

PRODUCT DESIGN and DEVELOPMENT

Chapter 9: Concept Testing

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Teaching source book:
Chapter 9 of
Product Design and Development
Karl T. Ulrich & Steven D. Eppinger

OUTLINE

- Definition
- Step 1: Define the purpose of the concept test
- Step 2: Choose a survey population
- Step 3: Choose a survey population
- Step 4: communicate the concept
- Step 5: Measure customer response
- Step 6: Interpret the results

Today's example

emPower Electric Scooter



emPower wished to assess the customer response to this concept in order to decide whether to proceed with its development

Concept Testing

- A team may not choose not to do concept testing if:
 - The cost of time and testing is too expensive
 - Choose to launch a product and iteratively refining it (example software product)
- Purpose:
 - Identifying the original product opportunity
 - Selecting two or more concepts
 - Assessing sales potential
 - Decide whether continue further development and commercialization of the product

Step 1: Define the purpose

- The test result should be able to answer some of these questions:
 - Which of several alternative concepts should be pursued?
 - How can the concept be improved?
 - Approximately how many units are likely to be sold?
 - Should development be continued?

Step 2: Choose a Survey Population

- Potential customer surveyed must reflect the target market for the product
- Choose a target segment
 - Empower target segment: college student, urban commuters, factory employee and airport employee
- Choose a size of sample size

Choosing sample size

- Small sample size
 - Primarily to get qualitative data
 - Surveying is relatively costly in time or money
 - Investment cost to develop and launch product is relatively small
 - Many positively inclined respondents can be found without a large sample (example bio medical appliances)
- Large sample size
 - Primarily to get quantitative data
 - Surveying is relatively fast and inexpensive
 - Require investment to develop and launch the product is relatively high
 - Many people have to be sampled to reliably estimate the fraction that values the product (example: new smart phone)

Step 3: Choose a survey format

- Face-to-face interaction
- Telephone
- Postal mail
- Electronic mail
- Internet

the use of electronic format may bias the sample toward those are technologically sophisticated

face-face: directly observe reactions to the product rich detail

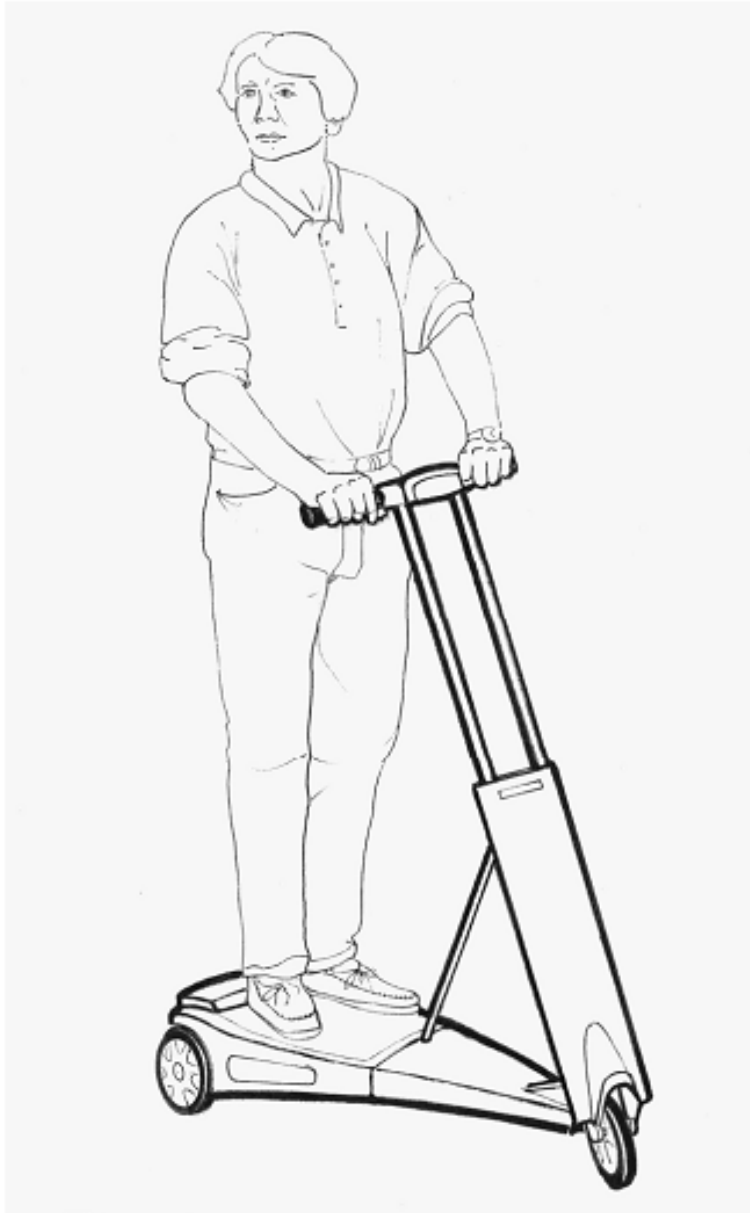
Step 4: communicate the concept

- Verbal description
- Sketch
- Photograph or rendering
- Storyboard
- Video
- Simulation
- Interactive multimedia
- Physical appearance model
- Working prototype

Verbal Description

- The product is a lightweight electric scooter that can be easily folded and taken with you inside a building or on public transportation.
- The scooter weighs about 25 pounds. It travels at speeds of up to 15 miles per hour and can go about 12 miles on a single charge.
- The scooter can be recharged in about two hours from a standard electric outlet.
- The scooter is easy to ride and has simple controls — just an accelerator button and a brake.

