# Quality Engineering Tutorial to Help Reconstruct Cities, Obtain Water in the Sahel and Aid Onondaga Lake Cleanup

Jorge Luis Romeu, Ph.D.
Adjunct Professor, Syracuse University
Emeritus, State University of New York
https://www.researchgate.net/profile/Jorge_Romeu
Email: romeu@cortland.edu


Summary

We discuss and describe the application of statistics-based quality, industrial, systems engineering, and operations research methods such as reliability and logistics, to the design, development and improvement of systems that help mitigate the effects of reconstructing cities ravaged by war or earthquakes, improve Africa's Sahel oasis and water holes, and implement the cleanup of Onondaga Lake. With this paper, we attempt to contribute to a more efficient relief, and to a sounder understanding, of such human and climate disasters.

## 1.0 Introduction

This is the fifth yearly academic paper we write, discussing the role of *Quality Engineering* (QE), a collection of methodologies that use *statistical* procedures such as *reliability, logistics, operations research* and *industrial engineering,* for mitigating adverse events on populations.

Our first paper was in written in July of 2021, and dealt with applying the *Quality Engineering Methodology* (https://web.cortland.edu/matresearch/QualityEngineeringToolsCovid-19.pdf) *to Covid-19 Systems Design and Improvement*. The second one, was written in July of 2023, and dealt with *Quality Engineering Tools for Mitigation of War Fallouts on Civilian Populations*, (https://web.cortland.edu/romeu/QualEngToolsWarFalloutMitigation.pdf) using as example the war in Ukraine. The third paper (2024) dealt with mitigating effects of war fallouts on civilian populations trapped in a *closed war zone*, such as a city under siege, where people and articles (https://www.researchgate.net/publication/382489101_Quality_Engineering_Helping_Civilian_Populations_on_War_Fallouts_and_Climate_Change_1) experiment severe difficulties for getting out, and where material aid has extreme difficulties getting in. And our fourth paper (2025) dealt with Quality Engineering techniques that help mitigate the yearly Drought and Flood Cycles that occur in Tropical Climates, common in Caribbean islands such as Cuba; the coast of the Gulf of Mexico, of Central, and of South America; Africa, India, Indonesia and other Asian islands: https://www.researchgate.net/publication/391657205_A_Tutorial_on_Quality_Engineering_Methods_to_Mitigate_Yearly_Drought_and_Flood_Cycles_in_Tropical_Climates

In all four papers, we used QE methods for the analysis of such adverse events, as well as for their implementation, thus providing more efficient solutions. For, QE methods are especially valuable in planning, designing, implementing, streamlining and improving useful engineering solutions, thus rendering mitigation procedures cost-effective, easier to manage, and to execute.

This paper, just like our previous four, pursues *three objectives*. *First*, to illustrate *the use of QE methodologies*. *Secondly*, to *provide practical examples of their implementation* in the mitigation of adverse consequences on civilian populations, making authorities aware of QE tools and uses. Finally, to *showcase the excellent work developed by our Syracuse University graduate students* during their *MFE634 Q*uality *Engineering* course, that is taught every Spring (see its syllabus: https://web.cortland.edu/matresearch/MFE634SylS17.pdf) for the MAE Department.

MFE634 graduate students develop, every semester, under our guidance, group final projects (https://web.cortland.edu/matresearch/PastProjectTopics.pdf) that examine real life problems, and then implement QE tools that provide efficient solutions for them.

In our MFE634 course we do not dwell on political causes or responsibility of the parties to these events, as our interest as engineers is to help improve the living conditions of persons reluctantly caught in the middle of said events. We follow two important educational principles: (i) Dr. John Dewey's *learning by doing theory* (https://www.pedagogy4change.org/john-dewey/) and (ii) *The Role of Engineering in* (https://repositories.lib.utexas.edu/server/api/core/bitstreams/da224561-af8b-463e-8e74-2e23e44ed263/content) *Society*, by S. Nichols and W. Weldon.

**2.0 Project Topics**

This paper deals with three topics. First, it discusses the reconstruction of a city ravaged, either by war, as in Gaza, or by a natural phenomenon, as in the recent earthquake in Venezuela. Then it discusses the improvement of oases in the Sahel region of Africa, where thousands of nomads steer their herds of camels, sheep and goats in search of water and grass. Finally, it discusses the cleanup of Lake Onondaga, one of the most polluted water bodies in the United States.

