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Study on E-waste Management Methodology

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Abstract: Electronic waste is a growing problem in the world. As technology is more rapidly developed and made accessible to the public, an increase in the disposal of old electronics becomes more imminent. Electronic waste is harmful to the environment and the amount that it attributes to the waste stream can be reduced. Electronic products such as mobile devices are ubiquitous and the rates with which they are acquired and replaced by the consumers continue to rise. The current mobile device market encourages the acquisition of new devices more often than the end-of-life of the entire product. To create a more sustainable technological future, there must be a reduction in mobile device contribution to electronic waste. The problem of electronic waste with specific focus on mobile devices, software development companies is approached from a systems engineering perspective.
Keywords: E-waste, Mobile device, Gaming Console, Lean Process.

I. INTRODUCTION

Electronic waste portrays disposed electrical or electronic gadgets. Utilized gadgets which are bound for reuse, resale, reusing, or transfer are likewise considered e-waste. Informal preparing of e-squander in developing nations can prompt unfriendly human well being impacts and ecological contamination. The negative environmental impact of irresponsible disposal of electric waste is due to the harmful contents of the devices which include high levels of hazardous materials such as Mercury (Hg), Lead (Pb), Cadmium (Cd), Chromium (Cr), PVC, and Brominated Flame Retardants. At the end-of-life of an electronic device, the device can be disposed of, recycled, or stored. When an electronic device is disposed of in the trash the device will end up in a landfill and those toxic materials will potentially seep into the environment.

Fig 1:Depicting E-waste

II. OBJECTIVE OF THE STUDY

A. Development of an Adaptable Mobile Devi
B. Implication of E-waste to build gaming console.
C. Management of E-waste in Software Development Companies using Lean Process.

III. LITERATURE SURVEY

[1]Waste is any activity that produces no value for the customer or user. Identification and description of different types of waste in software development. A Constructivist Grounded Theory was introduced and they have interviewed 33 software engineers, interaction designers, and product managers, and analyzed one year of retrospection topics. Iterated between analysis and theoretical sampling until achieving theoretical saturation.

[2]. An intelligent, automated sorting equipment for used electronics segregation and grading. It prevents operators from being exposed to hazardous substances from segregation processes and enables higher recycling rates within downstream processes .The sorting and grading equipment built by the project Partner Re-Find Technologies puts the WEEE-ID goals to work. The sorter uses sensors and intelligent data processing to detect almost in real time whether used electronic products are good for reuse, refurbishment or recycling, and sorts them accordingly. One of the criteria driving this functionality is based on the knowledge of the possibility to obtain reusable spare parts from a particular model.

[3] .The paper highlights a number of key waste management strategies and tactics used by Indian software development firms which could be used by the software development organizations around the world as best practices .A research reported by suggests two ways for managing electronic waste in a software business design with current technology in mind and greening software development and virtualization and consideration.

IV. METHODOLOGY

A. Scenario 1: Development of an Adaptable Mobile Device.

A modularized system which is characterized by functional partitioning into discrete scalable, reusable modules. Rigorous use of well-defined modular interfaces and making use of industry standards for interfaces .Ex: Phoneblocks is an open-source modular smart phone concept created and designed by the Dutch designer Dave Hakken primarily to reduce electronic waste. The inputs include the supplier software and hardware options that need to consider coordination between suppliers and developers at a central company to ensure that all outsourced pieces work with the standard base of the device and other components. The external guidelines to take into account are all industry regulations, security laws, and legal agreements made
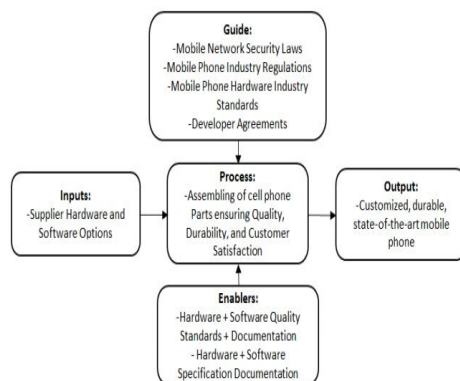with outside vendors.

Fig 2: Components of The Development Of A Modular Mobile Device That Would Need To Be Taken Into Account

The company that develops the modular device will be responsible for all internal regulations or enablers which include quality standards and specifications. The execution of the idea will depend on all of these components and how well a company could identify and then implement the different production processes.

