ELE 606 Product Development Report Group: 3

ELE606

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Introduction

This report details the progress over the last 6 months of our R&D team for Apple's new domestic product/service area, iHome. Specifically, the design and technical details relating to a new innovation within this sec tor, which has been explored at length during this time period. Having previously studied the external and strategic factors affecting Apple's diversification strategy, it was decided that the domestic product market would be a feasible area of expansion. This new area is named iHome, and in order to provide controllability over all products under this name we have developed a new product system named the iLink. This will be discussed at length in the following sections, as well as the strategic fit with Ap ple's diversification strategy. This report will be divided into the following sections:

Description of Strategic Fit

- How iHome fits with Apple's global diversification strategy

Technical Details

- A comprehensive description of iLink including diagrams an d specifications
- Project plan for the next market year

Market Research

- Results of consumer market research on the iLink

Methods of Research & Development (R&D) Team

- Details of skills and requirements of members of R&D team

Conclusion

- Conclusions drawn by team and recommendations made to management board.

Strategic Fit

Apple has had numerous successes with diversification into new product areas in the past. Some of these have included the consumer electronics and music industries. Therefore Apple has the capacity and experience to successfully facilitate the expansion to the new chosen product/service area, the domestic product market (iHome). Over the years, Apple has effectively created new and innovative products from these areas, which has resulted in a large and faithful customer base globally. Hence, Apple will need to continue this trend when diversifying into the domestic marketplace to retain its reputation and brand loyal consumers whilst attracting potentially new clientele. Additionally Apple has chosen the domestic market sector as there is no clear market leader for these products. Therefore, with the correct mix of technological innovation and marketing strategy they could potentially capitalise on the lack of dominance in the area and become the market leader.

A new innovative development in the world today is the concept of 'Smart Houses', whereby a number of household functions (such as TVs, fans, Hi-Fis e.t.c.) can be controlled autonomously from one system. This system would be responsible for the operation of the functionalities of various domestic appliances from one control unit, meaning the user can oversee the usage of any one appliance from various locations within the house.

The new product from the iHome domestic range, called the iLink will be responsible for fulfilling the above functionalities. Provided the user has previously purchased products from the iHome range (e.g. TVs, fans, Washing Machines, Microwaves e.t.c.), the iLink will provide an efficient user interface for the management of individual functionalities (e.g. changing the cycles on a washing machine) from anywhere within a particular range. This product would continue Apple's convention of innovation within a product/service area, as no similar technological invention currently exists within the marketplace. The iLink could therefore assist the inevitable transition from 'standard accommodations' to 'Smart houses' in the future, potentially appealing to house-owners of the future. Bearing in mind the spending power and reputation of Apple's R&D team, and the current lack of competition, iLink has a very high chance of market success.

The domestic product market is constantly developing to meet changing consumer needs, therefore there will be continual demand (short and long term) for products such as iLink to incorporate the functionalities of these new products and provide ease of controllability for their operations. Apple will not face any immediate competition for the iLink, as no other companies currently have the wealth of resources or capabilities that Apple presently possess. This would mean the iLink will be a unique innovation within the field of domestic products, which is an attractive selling point. The customer base for the iLink will be diverse and spread across large demographical groups. For example, older age groups will enjoy the ease of accessibility that the iLink will provide, such as being able to control their kitchen

appliances (e.g. kettles) from the comfort of their living rooms and not mak e tedious journeys to operate them manually. Also families will be able to monitor the state of their appliances without the requirement of leaving the room (this can help to provide parental control and safety to any home , especially those with children) . Therefore, it can be seen that the iLink fits well with Apple's diversification strategy in domestic products. The reason being iLink is an innovation within the product area itself, and is well suited to customers already buying or having bought product s within the domestic product/service area.

Technical Details

The Apple iLink is a new innovative device which provides control to all iHome domestic products. This device has been developed to give comfort and convenience to the user by incorporating a large proportion of functionality for iHome devices. This is achieved by either one portable handheld device or a main server assisted by several auxiliary units (portable or fixed). The technical description

and specification for both the portable and fix ed devices can be seen below:

Figure 1: Portable iLink (Home page)

Figure 2: 'Full' iLink Terminal (Home page)

The above views show the 'Home' page, whereby the user can select a room to view and choose a particular iHome product to control. Below the exa mple of the kitchen is used, followed by the interface menu for an iHome microwave:

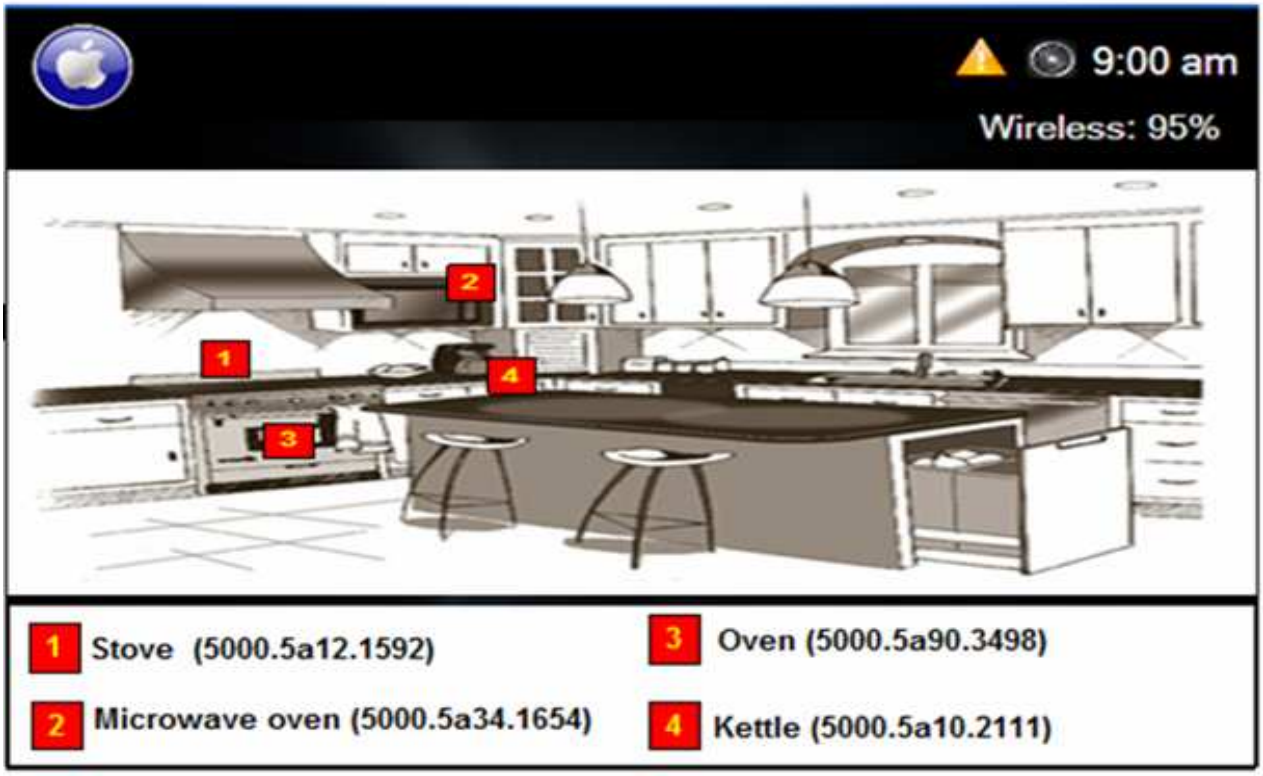


Figure 3: iLink view of kitchen devices

Figure 4: iLink view of microwave controls

Features	ILINK Portable Version	ILINK Full Version
Device Dimensions (thickness, width, height)	(12 x 185 x 75)mm	(25 x 583.2 x 380)mm
Screen Dimensions (thickness, width, height)	(5 x 125 x 75)mm	(12 x 380 x 380)mm
Storage	16GB (Removable)	1TB
Wi-Fi	Yes	Yes
Communication Method	Wi-Fi	Ethernet
Battery Life	Up to 8 hours	N/A
External Power	DC, Solar (optional)	AC 240V, Solar (optional)
USB Compatibility	Yes	Yes
Wireless Range	100m	N/A
Firmware Update	Auto	Auto
Colours	User Defined	User Defined
Memory card Compatible	Yes	Yes
File Server	No	Yes
Touch Interface	Yes	Yes

Table 1: Technical specification of iLink (portable and integrated)

