Identifying Needs

MAE 2250

Phases

- Phase 0: Planning
- Phase 1: Conceptual design
- Phase 2: System design
- Phase 3: Detail design
- Phase 4: Testing and refinement
- Phase 5: Production ramp-up

Iterate

Conceptual Design

- Identify needs
- Establish target specifications
- Generate concepts
- Select concept(s)
  - Test/Analyze concepts
  - Refine specs
- Plan project (downstream activities)

PDR

Preliminary Design Review (PDR)

- Product choice (market/need rationale)
- Customer needs (distilled, sorted, prioritized)
- Specifications (quantitative, benchmarked)
- Potential designs (morph chart)
- Selected concepts (min 3)
- Final choice (rationale, decision matrix)
- Project schedule (milestones, responsibilities)

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PDR

CDR

SAR

System Acceptance Review

Iterate

http://en.wikipedia.org/wiki/Design_review_(U.S._government)

Needs drive concept generation

Science→Technology→Product→Cost/Function→Customer

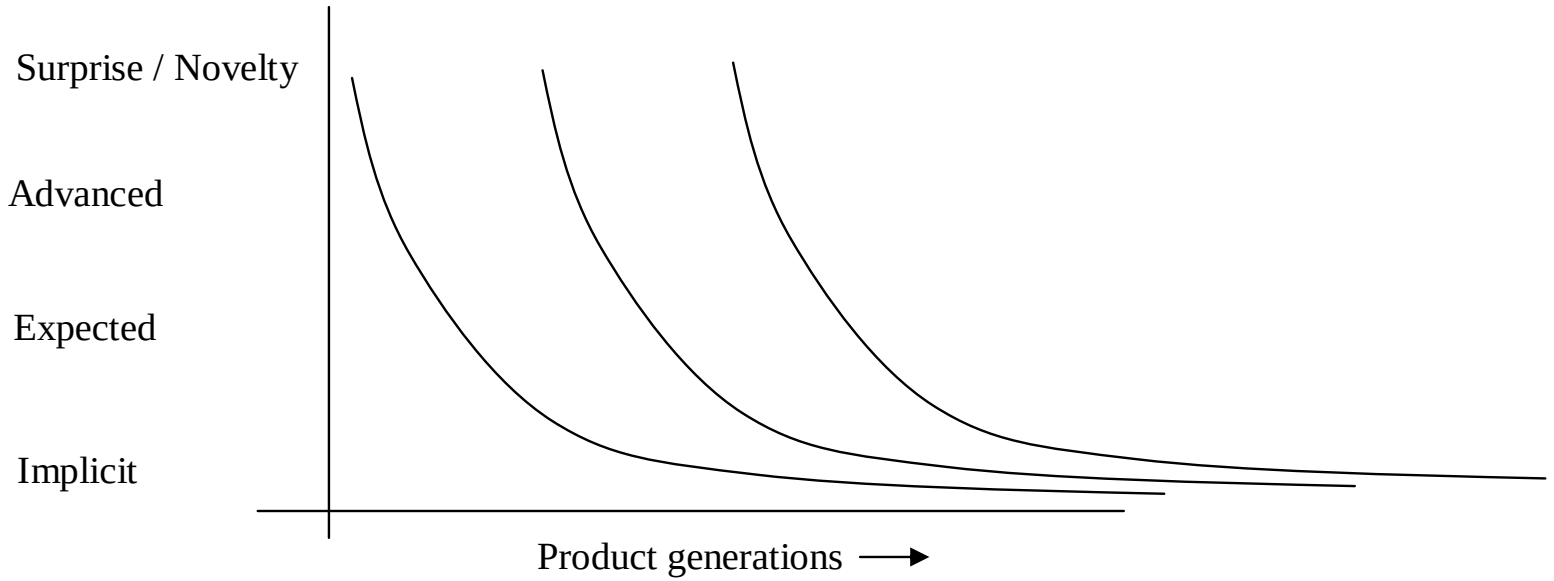
Customer→Cost/Function→Product→Technology→Science

List 10 needs of power screw driver

Need-identification goals

- The goals of need-identification process is to systematically
  - Ensure product is focused on customer needs
  - Cover all needs, including latent and hidden needs, implicit needs and explicit needs
  - Conversely, ensure no need is forgotten, especially implicit needs
  - Provide a fact base justifying specification
  - Create an archival record that records rational
  - Develop common understanding of customer needs within the team

Some needs are difficult to identify




HaHaStop.com

Direct customer-designer link. We do this by creating a ‘direct link’ between the developers (that govern the product design) and the customers (that use the product in context).

