



# New product development game (NPD game)

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# New product development game (NPD game)

This is a flexible game designed to illustrate some of the key concepts in new product or service development. It can be adapted and extended to provide both a quick 'icebreaker' experience before a lecture through to an in-depth experiential learning opportunity. We'll consider three variants here but feel free to extend and add more.

- Variant 1 = simple icebreaker exercises, useful for energizing the group and providing plenty of experiential learning about what not to do!
- Variant 2 = more complex game with multiple measures of success and the need to take strategic decisions about design and production
- Variant 3 = similar to variant 2 but including the wider network of suppliers into the story

## Overview

In outline the game involves breaking the group up into two or more competing teams. We'll consider two teams here – A and B – but in practice if there are more students there can be 3 or more competing teams. They are all told at the outset that they will be involved in designing and producing a new product and that it is a competition – it is often helpful to have some small token prize to motivate the teams. You should also tell them that you will be the customer and they need to satisfy you with their final product.

The groups are then allocated different roles – Production, Design and Observers. Ideally the 'Design' group should have 4 or more people, production 1 or 2 and at least one person should play the role of observer. (For very large classes it is possible to introduce a fourth role – suppliers – and allocate 1-2 people to that. See Variant 3 of the game below).

Having allocated 1 or 2 people to Production you should send them off to another room and instruct them to wait. The remaining group – Design – are then broken down further into roles within the Design team:

- Project Leader (1 person)
- Marketing (1 person)
- R&D (1 person)
- Designers (everyone else)

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Each is given an individual role briefing sheet (see examples attached) and as a group they are briefed as follows:

*“.....Your team have to design a prototype for a production model of a self-propelled car. You have 30 minutes to carry out this task and your team have been issued with some materials which you can use to develop your prototype. (each group is issued a bag containing an identical mixture of materials – straws, cards, string, rubber bands, balloons, etc.).*

*The design must be self-propelled – i.e. have some form of independent propulsion – and must meet the needs of the customer and conform to all relevant safety and other regulation.*

*After 30 minutes you will have 5 minutes to brief your Production team on your design and they will then have 10 minutes in which to build it. Any materials which they use must be paid for according to the chart of prices. (The team will also be issued with a chart showing the price of each item which they have in their bag of resources; the Production group will have access to a similar bag of resources).*

*The winner of the competition will be the team whose production model of the car*

- *travels the furthest*
- *meets or exceeds customer requirements*
- *conforms to regulations*

*.....”*

At this point the Design teams should find a space, either within the main room or else in different rooms. The clock should be started and the design phase will finish 30 minutes later. The Design teams then try to communicate to the Production team (at this point everyone should be in the room and other teams can watch their competitors struggle with this challenge). After 5 minutes the Production people start doing their best to assemble whatever the designers specified in their 5 minute briefing.

After 10 minutes the process should stop and the finished (or part-finished) vehicles should be displayed and tested. Ideally the winner would be the group whose car travelled furthest; in practice it is often impossible to complete the production phase in the time allowed. You should make allowance for this – for example, by allowing extra time but drawing attention to the problems of time and cost overruns in real world product development. It is also possible to test drive the prototypes which the design team worked on since these will normally be complete enough for the task.

Finally, after each team has demonstrated its car and you have allocated a nominal winner (!) the class should reassemble for debriefing. Begin by asking the different groups for their assessment and learning – a great deal will usually emerge in this stage. Then ask the observers for their input which will highlight and reinforce key themes. Finally ask the class to think about ways they might change their approach (in terms of how they organized themselves) if they were to repeat the task.

### **Briefing the Design team**

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The team will include a Project manager whose role is to bring the project in on time and budget. The R&D members participate in the design task but also have information about relevant new technologies which could be built into the design to enhance it. The Marketing person is responsible for liaison with the customer (you) and more generally with bringing information from the outside world into the design space. Example briefing sheets are attached.

