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TIM 105

HW1

1. **Structured Problem-Solving:** Use the structured problem-solving approach to solve the following problem: “improve the existing cell-phone”.

Problem as given: “Improve existing cell- phone” —> vague problem statement.
Step 1: Define the real problem. (requires reflection, thinking, asking questions, etc.)
Establish sub-problems:

1. SP1. Establish customer needs that all generic cell-phones should satisfy.
2. SP2. Assess exiting cell-phone product/services to determine how well these customer needs are satisfied.
3. SP3. Identify ways (solutions) to improve existing cell-phones with respect to (a) the customer needs (from SP1), and (b) assessment (from SP2).

Step 2: Create a plan

(a) Assumptions: who am I? engineer? marketing analyst? what role do you perform?
who is the solution for? for the new product dev team, … the CTO, CEO
which type (manufacturer) of cell-phone should you focus on? obvious.

(b) what information do I need?

- how cellphones work at some level -> functions, features, needs of cell-phones and how they’re realized
- other(?)

Create a plan for solving each subproblem.

SP1. Establish needs.

- understand how cell-phones work
- do internet research to understand what basic functions each phone should do
- create a list of needs that each phone must satisfy (functions, features, etc…)

SP2. Assess how well cell phones are satisfying these needs. Look at:

- your own experience
- internet consumer research
- consumer surveys

SP3. Improve the cell phones.

- do research (internet)
- structured brainstorming

How should I present my results? probably as a TABLE.
Pay attention to how you present information.

Step 3: Execute the plan (from step 2).

— I am doing research for a product dev team, and I am a student.

SP1: Establish customer needs that all generic cell phones should satisfy.

— easy to use

— continuity with past models

— increased battery life

— different options at each price

— allow users to maintain privacy

— Perform the functions of a Person Digital Assistant, like scheduling appointments, setting reminders, etc…

— Send or receive email

— Get information (news, entertainment, stock quotes) from the internet

— Play games, watch videos or TV shows/movies, and run other apps

— Ability to stream videos, download videos

— Send text messages and make phone calls and enable video chatting (Facetime, Skype, etc…)

— Take photos and videos

— Integrate other devices such as MP3 players and GPS receivers, and sync with Itunes, Amazon, or other accounts

— Pick up various types of radio (satellite, AM/FM, etc)

— Using the phone to make payments like a credit card (Apple pay and the like)

— Touch screen and/or a keyboard or a way for the user to enter input, a UI

— A rechargeable battery

— Ability to see multiple apps at once

— Universal remote control (ie changing the TV channel with your phone)

— Fingerprint sensor and/or face sensing tech so you don't have to enter a passcode (this is more secure)

— Wireless charging

— Unlock your car/other vehicles, and potentially your house if safe

— Being able to withstand water/go underwater

— Ability to automatically update apps

— Ability for apps to send notifications or updates periodically

— Voice recognition tech and ability to control phone with it (safer to use phone this way if you're driving)

SP2: Assess how well cell phones are satisfying these needs.

— Phones can be pretty expensive if you aren't getting it subsidized by your cellular provider. The newest iPhone initially sold for about $1,000 which is definitely pricey. Customers are less likely to buy a new phone if they have to pay a significant amount for a new one. However, cell phone providers subsidizing new phones largely mitigates this problem.

— The new iPhone doesn't have a headphone jack, with Apple hoping to make more money selling wireless headphones, and customers aren't happy about it.

— Battery life in cell-phones has only gotten moderately better in new phones, but some phones have introduces waterless charging, however phones still have to be connected to a charger.

— Customers found the iPhone to be easy to use, and various other phones to be relatively easy to use.

— Privacy is not upheld since phone companies, cellular providers, and some government agencies can see the messages you send.

— All phones have the ability to perform the tasks necessary to be a Personal Digital Assistant.

— All phones have the ability to send and receive emails, and the ability to connect to the internet and pull and display whatever information the user wants.

— All phones have the ability to play videos, stream videos, download videos, and run all other types of apps.

— All phones have the ability to send text messages, make phone calls, and allow video chatting.

