



**Internal**

- Manages schedule, budget and spec for the project
- Facilitated communication between all the groups
- Identified risks & holes
- Reported on project to upper management

**EE**

- Circuit design for all products
- Debugged and tested prototypes
- Worked with manufacturing engineering to transfer products into the contract manufacturer
- Worked with suppliers for sub-assemblies (LCD, battery, etc)

**Compliance**

- Ensured product would pass worldwide government EMI and safety specification (e.g. FCC and UL)
- Dealt with outside test labs to do formal testing

**Product Localization**

- Managed process for outsourced work in localizing software, user interface and documentation

- Got design from IDEO and designed the plastic and metal parts needed to fit everything together
- Did part design drawings to transfer to the plastic tooler (also worked on finishes and process with the plastic tooler)
- Tested plastic parts
- Worked closely with EE and vendors of subassemblies to make sure everything fit and would work Software development
- Wrote software and/or integrated purchased software modules for all of the products

**Hardware quality assurance**

- Testing on the final product to assure it met environmental specs (drop, vibration, temperature, etc.)

**Software quality assurance**

- Programmatic and user testing on all products
- Wrote test plans and test cases for internal and external use
- Managed beta feedback from inside and outside the company
- Maintained bug database



Outsourced

## Product Design

### Industrial design

- Design of how the product looked - form, finish, color, etc.

### Printed Circuit Board (PCB) design

- Takes output of the circuit designs from EE and designs the printed circuit boards. Output is a Gerber file which goes to the PCB manufacturer

### Prototype assembly

- Assembles and solders the PCBs for the product

### Localization and translation services

- Translates English into different languages for software

### Black box software testing

- Worked for in-house QA engineers doing contract testing (no knowledge of internal workings of the product - test as if they are users).

## Manu- facturing

## Sales/ Marketing

## Distribution

## After-sales Service

### Palm OS/HW architecture

- PalmOS licensed from Palm
- This implied a certain hardware architecture in order to make the OS work

### LCD module

- LCD
- Touch panel
- Thin sheet of glass/plastic
- The non-recurring engineering fee for these modules was high (\$500K - \$1M) and lead time was long (9-12 months)

### Battery pack

- Battery cells, protection and charging circuitry
- Packaging and connectors
- Used standard cells

### Cell Radio Module

- Baseband and analog circuitry that transmits and receives digital voice and data across the cell networks.



Internal
<p>Manufacturing and test engineering</p> <ul style="list-style-type: none"> <li>• Facilitated communication between in-house engineering and contract manufacturer(CM) during product transfer to manufacturing</li> <li>• Wrote test plans and managed CM to implement them</li> <li>• Supported CM during pilot production and start of mass production</li> </ul> <p>Supply chain management / Strategic commodity procurement</p> <ul style="list-style-type: none"> <li>• Maintained direct relationship with keystone suppliers and placed purchase orders (POs) with them</li> <li>• CM placed orders with third tier suppliers (for commodities that were generic)</li> <li>• Cost negotiations with CM, transferred BOM (bill of materials) to CM and managed supply/demand</li> </ul> <p>Quality</p> <ul style="list-style-type: none"> <li>• Wrote quality plans / requirements for the CM and monitored quality output from the CM</li> <li>• Inspections if required</li> </ul>

Outsourced
<p>Final packaging</p> <ul style="list-style-type: none"> <li>• Distribution and retail packaging</li> </ul> <p>Contract Manufacturer</p> <ul style="list-style-type: none"> <li>• All production from pilot units onward</li> <li>• Shipped to distributors directly</li> </ul> <p>Distribution / Logistics</p> <ul style="list-style-type: none"> <li>• Product shipment to retail and customers</li> </ul>



Internal
<p>Product Marketing</p> <ul style="list-style-type: none"> <li>• Definition of product</li> <li>• Interface to regular marketing</li> </ul>
<p>Marketing</p> <ul style="list-style-type: none"> <li>• Setting the strategy on how to sell the products (using advertising, pricing strategies, promotions, etc.)</li> </ul>
<p>Sales</p> <ul style="list-style-type: none"> <li>• Retail sales and later carrier sales</li> </ul>
<p>Customer support</p> <ul style="list-style-type: none"> <li>• Management of call centers, providing training for the call center and management of customer escalations</li> </ul>
<p>Web site</p> <ul style="list-style-type: none"> <li>• In early days, wholly outsourced. Eventually brought in house</li> </ul>

Outsourced
<p>Marketing implementation</p> <ul style="list-style-type: none"> <li>• Design of advertising, promotions</li> </ul>
<p>Customer documentation</p> <ul style="list-style-type: none"> <li>• Documentation managed by product marketing</li> </ul>
<p>Public relations</p>
<p>Customer support call centers</p>
<p>Web site design</p>
<p>Web site hosting</p>