Modern methods of managing people and what is now called project controls emerged during the latter part of the 19th and early 20th centuries by, unarguably, the work of two pioneering men and their followers: Frederick W. Taylor and Henry L. Gantt. Both men were mechanical engineers who studied theory but both believed in actual experience as well as data to develop the concept of what became known as “scientific management.” Studying work and tasks to determine the “best way” was a novel concept in US business and industry during the late 19th century. Taylor and Gantt discovered that the old way of doing things didn’t always apply.

This period was an era of rapid economic advancement and Industrial expansion in the US in conjunction with advances in science and progressive thought. The US was rapidly becoming a world military superpower during this period which required advanced industrial and management techniques.

Taylor’s and Gantt’s contributions were considered controversial and even radical but their work influences us even to this day. They truly laid the foundations for our methods of planning and execution of work.

Up until Taylor’s time, industrial processes and the management of them were influenced by the US ideals of freedom and democracy as espoused by Thomas Jefferson. In Jefferson’s world, the US was a democratic land of a small federal government. Businesses were small and independent: the land of the yeoman farmer or craftsman toiling away at his workshop bench. The great late 19th century economic growth, especially in heavy industries such as railroads and steel and the US federal government – the US Army and Navy, quickly left Jefferson’s idealized America behind. American business and industry’s expansion, fueled even further by the Civil and Spanish American Wars, required a different economic model. Taylor and his associates, especially Gantt, quickly met this need for a new way of doing things. Their ideas were translated and adopted by businesses and governments in many countries, even in the emerging Soviet Union after the First World War.

Taylor was most famous for introducing the concept of studying and planning work to seek ways to do it faster and cheaper. He believed that the old way and durations of tasks were not necessarily the best way. He was accused of being arrogant and inhumane. I believe that most of these allegations are exaggerations fabricated mostly by his competitors or detractors.

Taylor’s followers, in particular Gantt, “softened” some of Taylor’s initial or misunderstood ideas and unnecessary harshness. Gantt’s association with Taylor lasted 30 years.

Taylor believed that, in order to follow his “system,” a new mindset was required - what is now called a “new paradigm.” He was the earliest advocate of “work smarter, not harder.” His methods accomplished this by the study of tasks and finding the most efficient, less wasteful methods by using “good” data. Gantt furthered these ideas by inventing the bar chart and developing the concept of incentive pay. Gantt’s bar chart schedules and the advanced schedule forms are some of the most essential tools in project management. His Gantt charts were first used in armament production for the US Army. Taylor and Gantt also studied ways of making and improving the production of steel for guns and ships for the US Navy.

In spite of criticisms of their methods, I believe Taylor and Gantt can be considered successful in changing the way the US conducts business. Their influence can be felt in the heavy and construction industries, as well as human resources and accounting methods.

In summation, the Taylor System and its disciples created a new way of looking at work and management. In essence, this was an early form of “thinking outside the box.” Taylor discovered that “one can’t manage what one can’t measure.”


Someone asked: “What’s the use?”

*If your ultimate ambition is to roll a ton of rails,*  
*To build an automobile or to make a keg of nails,*  
*You will find that life’s a burden, you will find existence stale,*  
*If you live by rule and precedent you pretty sure will fail,*  
*And if you only work and sleep and take three meals a day*  
*Why there isn’t any answer and it really doesn’t pay.*

This poem nicely sums up the Taylor concept: just because something has always been done that way, don’t assume that it’s the “best way.”
As IBM used to say: “Think” (and plan) creatively. Enjoy life: there’s more to life than work – Taylor – at least for his class – believed in leisure time and recreation.

WHAT IS MANAGEMENT?

Hoopes defines management as: “Getting people to cooperate with each other in order to accomplish together more than could be done alone.” This great definition is also the essence of coaching or leadership in a team environment: individuals seldom accomplish much without a good team and team leader.

To paraphrase a sports cliché: Great managers are born in heaven but seldom lead in hell. Leadership or management skills rarely can be trained and one either has it or doesn’t. Motivating people is a rare skill indeed.

WHAT IS SCIENTIFIC MANAGEMENT?

Frederick W. Taylor was one of the first to recognize that a good team needs an informed, intelligent leader. Managers, under Taylor’s way, were tasked with the responsibility of motivating their employees and instructing them of the most – or best – way of performing a task. Efficiency, and productivity, is the desired results. Previous to Taylor’s time, in the US business or industrial tradition, workers controlled the pace and means or methods of work with little interference from a manager. Productivity, naturally, suffered.

During the late 1800’s, many employees operated as independent contractors to the factory owner. Major decisions for means and methods of production were often made on the “shop floor” by the individual employees and not the owner (or manager).

Taylor invented what became to be known as “Scientific management” or the “Taylor System.” Taylor and Gantt sought to improve, starting with factory “shop” management, productivity by efficient means and methods established by “scientific” studies performed by engineers.

Scientific management’s fundamentals include the following.

- science vs. the rule of thumb;
- harmony not discord;
- maximum output vs. restricted output; and,
- workers developed to their greatest efficiency and prosperity.

