Industrial Design

- Industrial designers are primarily concerned with the aspects of the products that relate to the users- the product's aesthetic appeal and its functional interface
- They "gift wrap" a product after its technical features are determined

Motorola ultra thin RAZR design

Success of this product was attributed to:

- Small size and weight (14 mm thick and 95 gms weight)
- Performance features (VGA camera, large colour graphic display, blue tooth)
- Superior ergonomics (angled position of display, easy to use key pad)
- Durability (can be drop from a height of 1 Meter)
- Material (laser cut key pad, advanced material)
- Appearance (vey futuristic- to make it a status symbol)

Definition

- Industrial design is defined as “Professional service of creating and developing concepts and specifications that optimise the function, value, appearance of product and systems for the mutual benefits of both user and manufacturer
- Product should be designed form “inside-out”. Form should follow function.

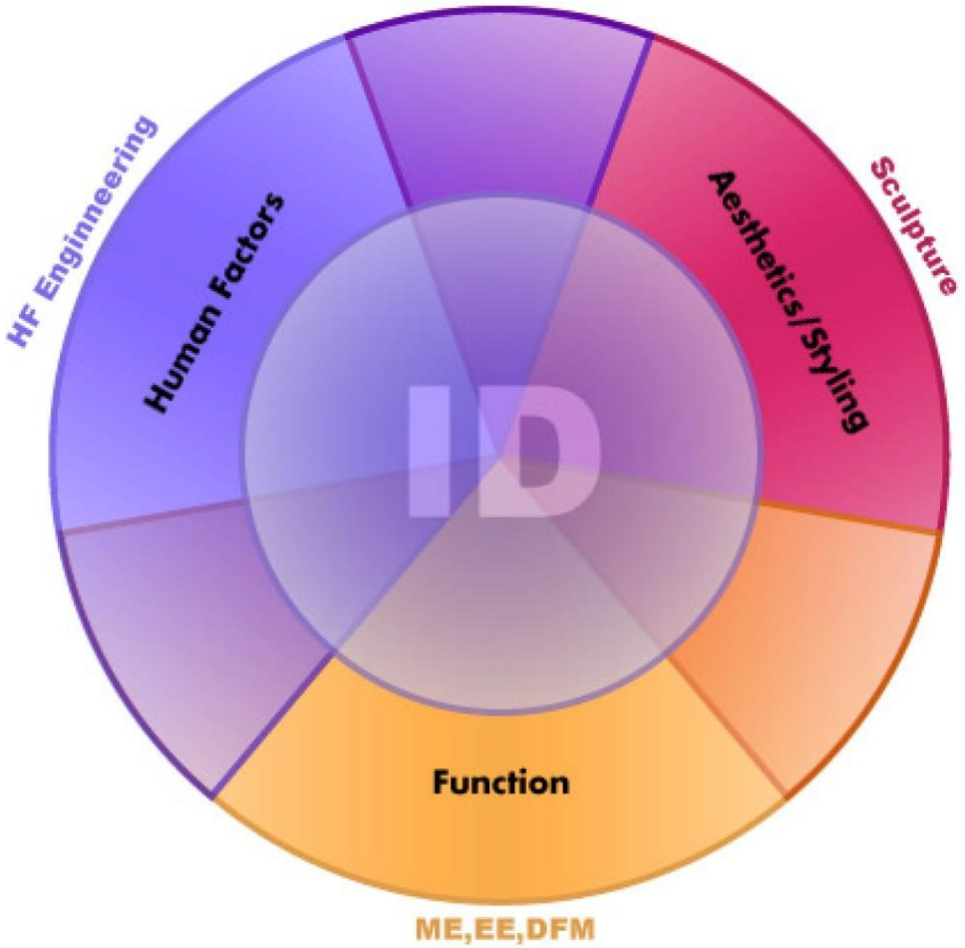
Critical Goals of Industrial designers

- Utility
- Appearance
- Ease of maintenance
- Low cost
- Communication

What is Industrial Design?

- Mission: Enhance the user's experience
  - Form/Aesthetics
  - Simplified Functionality
  - Improved Human Factors
  - Spirit – wow factor

    novel, cool, hip, etc.



Assessing the Need for Industrial Design

Judged under two dimensions:

- Ergonomics
- Aesthetics

Ergonomic Needs

- How important is easy of use?
- How important is ease of maintenance?
- How many user interactions are required for the products?
- How novel are the user interaction needs?
- What are the safety issues?

