1. Literature Review:

1. **Altan Martin and Cheryl Coppens: “Applying Benchmarking Today” 2008**  
   This paper gives the overview of “Smart Marks” which is a benchmark database with over 200 call center metrics captured from over 1,500 call center programs globally. The Benchmark information comes from data captured through COPC Inc. audits to develop a unique and objective benchmark database (but not collected from customers).

   This is very brief but very significant note that concentrates on resource crunch in small organizations. The small organization is defined wrt number of personnel employed. As the number of persons is less, people have to play more than one role. This puts the objectivity in question especially wrt to monitoring and controlling process activities and the evaluation of process and products for which simple remedies have been suggested. Another major drawback may be absenteeism in small organizations.

3. **Anne Frazier and David Chin: “Why good tools never make it out of the gate” 2011**  
   This paper discusses the various factors for successful deployment of tools into the well-established organization. The effectiveness of the tool in improving the organizational efficiency is demonstrated using two different strategies which helped the team in identifying the factors that make organizational change management successful by bringing in process improvements through automation. The authors identified a number of factors that need to be paid attention to make any process improvements into an organization having well established set of processes. Some of these factors include (i) Appropriate training at all levels to ensure consistent use of the tool (process improvement) (ii) Providing an Effective Process Framework that will minimize process burden while maximizing return (iii) Establishing a quantitative success criteria that emphasized adoption as well as quality improvement. (iv) Providing consulting support, both technical and managerial. (v) Monitoring and Controlling the success criteria. (vi) Engaging stakeholders up and down the organizational structure. (vii) Ensuring appropriate and timely training courses are available and offered at all levels. (viii)
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Communicating results and decisions in a timely and useful fashion and (ix) Conducting a Process Pilot in parallel to the deployment to ensure consistent usage


This paper briefly gives the emerging concepts of:

a. Web Application Frameworks
b. Service Oriented Architecture
c. Cloud Computing
d. Mobile Application Development
e. Model Driven Architecture (Developed by OMG-Object Management Group)

The challenges to be faced by standardization to address these technologies are a herculean task.


Often, the notion of process tailoring is to tailor-it-down. The author highlights that it need not be. It can be either up or down and while developing the process one has to judge where the “sweet-Spot” is, meaning, which process is more appropriate to the organizational needs based on which tailoring-up or tailoring down can be decided. Also, it cautions process altering in the name of process tailoring, which is done by some organizations. Further, if same type of tailoring is needed in more than one project, then process group should look for modifying the process. Further, the number of process waivers indicates the need for tailoring the process.


This paper details the slice & Dice approach to select projects for SCAMPI V1.3 appraisals in a large organization having thousands of employees, scattered over many geographies across the globe, dealing with multiple disciplines, multiple program types, multiple project sizes and multiple Architecture methodologies. The selection criterion
itself is arrived at different levels of filtering into only Development or Operations and Maintenance only, only multi-discipline, only model based architecture and finally the size that has given the right mix and number of projects to be included for SCAMPI.

7. Henry Schneider and SeungWook Bang: “Real World Examples from a Successful Maturity Level 5 Organization Case Study: The Korean Supreme Court Project, LG CNS” 2011

This paper presents how a CMMI Level-5 maturity Organization has successfully developed and maintained a group of related software applications to handle Real Property Registry Service for the Korean Supreme Court. The paper presents numerous metrics that are used to measure and monitor the successful usage of the applications meeting the stringent requirements of the client.


This site gives the historical background for the development of ISO 9000 standard and how it evolved over the period into different editions. The British standard BS 5750 that was known as a management standard that specifies how the manufacturing process is to be managed. ISO has adopted as ISO 9000 series of standards. The initial set of ISO 9000 standards that were released in 1987 consisted of 3 different standards ISO 9000: 1987 version has the same structure as that of BS 5750 consisting of three models ISO

9. Lakshmi Abburu etal “Analyzing your PPBs right – A Key to Successful OID” 2011

This paper discusses about the measuring the cost of innovation (in the context of OID of CMMI SVC Maturity Level-5) and Return on Investment on OID processes definition and implementation. The author asserts that Process Performance Baselines (PPBs) prepared are an effective way to identify the “needs” of the organization. The paper gives the steps to identify the right kind of innovations using PPBs. The analysis of PPBs
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indicate the improvement areas. The paper then gives the steps to analyze the PPBs and the statistical tools to be used. The reuse of components and process assets reduce the cost

