Design Requirements

Iteration

Solution Implementation → Identify Need

Problem Formulation

Define Problem

Problem Statement

Problem Solving

Identify Requirements

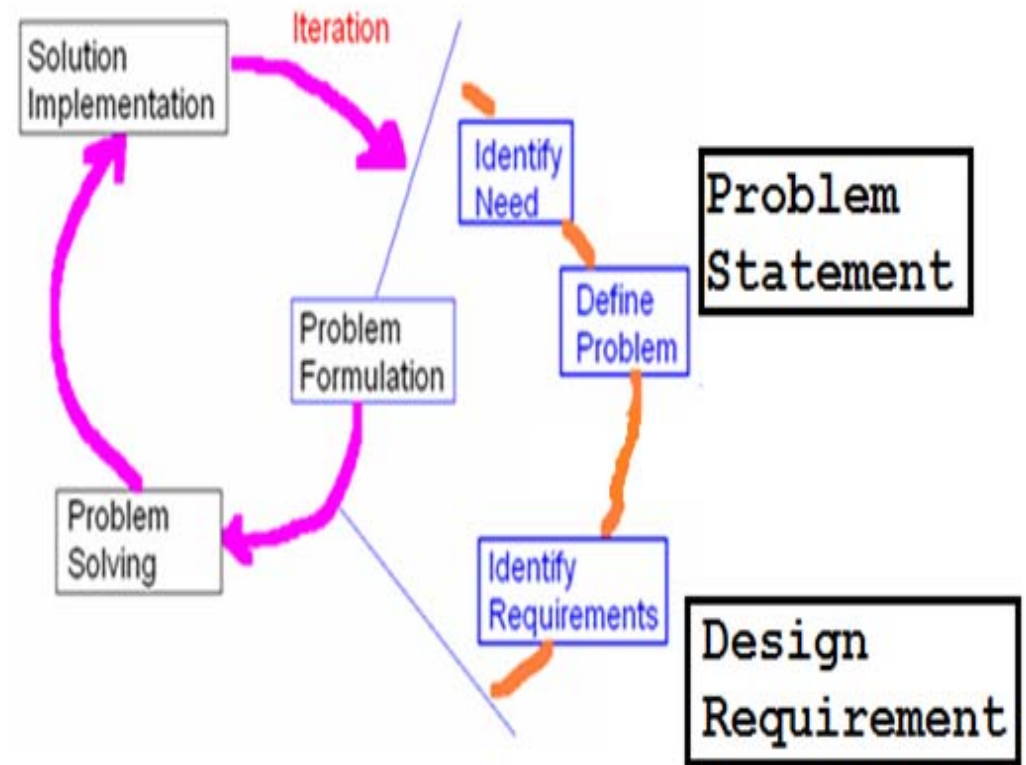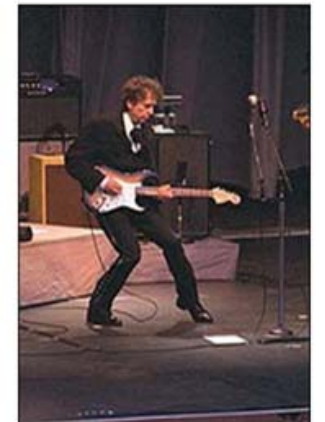**Design Requirement**

Your team's Problem Statement

- Discuss in your team's next weekly meeting
- Complete the activity for identifying the problem
- Submit the Problem Statement

- Excel and PDF format

- Next Step
- Design Requirements

A **product specification** (also referred to as "**product specs**") is a document with a set of requirements that provides **product** teams the information they need to build out new features or functionality. A good **product spec** doesn't micro-manage **product** development.