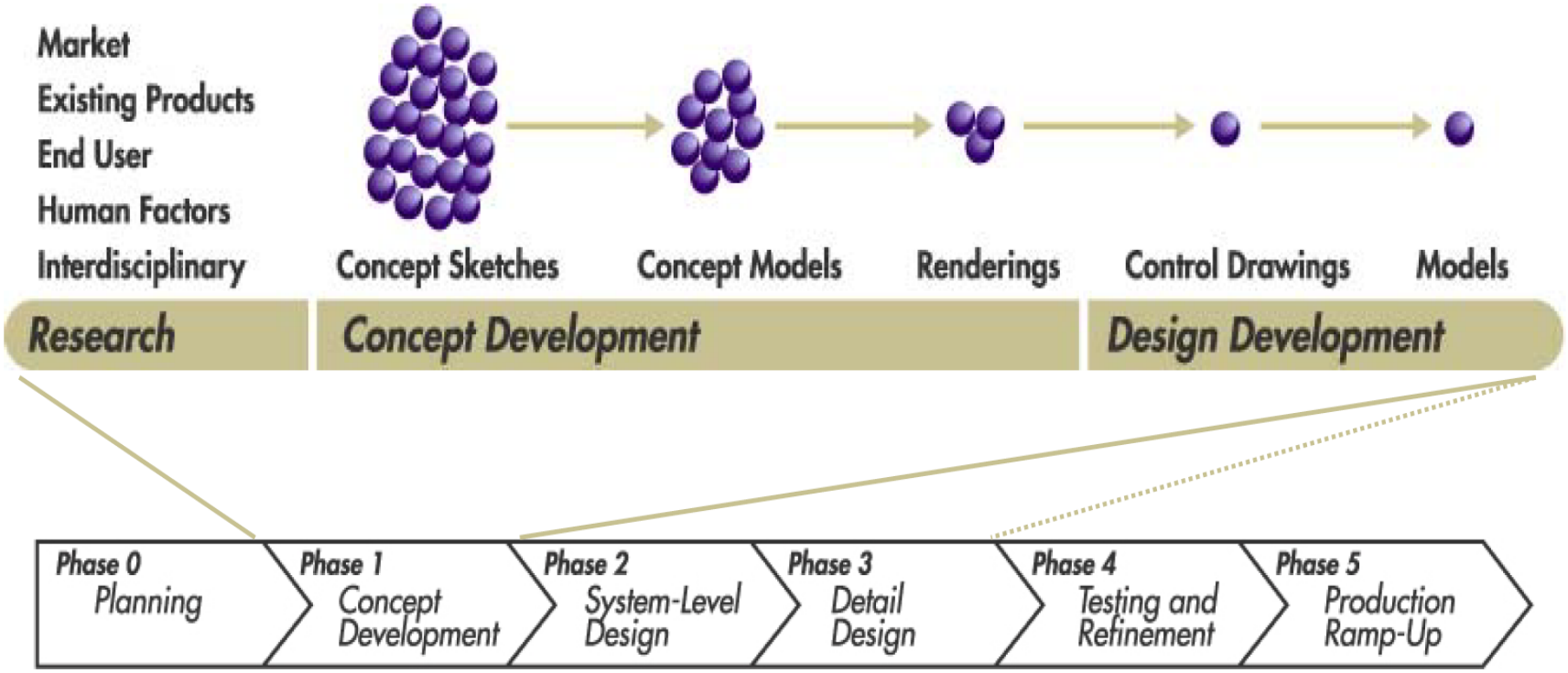
Aesthetic Needs

- Is product differentiation required?
- How important are pride of ownership, image, and fashion?
- Will an aesthetic product motivate the team?

Benefits OF ID Process

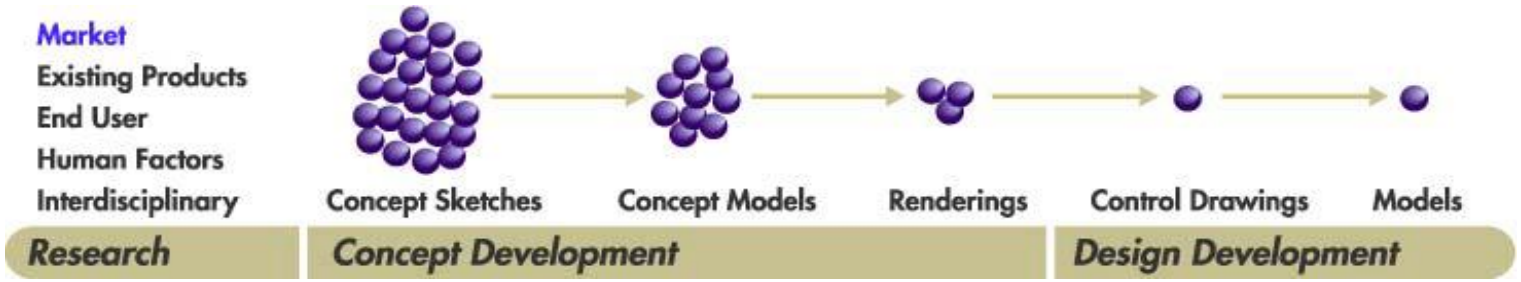
- Increased product appeal
- Greater customer satisfaction
- Strong brand identity
- Product differentiation

