Applying the triz principles

Innovation on demand describes a highly useful methodology for systematic technological innovation. TRIZ stands for the Theory of Inventive Problem Solving which is a translation of Teoriya Resheniya Izobretatelskikh Zadach. Basic tools and applications of TRIZcan be applied to the conceptual development of high-level technologies, new products, and manufacturing processes. This book is a must read for practicing engineers who carry out duties such as design, shop floor administration and R and D activities. TRIZ approaches often leads to discovering of strategic opportunities that technology managers can highly apply to develop new products and processes, proper organizational structures and novel services. Genrikh Altshuller, from the Soviet Union was the first to come up with TRIZ when he was still in high school in 1946. It was applied extensively in the Soviet defense and space industry whereby engineers were able to overcome difficulties in technology while maintaining an efficient economic system. Its availability was highly suppressed and it was unknown in America. In 1984, Gordon and Breach attempted to translate Altshuller's work and consequently published Creativity as an Exact Science. Its poor translation made a poor read hence a poor impact. In 1991, Invention Machine Corporation developed a TRIZ-based software package which entailed a series of problem solving analogies. It was displayed in New York. This package failed to reveal the extensive thought processes behind TRIZ, which the manufacturers were unfamiliar with and was required in applying the same in solving technology issues. Hence the power in this methodology was not fully realized. Proper exposure to the methodology was initiated by the Russian immigrants in the 1990s who set up consulting companies in the West and were in collaboration with Altshuller. They applied the principles in

training clients and coming up with solutions for their clients; companies. As a result of these efforts, leading companies in the U. S. have reported significant benefits from the application of these fundamentals. In 1993, Wayne State University in Detroit officially started teaching these fundamentals after modifying them to suit various audiences. This book covers the basic tools concepts and of contemporary TRIZ. The only reason for defining any subject is to determine whether TRIZ can be used. Real-life situations are then used to illustrate these concepts based on patented inventions made with the help of TRIZ. TRIZ has evolved over time to contain numerous problem analysis techniques and concept generation tools. This book covers formalized powerful tools like ideality tactics, the sufield analysis, definition of principles, and ARIZ have been tackled extensively. Major non-formalized methods discussed are the cost, size and time method and the system operator. It covers two basic principles that are of high interest to engineers and technologists which are: The improvement of technologies and products already in use by use of problem-solving techniques and the development of future generation technologies, products and manufacturing processes through technological forecasting. TRIZ has been extensively used in these basic activities. TRIZ has been widely used in the development of various software packages and generation of libraries that contain good design concepts based on various engineering domains. Finite element analysis (FEA) packages are used in treating a huge variety of stress and strain problems. The results, however, can be applicable or inapplicable depending on the studies carried on the analyzed problem constructed by FEA.

Fey and Rivin focus their work on engineering methodology and do not address contributions from other related areas such as marketing, packaging innovations or operations. Likewise, the use of the phrase on demand in the title should not be interpreted as a guarantee of timely results rather it is a systematic approach to achieving better engineering solutions. This book is true to the first and most fundamental principles of TRIZ and even the section on the formulation of functions advocates a disciplined approach. For example the common formulation " hot air dries hair" is replaced with the correct formulation " hot air evaporates water" on page 15. The objective of Chapter 1 is to show the need to replace random innovation with systematic innovation due to the shortcomings of the former. TRIZ provides systematic innovation by employing numerous methods for overcoming system conflicts instead of making tradeoffs. These breaks down into two major subcategories according to the laws of technological system evolution which are a set of methodologies on the development of conceptual system designs and a set of tools for identifying and developing of future technologies on page 8. Chapters 2 and 3 provide a variety of ideal systems, physical contradiction, and sufield analysis which entails solution and field of application. Chapter 4 introduces ARIZ which involves algorithm for inventive problem solving, which is the most powerful tool for problem root-cause analysis and solutions proposal in modern TRIZ on page 83. The major aims of ARIZ are problem formulation, breaking psychological inertia, and combining various tools of TRIZ in order to come up with an applicable solution. Chapter 4 explains the nine laws of technological system evolution which can be used to efficiently develop novel technologies and products, to objectively assess the potential business value of the systems designed and

predict the systems that competitors shall implemented. These laws are: Increasing Degree of Ideality, Non-Uniform Evolution of Sub-Systems, Transition to a Higher-Level System, Increasing Flexibility, Shortening of Energy Flow Path and Transition from Macro- to Micro-Level. Fey and Rivin caution that these laws don't work independently but are intertwined so as to come up with a complex solution. Chapter 6 discusses TechNav - a comprehensive process for the conceptual development of future technologies and products based on rules and laws of technological system evolution and business analysis. These phases are analysis, determination of high potential innovations, concept development, and concept selection and technology plan. A five level distribution of inventions by novelty level is proposed. In this system, inventions still being engineered account for less than five percent of all inventions.