**3.0 General Project Preparation and Development Plan**

In this section we overview the general preparation activities for a QE project. The main *QE tools* are in https://web.cortland.edu/matresearch/QualEngGralMfe.pdf, and Sections 2.0 and 3.0 of https://facultyweb.cortland.edu/matresearch/QualEngToolsHurricaneMitigation.pdf that discusses the use of QE tools to help civilians better prepare to survive natural disasters.

The very first thing required for the development of a successful QE Project is the selection of one or more *Champions*: i.e., high level officers that will ensure the fulfilment of the QE Project Team requests and needs. Without a *Champion's* help some of the QE Project team information requests and demands, may be ignored.

Then, we must decide which of two types of systems we will develop. We may need to *modify and improve an existent, but inefficient system*. Or, *if said system is non-existent*, *we will need to create it, from scratch*. Finally, we must define, with the Champion and other project leaders, the scope of the project, and select an appropriate composition for the QE project team.

All types of systems require designing and implementing command, control and communications centers, with substations able to oversee complex operations, including redundant sub-systems to back-up possible communication failures, and maintenance capabilities to resolve breakdowns.

A solid engineering project starts by implementing a COPQ (Cost of Poor Quality), with its four categories: internal, external, appraisal and prevention themes. Said information may be obtained through a Brainstorming exercise, that helps create qualitative Ishikawa chart, that shows which factors affect the response or performance measure under study. Ishikawa chart branches and levels eventually provide the framework for more quantitative statistical procedures, such as DOEs, ANOVAs, and Regressions.

Additional information material about key issues involved in the system is obtained from those subject-matter experts interviews. Process flowcharts and Value Stream Maps (VSM) are built to identify system bottlenecks, non-value-added steps and other problems that can then be modified or fixed, thus improving the system operation. These tools also provide guidance as to what additional data to collect, and where and when, in the system, they should be collected.

Before starting data collection, an MSA (Measuring Systems Analysis) should be implemented, to determine if the measurements taken include undesired elements, such as operator or gage errors. Gage R&R analyses detect these problems. If the larger percentage of the measurements come from actual part variation, and only a small percentage comes from operator and/or gage errors, the MSA results are acceptable. Otherwise, we must first address the measurement system problems, retest it, and only once accepted, we can safely start measuring the variables.

If a system already exists and we need to improve it, we proceed with a *Six Sigma (DMAIC*) or other continuous improvement methodology. However, if a system does not yet exist, then DFSS (Design for Six Sigma) and QFD matrix cascade methodologies are used to design it.

There may be specific technical problems that we want to assess. This can be done via Design of Experiments (DOE) and hypothesis testing. Our MFE634 students present examples of such analyses, using both statistical software and Excel (when a specialized SW is not available).

If there are new design aspects that did not exist before, but we want to try out, we implement a DFSS (Design for Six Sigma) or a QFD (Quality Function Deployment) Design procedure. If an existing method is proven inefficient and should be modified, the *VSM (Value Stream Maps)* are implemented. First, develop the VSM for the *current state,* to assess the existing process. Then, after the changes or improvements are implemented, a second VSM is developed, describing the system's *future state*. Finally, a statistical comparison of the key process parameters, before/after changes are implemented, is undertaken, to assess that the improvements work efficiently.

Failure Modes and Effects Analyses (FMEAs) and Fault Tree Analyses (FTAs) help identify the root causes of failures, possible counter measures, and some redundant procedures. FMEA and FTA should be undertaken to assess how and why systems fail, what are their consequences, and what types of preventive and corrective measures can be taken to avoid total system collapse,

Then, *Reliability* procedures are implemented to assess how the methods can fulfill their stated functions, in time. *Reliability* measures the probability of, say, a water supply system, providing effective service for a specified period, without interruptions (mission time).

Finally, we must state, implement and evaluate the suggested solutions to problems uncovered, showing that they actually improved the original system, and establishing the necessary controls for said solutions to become permanent system features.

**4.0 Quality Engineering Student Group Projects**

In this section we review the applications of *QE statistics-based methods* used to design and implement solutions to said *problems*. These student projects were developed by our *MFE634 students,* under our guidance, *and are illustrated further in their PPTs*.

This author strongly recommends said MFE students as well-qualified Quality Engineers. Their excellent work, shown here, demonstrates their engineering knowledge and experience.

