QR VIEWS

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FOR PRIVATE CIRCULATION AMONG MEMBERS ONLY

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Eighty-five percent of the reasons for failure are deficiencies in the systems and process rather than the employee. The role of management is to change the process rather than badgering individuals to do better.

- W. EDWARDS DEMING

1.0 Chairman's Message

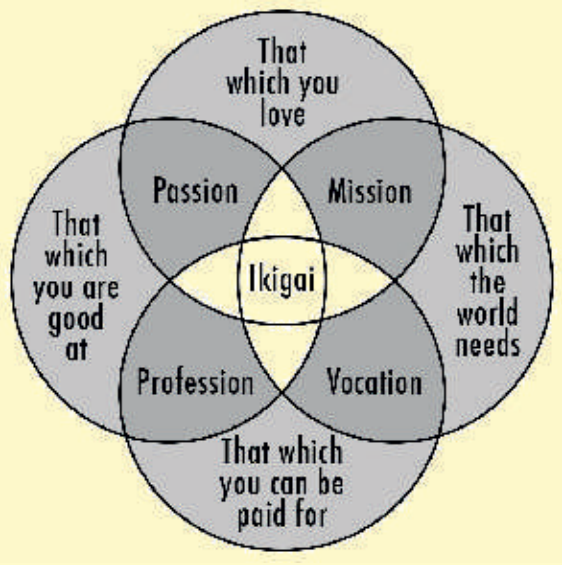
Quality of Life

Quality of life can be considered to be the process of cultivating one's inner potential or that of which makes one's life significant. The inner potential is a treasure within our self. This treasure will help to find wonderful things about us and we can share them with the world.

Quality of life reflects definitely in their official work, but this is not the end. It is a continuous process which extends to the spiritual feeling and so on.

The concept of life is described in 'Ikigai' concept, a Japanese secret to a long and happy life. The term 'Ikigai' means "a life worth living, the happiness and benefit of being alive".

'Ikigai' can be represented with a four circle diagram as given below:



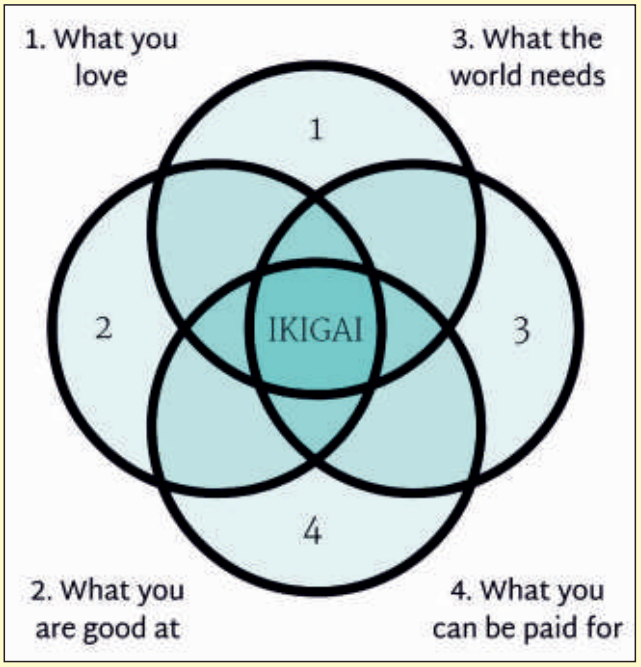
This is mainly associated with one's profession and how to achieve the goal.