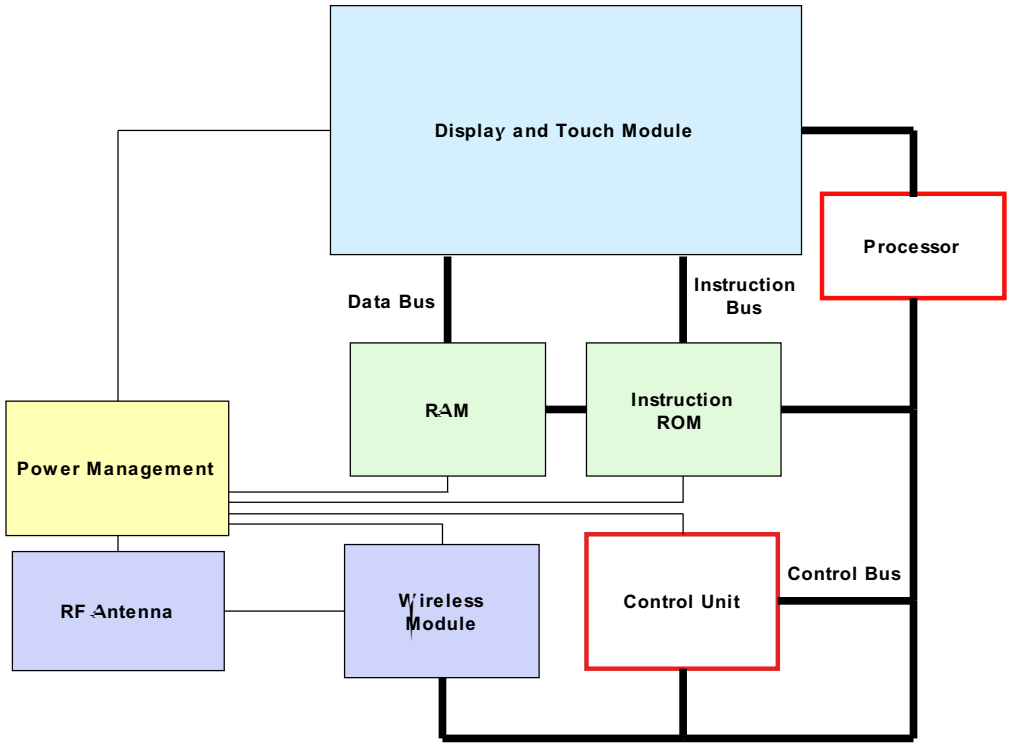


Figure 5: System Diagram of iLink

Figure 6: 'Full' iLink terminal in use

Touch Interface and portability:

This device fulfils Apple's recent trend of touch user interfaces. The graphical user interface present is three dimensional hence it allows the user to interact more efficiently with the device. Because of its unique design it is extremely portable and can prove to be an effective device when the user is moving around in their house.

Home Button:

This Button has a similar function to Home Button present in IPHONE, when the user presses this button the user interface reverts to the main window. In this device, the Home button is used for the same purpose. When the user presses the Home Button, it displays all the devices which are being controlled by ILINK. Furthermore, if there are too many devices controlled by ILINK then this will be organised into different rooms. Hence, the products can be accessed like accessing a file from a folder.

External Storage:

Due to fast development in RAM technology, it is very important to have an external storage compatible device. The external storage will be used in form of memory cards. Today's memory cards can have storage space up to 32 GB; therefore, it gives users the opportunity to enhance their personal devices by adding more memory to it (e.g. for logging errors with devices).

File server:

This feature is limited only to the ILINK full version. This is because portable version does not have enough memory. The 16GB memory for the portable device can act as user storage; however it is ideal to have a portable device to act as a server. While on the other hand we have full version with a massive 1000GB memory (1TB), which allows the user to save a large quantity of personal data (such as error logs and user manuals). The files can be accessed and modified remotely from anywhere in the world.

Error Alert:

Another feature which is implemented in this device is error detection and user notification. This idea is good conceptually, providing a monitoring mechanism for all iHome devices. The reason being ILINK is responsible for controlling electronic devices and if there is a failure or malfunction in a device the user is notified by an alarm being sounded on the portable iLink (through its on-board speaker). Hence, this allows the user to view the problem on screen and take necessary action to prevent any further damages or malfunctions.

Remote Access:

Due to its connectivity to the Internet, ILINK is capable of allowing remote access for the user. The device will be accessed by using a particular authentication method whereby the user is provided with a username and password combination. If the user needs to access the device, they must have the relevant IP address of the local network.

Firmware:

Nowadays the concept of firmware is quite common. It is a really effective technique to provide users with updates for their respective devices. This technique is being used by mobile manufacturers Nokia, Sony-Ericsson, Samsung and many other companies. Due to the market success of this concept, iLink has also capitalised on this notion also. However the firmware update is dynamic, so updates from Apple's online database are detected, downloaded and installed automatically without user input.