**4.1 Quality Engineering Project to Help Reconstruct a City Devastated by War or Nature**

First, we need to survey the damages in order to establish what tools and equipment are needed, their quantity, the types and number of specialists required, how we are going to transport them there, and where are they going to be lodged and supported. The transportation may be by sea, land or air, thus requiring port, road or landing strip facilities, with their corresponding support (i.e., warehouses, power sources, dorms, facilities, security and communications.

Then, we start work by clearing roads and finding lodging for the men, women and children that have lost everything: tents, mobile quarters, sanitary and medical support, educational facilities, food, etc. As debris is removed, bodies will be found that must be disposed of. Everything must be carefully guarded, as theft and vandalism will be present. A command-and-control center, with more than one method of communication (back-up, redundancy), is a must.

Technical and support personnel should be rotated, as this is a stressful and labor-intensive work.

Last but not least, a Champion is required to ensure that things get done. There will be stumbling blocks that will delay or prevent the work, that must be removed by a powerful agent.

Recent examples of such reconstruction work can be found in the bombardments of Gaza, in the Middle East, and by a back-to-back earthquake, in La Guaira, Venezuela.

The reader will find the students' PPT, describing the Quality Engineering methods used in: https://facultyweb.cortland.edu/matresearch/ReconstructCity2026.pdf

### 4.2 Quality Engineering Project for Improving Oases in the Sahel Region of Africa

In the XIX Century, before the Europeans redistributed Africa among themselves, the Sahel was an open region where nomads freely moved, searching for pastures to feed their flocks. After the 1885 agreements (https://en.wikipedia.org/wiki/Berlin_Conference) this changed, and movement restrictions were placed on the inhabitants, making their lives more difficult.

Nomads need grass and water for their animals, and move from one oasis to another, when food become scarce. Water is required not only for their animals but also for nomads to drink, clean, wash, cook, etc. Sometimes the water becomes unfit for drinking and other uses. In such cases, the nomads need a backup. They also need to establish a procedure for testing the quality of the water, and a water distribution strategy, to avoid conflicts.

Water is classified by type of user: people, cattle, irrigation, services, etc. We need to establish a user distribution and determine its Process Capability's required Lower and Upper Specification limits. This way, we establish the amount of water needed to service the entire user population. We need to have different water reservoirs and distribution channels according to its use; potable water must be pure, but animal water may not be. We need to monitor the water availability so we can foresee that there will be a shortage and prepare alternative solutions.

We need to establish a distribution system, including allocation, and establish surveillance to prevent water theft or water leaks. For example, water may be sold, rationed, etc. to users, and ranked by priority. Human consumption comes first; then come cattle needs, services (hospitals, schools, etc.) and agriculture. There must be a plan to compensate for lack of sufficient water, when there is a scarcity of system resources.

Finally, several services may be provided by the government in these oasis (e.g. maintenance of the grass, water and power supply), including social services. The oasis may have a permanent staff that may be responsible for maintaining and fertilizing the grass, as well as for maintaining the quality of the water. Since oasis may have electricity, a system of schools, providing zoom classes for the children, and presentations about animal husbandry, for adults, may be created. Healthcare (vaccinations, nurse consultation) may also be provided. This will convert the oasis into social development stations.

The reader will find the PPT, describing the Quality Engineering methods used, in: https://facultyweb.cortland.edu/matresearch/WaterToSahel2026.pdf

### 4.3 Quality Engineering Project to Help the Cleanup of Pollution in Lake Onondaga

In the early 1900s, future President Franklin Roosevelt visited the lake and used its saline waters to help with his Polio problems. Later, local industrial development used the lake as a dumping ground, killing all types of life. Late in the XX Century, the local industry stopped polluting the lake, several of them left the city, tearing down its buildings as not to leave even a souvenir of their sojourn in the Syracuse area, and of the environmental effects of such Sejour.

The Cleanup of Lake Onondaga went through three stages. First, the lake pollution was stopped, and no additional environmental damage accrued. Secondly, Nature took its course by way of the river that flows north of Lake Onondaga into Lake Ontario, and some pollution escaped through this outlet. Finally, a number of engineering and chemical methods of cleanup were implemented to completely free the lake of its pollution. Such phase is the topic of this student report.

After twenty good years, significant improvement has been obtained. Some fish life is back and, even when it is not advised to eat the fish caught from the lake, fishing as a sport and recreation activity is back. Finally, swimming is now authorized in a beach in the North part of the lake.