The Industrial Design Process



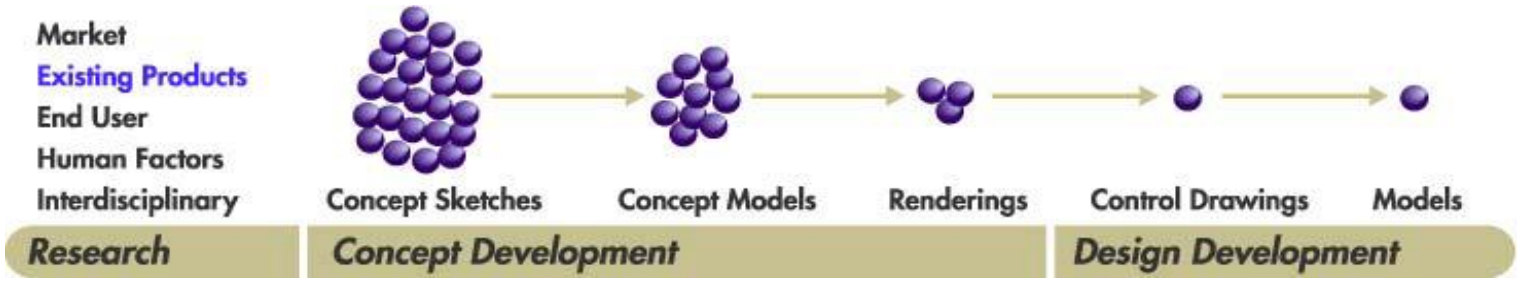
Research – Market

- Demographics
  - Who uses it
  - Who buys it
  - Who experiences it
- Social and Cultural factors
  - Barbies or Harleys
- Aesthetic parameters
  - Current Vocabulary
  - Trends
- Enviromental Factors
  - Responsible materials
  - DFR (Design for recycle)



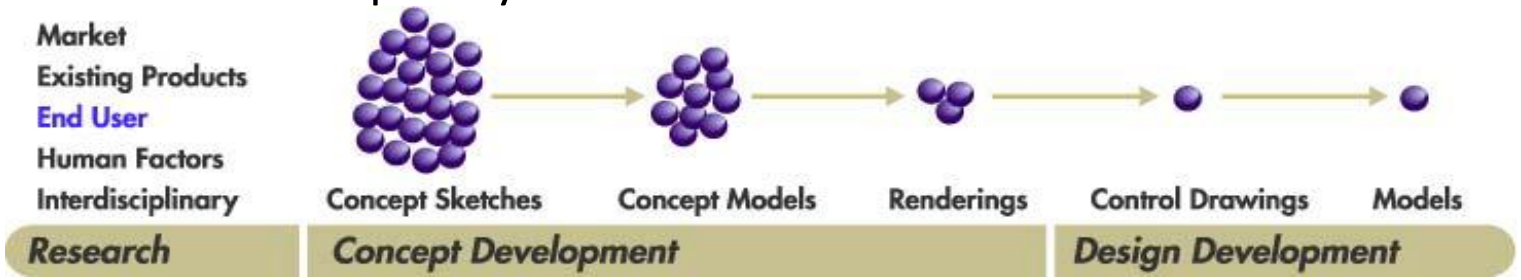
Research – Existing Products

- Reverse Engineering
  - Aesthetics
  - Functional behaviors
  - Mechanical Features
  - Materials
  - Manufacturing Processes
- Product Positioning
  - Features and pricing



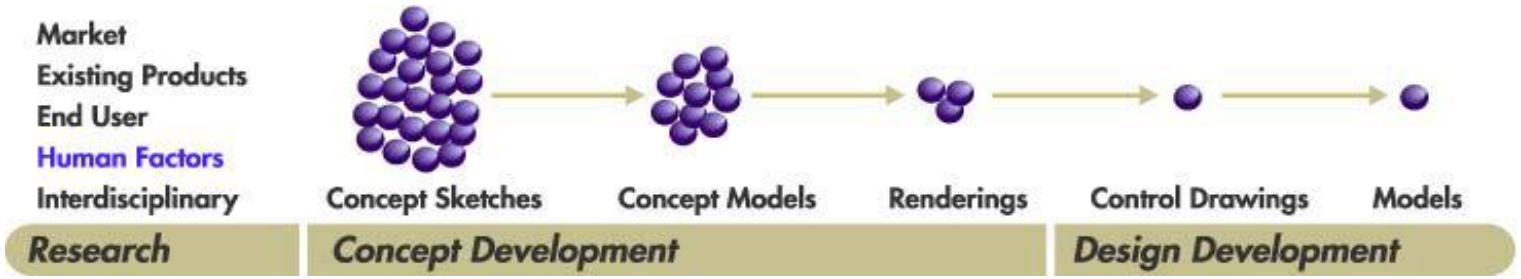
Research – End User

- Environment
  - Physical
  - Psychological
- Observation of Use
  - Features actually used and their hierarchy
  - Misuse
  - Time-motion study
- Create Dialog with User
  - Ask for ongoing feedback
  - Visit them frequently