10. Louis Peak “Over 1 Billion Served – The Service Oriented Enterprise” 2011

The paper emphasizes the need for systems for every activity by informing the secret of success of McDonalds stating “There are some amazingly simple systems in the McDonald's program, and for just about every situation you do encounter, there is a system in place to help you win in that situation, efficiently. TCS adopts The Service Oriented Enterprise (SOE) defined to handle the IT services comprises of six dimensions: (1) Operating Model (2) Enterprise Architecture & Cloud (3) Development (4). Data Management (5). Key SOE Processes and (6). Organization & Governance. The paper mentions the 12 Key SOE Process requirements on the same lines as that of COPC. Further the paper mentions that the two models of The Open Group Service Integration Maturity Model (OSIMM) that specifies how to measure the service integration levels of an organization and its IT systems and business applications and CMMI - SVC are a compendium of best practices which enables service focused Organizations to effectively Design the service Deploy and Deliver the service and Manage the service

(i) 9001:1987 Model for quality assurance in design, development, production, installation, and servicing was for companies and organizations whose activities included the creation of new products

(ii) ISO 9002:1987 Model for quality assurance in production, installation, and servicing had basically the same material as ISO 9001 but without covering the creation of new products.

(iii) ISO 9003:1987 Model for quality assurance in final inspection and test covered only the final inspection of finished product, with no concern for how the product was
produced. This set of standards were revised in 1994 as ISO 9000:1994 Revision that emphasized quality assurance via preventive actions, instead of just checking final product, and continued to require evidence of compliance with documented procedures.

These set of standards are influenced by MIL standards and are burdened with huge documentation that is needed. The set of standards were revised again in 2000 by combining all the three standards into one standard known as 9001 standard. Design and development procedures are required only if a company engages in the creation of new products. The 2000 version made radical changes in thinking by placing the concept of process management front and centre ("Process management" was the monitoring and optimizing of a company's tasks and activities, instead of just inspecting the final product). The Year 2000 version also demands involvement by upper executives, in order to integrate quality into the business system and avoid delegation of quality functions to junior administrators. Another goal is to improve effectiveness via process performance metrics — numerical measurement of the effectiveness of tasks and activities. Expectations of continual process improvement and tracking customer satisfaction were made explicit. The 9001 standard went into yet another revision in 2008, known as ISO 9001:2008 Revision, retaining essentially the same requirements as of ISO 9001:2000 but has made few important clarifications on terminology used.

This paper tries to define the context based quality and what are the quality principles on which CMM’s development is based.

This paper discusses the ways of and means of adopting more than one quality/process framework or model or standard and how to access the effectiveness of the synthesized quality framework using appropriate quality assessment methods that also will be a synthesized framework
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This paper gives the detailed idea of how to identify the concepts of different frames works that are used in an organization and how to synthesize these concepts to form a multi-model environment to meet the organizational quality and process needs.

This paper is an excellent collection of details about the reasons, basis and aims of the development of CMM as well as the time lines history of development of CMM. This presentation also gives the plan for development of CMMI, reasons and basis for its development and the source of funding.

This paper suggests service as an extension of development cycle and gives steps for transition from product to maintenance lifecycle.

A Service System Transition lifecycle is proposed that ensures methodical improvement of the product beyond initial delivery, without impacting the existing system functionality and operation (or where the impact is minimal). Sustainment of product coupled with continuity of services is expected to be filled with the proposed method of transitioning. multi-model environment to meet the organizational quality and process needs.

This paper lists down the main categories of risks as operational risks, strategic risks and composite risks and further classifies operational risks as People risks, technology risks and process risks. The strategic risks are basically security risks, privacy risks and intellectual property risks. The composite risks are of long term in nature and are in the form of losing talent to competition, continuous updatation of process knowledge, acquiring new business processes.
17. Nat Guadagnino: ‘CMMI For Small Business OR “How Much Can I Get Done with Almost No Resources and Little or No Money??” 2004
This paper also give more or less the details as mentioned in the above reference, but high lights that for small enterprises achieving goals is more important than all the specified practices. Moreover, going for Process Area wise Appraisals will ensure that the strain on the resources is minimum.

18. Neetesh Jathan “COPC’” 2010
This paper gives the historical perspective of the development of COPC. It gives the background information of how a collective group of call center service users joined together and brought out the first draft of COPC standard in 1996 which has come out as COPC-2000 standard. The initial group of business professionals who brought out the first COPC standard has formulated The Standards Committee that is made up of volunteers from organizations that implement the COPC Family of Standards. Standards Committee members are responsible for proposing improvements to the COPC-2000 Family of Standards and promoting implementation of the standards. The committee meets twice annually. Customer Operations Performance Center Incorporated, also known as COPC Inc., is a privately held international customer service support company based in Austin, Texas. COPC Inc. redesigns business processes for customer contact center and business process outsourcing (BPO) services, offering training, consulting and certification services.