— All modern phones have the ability to take photos and videos, and newer phones have seen much improved cameras. If phones can develop better cameras they could overtake the lower end part of the camera market, and add additional use as cameras for amateur photographers.

— All phones have the ability to store mp3 files and play them back, and have a GPS feature that can be used in apps. Non iPhone's would benefit from allowing users to sync their phone with iTunes since it is such a dominant player in the music industry.

— Most phones have the ability to pick up radio signals of all types.

— Most phones have the ability to make credit card payments.

— All phones have some type of a UI, most of them have a touch screen, and all allow users to enter input.

— Operating Systems are pretty secure now, but could always be improved. Adding additional security measures to keep phones from being tapped could be helpful, but not necessarily politically feasible since government agencies like the NSA have all our records.

— Only some phones allow you to see multiple apps on the screen at once.

— ZipCar uses a phone app to unlock some of their cars, and phones could be used to unlock people's personal cars/houses in the future, though they aren't right now.

— Most new phones can go underwater.

— Most android phones automatically update apps, but iPhone's don't.

— Phones have the ability to let apps send users notifications.

— Most phones have voice recognition technology, but don't have many advanced uses for it and only let you control certain features of the phone.

— Phones do not have the ability to act as remote controls.

Overall, cell-phones already handle most consumer needs pretty well. As more devices become connected to the internet, it will make sense to add the ability for phones to control them. Allowing users to control more aspects of the phone with their voice would also be an improvement.

SP3: Find improvements for the cellphone.

— find a way to improve battery life

— Standardizing charging technology so phone chargers can be set at many different places. If possible, setting up wireless charging in a way that users can charge there phone anywhere they're at, without having to bring a charger. That may not be possible.

— Removing "back doors" into phones so that government agencies and hackers cannot get information about users. Along that line, stopping the NSA from collecting text messages and tapping calls would go a long way towards securing user privacy, though it may not be politically feasible.

— Keep improving cameras.

— Allow users to have multiple apps on the screen at once.

— Introducing face recognition like Apple has done on all new phones could increase the security of each device.

— Partner with car companies to allow the creation of apps that can be used to unlock cars. Could also be done with houses and other buildings. Security could be a risk.

— Make sure the phone updates apps automatically unless the user turns of the feature, so users don't have to spend time waiting for apps to update.

— Increase what users can do using the phone's voice recognition technology, i.e. let them do more than make calls. This would make phone usage safer when people are walking around.

— Allow the phone to read notifications from apps out loud.

— Since many devices are being connected to the internet (i.e. the internet of things), allow phones to function as universal remote controls so they can control all of these devices.

— Increase memory space so that users can have more apps on their phone.

Table:

Needs	Assessment	Improvements needed
Ease of use	cell-phones are generally easy to use	small improvements to the UI, but nothing major
Continuity with past models	decent, but companies sometimes make users buy new equipment when they buy a new phone	don't make users buy new equipment to use the next gen phone like apple did with wireless headphones
Increased battery life	Has improved over time, but still not great	Dependent on many physical constraints, but try to make batteries last longer.
Different options at each price	Most quality phones are expensive, but cellular providers offering subsidized plans mitigates this problem	Phone's drop in price with time so not much change needs to be made here. Adding features to

		cheaper phones could offer a money making opportunity
Allow users to maintain privacy	Poor, government agencies, cellular providers, and phone companies have most messages their users have sent.	Not saving messages in massive databases, not letting the NSA and other gov agencies use “back doors” into phones.
Perform the functions of a Personal Digital Assistant	All phones can do this.	No improvement necessary
Send and receive email	All phones can do this.	No improvement necessary
Connect to the internet	All new phones (except for those explicitly for nothing but making calls) can do this	Allow even super cheap phones to connect.
Play games, watch videos, and use other apps	All smart phones can do this.	No improvement necessary
Text messaging, Phone calls, Video chatting	All phones can do this.	No improvement necessary
Take photos and videos	All phones can do this.	No improvement necessary
Offer other functions like an MP3 player or GPS	All smart phones can do this.	No improvement necessary
Pick up various types of radio	All smart phones can do this.	No improvement necessary
Phone can be used to make payments (Apple pay, etc)	Most smartphones have either Apple Pay or Android Pay, but there are kinks that have to be worked out as this is a new tech	Work out the kinks with this tech
UI complete with a touch screen or keyboard to enter input	All phones can do this.	Potential UI improvements (not necessary)
Rechargeable battery	All phones have this, but battery life could be longer	Improve battery life if possible
Ability to see multiple apps at once	Most android phones can do this, but iPhone’s can't	Apple should adopt this tech
Universal remote control	Phones don’t currently do this	As most devices become connected to the internet (i.e. the Internet of things)phones should be allowed to function as universal remote controls to control these devices

