

## **BRIEF HISTORY OF PROJECT MANAGEMENT**

**YOUNG HOON KWAK, PH.D**  
**PROJECT MANAGEMENT PROGRAM**  
**DEPARTMENT OF MANAGEMENT SCIENCE**  
**THE GEORE WASHINGTON UNIVERSITY**

### **INTRODUCTION**

Project management has been practiced for thousands of years since the Egyptian era, however, it has been about half a century ago that organizations start applying systematic project management tools and techniques to complex projects. In the 1950s, Navy employed modern project management methodologies in their Polaris project. During the 1960s and 1970s, Department of Defense, NASA, and large engineering and construction companies utilized project management principles and tools to manage large budget, schedule-driven projects. In the 1980s, manufacturing and software development sectors started to adopt and implement sophisticated project management practices. By the 1990s, the project management theories, tools, and techniques were widely received by different industries and organizations.

### **FOUR PERIODS OF PROJECT MANAGEMENT**

Snyder and Kline (1987) noted that the modern project management era started in 1958 with the development of CPM/PERT. Morris (1987) argues that the origin of project management comes from the chemical industry just prior to World War II. Morris (1987) further notes that the project management is clearly defined as a separate discipline in the Atlas missile program, especially in the Polaris project. Some literatures pointed the origin of project management to Henri Fayol's (1916) five functions of a manager: (1) to plan, (2) to organize, (3) to coordinate, (4) to control, and (5) to direct or command. Kerzner (1998) observes that project management is an "outgrowth of systems management."

Four periods have been identified to better capture the history of modern project management: (1) prior to 1958, (2) 1958 – 1979, (3) 1980 – 1994, and (4) 1995 to present. Table 1 summarizes four distinctive periods. Each period discusses the history of (1) project management tools and practices and (2) representative actual projects.

<b>Periods</b>	<b>Theme</b>	<b>Sub context</b>
Prior to 1958	Craft system to Human Relations Administration	<ul style="list-style-type: none"> <li>▪ Project Management</li> <li>▪ Actual Projects</li> </ul>
1958 – 1979	Application of Management Science	
1980 – 1994	Production Center: Human Resources	
1995 to present	Creating a new environment	

**Table 1. Four periods of project management**

**PRIOR TO 1958: CRAFT SYSTEM TO HUMAN RELATIONS ADMINISTRATION**

**Project Management**

The origin of the modern project management concept started between 1900s and 1950s. During this time, technology advancement shortened the project schedule. Automobiles allowed effective resource allocation and mobility. Telecommunication system increased the speed of communication. The job specification was widely used and Henry Gantt invented Gantt chart. The job specification later became the basis of developing the Work Breakdown Structure (WBS).

**Actual Representative Projects**

*T.D. Judah’s Project Plan for Building Pacific Railroad*

In T.D Judah’s (1857) "A Practical Plan for Building the Pacific Railroad," engineers and clerks at the project office prepared a formal report upon arrivals of survey information from the field managers. Once the data has been updated and analyzed, the project office forwarded orders to resident engineers, and field managers initiated the project. The project office also dealt with relationship with investors, field survey, cost estimation, feasibility study, and others. Project office simply functioned as an administrative office.

*Hoover Dam (1931 – 1936)*

In 1928, the congress passed the Boulder Canyon Act assigning \$175 million to the Hoover Dam. The “Big Six” that consists of Utah Construction, Pacific Bridge, H.J. Kaiser, W.A MacDonald and Kahn, Morrison-Knudsen, and J.H. Shea formed a consortium to work as a general contractor. It was crucial for the companies to have a detail project planning, controlling, and coordinating plan because the project involved six independent companies. The

construction site was located in the middle of the desert with no infrastructures. Boulder City was created to accommodate their workers to stay near the construction site.

The project required both physical and human resources. The project employed approximately 5,200 workers, and large amount of construction resources including concrete, structural steel components, steel pipe, and so on were required (Bureau of Reclamation 1985). The project was successfully completed under budget and ahead of schedule (Moore 1999). The Hoover dam project is still one of the highest gravity dams in the U.S., which generates more than four billion kilowatt-hours a year.