It is often best if the *designers themselves* are involved in gathering needs

Identification of needs is a process

- Identify the customer (“Stakeholders”: user, retailer, service person, etc.)
- Gather raw data from customers
- Interpret raw data as customer needs
- Organize needs into a hierarchy of (primary, secondary etc.)
- Ensure needs are basic and independent as possible (i.e., no overlap. Overlap may suggest that not a basic need)
- Establish relative importance
- Reflect and iterate

Gathering data from customers

- **Interviews**: One or more team members meet with customer and discuss. 1-2 hours, at customer environment. Often recorded.
- **Focus groups**: A moderator facilitates a discussion with 8-12 users. Typically conducted in special environment. Conducted by professional analyst. Users are paid ($50-$100). Has benefit of cross-stimulation. Costs about $3000.
- **Observation of product in use**: reveals hidden and implicit needs. E.g. screwdriver used to open cans, lift bent nails, and must fit in pocket.
  - Watch user indirectly
  - Work alongside user
  - Use product yourself (if possible)
- **Surveys**: written, emails


BLACK&
DECKER
LITHIUM

	Lead Users	Users	Retailer or Sales Outlet	Service Centers
Homeowner (occasional use)	0	5	2	3
Handy person (frequent use)	3	10		
Professional (heavy-duty use)	3	2	2	

Interview Questions

- When and why do you use this type of product?
- Walk us through a typical session using this product
- What do you like about this product?
- What do you dislike about existing product?
- What issues do you consider when purchasing this product?
- What improvements would you make?
- What is the best product in this area and why?

Effective interaction

- **Go with the flow.** If the user is providing information, go in that direction
- **Use visual stimuli and props**: Existing and competitor products, related products, and (later on) even prototypes
- **Suppress preconceived hypotheses** about needs and technology. Don't bias the interview based on assumptions of technology. If the user suggest a technology, probe as to why – there is a need behind it.
- **Have the customer demonstrate**. Reveals new information, and provokes the user
- **Be alert for surprises** and expression of latent needs: Needs that are not obvious and are not commonly articulated or filled. May give you an edge.
- What for nonverbal information: E.g. How the product is held.

Interpretation

- **Strive for solution-independent needs.** Express needs in terms of what a product needs to do, not how it might do it.
- **Specificity:** Avoid loss of details; Express as specifically as original statement; use hierarchy if needed
- **Use positive phrasing**: Easier to translate to specs. Does not break when dropped → Survives a drop. Sometimes impossible: Does not strip screws
- **Express needs as an attribute of the product,** not of user or something else. User holds it comfortably → Is comfortable to hold

Guideline	Customer Statement	Need Statement—Right	Need Statement—Wrong
"What" not "how"	"Why don't you put protective shields around the battery contacts?"	The screwdriver battery is protected from accidental shorting.	The screwdriver battery contacts are covered by a plastic sliding door.
Specificity	"I drop my screwdriver all the time."	The screwdriver operates normally after repeated dropping.	The screwdriver is rugged.
Positive not negative	"It doesn't matter if it's raining; I still need to work outside on Saturdays."	The screwdriver operates normally in the rain.	The screwdriver is not disabled by the rain.
An attribute of the product	"I'd like to charge my battery from my cigarette lighter."	The screwdriver battery can be charged from an automobile cigarette lighter.	An automobile cigarette lighter adapter can charge the screwdriver battery.
Avoid "must" and "should"	"I hate it when I don't know how much juice is left in the batteries of my cordless tools."	The screwdriver provides an indication of the energy level of the battery.	The screwdriver should provide an indication of the energy level of the battery.