Online trouble shooting and account:

In order to improve the customer services available, Apple has decided to give an account with each iLink device sold. By using these accounts, customers can share their experiences with Apple and content like wallpapers and themes for this device with other iLink users online. Furthermore if a customer is unhappy about the device or they are having problems with it, they are free to ask Apple technicians for any help via their online avenues. The user accounts will give technicians the

authorisation and ability to diagnose and repair problems with the iLink from their headquarters remotely.

Solar Power:

The solar panel comes as an optional accessory with both the mobile and full version of iLink. It gives the customer the option of using stored solar energy as the power source for all iHome products including the iLink. This feature has been introduced for this device by considering different countries all around the world. For example, in the UK, weather is not very predictable and rain can be expected almost daily. Therefore the solar panels can be best utilised in tropical climates (e.g. Africa) as supposed to less luminous countries.

Safety:

The iLink power radiation is kept at a minimum. This is ensure d by going into a 'power save' mode when not in use, and having a regulator which controls the amount of power radiation (depending on the size of the house) i.e. the distance of the devices from the iLink. This notion is in line with the global perception of environmentalism and being 'green'.

Future Plan

Over the past 6 months a dedicated R&D team have been working on the product development cycle for the new product, the iHome iLink. The last 6 months have resulted in the completion of Market Research t o identify consumer needs and the concept development stage to provide an outline specification for the iLink. In the coming 12 months, the R&D team must complete the detailed design/specification and manufacturing plan (7 months), adequately test and eval uate the final product again initial predictions (2 months) and finally suitably structure the marketing and promotion schemes for the iLink (3 months). This timeline can be seen below:

Green = Completed, Red = To be completed

Figure 7: Block Diagram of Product Development Cycle

As previously mentioned, phases 1 and 2 have already been completed in the last 6 months, as can be seen from the colour code above. The following table shows the responsibilities of the R&D team for the following year (the detai ls of the R&D team can be seen below in the 'Description of the Department' section).

R&D Member	Description of Role
Project Manager	To set milestones and deadlines for the 12 months. To ensure team members adhere to these deadlines and work is completed to required standard.
Hardware Engineer	To identify the necessary components and equipment required for design and manufacture of a prototype (alpha & beta) and the final product. Design and build prototypes and final product.
Software Engineer	To design the software required for operation of iLink and the interfaces to connect the hardware components to this software. Use a relevant programming language to achieve this goal efficiently and effectively.
Graphical Engineer	To use relevant software to prototype the design of the casing and how to fit system 'chunks' together efficiently. Identify the appropriate manufacturing processes and materials.
Network Engineer	Responsible for construction of wireless communication system for the iLink. Involves choice of frequency and networking protocols
Marketing Expert(s)	Design proposed marketing schemes for promotion and eventual launch of the iLink. Identify target markets/consumers and appropriate pricing techniques

Table 2: Roles for R&D team

Milestones

1. **[illegible]:**
- Obtain inventory of supplies and raw materia ls needed. Find suppliers who can provide required demand at cheapest possible price.