B. Scenario 2:Implication of E-waste to build a gaming console.

The Amman Tron Gaming Console-1 is an approach to serving nature along with advancing technology by minimizing the rate of producing e-waste and other discarded materials including plastic and rubber. The Amman Tron Gaming Console–1 is an electronic device that consists of some components including capacitors, resistors, integrated circuits, and keys that all are extracted from discarded e-waste materials. The console needs to interface with a computer that works on ASCII values for which it requires a circuit. Such a circuit is easily found in old computer mice and keyboards. Particular values are assigned for different features of the console, according to how it will be implemented into the game.

Fig 3:A Close-Up View Of The Steering Wheel, Which Includes Nitro Buttons To Speed Up The Car During Game Play.

The Amman Tron Gaming Console-1 is inspired by control systems used in sports cars, such as having a gear shifter behind the steering wheel for manipulating the gears up and down. There are also nitro buttons built on the steering wheel. Which are used to enable the boost feature to speed up the car rapidly in the game. To introduce the acceleration and braking of the car into the game, a transmission shifter (Fig. 3) was introduced, which is responsible for driving the car in both forward and reverse directions. The transmission shifter is constructed to slide in the front and back directions by the use of a two-way switch that enables the selection between two different ASCII values that define the forward and the reverse motions.

C. Scenario 3: Management of E-waste in Software Development Companies using Lean Process.
1) Lean is a process which in its core aims to reduce waste to minimum.*: Lean Thinking describes a process of identifying and removing waste in a value stream. The process discerns three types of activities: activities that clearly create value; activities that create no value for the customer but are currently necessary to manufacture the product; and activities that create no the customer, are unnecessary, and therefore should be removed immediately; i.e., waste.

Fig 4:Principles of lean

2) *Identify Value:* Value is constantly characterized by the client's requirements for a particular item. For instance, what is the course of events for assembling and conveyance? What is the value point? What are other vital prerequisites or desires that must be met? This data is key for characterizing esteem.

3) *Map value/ esteem stream:* Once the esteem (true objective) has been resolved, the following stage is mapping the "esteem stream," or every steps of actions of the means and procedures associated with taking a particular item from crude materials and conveying the last item to the client. Esteem stream mapping is a basic yet enlightening knowledge that recognizes every moves that make an item or administration through any procedure. That procedure can be in outline, generation, obtainment, HR, organization, conveyance, or client benefit. The thought is to draw, on one page, a "guide" of the stream of material/item through the procedure. The objective is to recognize each progression that does not make esteem and after that discover approaches to dispose of those inefficient advances. Esteem stream mapping is here and there alluded to as process re-building. At last this activity additionally brings about a superior comprehension of the whole business task.

4) *Create flow:* After the waste has been expelled from the esteem stream, the following stage is to make sure the rest of the means stream easily without any interferences, deferrals, or bottlenecks. "Make the esteem making steps happen in tight succession with the goal that the item or administration will stream easily toward the client," prompts LEI. This may require separating storehouse considering and attempting to end up cross-utilitarian over all offices, which can be one of the best difficulties for lean projects to overcome. Nonetheless, thinks about demonstrate that this will likewise prompt immense picks up in profitability and productivity, once in a while as high as 50-percent change or more.

5) *Establish Pull:* With improved flow, time to market (or time to customer) can be dramatically improved. This makes it much easier to deliver products as required, as in "just in time" manufacturing or delivery. This implies the client can "pull" the item from you as required (frequently in weeks, rather than months). Thus, items shouldn't be worked ahead of time or materials Accumulated, making costly stock that should be overseen, sparing cash for both the maker/supplier and the client.

6) *Seek Perfection:* Achieving Steps 1-4 is an awesome begin, however the fifth step is the most imperative one: making lean reasoning and process change some portion of your corporate culture. As gains keep on piling up, it is imperative to recollect lean isn't a static framework and requires consistent exertion and watchfulness to culminate. Each worker ought to be engaged with executing lean. Lean specialists regularly say that a procedure isn't genuinely lean until the point when it has experienced esteem stream mapping in any event about six times.

V. APPLICATIONS

The prime utilization of Electronic Waste Management is to guarantee that the hazardous segments are discarded properly and the valuable segments are returned in for further use by decreasing the impact of e-waste on condition.

Fig 5: Recycling of E-waste

For the benefit of the consequences of the examination it is expressed that the awareness regarding the issue of the hazard and administration of e-waste are low and critical measures are required to think about this issue. Being a responsible citizen we should be a part in e-waste administration as giving hardware things for reuse, which broadens the lives of significant products and keep them out of the waste administration framework for a while. When purchasing electronic items, dependably strive for those that are made with less harmful constituents, utilize reused content, are vitality proficient, and are intended for simple overhauling or dismantling. Finally ,Reuse, reduce and recycle are the effective solutions of the problems of e-waste.

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