

Blog - MEMS New Product Development, A Sellable Plan

David DiPaola, DiPaola Consulting, LLC, www.dceams.com

New product development is an extremely rewarding area of engineering and business. It often brings innovation to unmet needs that can improve quality of life and be extremely profitable for entrepreneurs and large corporations alike. With MEMS technology exploding with new business opportunities, this blog will discuss the critical factors needed for success in the early stage of new product development.

New product development starts with an idea. A product to enable the blind to see is very appealing to consider. However, without a viable business and technical plan to show the path to commercialization, the idea is not worth very much and its impossible to influence investors or managers to support it. Hence the first step is to identify an application and a lead customer that a business plan can be developed around. Equally important are a favorable competitive landscape, no or limited patents surrounding the area of interest and a large impact to society.

Applications that are driven by legislation or regulations are excellent because they have a high likelihood of fruition with definitive timelines. Legislation in automotive resulted in the development of MEMS based occupant weight sensors that provided feedback in systems used to deploy air bags with different force levels or not at all to better protect passengers in the event of an accident. Even better are applications that give consumers what they want. The Argus II Retinal Prosthesis System is a device that partially restores sight for specific blindness. This device provides electrical stimulation of the retina to elicit visual patterns of light that can be interpreted by the brain. Hence users can recognize doorways and windows and gain greater independence; a highly desired quality with significant impact. Over 1 million people in the US may benefit from this device and the lead customers are people with profound retinitis pigmentosa.

The Argus II will be the first device to hit the market and hence the competitive landscape is extremely favorable. Second Sight also benefits from large barriers to enter this market due to the rigorous FDA approval process. However, competition is on their heels. Nano Retina is developing another device that is smaller, fits uniquely in the eye alone and promises to provide greater number of pixels enabling recognition of humans. Second Sight is also developing the next generation device to be smaller, places the video camera in the eye and provides improved vision with greater number of electrodes.

Timing is another important aspect of new product development. There are limited windows in which a product can be developed and launched. When products are developed without an underlying customer demand, they rarely make it passed the R&D phase into commercialization. Often times technologies are developed in universities 15 - 30 years before they become mainstream commercialized products. Conversely, if the product comes to market too late, OEM's have already picked development partners and are reluctant to change suppliers. The application space may also be saturated with competitors making it difficult to win market share. Depending on the industry, these windows vary in size considerably. A typical cycle in automotive can range from 2 - 5 years. Consumer electronics can be as little as 6 months and class III biomedical applications can see cycles greater than 10 years. Hence it is important to fully understand market opportunities and have a detailed schedule to demonstrate the product can be launched within this defined window. Equally important, some core technology elements of the design must be developed to a functional point with limited areas needing major development or it will be challenging to meet the defined schedule.

For the occupant weight sensor, there was a limited time to engage with OEM's and show proof of concept before production suppliers were chosen after the legislation came into law. The sense element and conditioning electronics were proven in another automotive sensor and the

packaging was a major development piece. The required compliance with government legislation dictated the schedule for aggressive product development, validation, launch and ramp cycle.

An often mismanaged portion of new product development is the team behind the innovation. A team with robust chemistry, passion and a single leader are key to success. Multiple team leaders and poor chemistry only leads to infighting and redundant efforts. It is also important to limit team size to a critical few to expedite decision making and keep focused on what's important. Larger teams tend to get distracted with items outside of the core focus and can miss critical details and deadlines causing product failure. Self assembled teams starting at the grass roots level more times than not have excellent chemistry. They begin with an idea generated by 1 - 2 people and an additional 1 - 3 trusted colleagues are brought in as support roles to help manage the work load that often occurs after hours. This natural selection process brings people with similar passions together and weeds out less motivated people as they do not want the added work load.

An extremely important attribute of successful teams is to keep a low profile and minimize negative influences from external sources. At a project's beginning, it seems the vast majority of people are against it or have an opinion on why the project will not be successful. In reality, it is a fear of risk and the unknown. Hence those teams who understand this and maintain a high risk tolerance yet work to minimize it, have a definite advantage. Once early project successes are achieved, there will be plenty of time to tell others about the latest innovation. Having an advocate at the vice president level in this early stage is also extremely helpful because it can channel much needed funds to the project and keep middle managers without similar vision from halting activity.

Speaking the language of investors and business leaders is critical to get the financial backing to make the development happen and commercialization a reality. Hence the product's business plan must show that target profits can be achieved with a reasonable payback time of investment dollars. It is recommended that the plan include low, medium and high production volume estimations, product costs, product selling price and gross revenues. Operational costs, taxes, equipment depreciation, travel, engineering, marketing and overhead costs all need to be captured as accurately as possible. Concluding the analysis with return on investment, net present value and initial rate of return provide a good financial overview for the project.

New product development is an exciting area with many opportunities in MEMS applications. Identification of your lead customer and application, knowing the competitive and patent landscape, creating high impact products, being sensitive to timing, having small, focused teams, and developing a robust business plan can make a large difference in the success of product commercialization. Please stay tuned for future articles that explore additional aspects to achieve success in new product development.

Bio:



David DiPaola is Managing Director for DiPaola Consulting a company focused on engineering and management solutions for electromechanical systems, sensors and MEMS products. A 16 year veteran of the field, he has brought many products from concept to production in high volume with outstanding quality. His work in design and process development spans multiple industries including automotive, medical, industrial and consumer electronics. Previously he has held engineering management and technical staff positions at Texas Instruments and Sensata Technologies, authored numerous technical papers and holds 5 patents. To learn more, please visit www.dceams.com.