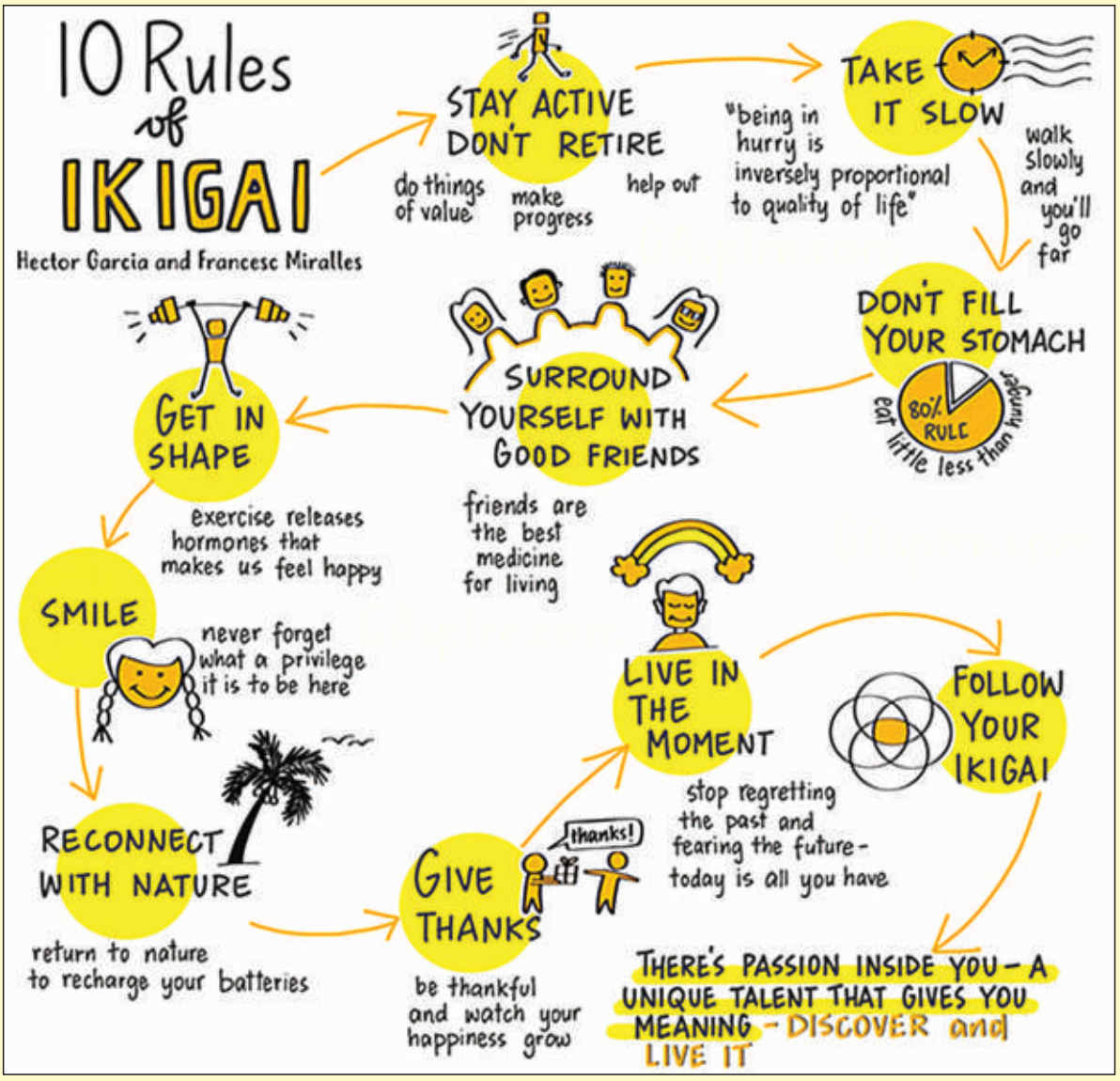
The Venn diagram given in the right side gives a holistic approach in the entire life cycle

The 'Ikigai' philosophy is given as 10 rules in the diagram below.

I wish all NIQR members a purposeful Quality life in the year 2020 and ahead.

C. Athi Pagavan





2.0 Risk Management – The Future of Quality

2.1 What is risk?

There are a number of definitions of risk. However, most incorporate the following common elements:

Risk of something happening that will have an effect on objectives; measured in terms of consequences and likelihood.

Risk of a situation or circumstance that creates uncertainties about achieving program objectives .

Risk of an event occurring that will adversely affect the achievement of objectives.