#### *Manhattan Project (1942 – 1945)*

The Manhattan project was the pioneer research and development (R&D) project that designed and built the atomic bomb. The initial project was proposed in 1939 to defend possible threats from Germany. In 1941, the Office of Scientific Research and Development (OSRD) were established to coordinate government-sponsored projects, and the Manhattan project initiated in 1942. The OSRD coordinated universities and resources for the research and development of the atomic bomb. The project was successfully tested in July of 1945, a month before the bomb was dropped on Hiroshima, Japan. The project involved 125,000 labors, and cost nearly \$2 billion.

### **1958-1979: APPLICATION OF MANAGEMENT SCIENCE**

#### **Project Management**

There were significant technology advancement between 1958 and 1979. In 1959, Xerox introduced the first automatic plain-paper copier. In the 1960s, many industries were influenced by the development of silicon chips and minicomputers. In 1969, Bell Laboratories developed programming language UNIX and computer industry started to develop rapidly. NASA's successful Apollo project earmarked a historic event of the mankind. In 1971, Intel introduced 4004, a 4-bit microprocessor, which is a foundation of the evolution of Intel's 80386, 80486, and Pentium processors in the 1990s. While many dedicated scientists developed ARPANET, Ray Tomlinson in 1972 introduced the first e-mail software. In 1975, Bill Gates and Paul Allen founded Microsoft. Several project

management software companies were founded during the 1970s including Artemis (1977), Scitor Corporation (1979), and Oracle (1977).

Between 1950 and 1979, several core project management tools including CPM/PERT, Material Requirement Planning (MRP) and others were introduced. CPM/PERT was calculated in large computer systems, and specialized programmers operated the CPM/PERT mainly for the government sector projects. The common organizations used the project office as “brokers of information” having small number of skilled schedulers and estimators (Vandersluis 1998).

### **Actual Representative Projects**

#### *Polaris project (1956 – 1961)*

The Polaris project refined the project management concepts as known today (Sapolsky 1972). The \$11 billion Polaris project was undertaken by the U.S. government to deliver nuclear missiles carried by submarines, known as Fleet Ballistic Missile. The project was initiated by U.S. Navy in late 1956, and successfully launched its first Polaris missile in 1961. The Navy created a new unit called Special Project Office (SPO) to avoid giving the Polaris project to Bureau of Ordinance and Bureau of Aeronautics (Sapolsky 1972).

#### *Apollo project*

In 1958, National Aeronautics and Space Administration (NASA) was created. Between 1969 and 1972, NASA successfully led six missions to explore the moon. In 1960, NASA set up the Apollo program office to provide following functions:

- Maintain and schedule Apollo missions using PERT.
- Procurement and contracting with suppliers such as GE.
- Develop management system to measure the performance.
- Set up a focal point of the Apollo program.

### ARPANET

*The Internet is as much a collection of communities as a collection of technologies, and its success is largely attributable to both satisfying basic community needs as well as utilizing the community in an effective way to push the infrastructure forward. This community spirit has a long history beginning with the early ARPANET. The early ARPANET researchers worked as a close-knit community to accomplish the initial demonstrations of packet switching technology described earlier. Likewise, the Packet Satellite, Packet Radio and several other DARPA computer science research programs were multi-contractor collaborative activities that heavily used whatever available mechanisms there were to coordinate their efforts, starting with electronic mail and adding file sharing, remote access, and eventually World Wide Web capabilities. Each of these programs formed a working group, starting with the ARPANET Network Working Group. Because of the unique role that ARPANET played as an infrastructure supporting the various research programs, as the Internet started to evolve, the Network Working Group evolved into Internet Working Group. (Leiner et al. 2000)*

The Internet project began its journey in 1962. It started with series of memos discussing the concept of “Galactic Network,” by J.C. R. Licklider of MIT (Leiner et al. 2000). The U.S. Department of Defense initially funded the project, and Advanced Research Projects Agency (ARPA) coordinated it. The ARPA’s objective was to schedule and coordinate the activities of the heterogeneous set of contractors. (Hughes 1998). The ARPA started to develop its ARPANET, the origin of the Internet.