Sketch



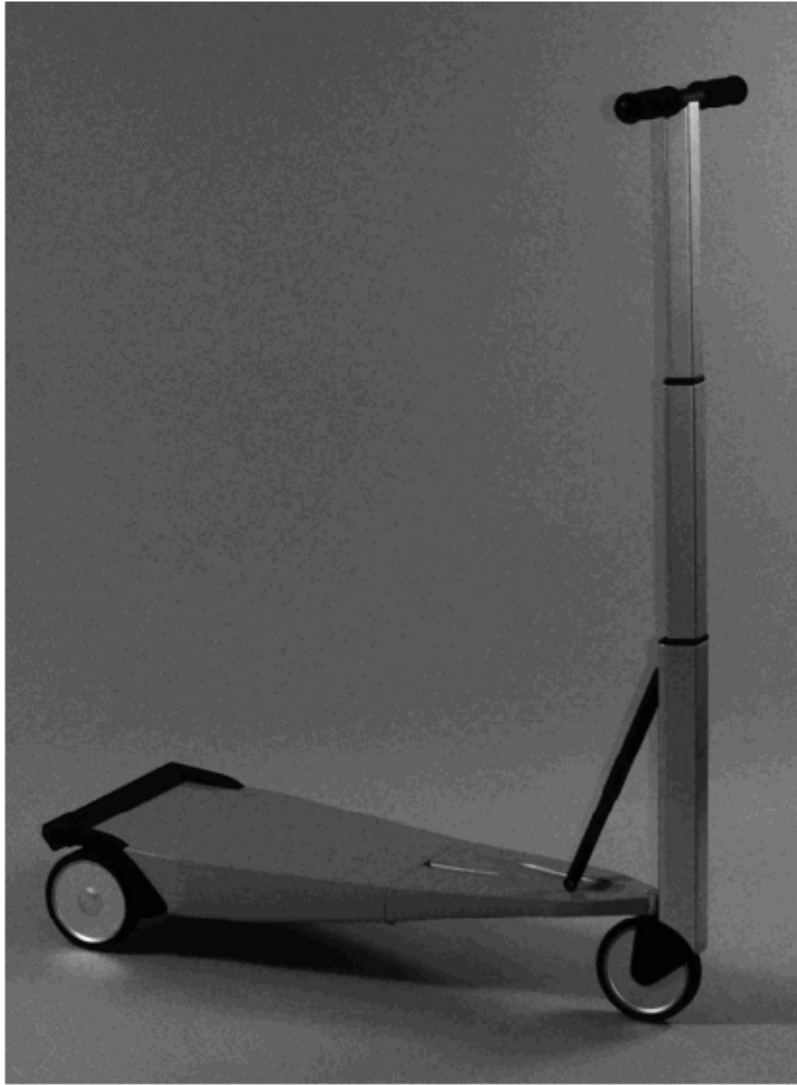
Rendering



Storyboard



Appearance Model Working Prototype



questions

- Should the price be included on the concept description?

questions

- Should the price be included on the concept description?
- Yes for relatively very low price/very high price
- Instead of asking the customer if they would buy the product based on price, ask explicitly the demand price.

Step 5: measure customer response

- Measure purchase intent:

I would
definitely not
purchase
the scooter.

I would
probably not
purchase
the scooter.

I **might**
or might not
purchase
the scooter.

I would
probably
purchase
the scooter.

I would
definitely
purchase
the scooter.

↑
"second box"

↑
"top box"

Step 6: interpret results

Forecasting Sales

$$Q = N \times A \times P$$

- Q = sales (annual)
- N = number of (annual) purchases
- A = awareness x availability (fractions)
- P = probability of purchase (surveyed)

$$= C_{\text{def}} \times F_{\text{def}} + C_{\text{prob}} \times F_{\text{prob}}$$

↑
"top box"

↑
"second box"

Cdef & Cprob: calibration constants

$0.1 < C_{\text{def}} < 0.50$,

$0 < C_{\text{prob}} < 0.25$

usually: $C_{\text{def}} = 0.4$, $C_{\text{prob}} = 0.2$

Example

- Scooter sold as Single-Person Transportation in Large Factories
- Assume currently scooters sold into this market at a rate of 150000 units/year ($N = 150000$)
- Assume the company achieved 25% of the sales ($A = 0.25$)
- Definitely would buy fraction of 0.30 ($F_{def} 0.3$)
- Probably would buy fraction of 0.20 ($F_{prob} 0.2$)
- $P = 0.4 \times 0.3 + 0.2 \times 0.20 = 0.16$
- $Q = 150000 * 0.25 * 0.16 = 6000$ units/year

Example

- Scooter sold to college students
- No N available, approximate:
 - How many students purchase bicycles/motor scooters intended for basic transportation up to two miles (approx 1 million)
 - How many students must travel distance from class to class, commuting from home. (approx 2 million)
- Fdev: 0.1, Fprob: 0.05
- 30% target market (by promoting the product in 100 largest campuses)
- $P = 0.4 \times 0.10 + 0.2 \times 0.05 = 0.05$
- $Q = 2000000 \times 0.30 \times 0.05 = 30000$ units/year

Conclusion

- Concept testing can verify that customer needs have been adequately met by the product concept, and/or gather customer information for refining the product concept