2.2 What is risk management?

Risk management is the ability to identify risk, assess it, and mitigate it. Although there are many definitions of risk management, the following share common attributes:

Risk management is the culture, processes, and structures that are directed toward the effective management of potential opportunities and adverse effects.

Risk management is the identification, assessment, and response to risk to a specific objective.

2.3 Risk management standards and models

Risk management standards are proliferating like weeds. ISO is developing ISO/DIS 31000--"Risk management--Principles and guidelines on implementation." The critical elements of the standard are:

- **Risk identification** Identifies the sources of risk, risk events, and their potential consequences
- **Risk analysis**. Analyzes the causes and source of the risks and the likelihood that they will occur
- **Risk evaluation**. Determines whether risks need to be addressed and treated
- **Risk treatment**. Determines strategies and tactics to mitigate or control risks

Additional risk management standards are being developed for specific industry sectors.

2.4 Advantages of risk-based decision making

An interesting management phenomenon occurred during the last decade. Approximately 10 years ago, quality was the critical filter in high-level management decision making. Then it evolved to price, which led to the global rush to find offshore suppliers and eventually to massive outsourcing. Price evolved into the total cost of ownership and quality became a less compelling issue to senior management.

So, what's the primary filter for senior management decision making now? Risk management. Why is risk management so critical these days? Four reasons:

Risk is inherent in globalization and outsourcing.

Executives don't want to be blindsided, and they feel uncomfortable with uncertainty.

Executives want to manage outcomes and stakeholder expectations.

Bottom line: Risk management is preventive and predictive, not reactive.

2.5 Examples of risk management

Let's look at several applications of risk management. Competition forces companies to develop more products faster as markets become specialized and customers demand more. Companies realize that they can't keep pace with customer demands, so they rely on suppliers to design new marketplace offerings to improve their products. For example, **cell phone companies** must churn out new models to keep up with rapidly evolving markets. Collaborations become more critical, and product-timing risks increase. **Products reach the market either too early or too late to beat the competition. If too early, there is insufficient demand; too late, and the crucial buy window is missed.**

Much like Sara Lee Corp., The Boeing Co. adopted a business model that emphasizes outsourcing and supply management. The model incorporates the following: Design the core product, outsource the core assembly (up to 85% of manufacturing dollars), assemble the complete product, test the product to ensure compliance, and then manage the Boeing brand. Although the Boeing 787 Dreamliner was built following that model, **Boeing didn't anticipate or manage the risks involving its fastener supplier, which delayed the 787's market introduction by many months.**

Product development is a global activity. Automobiles may be designed in Los Angeles and assembled in Ohio from parts manufactured throughout the world. Managing worldwide, disparate suppliers requires project risk management. Project risk management is the ability to anticipate project problems and obstacles that may hinder the project from achieving objectives within cost, schedule, and quality constraints.

What are the hazards?	Who might be harmed and how?	What are you already doing to control the risks?	What further action do you need to take to control the risks?	Who needs to carry out the action?	When is the action needed by?	Done
chemicals	damage from direct contact with cleaning chemicals. Vapour may cause breathing problems.	products safely, eg follow instructions on the label, dilute properly and never transfer to an unmarked container.	Staff reminded to check for dry, red or itchy skin on their hands.	Manager	12/10/19	12/10/19
			Staff reminded to wash gloves before taking them off carefully and storing in a clean place.	Manager	12/10/19	12/10/19
Electrical Faulty building wiring, faulty electrical appliances.	Staff could get electrical shocks or burns from faulty electrics, including portable electrical equipment – heaters, fans etc.	• Staff trained to spot and report any defective plugs, discoloured sockets, damaged cable and on/off switches, and to take any defective equipment out of use. • Staff know where the fuse box is and how to safely turn the electricity off in an emergency. • Clear access to the fuse box. • Qualified electrician does safety check of building electrics every five years.	Manager to do visual check of plugs, sockets, cables and on/off switches every three months.	Manager and all staff	From now on	
Fire Faulty electrics, arson.	If trapped, staff could suffer from smoke inhalation/burns.	Fire risk assessment done, and necessary action taken.	Remind staff to keep backyard gate locked out of hours to stop intruders getting in.	Manager	7/10/19	7/10/19
Cold temperatures, freezer work	Staff may suffer discomfort when restocking freezer.	Freezer gloves provided for use when restocking freezer.	Replace gloves when they are showing signs of wear and tear.	Manager	From now on	