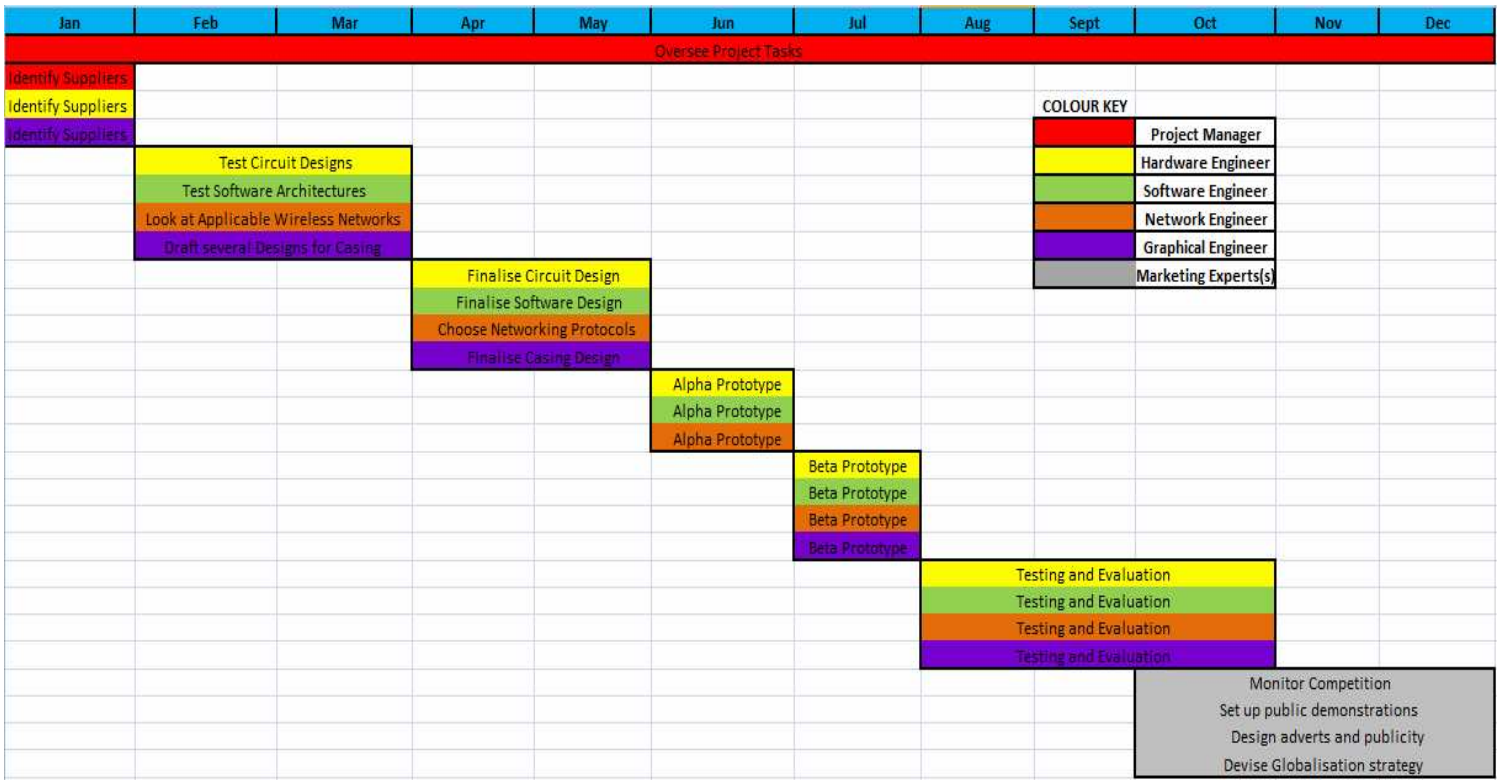
2. **[illegible]:**
- Test circuit designs for hardware components.
- Test software architectures for iLink coding and interfaces.
- Look at applicable wireless networks for communication system.
- Draft several designs for possible casing/packaging.
- Finalise software and hardware components.
- Choose networking protocols to be used.

- Determine final casing structure and build prototype to t est.
- Interface all hardware, software and networking components into one system (Alpha prototype)
- Combine alpha prototype with finalised casing (Beta prototype)
- Test and evaluate performance of Beta prototype with specification
- If meets requirements, then finalise manufacturing plans for mass production.

3. Market Research (Market Experts)

- Monitor competitors in the market sector and ensure no similar products will be released before iLink. Therefore ensuring iLink is an innovation in the field and not simply another product.
- Set up public demonstrations to get consumer feedback on the current iLink system. Use this consumer feedback to change any features if necessary before product release.
- Design relevant advertising and publicity for upcoming launch of iLink.
- Devise a globalisation strategy so the iLink may be sold and produced all over the world.

Gantt Chart



Market Research

The main potential market for iLink has been identified as the users of the previously described iHome products. However, as with all new products, a proper market research needs to be undertaken before launching iLink.

Step 1 - Gather raw data

SECONDARY DATA

The first phase of gathering raw data will be partly from the performance of the iHome products in the market. Therefore, the data collected here will be secondary in nature, which is easier and more cost-effective to collect than primary data. Given below are some of the questions posed for collecting data relevant to the launch of iLink.