### **Briefing the Production team**

The team will be given a briefing sheet (see examples attached) on which there are a number of constraints about working with different kinds of materials. For example some have to be handled with gloves, some delicately with tweezers, some involve a waiting time, and so on.

The only briefing they are given is that they will be required to learn about and then produce something in 25 minutes time. They should not leave the room unless invited to do so by the Design team. They may meet observers who come to visit them but should ignore them and simply carry on with whatever they are doing.

### **Briefing the observers**

The observers can listen to this briefing of the Design team and then they should spend the rest of the time observing Design and Production teams, taking careful note of how they manage the process of designing and developing the new product. It is important that they pay attention to the how rather than the 'what' of the design – and watch out for things like group dynamics, people being included or excluded, etc. Their role will be to present a mirror of the process to the participants after the final competition has been decided.

### **Key points in running the game**

The idea behind the game is to set up several 'traps' into which the groups are likely to fall. Each highlights a typical problem in new product/service development and can be used as the experiential trigger for a discussion of relevant theory and useful enabling tools. It should create an atmosphere of fun in which failure (which is the most likely outcome (!) is OK but which allows key themes to be explored.

First of all the separation of the Production and Design teams is deliberate – the Production people have almost no idea of what is to be designed and delivered, and, if left alone in their room, have little to do except speculate and try and anticipate for 25 minutes. Needless to say they become frustrated and annoyed! But they also have important information which the design team ought to be aware of – for example, the difficulties which might be encountered in trying to assemble something delicate through thick gardening gloves! Assembling some other parts involves delays and this may have an impact on the overall time taken to produce a working production model – this, in turn, will have an impact on overall costs and budget.

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There is, in fact, no reason why the Design team should not visit the Production people and even invite them to join in the design discussions – but they rarely do! They are so preoccupied with the excitement of creating a new idea they tend to forget about the downstream challenges of communicating to Production and actually having the product made.

The messages here are about early involvement, design for manufacturing and overall communication.

For the Design team the trap is that they are quickly drawn into the significant challenge of invention – how to come up with something which can be self-propelled and how to make that work using the materials available. They can be very ingenious with rubber bands and balloons but tend to become very focused on the task and to lose sight of the wider challenges. The need to establish an understanding of Production is one of these, described above, but another is the customer.

Whilst you have given them an outline specification they should ideally seek to understand your requirements as closely as possible if they are to satisfy you. You should make yourself available to them for discussions but do not volunteer too much information. For example, unless they ask, don't tell them the colour scheme you would prefer – it's quite a challenge to a design team who are proud of their technical achievements to realize that the customer isn't delighted because the car is green and his favourite colour is blue! Again the key points around getting close to customers at the earliest stage and throughout the project are easy to draw out.

A third trap comes when the Design team try to communicate their prototype ideas to Production. Given the lack of involvement of the latter it is very hard for them to grasp the details of an ideas which the Design team have worked on for 30 minutes – and even more so since there is only a small window of time available in which the Design team can communicate. Needless to say there is considerable frustration on the part of the Design bystanders as they watch Production mangle their ideas or fail to complete on time because of the additional difficulties which the Design team hadn't anticipated!

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## Variants on the game

The basic design is very flexible but some useful extras include:

Having a budget – the customer (you) can set a price he/she is prepared to pay and the Design team then need to think about how to create their car to give them a profit margin. They will need to understand the costs of various components and also the costs of Production time. When the difficulties of actually getting the model produced emerge (see above) this will quickly add to the costs and if they do find themselves asking for an extension of the 10 minutes they can quickly see their profit eroded and even move into loss. (Needless to say this echoes the typical problem of time and cost overruns in real-world product development).

Having various inputs from the market to feed in to the Design team at key stages. These might be some information from the national regulatory body about mandatory requirements for some components (say an anti-collision radar) which must be installed. This will be important for the designers to take on board even if it adds to the cost and complexity; if they fail to react to this they miss one of the critical criteria which you have spelt out in the initial briefing.

