**US9221 – Developing a new product (**[**new product development.ppt**](1_new%20product%20development.ppt)**)**

To be read in conjunction with reading Wikipedia – [New Product Development](http://en.wikipedia.org/wiki/New_product_development)

There are 4 main stages in the development of a new product. These are:

* The development of a business case to be presented to financiers.
* The development of a prototype involving design and software engineers and marketers.
* Manufacture of the final product
* Marketing and advertising and Customer Support

**Concept Development** (Slide 9-3)

A good idea that is had by someone in the company, customer requests and competitors products. Included here are the initial designs – notes and diagrams are developed into a brief and more specifications are given.

Initial screening of ideas done at this stage.

Market Research

Is there a place for this? See if people would buy this product and how much they would be willing to pay for it?

Do competitors have a similar product?

Technical Research

Do we need to acquire new machinery or can we adapt exiting?

Do we have the personnel?

**Feasibility Study** (Slide 9-7)

Carried out on each concept to see if it is a workable idea and if the cost of development will be recovered by sales. Evaluates, ranks and shortlists workable ideas.

Involves preliminary design details (concept sketches) and production cost analysis. The report brings together market research and technical research.

People involved include: design engineers (mechanical and software), financial and marketing experts.

**Business Case** (Slide 9**-8**)

**What is a business case**?: <http://www.change-management.com/tutorial-business-case-mod1.htm>

A business case captures the reasoning for initiating a project or task to convince a decision maker to take action.

* What is the project or task?
* What is the reasoning or rationale for initiating the project?
* Who are you trying to convince.?
* What is the action that we need? Eg. Commitment to funding.

A business case is developed for any concept/s surviving the Feasibility Study phase. The business case will include: concept development, market research, technical research, design and a feasibility study. It is a profile containing all the information required for the board to make an informed decision on the product. Information includes market research on trends.

The following steps are followed in the development of a Business Study:

* Detailed information is collected – tech, marketing and financial
* Product ideas are compared
* Best ideas are short listed, rest are discarded.
* Full Business Case for each idea prepared and presented to the Board.
* Board decides which idea to go ahead with.

<http://www.change-management.com/tutorial-business-case-mod1.htm>

Now we can look at the [steps or activities](http://www.therightquestions.org/how-to-make-a-successful-project-plan/) that have to take place for the process to work. One effective way to look at these tasks is using a flow diagram or flowchart. In a flowchart you can break down the process into the key component parts including any decisions that might affect the outcome. An example below shows the tasks that need to be carried out in order to prepare a room for incoming guests at a hotel.



The development of a new electronic product starts with:

* a **discussion** of the potential solutions/ideas,
* a **feasibility study** being carried out to find workable solutions where the cost of development can be recovered from sales.
* a **Business Case** is prepared for those ideas that survive the Feasibility Study stage of the project.

Detailed information is collected regarding potential markets; comparison to other products (both from competitors and within the company); technical solutions such as equipment needed for manufacture and the availability of resources. A full cost-benefit analysis is required to see if the costs incurred in the development and manufacturing phases can be recovered from the sale of the item. A full report is prepared to be presented to the board who make the final decision on going ahead with the idea (or which idea).

<http://www.dpi.vic.gov.au/agriculture/horticulture/horticulture-and-business/small-horticulture-enterprise-key-things-to-know/commercialisation-flow-chart>

**What is in the report?**

Usually a well-structured, formal document, the business case tells the story of an initiative - from beginning (what problem or situation triggered the initiative) to end (what benefit, value or return is expected). Business cases are typically written at the project or initiative level as a way to secure funding and commitment.

Usually involves the following:

* Executive summary
* Project description
* Solution description - Presents the high-level description, scope, and objectives for the project or task.
* Cost-benefit analysis - Clearly presents the costs and anticipated benefits.
* Implementation timeline
* Critical assumptions and Risk assessment
* Conclusions and recommendations

**The consequences of not doing a full business case** are numerous. Worst case is that there is no real market for your “good idea” meaning that there is very little return for the money and time invested in the development of the product. The product could be priced beyond what the market is prepared to pay. On completion of the manufacturing of the product it is found that it doesn’t really do the job it was designed to do. Competition may have a similar product.