The paper starts with defining the meaning Innovation by taking the different ways it is explained in different sources like dictionaries and web sites. The paper presents the different definitions of innovation as seen by CIOs top companies like IBM and Gartner. It defines the measurement of innovation in terms of investment innovation versus return and then the five major types of failure innovation process. The means of achieving the
results of innovation through the use of CMMI -OID (organizational Innovation and Deployment) processes are discussed. Innovation can be deployed to reduce the COQ (Cost of Quality) for which the managements have to consider software as a strategic business asset and deploy a more flexible and affordable infrastructure to optimize the business process of software delivery and concludes that innovation is means to beat the competition.

TCS is one of the world’s biggest software and related services provider which adopts multiple quality standards to meet its diverse business lines. This paper presents the effectiveness of implementing CMMI Services Level-4 and Level-5 processes. The effectiveness is demonstrated using a set of defined performance metrics of QPPO (Quality and Process Performance objectives), PPB (Process Performance Baselines) and PPM (Process Performance Models), each of which comprise relevant metrics. The effectiveness Level-4 and Level-5 processes are demonstrated for three different business lines of Maintenance, BPOs and IT infrastructure Services. The paper points out that PPMs and PPBs may not add insights into the changes needed in the case of meeting stringent SLAs prescribed by the clients.

This paper gives a detailed outcome of a pilot that is run on a small organization and summarizes the lessons learnt of adopting CMMI for small business in 16 points. The major lessons learnt are (i) Small businesses compare the benefits wrt to the finances that are needed in terms of money, materials and manpower and time (ii) Small businesses may not have formal SEPG group, but to be managed with focal points (iii) It is easy to adopt CMMI practices if the organization is already having a defined QMS in place like that of ISO (iv) Placing a Metrics collection system is a challenge (v) In time staff training is both overhead and challenge (vi) Simple CMMI based processes may lead to
significant impacts that may sustain the interest for improvement (vii) Judicious use of elements of CMMI related to business context lead to useful practices that result in benefit. (viii) Often changes in the practices in the model may not be relevant but alternative practices may have to be identified (ix) The work products generated from practices may not match one-to-one as suggested in the model ((x) Small business often are more involved in service delivery where it is difficult interpret CMMI to meet their needs.

This paper gives an exhaustive list of software standards, frameworks, award models and their brief history of evolution. The paper suggests ways and means of selecting a set of standards/frameworks to meet the organization’s quality and process needs. The paper further suggests that organizations may consult or join other organizations in sharing experiences of different frameworks that can be utilized for mutual benefit

This paper discusses the most commonly adopted approach used by many service providers where the CMMI levels 2 and 3 processes are clubbed with ISO 9000 to bring process discipline (in terms of ISO audits) and process enrichment (through Process Areas of CMMI)

This paper brings out some lessons learnt by implementing CMMI Level-2 and some Level-3 processes in Analytical Services Inc which carries out confidential projects for NASA and US Defense. It states that CMMI can be adapted to small projects in a limited way with the advantages of easy management commitment and involvement and with quick visibility of results. On the other side it is costly and in small organizations customer requirements take priority over process development and implementation. CMMI is more development whereas mostly small enterprises are service oriented.
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This paper gives the context of the development CMM, the circumstances under which the US DoD has funded SEI to develop CMM. It also gives the history of releasing different versions of CMMI.

The author takes four process areas of CMMI L4 and L5 (OPP, QPM, CAR and OID) and explains the misconceptions for each of these process areas. If proper interpretation is not made about the requirements of these process areas, it will ultimately result wrong decision making. Often identifying the correct data to collect is the key to successful understanding and interpreting of these processes. The author then presents the correct way of interpretation of the results and to determine whether we have achieved high process maturity or not.

This paper highlights of how to proceed with value added audits/appraisals using PPQA for continuous improvement. The Processes are to be read and understood before auditing and mapped to relevant process areas. The paper then discusses about the independence of quality audit team in a conventional organization that can be replaced by audits by peers in organizations where open quality culture prevails. Then the paper discusses an audit model and gives an excellent mapping of the relations of practices of PPQA with other process areas within CMMI. All lifecycle activities are mapped. The paper tries to identify the meaning of QA as seen by commercial firms (Plan & Test, Report Bugs and Regression Testing)) and as seen by Government agencies (Plan, Review, Audit, Report and Follow-up). The paper differentiates between Audits and Value Added Audits (in addition to audits, value additions can be identifying process efficient, risk examination and process improvement identifications etc)