The reader will find the PPT, describing the Quality Engineering methods used, in:
https://facultyweb.cortland.edu/matresearch/OnonLakePollut2026.pdf

### 5.0 Description of some of the methods implemented.

In this section we explain how and why we use four of the main Quality Engineering methods implemented in these projects, the segments of the projects where these are mostly used, and the objectives we pursue with their implementation.

These four methods are: the *Initial Project Assessment*; the selection of the *Six Sigma/DMAIC*, to improve an existing but inadequate system; the selection of the *Define for Six Sigma/DFSS*, that allows us to design a quality system that does not yet exist; and the *Lean or Kaisen improvement method*, that takes an existing but inadequate system and renders it better by eliminating its non-value-added elements and by streamlining the entire system flow.

### 5.1 The Project Initial Assessment.

A Quality Engineering Project starts by describing the project topic, scope and objectives. Then, it gives a pseudocode or a flowchart outline of the project process. We first Brainstorm, to obtain information of possible system elements, to derive input, outputs, problems, causes, etc. which are summarized in an Ichikawa chart. With this information we create the crucial COPQ chart, which helps convince management that, no matter how costly will the improvement process be, it will always be less expensive than leaving the problem unsolved.

## 5.2 Improving with Six Sigma DMAIC

**Six Sigma DMAIC** is used when the system already exists, but is inefficient and needs to be improved. *Define is the initial phase*; the project is organized and the first tasks, starting with Brainstorming and interviews, to obtain valuable system information, are implemented. COPQ is developed, convincing management that spending time and resources in fixing the system is a valuable investment. The project chart, members, functions, objectives etc. are defined here.

The SIPOC model (a detailed form of the Input/Output model) is developed. We use it to obtain a balance between the system parts. From all this information we develop an Ishikawa chart that reflects key factors impacting the system performance, represented by the response variable. We will use this chart, later in the project, to develop quantitative models. There are several ways to approach and solve system problems, leading to different projects. Thence, we need to assess and compare these approaches, selecting the most cost-efficient one (the best).

In the *Measure phase*, we start by assessing the key factors impacting system performance and decide which data to collect. Initially, a Measurement Systems Analysis (MSA) is undertaken to ensure that measurements reflect variation in the items and not measurement errors. If operators are untrained and/or gauges are defective, we need to address them, and reperform the MSA, until the measurement system is acceptable. Concerns regarding deficient system performance are investigated further and data is collected to test hypotheses about them. Said concerns are explored by interviewing different system leaders. The results help create the Pareto Charts and FMEAs, revealing what issues are important (CTQs) and what causes and effects are associated with problems detected. An initial Process Capability analysis quantifies the system inefficiency, letting us know which elements and in what quantities will be required to make the improved system more capable. MSAs require the implementation of Gage R&R statistical analyses.

In the *Analyze phase* we finish data collection and perform statistical test to verify or discard and quantify, the hypothesis (theories) elaborated. Value Stream Map of the *Current State* is applied, determining the problem areas, bottlenecks, non-value-added steps, etc. that need to be resolved.

In the *Improve phase*, we develop possible solutions to the problems detected, again using a PPI method to assess, compare and select the best solution. We then experiment with various solution designs via DOE experimentation. We detect significant factors and their effects on a response variable, correlated with the system efficiency. FMEAs, now including a Criticality component, allows failure comparisons to determine which ones are more important. Control Charts allow us to determine whether the system is stable, and a *Future State*, Improved, Value Steam Map (VSM) will show how the proposed system changes will make it better. Finally, a maintenance organization is required to preserve system operation.

The *Control phase* completes the improvement work. As things have changed, new MSA, SPC and Process Capability analyses are required, to assess and quantify the improvements that have occurred. And we perform final statistical analyses, to confirm the size of the improvements.

**5.3 Designing Systems with Six Sigma DFSS**

The *System does not exist and must be first designed*. Thence, we need to apply Six Sigma in a different way. The first three phases (Define, Measure, Analyze) are similar to those in DMAIC. But the final two phases (Design and Verify) are not.

In the *Define phase* we review the different system implementations, according to the different stockholders, find the Champion, implement the COPQ, form the project team, and review in detail the Quality Planning steps. In the *Measure phase* we establish the user and consumption distributions. These serve to ascertain the size and number of elements required to fulfill customer needs, as well as to establish the Input/Output requirements for the model. With this info., the current Process Capability is obtained, and the requirements to improve it are analyzed.