Q. What is the percentage of iHome product users in the market?

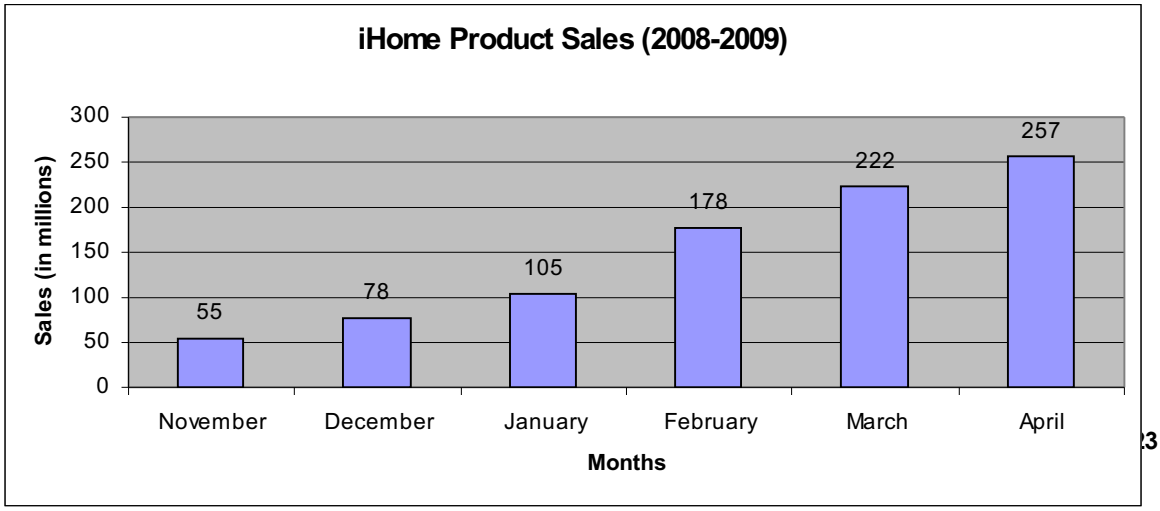
The percentage has been calculated from the Apple database, which turned out to be **35.5%** of the total owners of electronic household appliances.

Q. What is their evaluation of the products that they are using?

This data has been also collected from the Apple database, based on the information on the **Customer Satisfaction** and **Customer Feedback** sections. Overall, all customers were extremely satisfied by the performance of the products and minimal changes to the products were suggested.

Q. How likely are they to include more iHome products into their household?

This information has been collected from how well the iHome products are doing in the market at present, and the trend of the actual sales figure over the months since the their launch.



From the above graph, the prediction for the sales of the iHome products for the rest of the year of 2009 is about 2.5 billion, which will be a determining factor for the sales of iLink.

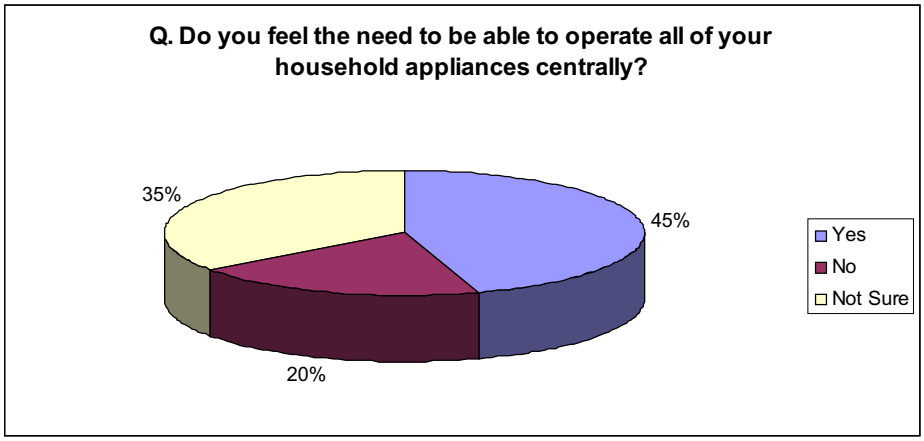
PRIMARY DATA

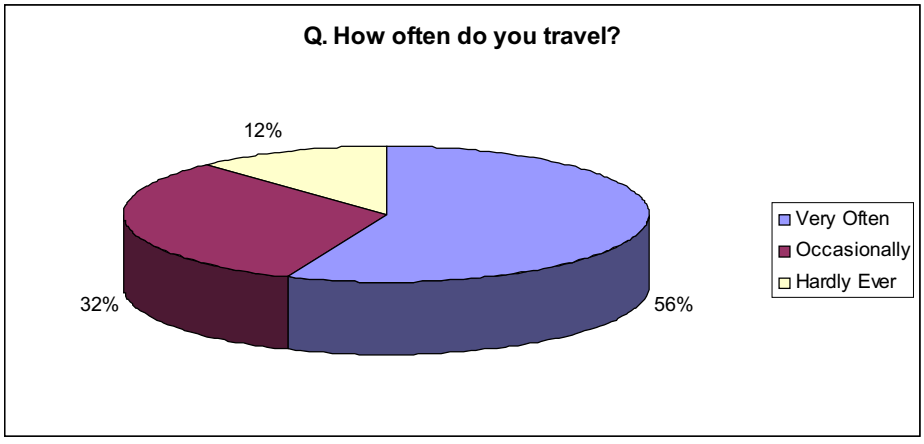
The primary data will be collected with the help of three different methods:

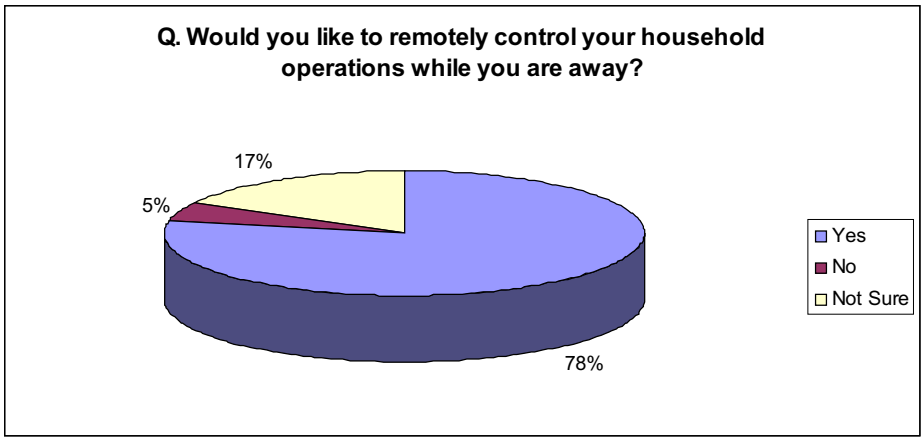
Observing the product in use: The iLink will be distributed to 50 homes currently using most of the iHome products. They will be asked to use the product repeatedly over a 15-day period.

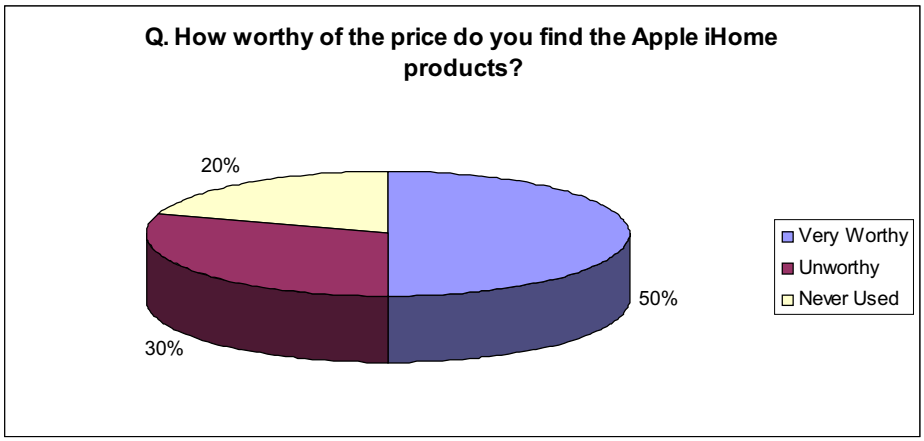
Interviews: The participants will then be interviewed and their feedback will be taken into account in order to make further modifications to the product.

Surveys: A web-based questionnaire will be created. Some of the questions in it and their respective answers are given as follows:









QUALITATIVE	QUANTITATIVE
From the questionnaires conducted above, there is a considerable demand in the market for a product that can control all electrical appliances in a household **centrally** and **remotely**.	As calculated from the secondary raw data, the prediction for sales of iHome products for the rest of 2009 was 2.5 billion. Therefore a market pull of at least 1 billion has been predicted for the iLink.

Step 2 - Interpret raw data in terms of customer needs

The Needs and Attributes of the device must be highlighted, some of which are given as follows:

NEEDS	ATTRIBUTES
I travel a lot. I would like to be in control of my household activities.	The device must have a means to page the mobile device of the person, constantly updating him.
I am an elderly disabled person. I need to be able to help myself.	The device needs to centrally control all other domestic products, with minimal movement of the user.
I am a working mother. I need to keep track of my young child at home.	The device will send warnings and alarms if it detects any anomalous behaviour of domestic products in the house.
I have a low income status.	Apple must offer deals for the iLink when bought in conjunction with other iHome products. The option of 'Buy Now Pay Later' must also be available.

Step 3 - Organize the needs into a hierarchy

The features of the iLink product need to be diverse enough in order to cover all the four types of Needs.