**Technical Solution (**Slide 9-10)

Develops all the planning documentation required for the production of the product. It includes a **product development plan** and **timelines** for the completion of various stages in the production. At this stage research is carried out to determine **what machinery** may be required and whether existing machinery can be utilised. Any new machinery and equipment will need to be sourced and priced. Availability of the equipment and how it will take to get the equipment up-and-running will also need to be known.

**Technical manuals** are written at this stage of the process. It may take a long time to translate the manual into different languages.

**Developing a Technical Solution**

The format of the Technical Solution may include: <http://it.toolbox.com/blogs/enterprise-solutions/deliverable-technical-solution-30288>

· an application profile -- a description of the major components of the application and their interactions with each other and other systems,

· a technology profile -- the basic technology concept for a system, which together with the technology and standards enables system requirements to be met,

· a System Blueprint or description of the system,

· other technical material to meet the customer’s technical requirements as described in the Proposal Request.

**Prototype** (Slide 9-11)

This is a working model of the final product and is important in order to show that it works. These are built using a suitable platform such as a PCB or stripboard. The first prototype may be an untidy, clumsy affair. Once a working prototype has been produced then money can be invested in equipment to produce a more sophisticated prototype.

There are 3 stages in the development of a prototype:

* A basic working model to show that the idea works.
* A more permanent prototype showing what the final product will look like. Minimise the number of leaded-through components. This is used for presentation purposes. The casing is developed at this stage.
* Improve the layout to eliminate loose wires in order to increase automation. Pre-production prototype is in fact a limited run of the final product. A more streamlined model.

The prototype needs to be tested to see if meets the specifications and does what it was intended to do.

Producing a working model of the final product is crucial to the financial success of the project. To not do a limited run of the final product could result in you getting to the end of the manufacturing stage and discovering that either the casing doesn’t fit properly or even that the product doesn’t do the job it was designed to do. It is also important to have a mock-up of the final thing to show at International Fairs and buyers.

<http://www.synthx.com/articles/pdp5-prototype.html>

<http://leardon.com/what-is-a-production-prototype>

<http://www.innovate-design.com/prototyping-process/>

<http://science.howstuffworks.com/prototype-integration-facility2.htm>

**Manufacturing Process**

* PCB printed and screened with solder (automated)
* Board is pre-drilled. (automated)
* Components placed on the board and soldered.(automated) robotic pick-up and place machines accurately place tiny components ready for soldering.
* Components are soldered by passing through a thermal reflow oven.(automated)
* Through hole components are placed on the board and soldered manually by skilled workers.
* Testing and possible repair of faults. (manually)
* Casing made

**Testing**

Comprehensive diagnostic testing is carried out using a multiple point electronic test nail-bed. Faults can be identified and located using sophisticated software linked to the test bed.

Visual and manual testing carried out at various stages during the manufacturing process.

Compliance testing – to meet any standards such as EMC screening, noise, FCC (USA) and RoHC.

**FCC – Federal Communications Commission**

This is a label to show that all electronic products manufactured or sold in the USA comply with the electromagnetic interference limits as set by the commission. The label is recognised worldwide.



**RoHS – Restriction of Hazardous Substances**

This is a directive that originated in the EU and restricts the use of six hazardous chemicals used in electrical and electronic devices.

RoHS specifies maximum levels for the following six restricted materials:

* **Lead (Pb)**: < 1000 ppm
* **Mercury (Hg)**: < 100 ppm
* **Cadmium (Cd)**: < 100 ppm
* **Hexavalent Chromium: (Cr VI)** < 1000 ppm
* **Polybrominated Biphenyls (PBB):** < 1000 ppm
* **Polybrominated Diphenyl Ethers (PBDE)**: < 1000 ppm

These substances are harmful to the environment and pollute landfills and are harmful in terms of occupational exposure during the manufacturing process. Any business that manufactures or assembles electronic devices that are to be sold in the EU must comply with this directive.