What Are Product Specifications - ProdPad

https://www.prodpad.com › resources › guides › produc

Problem → Requirement (or "Spec")

- Conversion of **Description** → **Specification** (Example)

Customer: I **need** a replacement for an AC Adapter for a legacy laptop which was now discontinued.
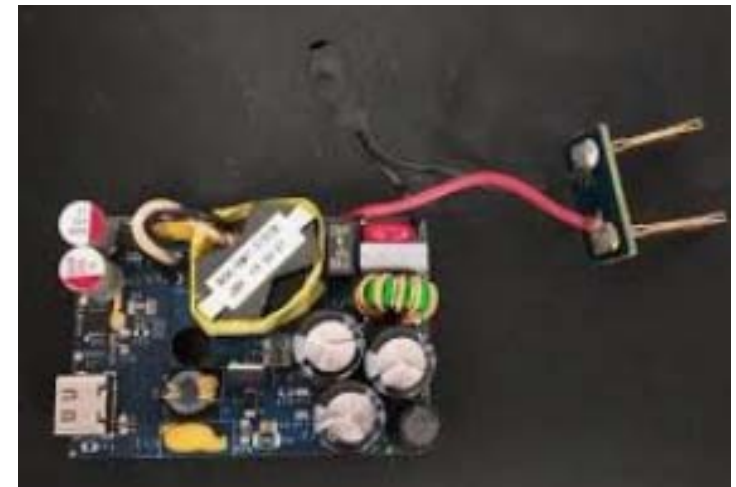
Product Specs - Samples

- **Inputs:** 110 V AC via 3-wire connection
- **Outputs**: Position Location in GPS format via USB connection
- **Response Time**: Output should be available within 1 sec after input command entered
- **Dimensions**: It must fit within 10"x6"X15"
- **Easy of use**: It must not require more than 1 minute to set up the system
- **Energy Use**: The maximum power demand must be less than 20W and lasts at least 2 hours with standard audio system emergency power source
- **Operation Limit**: The system should stand more than 4 hours in temperatures ranging from 40°F to 130°F.

- **Weight:** The system must be less than 1 pound
- **Noise Level:** The noise level of the system should be less than 60dB at 2 feet from front of the device when operating
- **Performance:** Car must reach 110 mph within 10 seconds
- **Interface with other systems**: "all connectors must fit to industry audio cabling standard 3.5 mm TRS minijack
- **Lifespan:** The soda container must last for 2 years when filled with pressurized soda at 85°F
- **Ergonomics**: The system must be able to be lifted up with less than 10 pound force

Software Specs (SRS: Software Requirement Specifications)

Overall description

- Product perspective
  - System Interfaces
  - User Interfaces
  - Hardware Interfaces
  - Software Interfaces
  - Communication Interfaces
  - Memory Constraints
- Design constraints
  - Operations
  - Site Adaptation Requirements
- Product functions
- User characteristics
- Constraints, assumptions and dependencies

830-1984 - IEEE Guide for Software Requirements Specifications

Specific requirements

Software Specs - Example

2. Overall Description

2.1 Product Perspective

Gephi was developed for everyone who is interested in graphs and wants either to just experiment with them so that he can understand them or wants to use them as a means of analyzing data. It can handle various graph formats (GEXF, GDF, Pajek, DOT, GraphML, UCINET, CSV...) and supports directed, undirected and mixed graphs.

2.4 Operating Environment

- Windows 2000
- Windows XP
- Windows Vista
- Windows 7
- Windows 8
- Windows 10
- Mac OS X
- Linux

2.2 Product Functions

File:

- New Project: Creation of a new project
- Open: Loads an existing project or a file of one of the supported graph formats
- Open Recent: Loads one of the displayed, recently opened files.
- Close Project: Closes the currently open project.
- Properties: Displays some properties of the project (such as the title) which can be edited.

Window:

- Context
- Data Table: Displays the Data Table tab.
- Filters: Displays the Filters tab.
- Graph: Displays the Graph tab.
- Layout: Displays the Layout tab.
- Output: Displays the Output-Log tab.

