Disposable System Development – A New Paradigm
For Managing ICT Projects in the Innovation Age¹

Part 1: How Business Changed Project Management Practice

By Professor Hubert Vaughan

For those who are engaged in the IT industry certainly aware of the challenges we face nowadays. With project schedule continue to slip, budget continues to overflow, and the solutions that we developed continue to fail to meet our customers’ expectation and satisfaction. Most project managers can think of in project engagement is to get it over with, and move on.

As a practitioner, we blamed our customers who can’t give us precise requirements, we blamed our team for not delivering modules based on our requirement specifications, and we blamed everyone around us but ourselves.

For researchers and users, they will say project failure because the project managers are incompetent. They lack the necessary business knowledge, poor leadership skills, lack of organization skills, communication skills, negotiation skills, problem solving skills, and poor enforcement of development disciplines, et al. While I do agree that acquiring these skills may improve project success rate, but these are more generic management competency than project management specific competency. While some Academic focused around these generic management “skills” for project management competency, I believed in exploring project managers’ ability to use the PM Body of Knowledge during project engagement. One good example is the bold attempt by some project managers who track project progresses by managing “Works to be done” instead of “Works Completed”.

Others will say project failure because the project scope is not well define, thus causing continuous change requests that blew the project timeline and project budget out of proportion. Or argued that project estimation (for timeline, budget, and resources) were not realistic. These may hold truth to certain extent, but was only part of the causes.

We can put forward thousands of reasons why most Information and Communication Technology (ICT) projects failed. Many researchers and professional continue to find new tools and techniques to improve the ultimate chances of delivering ICT projects successfully.

For many years, we all wondered why ICT project continues to fail while more certified Project Managers are available to manage business and engineering projects. For thirty years I worked on ICT related projects around the world ranging from Application development to Products development with project and program management responsibilities. The last 10 years I taught Project Management and Software Engineering at Universities in China and

¹ This series of articles is by Professor Hubert Vaughan, recently retired from Tsinghua University in Beijing, and is based on his research over the last ten years during which he has developed some new approaches to managing major information and communication technology projects.
lectures in many other countries across Europe, Middle-East, Asia and North America. I continue to practice and research on project management and software development related subjects while working in the academic environment. I deliver consultancy services and advise on project management issues to a number of government ministries and Stated-Owned enterprises in China. It gave me great opportunity to discover some of the reasons why projects continue to fail even managed by certified or competent project managers.

Most of my discoveries are related to the ICT projects, aeronautics and/or astronautics projects or programs, financial services and green energy sectors. My finding is yet to be conclusive but can give us some insight on what can be done to improve chances of successful project delivery.

Project Management Practice

Project Management practice can date back to the age of building the first Egyptian Pyramid or beyond. It is generally recognized that Henry Gantt who introduced the Gantt chart was the fore-father of modern day project management practice. It was not until the "Critical Path Method" (CPM) co-developed by DuPont Corporation and Remington Rand Corporation for managing plant maintenance projects, and the "Program Evaluation and Review Technique" (PERT) developed by Booz Allen Hamilton as part of the United States Navy's Polaris missile submarine program, that project management quickly spread into many private enterprises as common practice.

There are many commonalities between DuPont’s Plant Maintenance Projects and the US Navy’s Polaris Missile Submarine program even though their natures and deliverables are very much different. First and foremost, the project objectives (deliverables) are clear and precise. Secondly, the maintenance processes and the submarine building process for the deliverables (i.e. project plans) specified are well defined and documented. As a result, standard time value (established through Work Study) can then apply to each individual process (or task) that enables proper effort and cost estimation. Last but not least, straight discipline was enforced during project life cycles. The results were so impressive that value of such practice was evidenced, and organizations started applying same practice toward their undertaking.

These practices were developed more than 60 years ago when the business world was more statics with their products and business models. Project Management Bodies of Knowledge were first developed around these original practices under the assumption that:

1. Project Scope can be identified, well defined and locked down

2. Processes of achieving the final deliverables are clear down to every task during delivery

3. Effort can apply to each task or activity that resulted in creating proper timeline and delivery cost.

4. Activities can be organized and arranged using Critical Path Method that enable a balance, project timeline and project resources.
5. Straight disciplines were enforced during project engagement that provides regular management reviews and control changes.