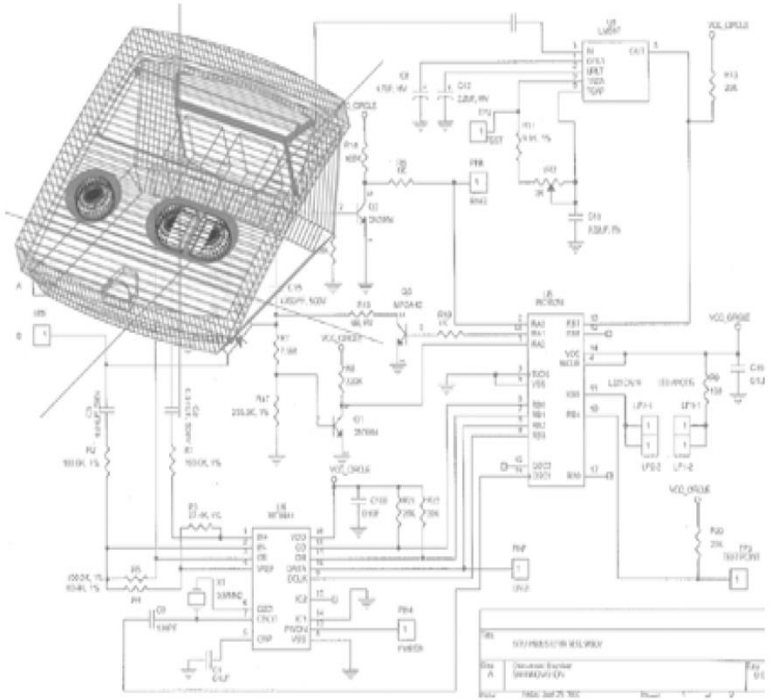
Research – Human Factors

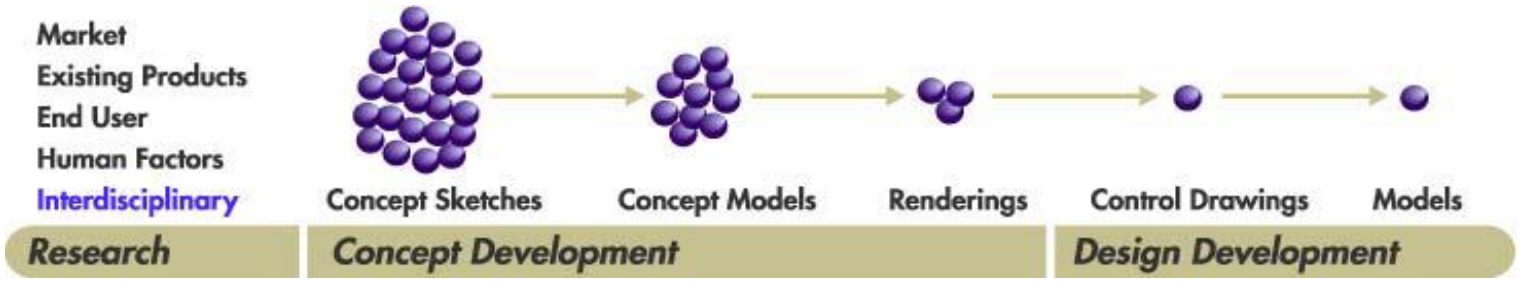
- Ergonomics
  - Physical interface
  - GUI
  - Tactile Feedback
- Intuitive Use
  - Form communicates function
  - Product graphics
  - Icons and visual consistencies