In only four pages, module 2 introduces the system conflict matrix and inventive principles which have been incorporated into some TRIZ-based software products. Fey and Rivin state on page 195 that although using these tools is simple, their effectiveness is comparatively low due to problems associated with the formulation or selection of system conflicts, limitations using predefined, typical attributes, absence of tactics, and detachment from the concept of physical contradiction. Fey and Rivin propose the use of ARIZ analysis in solving these issues. In this essay, I have decided to discuss how technology can be used to re-engineer computer databases for use in the school library system in order for them to have a database that has a higher quality and output and performance while this does not affect how durable they are. Recently, changes in technology have

shown that products like the television sets, cameras, refrigerators and computers have over time been developed to higher quality standards while their prices have declined. This has not been the case when it comes to durability. In the early 1990's phones were for the sole purpose of calling and could not access unique services such as the internet and storage of files, television sets were only available in black and white visual mode in the 1970's and early 1980's and computers were made of Pentium 3 and had a low processing speed of 1. 6. Though faster machines which are more productive and have higher performance rates have been developed for a wide range of markets, their durability and reliability over the long-run has become skeptical. On the computer database, the contradiction matrix is as follows: The feature I endeavor to improve is productivity which shall entail quality and performance while ensuring the durability of the resultant database does not decline. The TRIZ matrix proposes the following principles as a solution to these contradictions. Applicable principles are: Principle 20: Continuity of useful action. Under this, the principle suggests that I should carry out work continuously while making all parts of the computer work at full load all the time. I should also eliminate all idle and intermittent actions of work. Therefore a common database that will serve in a similar capacity as a server such that its power supply is ever on to prevent loss of information or illegal access that compromises security. This also involves releasing the cache memory when not in use and installation of a larger dirty dynamic advanced Random Access Memory instead of a static one preferably one higher than 2 GB. Principle 10: Preliminary action: It encourages performance of any necessary changes on the database system be it partial or wholly before they are actually needed. For example, multiple

fans should be included for an efficient cooling system which can withstand time. Proper dust control measures should be put in place. This shall prevent heat backflow which destroys internal cables and the power supply. It also proposes that I should pre-arrange components such they are used from the most convenient place without losing time for their delivery. I will ensure that a flexible manufacturing cell is always available in the market for this particular product such that a back-up power plan is available in case of power failure. This cell should not compromise durability. A reputable database management language like MySql shall be used instead of Microsoft Access which keeps on getting corrupted. Principle 16: Partial or excessive actions. If the computer's database system durability shall have to be compromised, then the nearest applicable method should be used, the closest approximation of these method. If the resultant computer that has been reengineered cannot hold some features like high graphics display, the closest set of display drivers should be installed if they are adaptable to the system. Various functions such as retrieval and updating of information such as those who have borrowed or returned books should have a back-up plan. Principle 10: Strong oxidants were found not to be applicable since it could be only applied to technologies other than computers such as refrigerators. It proposes that I should replace common air with oxygen-enriched air or with pure oxygen, expose air or oxygen to ionizing radiation so as to use the ionized oxygen. The ionized oxygen should be replaced with ozone. This can only be used in super-cooling systems to enhance efficiency. It is in view of this that I have decided to come up with a database management system applicable in a school library system. The system will be highly productive and efficient without compromising durability and reliability. The system in

place at the school library is slow and highly unproductive. My system shall therefore have a processing speed of 3. 0 to take care of the current problem of 'hanging'. Students will no longer have to queue since this speed will easily store and retrieve from the database unlike the current speed of 1. 66. The current system has a Random Access Memory of 256 MB. The system am proposing shall have a RAM of 1 GB to be installed on the expansion slots in form of two 512 dirty dynamic RAMs which allow quick access and enhanced virtual memory on the Central Processing Unit.