3.0 Student chapter revival function at ACE Engineering College, Thiruvananthapuram

National Institution for Quality and Reliability is an esteemed Indian association which came into existence from July 1987. The association deals about quality assurance and reliability. Many students are benefitted by the organization, which helps in grooming of very efficient quality assurance engineer with all known international standards such as ISO 9000 and various other standards. Students who have taken membership in this esteemed association have had a well good preference in placements. NIQR's first student chapter was formed in our college during the year 2015.

The revival of the student chapter happened on 31 august 2019 to make students of upcoming years to understand the basic necessity of quality assurance, reliability and quality management. Students found the topic in a new horizon where it unleashed the quality aspect. The program started with Shri. P. Muthuganapathy who is secretary of NIQR Trivandrum Branch who gave introduction on NIQR to budding minds. The next initiation was on the importance of NIQR which was given by Shri. C. Athi Pagavan who is chairman of NIQR Trivandrum Branch. Shri. C.A. Ignatious gave a brief lecture on quality assurance and reliability in a practical way, which students understood in a evident manner. Sir also elaborated about the way engineering should be perceived and superintended us to face an interview. The presence of Shri. H.Sai Ganesan, Treasurer of NIQR Trivandrum has also encouraged the students. The program was held in the presence of our beloved principal Dr. Farooq Sayeed, HODs' from various departments and faculties from various departments. The program was initiatied by Mr. Syam Chand .S.L , Assistant Professor, Mechanical department and Mr. Prem Kishore, Assistant Professor, Aeronautical Department. With the hospitality provided by our institution the committee has decided to offer courses based on quality and reliability which will soon be available in our institution

Sai Theagarajan S.K.
Student Designate, ACE College of Engg., NIQR, Student Chapter

Student chapter function at ACE College of Engineering, Trivandrum

Shri. C.A.Ignatious, Vice President Vin-Vish Technologies Pvt Ltd., Trivandrum, delivering a lecture

Quality is the result of a carefully constructed cultural environment. It has to be the fabric of the organization, not part of the fabric.

- Phil Crosby

4.0 Event tree analysis (ETA)

4.1 Introduction

The basic principles of this methodology have not changed since the conception of the technique in the 1960's. ETA was first successfully used in the nuclear industry in a study by the U.S. Nuclear Regulatory Commission the so-called WASH 1400 report in the year 1975. Over the following years ETA has gained widespread acceptance as a mature methodology for dependability and risk analysis and is applied in diverse industry branches ranging from aviation industry, nuclear installations, automotive industry, chemical processing, offshore oil and gas production, and defense industry to transportation systems.

In contrast to some other dependability techniques such as Markov modelling, ETA is based on relatively elementary mathematical principles. However, as mentioned in IEC 60300-3-1, the implementation of ETA requires a high degree of expertise in the application of the technique. This is due in part to the fact that particular care has to be taken when dealing with dependent events. Furthermore, one can utilize the close relationship between Fault Tree Analysis (FTA) and the qualitative and quantitative analysis of event trees.

4.2 Terms and definitions

For the purposes of Event Tree Analysis the terms and definitions given in IEC 62502

Analysis techniques for dependability – Event tree analysis (ETA) [3] are applied.