6. Progress can be measured through the use of PERT or similar techniques

**The ICT Project Development Methodology**

For many years, the “Waterfall Development Methodology” was considered the preferred model for software development. For more than 40 years, this development process provides a logical approach of creating the desire solution. The foundation of successful delivery of the desire solutions lies at the door step of the “Fact Finding” process. The facts that we discovered triggered our creativities that lead to the solution design, that enable us to translate such design into a technically viable boundary of the solution known as “specification”. The success of application development depends on the thoroughness of facts that we discovered, and the creativities of the designer, as well as the technical competency of the engineers who translate the design into “computer programs”, grouped together as the “solution”.

Until the late 80s or early 90s, most IT projects were simply a replacement of manual business processes, or integration of various departmental solutions that was created before so that business owners could use the information available to strengthen their business strategies.

Even though many new development methods were introduced along the way, such as the Rapid Application Development in the early 80 all the way to the latest Agile Development of the current era, successful solution development stills depend on the comprehensiveness of facts that we can discovered related to the project objectives. The basic philosophy of the new methodologies after “Waterfall” relies on repetitive discovery of facts during the development cycle, thus enabling a solution that gradually meets customer expectations while making it difficult to manage project timelines, resources, budgets and progress.

**Managing Projects with the Best Practices that we know**

Project Managers were taught and trained with a generic approach to address the development methodology that we deploy, and the business environment of the above mentioned 6 assumptions throughout the development (identifying and defining) of project deliverables.

1. Draw a boundary to identify what needs to be done, clearly laying out what are included and what are not included when creating project deliverable. These are part of the Scope Management that we all do at the beginning of a project engagement.

2. Developing a proper project plan requires the project manager and the core team members to create the logical steps of delivering the final project deliverable using Work Breakdown Structure (WBS).
3. Once the logical steps are in place, Critical Path Methods were used to identify the inter-
dependency of each stage, each activity, and each task. This will become the Project 
Network Diagram for scheduling purpose.

4. Apply effort estimate to each and every task, related cost and resources assigned to 
each activity. Tagging the estimated start date and estimate end date of each activity 
that formulates the project schedule.

5. During project engagement, project managers collect information from each team 
members on a regular basic identifying what was completed/partial-completed, what 
resource was assigned to such task or activity, how much time were spent on each 
completed/partial-completed task or activity.

This regular information collection formed the basic of project progress report that 
enable the project manager to monitor project status.

Enforcement of receiving information on time for regular review by the project 
manager, and is strictly adhere to by all team members in order to provide the necessary 
details of reporting project status to project sponsors and project stakeholders regularly.

6. This regular progress report allows the project manager to identify if there are any 
variances between the “actual” versus what was originally “planned”. It enables the 
project manager to manage the resources, timeline, and cost of the project. Tracking of 
the project progress ensuring the project is completed in time, under budget with the 
minimal resources available.

Project Management Professionals managed projects with similar practices developed more 
than 60 years ago. The early days of IT projects that focused on automation did not consider 
risk, some considered a “manual fallback procedure” as part of the risk management plan; 
change requests were rare and few until the time of solution integration; the only 
procurements were hardware, operating control systems, installation services and cabling.

As time advanced forward, projects became more complex, much larger in scale, more 
knowledgeable users were involved, and they covered much wider geographical locations. 
Project managers are expected to manage project risks, project changes, and project 
procurement and supplies. This forms the current Project Management Practices most 
Project Managers applied in their project management career.

**Project is not the same anymore**

Today’s business is more dynamic in nature, fast paced, driven by profitability and 
competition. Business environment is no longer the same as 60 years ago. Project property 
changes along with business environment. Computerization and automation are part of 
everyday business. Technology interacts with everything that we do in business and in 
private, changing the way we live in our daily life. Yet Project Management practice remains 
more or less the same as 60 years ago, and we are trying to discover facts that do not exist,
trying to create “requirements” that are impossible to define. Therefore subsequent specifications and solutions built will not meet the ultimate business goals.

If we look at some of the differences between properties of IT projects 60 years ago in comparison to ICT projects of today, we can see the differences.