Research - Interdisciplinary Integration

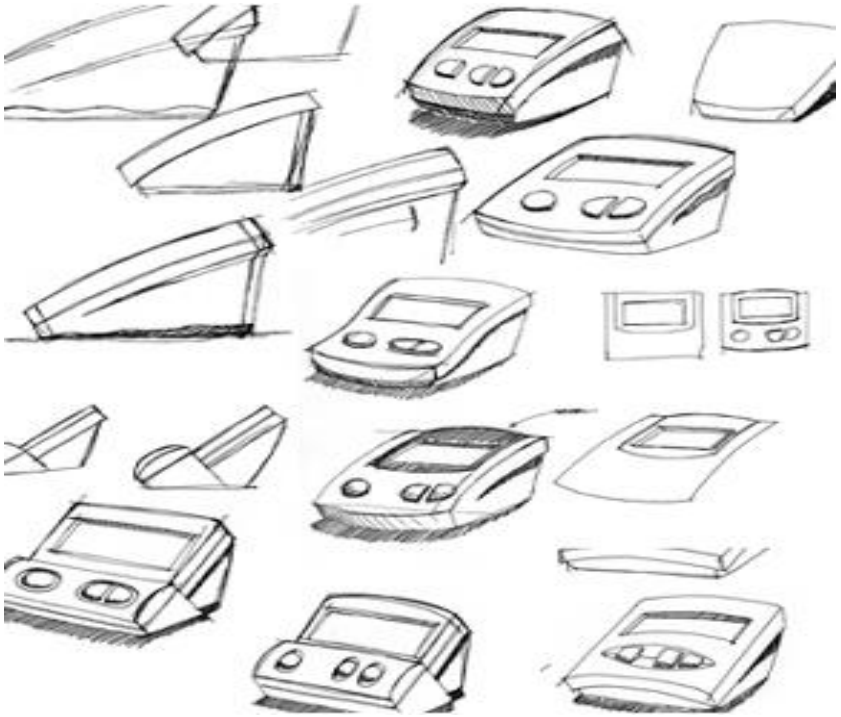
- Mechanical requirements
  - Product architecture
  - Component envelopes
- Electrical requirements
  - Electro Magnetic constraints
  - Thermal constraints
- Manufacturing requirements
  - Cost
  - Preferred processes

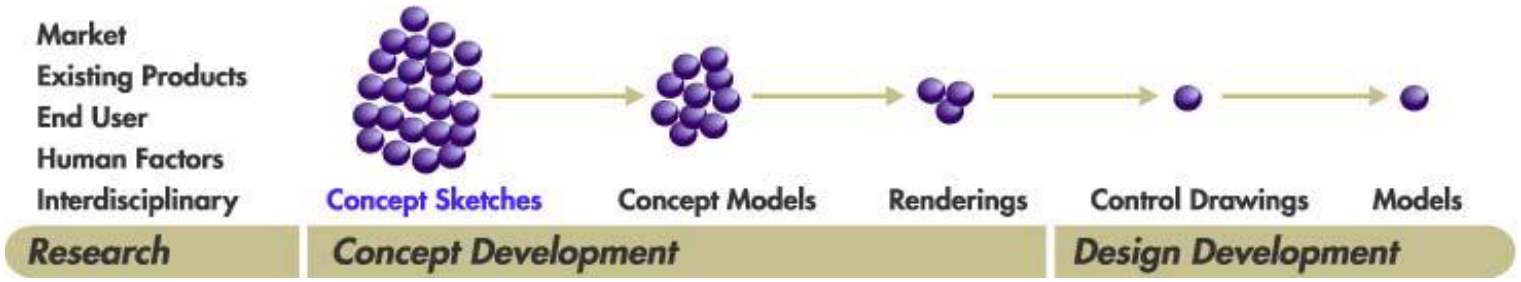




Concept Development - Sketches

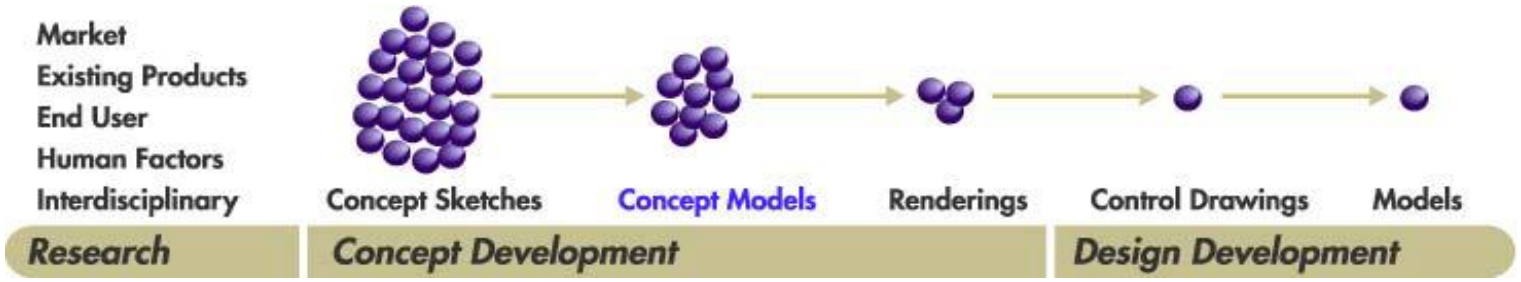
- Benefits
  - Fast and iterative
  - Synthesize the research
  - Functional and aesthetic
  - Conceptualization
- Techniques
  - Pen, marker, colored pencil
  - Trace, white paper, newsprint