2.5 Design and Implementation Constraints

Gephi is developed in Java, it uses OpenGL for its visualization engine and has been built on top of the NetBeans Platform. It uses a modular design where every feature is wrapped into a separate module and the modules depend on each other through well-written APIs. There are several APIs available to make plugin development easy.
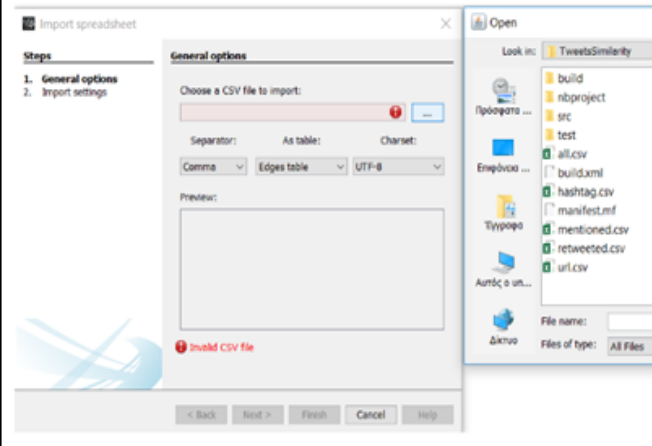
Software Specs - Example

3.1 User Interfaces

1. Gephi's Welcome Screen:
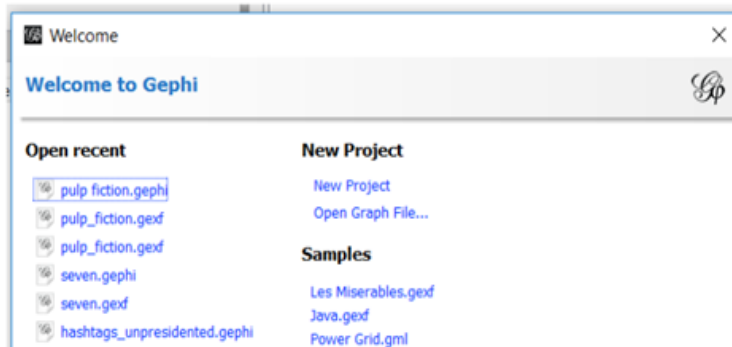
3. Import Graph (CSV file)

3.2 Hardware Interfaces

The minimum hardware requirements of Gephi are a 500 Megahertz CPU and 128 megabytes of RAM. Also, because Gephi uses an OpenGL 3D engine to speed up graph visualization, a compatible graphics card is required. A system with these specifications can handle a Network of approximately 1000 edges and nodes. For bigger networks, additional memory is required (https://gephi.org/users/requirements/).

3.3 Software Interfaces

Gephi requires Java to be installed on the system, more specifically Java version 7 or 8 for its latest release. Additional information can be found on section 2.7 of this document.

Gephi can be connected with a MySQL, SQLite or PostgreSQL database to import a graph edge list.

3.4 Communications Interfaces

Gephi requires an internet connection to install new plugins, update already installed ones and update some of its components (APIs, modules etc.).

Product/Software Specs – Practice (Team Work part 1)

- **Problem Statement**: Start from the Problem Statement of your team project

- **Product Specs**

  Smart Traffic   Smart Building

  Memory Forensics

       SLAM

  Semi-Autonomous Robot   Quantum AI

  Social Sphere Machine   AWS DeepLens

- **Software Specs** (if the problem can be resolved primarily by software)

  Work on either (a) Product or (b) Software Spec

Product/Software Specification - **Summary**

- What is <u>Specification</u> ?

2. Environmental and Socio-Cultural Constraints

Environmental Constraints

Socio-Cultural Constraints:

Ford's 'golden noses' seek edge in slowing China car market

REUTERS

#BUSINESS NEWS JULY 19, 2017 /

BY ELIZA H FOR HOME & DECOR / JANUARY 10, 2017

Example - Socio-Cultural Constraints

Bloomberg

Chinese Consumers Hate That New-Car Smell

Among China's motorists, popular ways of getting rid of that new car smell include using bags of activated carbon, lemon, grapefruit or orange peels, and a mix of water with vinegar.