Another input might be a market survey which gives them information about key trends in cars – about colours, configuration, etc. The team do not have to take this information on board but they usually do – assuming that market research is a good proxy for what the customer wants. They may, for example, be told that the current trend is for tricycle cars and may build one like this hoping to impress you with their technical flair. You can react by saying that, whilst the general trend is for three wheels you feel safer with four – and reminding them that it is your requirements that need to be satisfied!

Bringing suppliers into the game adds a level of complexity because they can affect the outcome in several ways. They have information about availability and price which is important for Design to know about otherwise they may specify components which are costly and take a long time to arrive at Production. More important you can allow the Supply team to offer additional technologies and components not available in the original design materials – essentially they can be a source of additional innovation. Once again the exact role they play is flexible but the key point which their inclusion highlights is the need for early involvement, clear and shared vision and mechanisms to allow for sharing and building on ideas. In today's open innovation context this is a useful additional lesson.

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## **Example briefing sheets**

### Purchasing

Your task is to work with the Design team to identify the Bill of Materials which Production will need to build the production model of your vehicle.

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## **R&D**

You are part of the design team and you have available a number of new technologies which your labs have been working on. You can introduce them to the team at any time.

These are available as free prototypes to play with. When you come to build the production model **you must buy** all the parts from your suppliers.

Advanced communications module and onboard office system(Yellow dot)
Advanced safety system (Green dot)
Collision avoidance radar (Blue dot)
Entertainment system (Red dot)



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## ***Marketing***

Your task is to liaise with the customer and communicate their requirements to the design team

## Suppliers

You have all the items which have been issued to the design teams for developing their prototypes. They must buy these from you for their production models.

In addition you may have some extra ideas and items which might help them .... You can set your own prices/delivery terms for these.

	Cost (€)	Delivery lead time (minutes)
Balloon	50	5
Rubber bands	10 each	2
Small cards	10 each	2
Large cards	20 each	2
Blutak	50	2
Sticks	20 each	2
Straws	30 each	5
Sellotape	50	2
Clothes peg	75	2
Pens	20 each	5
Scissors (advanced cutting machinery)	250	2
Paper clips	50	1
Small bulldog clips	50	2
Pencil	50	2
Spoon	50	3

Advanced communications module and onboard office system(Yellow dot)	250	5
Advanced safety system (Green dot)	500	5
Collision avoidance radar (Blue dot)	500	5
Entertainment system (Red dot)	100	5

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## ***Production***

You have to assemble a product according to any briefing you receive from the Design team.

You are responsible for procurement of all items from the suppliers

You must obey these rules:

Any adhesives (including sticky sided paper materials) must be handled with gloves

Any plastic components must be handled wearing goggles and a hat

All red items require two people to handle them at all times.

All green items must be handled with tweezers

All blue items require 2 minutes waiting time before assembly to allow them to cool down

All yellow items require handling with gloves

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## ***Project Manager***

Your job is to deliver a working prototype to the customer

Your design team have 25 minutes to design and 5 minutes to communicate the design to your production team

Your production team have 10 minutes to produce the working prototype

Any additional time is costed at €50/minute (design) and €250/minute (production)

You have a budget of €10,000

Your designers have free materials but your production team must buy anything they use

This is a competition and the winner will be judged based on:

- Meet or exceed customer's specifications
- Travel unaided (after initial push) the longest distance
- Conform to international safety requirements
- Profit (= €10,000 minus all costs)

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### ***Instructions to observers***

Your task is to observe how the teams work on this project. Do not worry about the actual task but concentrate on the *process* – how they work together (or not) to achieve their objectives.

Look out for things like:

Communication

Involvement of all team members

Shared creativity

Awareness of overall task

Team working

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***Design team member***

Your task is to design a product which can be made on time and within budget.