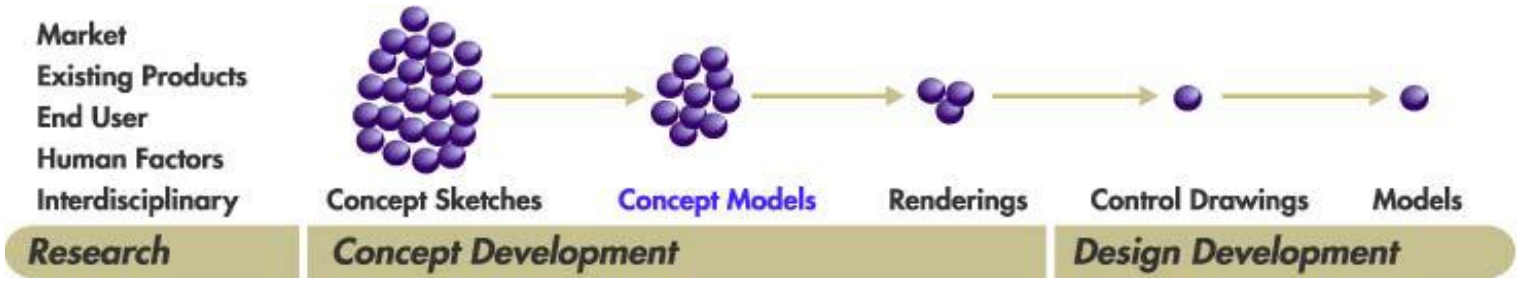
Concept Development – Form Models

- Benefits
  - Fast and iterative
  - Ergonomic evaluation
  - Form Evaluation
- Techniques
  - Foamboard insulation, Foamcore
  - Found objects, existing parts
  - Pine strapping, bricks
  - Hot glue, double, stick tape, sheet rock screws



