and associated paperwork
	S: Account for development, testing, and design costs throughout the development process. Don't assume going offshore will always be cheaper. Optimize personnel time to leave room for potential cost barriers.	**S:** Share design thoughts and requests across the development team early and often. This minimizes delays with vendors and allows early and more accurate estimates.	**S:** Define system requirements early on and set aside time for testing and certification processes. Work with experts in the processes to increase your odds of first-pass success.
Process Requirements Management	**P:** Leaving quality processes as the last step	**P:** Sustaining engineering work is overburdening teams and distracting from new PD work	**P:** Project scope creep happened and the delivery date was pushed out
	S: Do not wait until the end of the project to investigate quality issues. Implement design/verification methods early and repeat them often throughout the project life cycle.	**S:** Have one team dedicated to sustaining engineering and another for new PD. Outsource your sustaining engineering work—outsourced firms work to a fixed schedule.	**S:** The project manager should document specific deliverables and manage the program to those dates for the project based on requirements and scope, which can differ by client.

OPTIMIZE YOUR PRODUCTIVITY

We've covered many of the ways a PD team's productivity can be distracted, deterred, or delayed and potential solutions for each pitfall. Of course, it's even better to build your team to avoid these productivity pitfalls entirely.

It can be easy to just take a grab-and-go approach when developing your internal PD team. It's tempting to choose the best team members and move on. However, if you're proactive and consider the potential pitfalls when setting up your PD team, you can make more strategic choices and better position yourself for project success now and in the future.

We suggest taking these steps before building your internal PD team:

1. **Determine the true cost of your personnel**
   Most companies only include salary and benefits costs when calculating the cost of personnel, but including a more extensive list of costs allows you to predict your return on assets more accurately. We've developed the equation below to help calculate the true cost of your personnel.

Productive hourly cost (PHC) =
(hourly base salary + hourly benefits + hourly overhead + hourly indirect labor)

Multiplication factor for personnel =
PHC / (base annual salary / productive hours available yearly)

2. **Determine your product revenue**
   Your products should produce a significant revenue stream, so it's crucial to understand your product revenue in the scheme of your product's market share and life cycle. When you incorporate the true cost of your personnel, you can determine your product revenue with the following equation:

Market revenue =
(total market size × market share × [sales price − unit cost of goods sold (UCOGS)]) × (brand impact − cannibalism) × confidence factor

Product profitability =
market revenue − total cost of goods sold (TCOGS); where TCOGS = (total market size × market share × UCOGS)

PD-ROA =
product profitability / cost of product development personnel; result can be expressed as a value or multiplied by 100 to get a percentage

3. **Assess and adjust your team's productivity** Consider all the productivity pitfalls presented here and assess your team. Make the necessary adjustments based on our recommendations to maximize your internal PD team's productivity.

The best strategy to optimize your PD success is to evaluate all the cost components and potential PD productivity issues ahead of time and then build your team to prevent those pitfalls. As product development evolves, your people and processes need to evolve with it. Changing how you see your teams and the skill sets they can provide will help you go further in your PD efforts.

When optimizing resources already in place, you must consider all team capabilities across the entirety of the product development spectrum and map out the whole of your project phases. No task is too small. No skill is irrelevant. Ensure you understand the skills you're missing and have a plan to compensate for them.

CONCLUSION

As we've stated in the previous papers in this series, we view products as a firm's most critical assets, and they are necessary to produce a future stream of revenue and profits. Thus, when you optimize your PD team's productivity to perform effective product development, you also optimize your revenue and profit streams.

If you've tried to optimize your PD team's productivity but still struggle with a few of the productivity pitfalls, it's time to consider outsourcing some of your PD work. We'll look at three considerations that can help you make that decision in the fourth white paper in our series on successful product development: "When to Outsource Product Development."