To prepare for data collection we implement an MSA, through a Gage R&R analysis, to be sure the measurements are accurate. An FMEA is implemented on the current system to ascertain the possible failures, its causes, impacts and contingencies. With such information we implement the Pareto and Ichikawa Charts and use the acquired knowledge to initiate the *Analyze phase*.

The system does not yet exist, so we need to compare potential designs. To evaluate them, physical prototypes or computer simulation models are built and run. Also, another FMEA is undertaken that helps to determine shortcomings, bottlenecks, design mistakes, etc. Finally, the best design is selected.

In the *Design phase*, and using the QFD Matrix Cascade approach, the entire system is designed and assessed. We verify that the Input/Output model is working. Then, we consider *alternative Plans B*, for the case when the initial plan is unfeasible. This may generate additional activities. Finally, a maintenance organization with personnel, tools, spares, warehouses, etc. is necessary to preserve the system capabilities.

In the last, *Verify phase,* final MSA, FMECAs and Process Capability analyses are undertaken. FMECAs help identify and modify riskier design components, and a Capability Analysis shows the level of improvement that the system has achieved. Finally, the full system deployment is undertaken, and its documentation and detailed Gann charts are delivered.

**5.4 Lean and Kaizen improvement projects**

*Lean* and *Kaizen techniques* are used for improving Systems, by *Eliminating Non-Value-Added* Steps and by *Streamlining its Flow*. They accomplish this by fighting the *eight key system wastes*. Kaizen (continuous improvement) principles include removing non-value-added activities, and inconsistent use and excessive demands, on people and on processes. The *Five Whys* and the *Five S* procedures are then presented, with practical examples, that help uncover and fix many systems problems.

Initial Process Capability and SPC Charts are used to assess the system performance. Both shows how unsatisfactory the system is, thus requiring improvement. Searching for the causes include Brainstorming and building of Ichikawa charts, which then become regressions. These provide initial performance values, that will be improved. We then implement the *Current State* Value Stream Map (VSM) that describes how the system operates. We then establish some hypotheses about what the causes of some of the problems are.

Confidence Intervals for *Reliability* of the system operation (also known as *Quality on Time*) are obtained. These allow the establishment of *Mission Times* (required time to accomplish system tasks) and their optimistic, average and pessimistic estimations.

With these details we will implement improvements and build a *Future State* VSM that allows the establishment of a new system performance and shows the areas and extents of the improvements. The improvements are confirmed through statistical tests and recalculation of Process Capability. Also, as the process has changed, FMEAs and MSA analyses are also required. A maintenance organization with personnel, tools, spares, warehouses, etc. is again necessary, to help preserve the new system

Finally, it is worth noting that even when *Lean and Six Sigma* improvement procedures can be applied separately, *applying them in tandem is much more beneficial*. *Lean eliminates waste* and streamlines the system operation. *Six Sigma optimizes* the system operation *by minimizing* its performance *variation*. Lean, by itself, does not deal with variation. And Six Sigma will optimize a system that may include waste. It is *more efficient to implement them together*.

## 6.0 Discussion

Our *current research* deals with the *application of statistical-based quality engineering methods*, such as reliability, logistics, industrial and systems engineering, and operations research, *to the design, development and improvement of systems* that help Reconstruct Cities, Obtain Water in the Sahel and Aid the Onondaga Lake Cleanup.

There are several important issues in QE projects that deal with said problems. For example, Bad Actors, such as thieves, will try to violate the distribution methods or commit crimes. Thence, we also need to consider law enforcement activity, to maintain order.

We also need to be vigilant about contagious diseases such as cholera, polio, diphtheria, etc. that occur when water is scarce or rationed, and hygiene suffers. Sampling the population is a valid alternative to complete inspection, when we do not have sufficient time or resources to examine everybody. Using an approach akin to *rectifying inspection*, we can examine members in a pre-selected sample. If any member shows symptoms of a contagious disease, we separate and treat said individuals, to prevent starting an epidemic. And if such number is high, we know that the feared contagious disease has finally arrived.

A secure and efficient command and control system is key to project success. Computers can be our primary system. A backup system, for the case the primary one goes down, is also necessary. Cell phones can be an option. Rapid communication enhances system efficiency.