The ARPA project was a research and development project that was initially developed by the ARPA then managed by several organizations. In the 1970s, Federal networking council was formed to support international organizations and coordinate federal agencies such as NASA, Department of Energy and others (Leiner et al 2000). Different from single organization-driven projects, the initial ARPANET was driven by numbers of researchers and organizations. Currently, the Internet is coordinated by several organizations including the Internet Engineering Task Force (IETF), Internet Engineering Steering Group (IESG), the Internet Architecture Board (IAB), the Internet Society (ISOC), etc.

### **1980-1994: PRODUCTION CENTER: HUMAN RESOURCES**

#### **Project Management**

During the 1980s and early 1990s, the revolution of IT/IS sector shifted people from using mainframe computer to multitasking personal computer that had high efficiency in managing and controlling complex project schedules. In the mid 80s, the Internet served researchers and developers, and local area networks and Ethernet technology started to dominate network technology (Leiner et al 2000).

During the 1950s through 1970s, most computer engineers were responsible for operating the project management systems because the mainframe systems were not easy to use. Morris (1985) acknowledged the unfriendliness of the mainframe software. During the late 1970s and early 1980s, project management software for PC became widely available by a number of companies in the mid-1980s which made project management techniques more easily accessible.

### **Actual Project Cases**

Three projects were selected to portray the era of 1980s and early 1990s: The English-France Channel project (1989-1991), Space Shuttle Challenger project (1983-1986), and The XV Calgary Olympic Winter Games (1988). These projects illustrated the applications of hi technology and the project management tools and practices.

The English-France Channel project was an international project that involved two government agencies (British and French government), several financial institutions, engineering construction companies, and other various organizations between the two countries. The project goal, cost, schedule, and other factors needed to be adjusted to conduct the project. The language, use of standard metrics, and other communication differences needed to be coordinated. The disaster of the Space Shuttle Challenger instantly brought a lot of attention to the project management community. The incident brought more interests in risk management, group dynamics, and quality management. The Calgary Winter Olympic game in 1988 applied project management to event management. Its successful adoption of the project management practices expanded to various event management practices.

### **1995-PRESENT: CREATING A NEW ENVIRONMENT**

*We are on the verge of a revolution that is just as profound as the change in the economy that came with the industrial revolution. Soon electronic networks will allow people to transcend the barriers of time and distance and take advantage of global markets and business opportunities not even imaginable today, opening up a new world of economic possibility and progress. (Albert Gore Jr., Vice President 1997)*

### **Project Management**

The Internet started to change virtually every business practices in the mid 1990s (Turban et Al 2000). It provided fast, interactive, and customized new medium that allowed people to browse, purchase, and track products and services online instantly. As a result, the Internet permits organizations to be more productive, more efficient, and more customer-oriented. Between 1995 and 2000, the project management community adopted internet technology to become more efficient in controlling and managing various aspects of projects. While the information technology revolutionized the traditional business practices, various industries started to adopt and to apply project management practices.

### **Actual Project Cases**

#### *Year 2000 (Y2K) Project*

The Year 2000 (Y2K) Problem known as the millennium bug referred to the problem that computers may not function correctly on January 1<sup>st</sup>, 2000 at 12 AM. It was a man-made problem that started back in the 1950s. President Clinton issued an executive order 13073 back in February 1998, "Year 2000 Conversion," which required all federal agencies to fix the Y2K problem in their systems (DOD 2000). Several government agencies and state governments initiated the year 2000 awareness program back in 1996. The order initiated to build a centralized focal point for monitoring all Y2K activities within the US government.