MUST-HAVES: The device must have an interface with all iHome domestic products, by being able to read data from and send control signals to them.	**DELIGHTERS**: The device can have voice technology embedded in it, which can read messages aloud, instead of the user looking at the device every time.
LINEAR SATISFIERS: The more simple and user-friendly the interface is, the more satisfied the customers will be.	**NEUTRALS**: The customers would not really worry about what technologies are being used for the whole system to

Apple needs to make sure that all customer needs, both [illegible] and [illegible] are served.

Step 4 - Establish the relative importance of the needs

The list of things Apple will have to take into account in the order of their importance are as follows:

- The iLink need to be affordable by most classes of the society.
- Two different versions need to be available:
  - in-built in the house ('full' version), uses cable connections, more expensive
  - portable, uses wireless interface, cheaper
- Constantly send updates to the devices in order for an improved system.
- Instantly process error messages from the devices in order to clear bugs.

Step 5 - Reflect on the results and the process

The marketing research methods specified are thorough and comprehensive. In order to gain practical knowledge of the research and boost consumer opinion of the product, further development must be carried out to make the product more commercially appealing. This can be done by product testing or participating in trade shows, during which knowledge can be gained about buyers' mentality and expectations and thereby gaining a better understanding of the market.

Concept Research and Testing

Concept Research needs to be undertaken with the help of SWOT and PESTEL analyses. The important findings of these analyses are:

- iLink will work as a control for only iHome products. Therefore it is expected to increase the sales of the whole range.
- If not thoroughly explained, iLink might be thought of as a luxury in this current global economic recession.
- iLink may be thought to cause an environmental hazard due to its wireless interfaces, and that it why the cable interface option is also there. Also the wireless interfaces will strictly follow the ICNIRP (International Council on Non-Ionizing Radiation Protection) RF radiation standards.

Concept Testing can be undertaken by using prototypes of the device and virtual reality.

Description of the Department

Apple is capable of producing iLink due to its well reputed R&D department. Apple's R&D department has been solely responsible for technological innovations such as the iPhone, iMac and most notably, the iPod. Therefore the design and production of a technologically advanced product such as the iLink will be plausible due to the expertise in these areas of Apple's R&D team. For this particular product, Apple will require the following R&D mix:

- Project Manager – Several years of experience in setting, meeting and adhering to deadlines/milestones as well as providing continuous proficient leadership of R&D group.
- Hardware Engineer – Design & construction of electronic components with at least several years experience in top-level and cutting-edge technology
- Software Engineer – Design & construction of software components, including experience using numerous programming languages (e.g. Java, C++, MATLAB, Assembly, VHDL etc.)
- Graphical Engineer – Design & construction of casing/packaging, requires experience in industrial manufacturing processes and product design
- Network Engineer – Design & construction of wireless communication system. Advanced understanding of wireless networks and their properties is essential.
- Marketing Expert(s) – Responsible for market research, advertising and business strategy. Must have experience in the promotion and marketing of consumer electronic products.

Conclusion

In conclusion, the Apple R&D team assigned to the new product the iLink believe that it will play a key role in Apple's diversification strategy into the domestic product market. It has been discovered through research that there i s no clear market leader in this sector, paving the way for Apple to potentially fill this void in the future as it has done in the Consumer Electronics marketplace. Additionally, as the iLink is the first of its kind in the market, Apple will not face any initial competition from rival companies, giving the iLink the best chance of success. In the event that a rival company does seriously challenge the iHome domestic product range, due to Apple's proficiency and success in alternate market sectors they can allocate more expertise and resources toward the domestic product market to strengthen their position. The R&D team have specified the following recommendations to the management board for the initial and ongoing success of the iLink:

- The iLink should aim to adapt to the global market, in order to provide the greatest chance of success.
- Appropriate pricing strategies should be employed to maximise the initial and future sales of the iLink
- The unique functionality of the iLink should be a main marketin g point for its publicity and advertising
- Apple should have ongoing R&D into improved services (e.g. remote troubleshooting) and updates for the iLink
- Management reviews of the iLink business plan should be regular to ensure the direction and success of iLink correlates to original predictions (e.g. profits/turnover).

Due to Apple's global brand image and reputation, as well as their loyal customer base, the iLink should have an appropriate environment to develop and eventually succeed. This along with the lack of market dominance and novelty of the product design (first of its kind) mean the iLink has tremendous market potential for the future, provided the above recommendations are adhered to.

References

1. <Reference 1>
2. <Reference 2>
3. <Reference 3>
4. ...