American buyers, on the other hand, have been consistent in taking issue with voice recognition, Bluetooth and connectivity systems in J.D. Power's recent U.S. initial quality surveys,

A visitor sits in the driver's seat of a Dongfeng S500 electric car at the Beijing International Automotive Exhibition. New car smell is deemed unpleasant in China, where formaldehyde pollution of interior air have worried people. *Photographer: Qilai Shen/Bloomberg*

Environmental & Socio-Cultural Constraints – (Team work part 2)

- **Problem Statement:** Start from the Problem Statement of your team project
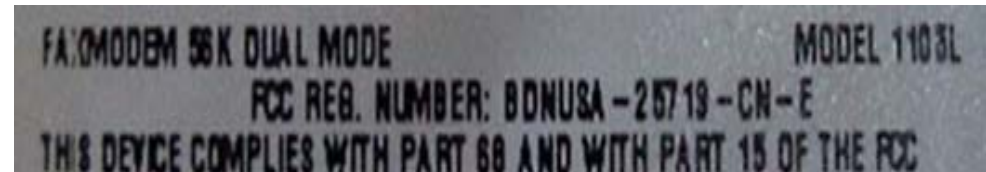
- **Environmental Constraints**

- **Socio-Cultural Constraints**

Smart Traffic   Smart Building
Memory Forensics
SLAM
Semi-Autonomous
Robot   Quantum AI
Social Sphere Machine   AWS DeepLens

'Design Requirements   3. Compliance

Compliance to Regulations

FAXMODEM 56K DUAL MODE   MODEL 1105L

FC Tested To Comply With FCC Standards

FOR HOME OR OFFICE USE

FAXMODEM 56K DUAL MODE   MODEL 1103L
FCC REG. NUMBER: BDNUSA-25713-CN-E
THIS DEVICE COMPLIES WITH PART 68 AND WITH PART 15 OF THE FCC
RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:
(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2)
THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING
INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.
RINGER EQ. #: 0.5A   JACKS (USOC) RJ11C

FAXMODEM 56K DUAL MODE   MODEL 1103L
FCC REG. NUMBER: BDNUSA-25713-CN-E
THIS DEVICE COMPLIES WITH PART 68 AND WITH PART 15 OF THE FCC

Key rules from FAA proposal for commercial drones

Max speed: 100 mph
Max weight: 55 lbs
Max altitude: 500 ft.

Fly during daylight only

Rules don't allow for drone deliveries as envisioned (sorry Amazon)

Operator requirements:
• At least 17 years old
• Have passed initial, recurring tests
• Obtain operating certificate
• Vetted by TSA

Must be directly visible by operator

Source: Federal Aviation Administration   Kyle Kim @latimesgraphics

FDA 510(k)

Compliance – (Team work part 3)

- **Problem Statement:** Start from the Problem Statement of your own project.

- FCC Regulation ??

- OSHA Regulation ??

Smart Traffic   Smart Building
   Memory Forensics
               SLAM
   Semi-Autonomous
   Robot   Quantum AI
  Social Sphere Machine   AWS DeepLens

- NEC ?

- **Conversion**

- **3 Components**:

- Design Requirements should:

Design Requirements – Team Assignment

- **Pre-Requisite**: Problem Statement of your own team project

- **Assignment**: Design requirements of your own project

- <u>Project Design Requirements</u> (with 3 components)
  - Product (of Software Requirement) <u>Specifications</u>
  - <u>Constraints</u> of (Time, Cost, Environment, Socio-cultural, <u>etc</u>)
  - Rules/Regulations/Standards to <u>comply</u> with

- Format: <u>Design Requirement Form</u> (available in the web page)

- File Name: **GroupName_DesignReq.xxx** (xxx being the file type)

- Submission Due: Check the Team Assignment 03