**Marketing and Advertising**

Marketing is the promotion of a product and can happen before the actual product is completed. Marketing can commence before final production even begins. You are generally “selling” a concept. Presence at Trade Fairs, or the like, is important. So too is having a good quality 3D model is required so that potential buyers can see and feel what the final thing would be like. Marketing is generally aimed at buyers who may be familiar with some of your other products. The aim is to generate interest in the new product even before it is in full production.

Advertising does require you to have a stock of product available for sale. Advertising is usually limited with short timelines. This mainly due to the short life of a model before something new is available. Advertising is aimed at individuals and trying to get them to look at your product as an option when purchasing.

Marketing is critical and can be useful to set pre-orders for a particular product. Any models used in promotions must be realistic to attract buyers, but not too detailed so as to give too much away.

To omit the marketing stage in the development of your product means you run the risk that no-one will know of your new product. This will mean reduced sales and hence a failure of the company to make a profit.

[Advertising is the act of getting the word out to consumers about a product or service. Marketing is the larger process of successfully selling products or services to the consumer from start to finish. Marketing may begin as early as the research and development stage and involves market research, product development, pricing, sales strategies, distribution, advertising and public relations. Advertising, therefore, is only one part of the marketing process.]

[**Marketing**

Marketing refers to the process of preparing your product for the marketplace. It involves understanding who your potential customers are and what they want to get from your product or service. Colors, logo and other design elements help to align the image of your product with the interests of your target audience. It is marketing that defines your brand and attracts the market share you want.

**Advertising**

Advertising is the process of making your product and service known to the marketplace. It is essentially spreading the word about what your company has to offer. While marketing is the way in which you convince potential buyers that you have the right product for them, advertising is how you communicate to them the existence of that product.

**How to Market**

To market your product or service, you must first study your target audience. Identify their values and needs. If you face a conservative, quality conscious demographic, develop a campaign that showcases your brand as being high end, tried and true. If, on the other hand, you are reaching out to the dynamic risk takers, use an edgier, more forward-thinking approach to develop the image of your product. Compose an easy-to-remember slogan or mission statement that communicates your brand message, and create promotional materials that reflect the tone and personality of that message.

How to Advertise

Once your product image is developed and your marketing strategy is in place, present your product or service to your audience through advertising. Print, television, radio and the Internet are all venues that can communicate your brand to potential buyers. Social media is an inexpensive but powerful option; tools such as Twitter, Facebook and Google+ can help spread the word about what it is you have to offer. Because your marketing strategy has identified your target audience, you can now focus your advertising dollar on the specific types of media used by that audience to increase your likelihood of successfully acquiring new customers.]

<http://smallbusiness.chron.com/difference-between-marketing-advertising-25047.html>

**Summary**

A concept is developed further to see if it is workable and financially viable.

Research needs to be carried out to see if the market is ready for the new idea. Whether there is a need for the product. This will also reveal if there is something similar already on the market.

Technical research involves identifying any potential “fish hooks” and solutions to solving these problems. This also involves identifying the machinery requirements that may be necessary for the manufacture of the product. This may also involve a timeline of the proposed production process.

A feasibility study is an evaluation of the proposed concept. This includes if the idea is workable and the money spent in development can be re-couped by sales. This involves preparing preliminary concept and design details, initial designs and a cost-benefit analysis.

Developing a prototype involves:

* the development of a technical solution to fulfil the requirements of the initial concept criteria.
* Building the prototype, and
* Testing to see if it works and meets the specified brief.

The manufacturing process is commenced only when it is shown that the prototype works as designed. This involves:

* the manufacture of the PCB,
* the placement and securing of the components,
* testing the boards for faults,
* producing the casing, and
* fitting the board to the casing.

Many of the processes are automated and carried out by programmed, robotic arms. Skilled technicians are required for some of the stages in the manufacturing process as well as for the final testing of the product.

The final product needs to be sold and the new customers cared for. Once there is a stock of the product advertising can start. A team is required for the sales and distribution of the product and technical support needs to be available to users of the product. This can be through a toll free call centre or a website. A complete backup service must be available to meet any concerns from customers.

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