4.3 General description

The Event Tree Analysis (ETA) is an inductive logic technique to model a system with respect to dependability and risk related measures as well as to identify and assess the frequency of the various possible outcomes of a given initiating event. According to the IEC 60050(191) the dependability of a system is defined as the ability to meet success criteria, under given conditions of use and maintenance. The core elements of dependability are the reliability, availability and maintainability of the item considered. Starting from an initiating event the ETA deals with the question "What happens if..." and thus constructs a tree of the various possible outcomes. It is therefore crucial that a comprehensive list of initiating events is compiled to ensure that the event tree properly depicts all the important event sequences for the system under consideration. Using this forward logic, the ETA can be described as a method of representing the mitigating factors in response to the initiating event - taking into account additional mitigating factors. From the qualitative point of view ETA is a means of identifying all potential accident scenarios (fanning out like a tree with success- or failure branches) and of identifying design or procedural weaknesses. As with other dependability techniques, particular care has to be taken with the modelling of dependencies bearing in mind that the probabilities used for quantifying the event tree are conditioned on the event sequence that occurred prior to the occurrence of the event concerned. Clause 9 deals with these qualitative aspects of the analysis as well as the basic quantitative rules for the calculations used to estimate the (dimensionless) probabilities or frequencies ([1/h]) of each of the possible outcomes. Caveats concerning the quantification of software failures as well as the quantification of human factors will not be dealt with in this standard, since these issues are covered by other IEC publications.

The advantages of ETA as a dependability and risk related technique as well as the limitations are discussed bellow. As an example of the limitations of ETA, the restrictions to the modelling of the time-dependent evolution of the events should be noted.

Event Tree Analysis bears a close relationship with the Fault Tree Analysis (FTA) whereby the top events of the FTA yield the conditional probability for a particular node of the ETA.

4.4 Benefits and limitations of event tree analysis

Benefits

An ETA provides the following merits:

a) It is applicable to all types of technical systems;

b) It provides visualization of event chains following an initiating event;

c) It enables the assessment of multiple, coexisting system faults and failures as well as order dependent events;

d) It functions simultaneously in the failure or success domain;

e) Its end events need not be anticipated;

f) It identifies potential single-point failures, areas of system vulnerability, and low-payoff countermeasures. This provides for optimized deployment of resources,

improved control of risk through improved procedures and safety functions;

g) It allows for identification and traceability of failure propagation paths of a system;

h) It enables decomposition of large and complex systems into smaller, more manageable parts.

The strength of ETA – compared to many other dependability and risk related techniques – is its ability to model the sequence and interaction of various mitigating factors that follow the occurrence of the initiating event. Thus the system and its interactions in an accident scenario, with all mitigating factors become visible to the analyst for further risk evaluations.

Limitations

An ETA has the following limitations:

a) The initiating events are not disclosed by the analysis, but must be foreseen by the analyst;

b) Possible operating scenarios must be anticipated by the analyst;

c) Subtle system dependencies might be overlooked, leading to unduly optimistic estimates of dependability and risk related measures; also sometimes being in a particular state for too long a time can result in a failure state, which is difficult to model in an event tree.

d) Method needs practical experiences of the analyst and preceding system investigations, e.g., to address correct handling of conditional probabilities and dependent events;

e) ETA is not very suitable for handling common cause failures in the quantitative analysis. This aspect should be covered by fault tree analysis which can then be linked to the ETA;

f) Although multiple pathways to system failure may be identified, the levels of loss associated with particular pathways may not be distinguishable without additional analysis; however, awareness of such a need is required

4.5 Development of event trees - general

The events delineating the event sequences are usually characterized in terms of:

a) Functional event tree: The fulfilment (or not) of mitigating functions;

b) System event Tree: The intervention (or not) of mitigating factors which are supposed to take action for the mitigation of the accident;