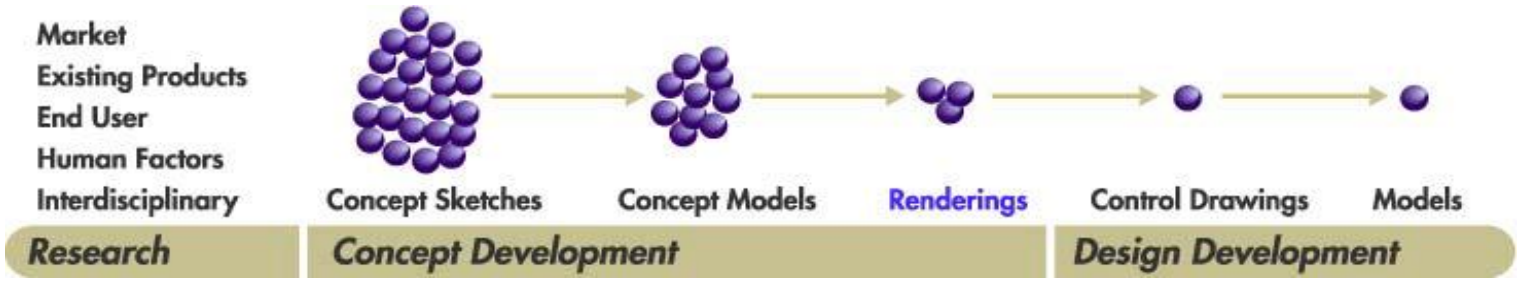
Concept Development – Ergonomic Models

- Human Factor Studies
  - Height
  - Weight
  - Articulating parts



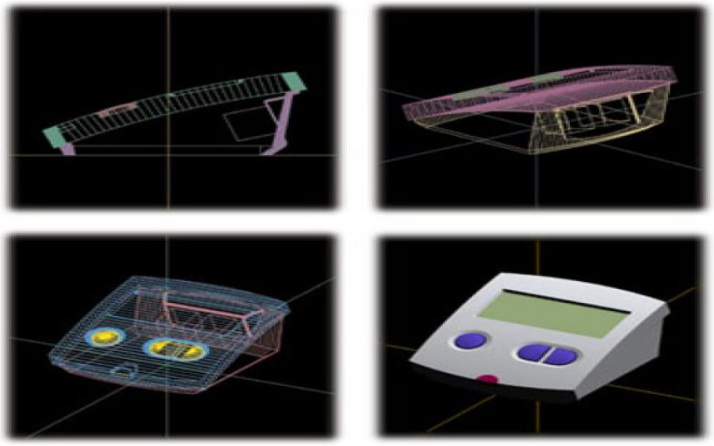
Concept Development - Renderings

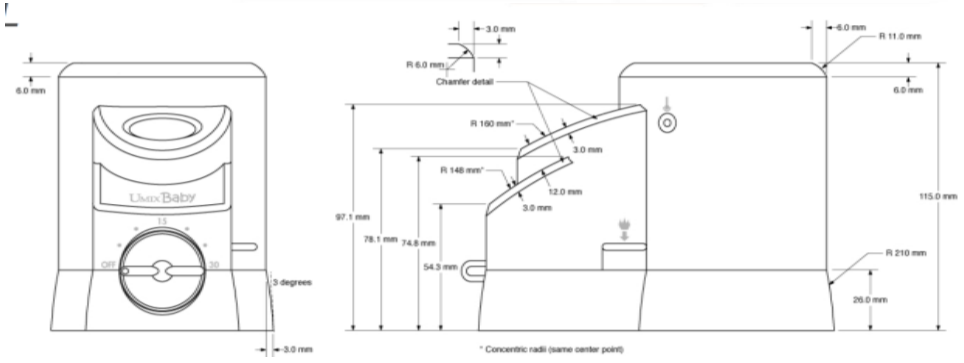
- Benefits
  - Styling Subtleties
  - Product Graphics
  - Can be used as a sales tool and in focus groups
- Techniques
  - Markers and bond
  - Colored Pencil
  - 2D illustration programs
  - 3D rendering programs

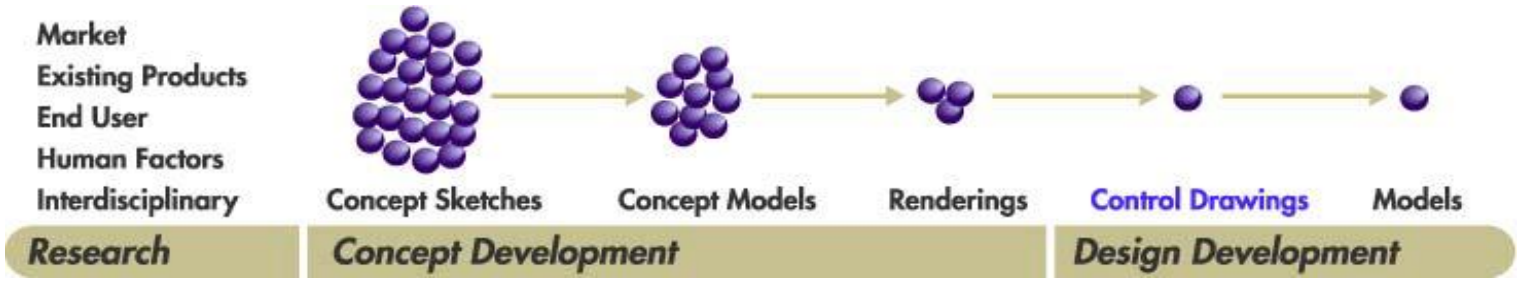


Design Development – Control Drawings

- Benefits
  - Communicates ID downstream
- Techniques
  - Classic drafting tools
  - Dimensioned 2D computer drawings
  - 3D files – IGS, STL