Customer:	Bill Esposito	**Interviewer(s):**	Jonathan and Lisa
Address:	100 Memorial Drive Cambridge, MA 02139	**Date:**	19 December 1999
Telephone:	617-864-1274	**Currently uses:**	Craftsman Model A3
Willing to do follow-up?	Yes	**Type of user:**	Building maintenance

Question/Prompt	Customer Statement	Interpreted Need
Typical uses	I need to drive screws fast, faster than by hand.	The SD drives screws faster than by hand.
	I sometimes do duct work; use sheet metal screws.	The SD drives sheet metal screws into metal duct work.
	A lot of electrical; switch covers, outlets, fans, kitchen appliances.	The SD can be used for screws on electrical devices.
Likes—current tool	I like the pistol grip; it feels the best.	The SD is comfortable to grip.
	I like the magnetized tip.	The SD tip retains the screw before it is driven.
Dislikes—current tool	I don't like it when the tip slips off the screw.	The SD tip remains aligned with the screw head without slipping.
	I would like to be able to lock it so I can use it with a dead battery.	The user can apply torque manually to the SD to drive a screw. (!)
	Can't drive screws into hard wood.	The SD can drive screws into hard wood.
	Sometimes I strip tough screws.	The SD does not strip screw heads.
Suggested improvements	An attachment to allow me to reach down skinny holes.	The SD can access screws at the end of deep, narrow holes.
	A point so I can scrape paint off of screws.	The SD allows the user to work with screws that have been painted over.
	Would be nice if it could punch a pilot hole.	The SD can be used to create a pilot hole. (!)

Organize needs into a hierarchy

- Group and decompose needs
  - Generalize and specialize needs
- Makes list more cognitively manageable
  - 7-pieces of information
- Identify under-represented areas
  - Add new needs
- Identify overlaps
  - Remove overlaps
- Choose simple labels

Establish Importance

- E.g., On scale 1-5
- Check raw needs for “should”, “must” etc

The SD provides plenty of power to drive screws.

* The SD maintains power for several hours of heavy use.

** The SD can drive screws into hardwood.

The SD drives sheet metal screws into metal ductwork.

*** The SD drives screws faster than by hand.

The SD makes it easy to start a screw.

* The SD retains the screw before it is driven.

*! The SD can be used to create a pilot hole.

The SD works with a variety of screws.

** The SD can turn phillips, torx, socket, and hex head screws.

** The SD can turn many sizes of screws.

The SD can access most screws.

The SD can be maneuvered in tight areas.

** The SD can access screws at the end of deep, narrow holes.

The SD turns screws that are in poor condition.

The SD can be used to remove grease and dirt from screws.

The SD allows the user to work with painted screws.

The SD feels good in the user's hand.

*** The SD is comfortable when the user pushes on it.

*** The SD is comfortable when the user resists twisting.

* The SD is balanced in the user's hand.

! The SD is equally easy to use in right or left hands.

The SD weight is just right.

The SD is warm to touch in cold weather.

The SD remains comfortable when left in the sun.

The SD is easy to control while turning screws.

*** The user can easily push on the SD.

*** The user can easily resist the SD twisting.

The SD can be locked "on."

**! The SD speed can be controlled by the user while turning a screw.

* The SD remains aligned with the screw head without slipping.

** The user can easily see where the screw is.

* The SD does not strip screw heads.

* The SD is easily reversible.

The SD is easy to set up and use.

* The SD is easy to turn on.

* The SD prevents inadvertent switching off.

* The user can set the maximum torque of the SD.

*! The SD provides ready access to bits or accessories.

* The SD can be attached to the user for temporary storage.

The SD power is convenient.

* The SD is easy to recharge.

The SD can be used while recharging.

*** The SD recharges quickly.

The SD batteries are ready to use when new.

**! The user can apply torque manually to the SD to drive a screw.

The SD lasts a long time.

** The SD tip survives heavy use.

The SD can be hammered.

* The SD can be dropped from a ladder without damage.

The SD is easy to store.

* The SD fits in a toolbox easily.

** The SD can be charged while in storage.

The SD resists corrosion when left outside or in damp places.

*! The SD maintains its charge after long periods of storage.

The SD maintains its charge when wet.

The SD prevents damage to the work.

* The SD prevents damage to the screw head.

The SD prevents scratching of finished surfaces.

The SD has a pleasant sound when in use.

The SD looks like a professional quality tool.

The SD is safe.

The SD can be used on electrical devices.

*** The SD does not cut the user's hands.

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The SD drives sheet metal screws into metal ductwork.

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***=Importance level

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!=Surprise

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Exercise

- Break into teams of 2, label A and B
- Choose a product
- A interviews B to extract a list of customer needs (try to think as a customer)