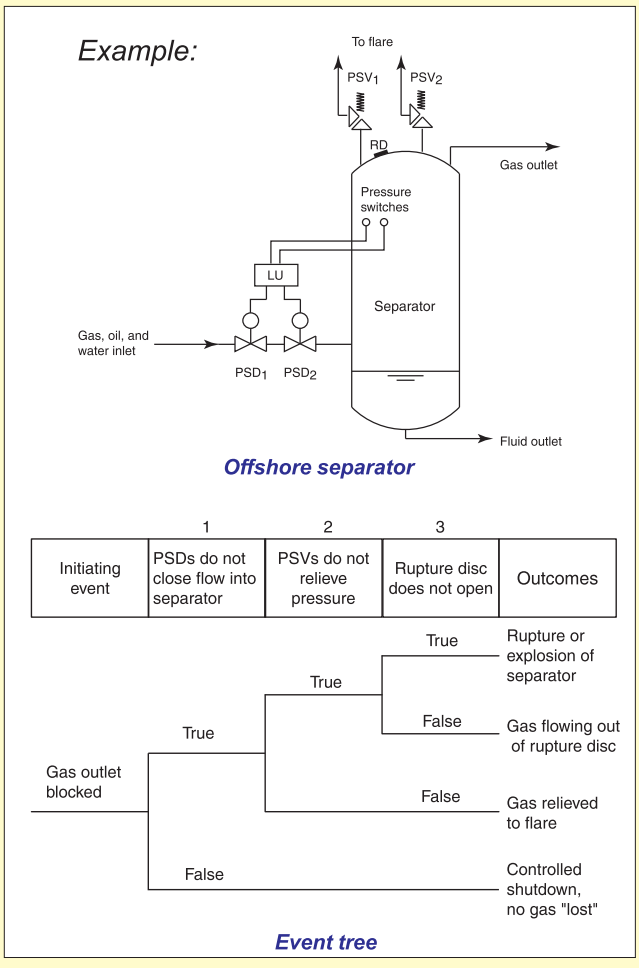
c) Phenomenological event tree: The occurrence or non-occurrence of physical phenomena.

Typically the functional event trees are an intermediate step to the construction of system event trees: following the initiating event, the safety functions which need to be fulfilled are identified; these will later be replaced by the corresponding mitigating factors. The system event trees are used to identify the sequences involving the mitigating factors. The event trees involving physical phenomena describe the accident with physical phenomena evolution taking place inside and outside the system under consideration (e.g. pressure and temperature transients, fire, containment dispersion, etc.).

4.6 Evaluation

Before starting the quantitative analysis of the frequency or probability of the outcomes of the different event sequences, one has to carefully analyse the qualitative aspects of the event tree model, i.e., the dependence of the events, including the initiating event and the top events as well as the intermediate or basic events of the linked fault trees.

In order to facilitate the depiction of the basic principles of the evaluation following figure shows the basic graphical representation of an event tree used in this clause for illustration purposes.



5.0 Annual General Body Meeting

The NIQR Trivandrum Branch AGM and Quality Day celebration were held on 22 November 2019 at 18:00 h in Hotel Residency Tower, Statue, Trivandrum. The invited lecture was given by Shri.K.Beji George IRTS (Indian Railway Traffic Service), Chairman & Managing Director, HLL Lifecare Limited, Trivandrum. He had shared his experience in Railways department and explained about the traffic safety and its reliability requirements. He also mentioned about the usage of modern technologies like NAVIC (Indian Regional Navigation Satellite System) for improving the safety and reliability of the railway traffic. The video on the HLL Lifecare Limited was also shown for the benefit of the members.

The Quality day talk was delivered by Dr.B.Valsa, Dy. Director, Systems Reliability, Vikram Sarabhai Space Centre, Thiruvananathapuram.

Dr.Valsa delivered a lecture on the absolute quality requirements for the success of launch vehicle and spacecraft missions. She explained from the electronics parts selection, its screening test requirements and system level validation before integrating them to spacecraft/ Launch vehicle. She also highlighted the importance of software quality assurance and its documentations for the success of spacecraft/ Launch vehicle missions.

Shri.P.Muthuganapathy, Secretary NIQR Trivandrum Branch read the AGM minutes for the year 2018 and presented the activity report for the year 2019. Shri. H.Sai Ganesan, Treasurer of NIQR Trivandrum presented the audited accounts statement for the financial year 2018-2019. The activity report and audited statements are approved in the AGM by the members after discussions.

Shri.C.A.Ignatious, Vice President, Vin Vish Tech., presenting a memento to Shri. Beji George

Shri.K.S.Mani, Dy. Director, RQA, ISRO Inertial Systems Unit presenting a memento to Dr.Valsa.

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