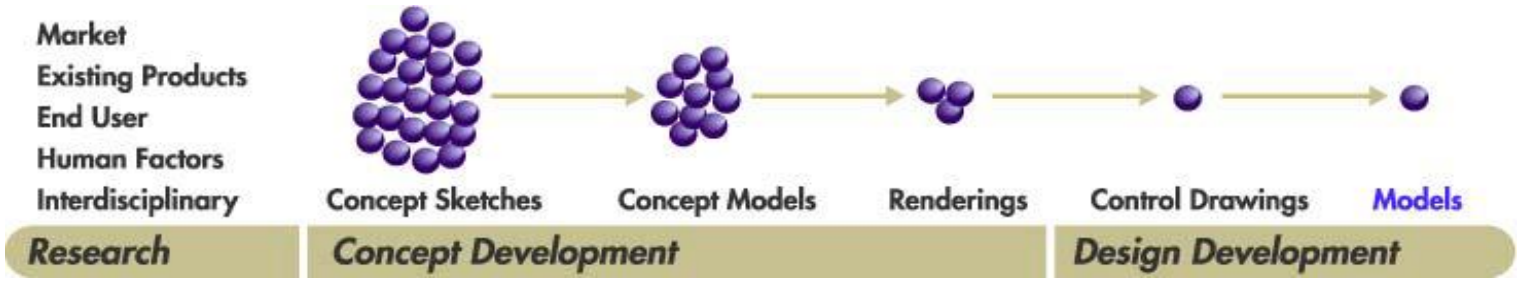




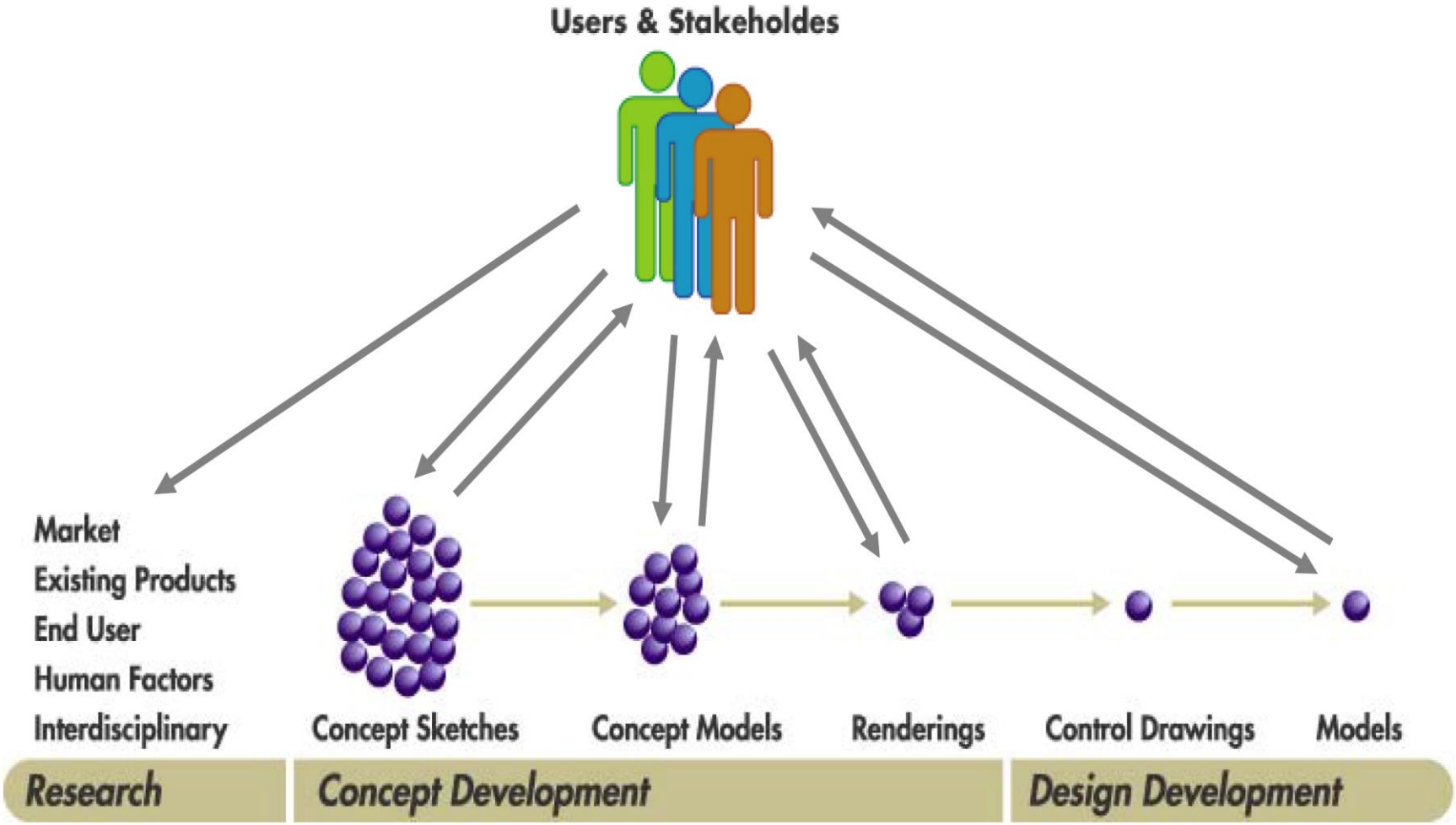


Design Development – Hard Models

- Benefits
  - Represents final aesthetic and function
  - Not necessarily a prototype
- Techniques
  - Rapid prototyping processes
  - Rubber molds
  - Hand building and milling
  - Spray paint
  - Dry transfers



User Feedback



Management of ID Process

- Technology driven products: Task here is the packaging of core technology and determination of external appearance and ensuring that product communicates its technological capability (Ex. Hard disc drive, Computer work station, super computers etc.)

Contd

- User driven products: Core benefit is derived form functionality. ID is introduced at the early stage of PD. (ex. Furniture, coffee maker, toaster etc.)
- Technology and user driven products: (cell phone, camera, automobiles)

Assessing the quality of ID

- Quality of the user interface
  - Do the features effectively communicate their operations?
  - Is the product's use intuitive?
  - Are all features safe?
  - Have all potential user and uses of the product identified?

Contd.

- Emotional appeal
  - Is the product attractive?
  - Does the product express quality?
  - What images come to mind when viewing it?
  - Does it inspires pride of ownership?
  - Does it evoke feeling of pride in the development team?

Contd.

- Ability to maintain and repair the product
  - Is the maintenance obvious? Is it easy?
  - Do product features effectively communicate disassembly and assembly operations?

Contd.

- Appropriate use of resources
  - How well these are used?
  - Is the material selection appropriate?
  - Is the product over or under designed?
  - Were environmental and ecological factors considered?

Contd

- Product differentiation
  - Does it stand out in store?
  - Will it be remembered by the customer who sees it in advertisement? On a street?
  - Does it enhance the corporate identity?

What is a Successful design?

- Completely committed to a particular human need (or market)
  - Function
  - Form
  - Ergonomics
  - Emotion
- Must be honest
- Cannot completely fail on any one attribute