It is also necessary to find funds to support all these activities. Improvement methods can be expensive, and management may be adamant to provide the funds. But we can show, through COPQ, that leaving the system as it is, becomes much more expensive.

Finally, these projects show how graduate engineering students can examine and solve real-life problems. Such experience alerts them to their societal engineering responsibility, and provides them with additional application fields, where they can employ their engineering expertise. We encourage Faculty and Universities to use said educational techniques.

**7.0 Conclusions**

Our current objective is to alert potential disaster relief organizations and government agencies about QE techniques that can be utilized, and about the types of professionals required to help said organizations to improve their systems. QE techniques can help in designing, implementing and finding effective solutions to defective systems issues. Readers desiring further information about these projects or QE techniques can contact us.

We also want to encourage disaster relief organizations and government agencies to undertake joint work with quality, reliability, logistics, and industrial/operations research engineers, and to apply their methods, not only after said water relief and disaster systems have been designed and implemented, but also during the time that these types of systems are being considered.

We also want to provide practical examples to subject-matter researchers, government officers, and to the public, to help them understand what quality engineers do, and how these can help set and/or improve disaster mitigation systems, thus fostering greater collaboration.

Finally, this statistics-based research on mitigation of the effects of floods and droughts, can be used as part of a general disaster relief course, or as part of an applied modeling and analysis graduate course in industrial and systems engineering, operations research, or applied statistics.

**Bibliography**

Acheson, J. Quality Control and Industrial Statistics (5th Edition). Irwin, 1986

Gryna, F.; Chua, R. and J. DeFeo, Juran's Quality Planning & Analysis for Enterprise Quality (5th Ed.). McGrawHill, NY. 2007.

Hillier, F. S and G. J. Lieberman. Introduction to Operations Research. Int'l. Ed. 1995.

Kececioglu, D. Reliability and Life Testing Handbook. Prentice Hall. 1993.

Romeu, J. L. *Operations Research and Statistics Techniques*. Proceedings of Federal Conference on Statistical Methodology. https://web.cortland.edu/matresearch/OR&StatsFCSMPaper.pdf

Romeu, J. L. *Commented Summary of a Year of Work in Covid-19 Statistical Modeling.* Proceedings of the 2022 Annual Meeting of the American Statistical Association (JSM). https://www.researchgate.net/publication/349008991_Commented_Summary_of_a_Year_of_Work_in_Covid-19_Statistical_Modeling

Romeu, J. L. *A Free-Access Applied Statistics Web Page*. Proceedings of the 2022 Annual Meeting of the American Statistical Association (JSM). https://web.cortland.edu/romeu/WebPageJSM2022.pdf

Walpole, R. E. and R. H. Myers. Probability and Statistics for Engineers and Scientists. PrenticeHall. http://www.elcom-hu.com/Mshtrk/Statstics/9th%20txt%20book.pdf

**About the Author (https://web.cortland.edu/romeu/):**

Jorge Luis Romeu is a Part Time Professor in the Mechanical and Aerospace Engineering Dept., Syracuse University (SU), where he has taught, for over 20 years, Statistics and Quality graduate engineering courses. Romeu was also, for sixteen years, an SU Research Professor. He is a Senior Speaker Specialist for the Fulbright Roster Program. Romeu retired Emeritus from the State University of New York (SUNY), and worked as a Senior Research Engineer for IIT Research Institute (IITRI), which operated the Reliability Analysis Center, an Air Force Information and Analysis Center. Romeu received seven Fulbright assignments: for Mexico (3), the Dominican Republic (2), Ecuador, and Colombia. He teaches yearly workshops on Quality Engineering, in Spanish, for Latin American professionals. He holds a Math/Stats degree from the University of Havana, and a Ph.D. in Industrial Engineering and Operations Research, from SU. Romeu is a retired Chartered Statistician Fellow of the Royal Statistical Society (RSS), a member of the American Statistical Association (ASA), a Senior Member of ASQ (American Society for Quality), a past Regional Director, and holds Reliability and Quality Certifications. Romeu created and directs the *Juarez Lincoln Marti International Education Pr*oject *(JLM,* https://web.cortland.edu/matresearch/), which has aided higher education in Ibero-America for over 30 years. The JLM Project supports the *Quality, Reliability and Continuous Improvement Institute (*QR&CII), an applied statistics and operations research free access web site, that can be found in: https://web.cortland.edu/romeu/QR&CII.htm