**Competitive Business Environment** puts a lot of pressure on organizations to stay ahead to survive. While in the past, most organizations were able to spend time and effort to refine their products and/or services before launch, today’s products and services are launched as soon as possible in order to hit the market before their competitors. Organizations prefer to refine their products and services through direct customers’ feedback or complaints so to refine their products/services reactively. Thus we now have shorter Product or Service Life Cycle but longer Product or Service Life Span.

As a result, more frequent upgrade service and maintenance requests are needed to provide a minimal level of customer/user satisfaction and operational needs. Instead of once or twice a year as in the past, we are now forced to update and maintain our product or service monthly if not weekly.

**Emphasis of Collaboration and Procurement**

We called it “customization” in the old days. It was a strategic decision when we decided to purchase software that can provide most of the key functionalities but required additional development to add special functions for our operational needs. Most organizations preferred to change operational processes for the software instead of changing the software itself.

It is more a tactical decision today enabling certain leading edge technology to be included in business systems that such skills and knowledge companies do not processes, for resource availability and cost effectiveness, and certainly the final profitability of business investment and time to market. Organizations purchase products/services or partial products/services from suppliers that enable us to simplify our development effort. We collaborate with partners and subject-matter-experts to deliver solutions that is expected to meet strategic visions of market leadership.

**Cross Border Development, Production & Outsourcing**

In the old days when development teams worked together under one roof, the manager knew his/her team members very well. The strengths and weaknesses of the project team members; their technical skills and competency; their dedication to their assignment; as well as their reliability of getting the job done. The environment enabled managers to estimate efforts and schedule more realistically. The managers also saw the results and progress on the spot and were able to adjust his/her plans through verification and confirmation during regular review meetings.

Today’s development teams located at different development centers could be spread all over the world or in many different geographical regions. The manager may not be aware of
the members’ technical competency and skill. Sometimes don’t even know if other development centers have sufficient resources for the assigned activities. It creates havoc for realistic effort estimation and duration. Other activities may be outsourced to external organizations under procurement contracts that may require different management styles and techniques for the procurement managers and the project managers.

**Research and Development** used to be completely in-house activities, from product and service conception to creation of parts ready for assembly and mass production. Today’s concept of Open Innovation R&D takes in external components and production facilities or service groups to formulate final products or services. Projects include more procurement and out-sourcing of activities that requires managing external entities with similar strategic interests. These external entities may easily impact project schedules, cost, and resources at the final development stage of assembling and integrating of external parts, components, or services, such as the Boeing “Dreamliner”.

**International Trade and Tax Incentive**

Sometimes, contracts are awarded to regional offices or external organizations based on International trade law, Tax benefits, and political preferences instead of capability and reliability, for strategic alliance purposes or otherwise.

**How it impacts the way we manage our project today**

Business dynamics impact the ways projects are being delivered and how they can be managed. We can no longer rely on the traditional approach of “Who did what?”, “What was done?”, “How much time was spent?”, “What we procured this reporting period?”, “How much we paid and to whom?”, and “effort variances between estimate and actual”. And the so called progress based on an original project baseline is no longer relevant. 30% effort spent does not mean 30% completion of the project. Half the budget spent does not mean the remaining half can cover the remaining project under development.

**Project Life Cycle** is getting shorter and shorter. Instead of two or three years’ development cycle, we are looking at most projects lasting no more than 6 to 8 months, while Programs may last longer. This implies less time for project managers to plan; to review changes and issues raised during execution, to track and analyze progress and report status; to influence Sponsors and Stakeholders’ decisions; less time for the development team to design, develop and test the solution before launch.

**Project Objectives** are harder to define nowadays; it is more like a vision, a wish list from the project sponsor. Most projects try to deliver something that does not exist during project engagement, e.g. *Improves market share through product innovation*. Unlike the old days when project deliverables can be well define based on facts and/or processes that we can identify, and can meet the project objective with ease, e.g. *Reduces errors through automation and improve operational efficiency*. Today’s project objectives are more complex, imaginative, and visionary than before. It is sometimes nearly impossible for the
project team to define project deliverables that can meet user/customer expectations or requirements.

**Project Scope** is more difficult to define in today’s project because of the ambiguous objectives and uncertainty of delivery processes. Change management is nearly impossible when project objectives and deliverables are ever evolving targets. Unlike the old days when statements of work could identify what is inside the scope and what is excluded from the project scope.