The Y2K project integrated several aspects of project management. First, the Y2K project had a specific objective (to fix Y2K problems) and sharp deadline (on January 1<sup>st</sup>, 2000 at 12:00 AM). Second, the project was globally and independently conducted that virtually every organization using computers were at stake. Each organization focused on correcting Y2K problems within the organization, but the problem was interrelated due to the dependency of various computer systems via computer network. Third, there were various methodologies and tools to remedy the problem. Fourth, from the initiation to completion, detailed progressive reports were widely available. The Y2K project became the most documented projects in the project management history because virtually similar projects were conducted by millions of organization in the world.

Y2K problem boosted many organizations to adopt project management practices, tools, and techniques to conduct their own Y2K project. Many organizations set up the project office to control and comply with their stakeholders regarding Y2K issue. Furthermore, use of the Internet was common practice for Y2K projects which led to set up a virtual project office. The goal of the Y2K project office was to deliver uninterrupted turn-of-the-century, monitor Y2K project efforts, provide coordination, develop risk management plan, and communicate Y2K compliance efforts with various stakeholders. The Y2K office was a focal point for all the project works, and its functions were highly visible that it boosted the awareness and importance of the project office. In addition, it increased the awareness and importance of risk management practices to numerous organizations.

#### *Iridium Project*

Motorola's \$5 billion Iridium project aimed to provide global communication service virtually anywhere at anytime (Barboza 2000). In November 1998, the Iridium network was established, and started to provide global network services. In March 2000, Iridium filed for bankruptcy terminating its services. The project was once viewed as a technological breakthrough; however, it ended up so quickly and mysteriously. The program office was established with full time project control managers, software engineers and analysts were also relocated. In addition, the project control managers utilized sophisticated project management software, Primavera Project Planner, to handle complex and inter-related project scheduling management. (Fabris 1996).

### **SUMMARY AND CONCLUSIONS**

Historians and dedicated scholars contributed to the project management history over the years. Most of the documents were written in narrative format that covered only a few aspects of project management. A set of standards will make it easy for project management community to build its history in order to take advantage of lessons learned from the past. The literature reviews suggest that technology and advanced management tools strengthened the functions of the project office. More organizations are adopting and applying project management practices, tools and techniques to its various operations. Therefore, a permanent project supporting entity that provides comprehensive project management knowledge is needed. Advanced Internet and computer technology is



assisting organizations support the needs of project management. Eventually, the project office will function as a heart of project management community. Table 2 summarizes the brief history of project management.

	<b>Technology</b>	<b>Management Science</b>	<b>Project Management &amp; Technology</b>	<b>Major Projects</b>	<b>Project Office</b>
<b>~ 1958</b>	- Telegraph - Telephone - First computer - Automobile - Airplane - First database	- Adam Smith - Frederick W. Taylor - Henry Fayor - Henry Gantt - A McGregor's XY theory	- Parametric Cost Estimating - PERT/CPM - Gantt Chart - Monte Carlo Simulation - Systematic Application	- Inter Continental railroads - Hoover Dam - Polaris - Manhattan project - Panama Canal	- Focal point - "proximity" - Traditional project office functions - Navy Special Project Office (SPO)
<b>1959 ~ 1979</b>	- IBM 7090 - Xerox copier - UNIX - Microsoft Founded	- ISO - Total Quality Management - Globalization - Quality Management	- PMI - Inventory Control - Material requirement planning	- Apollo 11 - ARPANET	- Project Supporting Office
<b>1980 ~ 1994</b>	- Personal Computer - Wireless in-building network - First Internet browser (MOSAIC)	- Manufacturing resource planning - Risk Management	- Matrix organization - PM Software for PC	- Boeing 777 - Space Shuttle Challenger - The English-France Channel project	- Project Headquarter - War Room
<b>1995 ~ Current</b>	- Internet	- Critical chain - Enterprise Resource Planning	- PMBOK (PMI)	- Iridium - Y2K project	- Virtual Project Office - Web-base Project Office

**Table 2. The Brief History of Project Management**

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