Finger print sensing or face sensing instead of just a passcode to enter the phone	Most phones have fingerprint sensing, only the newest iPhone has face recognition tech	All phones should add face recognition tech to increase the security of each phone
Wireless charging	Some phones do this	Standardizing charging technology would allows wireless chargers to be set at many different places, where everyone could charge their phone
Using the phone to unlock other devices/vehicles	ZipCar has an app that lets user unlock ZipCars, but no other companies do	Partner with car companies to allow the creation of apps that can be used to unlock cars
Can go underwater	Most phones can do this	No improvement necessary
Automatically updates apps	Only Android phones do this	Apple needs to adopt this tech
Lets apps display notifications	All smart phones can display notifications as messages	Have the phone read the notification out loud

Step 4: Check you work (Reflect on the results, ask questions, …)

In terms of the things I know, do the results make sense?

The results do make sense. Most people are generally satisfied with their cell-phone's so it makes sense that there wouldn't be need unsatisfied needs.

Step 5: Learn and generalize

- about cell phones and improving them
- about yourself as a problem solver

Cell phones are already pretty good at meeting customer needs, and the main sources of improvement that I see with them are the ability to connect with everything else in the world. Essentially allowing phones to act as universal remote controls with everything a person owns. The biggest issues with improving cell phones are the physical limitations imposed by being a mobile device, and the security risks that come with increasing the size of networks.

2. **Product Needs Analysis:** This exercise is an important precursor to your project. Examine the following products: Cell Phones, I-Pod, and Notebook (Personal) Computers. What are the basic customer and/or societal need(s) that these products and their associated technologies satisfy? Develop a set of criterion to evaluate these products, and then, using these criteria and an appropriate table (i.e., a matrix with rows and columns) evaluate each of these products.

— A product has customer value if it offers them functional, social, hedonic, or aesthetic benefits

— A functional benefit occurs when a product allows the consumer to do something they would not be able to do without it. If a product has tangible attributes that will benefit the consumer when they use the product.

— A social benefit occurs when a product improves the consumer's social status within a certain group, or society as a whole. This will occur if the product is considered to be of high value.
— A hedonic benefit occurs when a product gives the consumer pleasure in some form. This could take the form of helping the consumer relax after a stressful day at work, or the form of helping the consumer have fun.
— An aesthetic benefit occurs when a product has the capacity to present a sense of beauty. People like to look good, and they want products that are visually appealing.
— A product also is a benefit to society if it has improved society in some way.
Table:

Benefit\Product	**Cell Phone**	**I-Pod**	**Notebook Computers**
Functional Benefits	Allows you to make phone calls or send text messages from nearly anywhere, most can access the internet and bring the host of benefits that come from being connected.	Allow you to play music on the go.	Allow you to use the various apps developed, connect to the internet. Can help you be more productive. If laptop, can be taken anywhere.
Social Benefits	Having a new, expensive phone can help you seem important. Not having a cell phone at this point is odd since they're so prevalent and could hurt your social status.	Being able to play music when around other people. Nothing really.	Can help you stay connected through various apps.
Hedonic Benefits	Certain apps can help you relax, or make you happy if you like the app.	Listening to music when you're stressed can be relaxing.	If you like watching videos or using various computer of web apps the PC can make you happy.
Aesthetic Benefits	Most phones are designed to look good, but nothing really.	Most I-Pod's are designed to look, but nothing really.	Nothing.
Benefits to Society	Helping connect us with the world around us.	Nothing.	Computing power has allowed us to automate many formerly manual tasks. They have made society more efficient, and wealthier.