**Effort and Cost Estimation** is depending more on project managers’ experiences and his/her knowledge of the subject matter, and in most cases, driven by available budget instead of reality. In the past, there were always historical data and certain standards that could provide reasonably reliable estimates because most resources were in-house and similar projects were delivered to other departmental users/customers. Today’s project requires effort and cost estimation from external suppliers (procurement) and services providers (out-sources) that are more difficult to evaluate for accuracy and reliability.

These are just some of the changes in the way we do business nowadays that impact our project management practices.

**Managing projects for business Innovation today and tomorrow**

Before we can manage today’s project, we must try to understand what kind of deep water we are in. Back in September 2009, I published an article “Managing the next generation software development” in PM Forum/PMWT (former electronic media of PM World Journal), introducing the fact that ICT projects had entered a new frontier, from the early day of the “Automation Age”, to the “Information Age” of the last two decades, we are now developing software to search for market opportunity and product behaviors for sustainability, growth and profitability, and I called it “Innovation Age”.

Not only business needs INNOVATION to survive in this competitive business world today. Project managers need innovative approaches to manage their assignment before they can have any chances of delivering their assignment successfully.

Next month, I will share some of thoughts and experiences from my last few years while teaching and researching a better solution for managing ICT projects for Business Innovation, and how the Application development Methodology can adopt to this new frontier. How we manage is only part of the key to successful project delivery in today’s Innovation Age. A proper Development Methodology will supplement your project management skill to meet your client/user needs.

My last 10 years were focused on finding ways to meet the following objectives and I believe I had found the solution. A solution I called “Disposable System Development”.

- A Methodology that can “eliminate” system maintenance altogether
- System modules/components can be disposed and simply replaced by new module/component
c. Eliminate “non-existing” Requirements that are currently used in the IT development, replaced by something more appropriate that meet customer’s strategic vision, can deliver customer expectation and benefits

d. Enhance project managers’ competency and build strong Project and Program Management teams instead of massive technical development teams

e. Procurement of quality services that we can manage, eliminating high-cost in-house technical developers

f. Better control of out-sourcing/procurement activities

g. Improved cost estimation and timeline management

h. Manage ICT development projects as business engagement by managing Profit Margins

i. Minimize operating cost by 30% to 40% for most ICT service organizations

j. No more “redundant” or “obsolete documentations”, only meaningful documents to understand the system goals and application structure with specification that reflected actual functionalities.

I shall make use of the next few issues, here at the PM World Journal, and share with you what was accomplished. Hopefully with feedback, comments, and collaboration with readers, we can improve the way of software development for this new “Innovation Age”.
About the Author

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Hubert Vaughan commenced his career in the field of computer technology in early 1972. For thirty years, Hubert practiced and served a number of International technology and financial Organizations including IBM, DEC, Unisys, Tandem, Bell Canada, Andersen Consulting, Lucent Technologies, National Mutual, ANZ Banking Group and Bank of Montreal; holding senior management positions in Technology related services. His career covered the five major continents around the world as Department Manager, Director, Assistant Vice President, and Vice President that spanned across software development, professional services, product development, technology consulting, project/program management, strategic planning as well as business development.

The last ten years, Hubert joined the Academic Institutions in China as Professor at the Institute of International Engineering Project Management (IIEPM) of Tsinghua University. Hubert also lectured at the Graduate School of China Academy of Science, the Beijing University of Aeronautic and Astronautic, teaching Innovation Management, Management of Technology, Program Management, Project management, and Software Engineering.

Apart from his teaching engagements, Hubert is a Research Fellow at the China Academy of Management Science, a member of the International Society of Professional Innovation Management (ISPIM), a former member of PMI’s Certification Governance Council (CGC); a co-founder of First International Innovation Management Alliance (FiiMA), and an Editorial Advisor of professional e-journal PM World Journal. Hubert is a Program Consultant to a number of multi-billion dollars projects run by State-Owned technology organizations and financial institutions in China.

Hubert is a regular presenter at international conferences and seminars in North America, Europe, Middle-East and Asia-Pacific. He had published more than fifty papers related to Software Engineering, Project Management, Program Management, and Innovation Management subjects both in China and in various international professional journals. Retired from his academic engagement in July 2013, Hubert continues his research work in Innovation Engineering and presents at international events about his research findings throughout his career. He can be contacted at hubertvaughan@gmail.com