Scientific management can also be defined in other ways. Hearn lists three guiding principles of “Taylorism,” including the following:

- Separate the labor process from the skills of workers (by simplifying jobs and routing tasks, the work process would be made amenable to a less skilled work force and, to that extent, management would be less dependent on skilled labor)
- Separate conception from execution, placing the responsibility for conceptualizing the productive process and planning the work tasks in the hands of management, leaving for the shop floor only the execution of predetermined, rigidly enforced plans
- Monopolize productive knowledge at the managerial level and use this monopoly over knowledge both to centralize decision making and to control every step of the labor process through formal rules and procedures

A BRIEF HISTORY OF US INDUSTRY

Modern industrial factory operations and management can be traced back to the textile mills in New England about the 1840s. Labor shortages were eased by immigration, mostly Irish, and tilted the balance of power away from workers and subjected them to management control. During this era, slavery existed, with, of course, absolute management control.

Armories, also an early industrial age development, were run military-style: workers were under the command of a supervisor. Foremen kept records of tools and materials to prevent theft and production was tracked. Workers even had to pay for deficiencies in the final product. However, production was little advanced past the old medieval-style artisan/craftsman work. Breaks were frequent and considered a right.

Railroads, the first true heavy industries or corporations in the US, also adopted military-style management starting about 1828. In fact, many of the early railroad construction engineers were US Army officers. Construction was organized like a military campaign.

ENTER FREDERICK W. TAYLOR

Frederick Taylor, born into wealth in Philadelphia, Pennsylvania during the era of rapid industrialization, decide to forgo his prep-school education and got a job as a machinist at Midvale Steel near Philadelphia. It didn’t hurt that one of his relatives was an officer in Midvale Steel. His down-and-dirty on the job experience provided a hands-on insight into how factory shops were operated and managed. What he saw, he didn’t like.

Taylor quickly surmised that the work methods that he observed were slow and inefficient.

Some workers adhered to the practice of “soldiering:” limiting output with frequent breaks. Supplies and orders were arranged haphazardly. In fairness, though, this was the time before the eight-hour workday and employer provided benefits. The technology that fueled industry was advancing at a rapid pace. Methods often did not keep up with the technological advances. Men and machines were driven hard.

Taylor obtained permission to study methods of operating machines – lathes, cutting tools, etc. – to see if they could be run more efficiently.

The steel industry, which Taylor and Gantt developed their techniques by studying the work processes, was still in its infancy in the 19th century. Production was measured in pounds rather than tons. Improved technology enabled production to advance rapidly especially in the period after the Civil War. Taylor and Gantt emerged during this period of rapid technological and scientific advancement.
Taylor, the original pioneer, apprenticed at a pump works near Philadelphia from 1874 - 1878. Taylor learned the work from the “shop floor” but quickly rose in status to shop foreman. In 1878, he moved on to Midvale Steel in Philadelphia as a shop foreman. At Midvale, he hit upon the idea that work could be done faster and cheaper if it was studied and organized. The data collected in observing actual work could be used to make it more efficient. Taylor’s work at Midvale lasted until 1890.

Taylor’s basic tool to study work was the stopwatch. He timed various shop activities especially cutting metals and use of a lathe. Taylor even wrote a book, “The art of cutting metals” that was on the “cutting edge” of technology and he patented many of his methods. His assistant Gantt helped compile the data. Much of their findings were published and used – sometimes with mixed results – and companies like Bethlehem Steel in the early 1900s.

Taylor set the output a worker was expected to produce – his “piece rate” – that was based on his studies. The more one produced, the higher the wage scale. Those who didn’t produce were therefore given a “disincentive.”

Whereas Taylor was seen as driving men – speeding them up like machines – Gantt departed from Taylor’s treatment of workers as mindless machines and relied on them to accomplish the speedup. Together with bonus pay that Gantt instituted to motivate workers, he forced the individual worker to use his brains and faculties to the fullest extent “…as every move must be made to count.” At Bethlehem, the foreman was claimed to become: “the men’s friend and helper, a phrase Gantt often repeated.” In actuality, foremen were often given bonuses to “drive” the workers harder. Gantt moved scientific management toward a milder use of top-down power by eliminating Taylor’s negative incentives and allowing workers to decide how to do their jobs. In addition, Gantt aimed to improve workers’ skills to heighten their adaptability and willingness to learn.

Gantt eventually went into the consulting business without Taylor. Gantt developed his “Gantt Charts” while consulting for the US Army in rifle production. Gantt’s charts were simple: a targeted production goal – based on studies – was established per day. Each day, a foreman filled out his actual production and reported it as a percentage of the target. Many workers did not like do have their “deficiencies” exposed so the charts were not widely adopted.

The basic information reporting of Gantt’s charts served as the foundation for the later PERT charts and CPM schedules developed for the Polaris Missile program for the US Navy and by DuPont in the 1950s. CPM, the critical path method, has been used with much success by state governments to schedule and control the production of the state’s biannual budget – an entirely administrative task. New product developments, marketing efforts, Broadway productions, and US presidential campaigns have all benefited from the availability of CPM. CPM has been used on almost any kind of project in which the activities to be done could be defined and a desire for project control existed.

Taylor and Gantt truly laid the foundations for how our modern society works and conducts business. Both were pioneers: they were advanced in their thinking and ideas. Messianic to many but misunderstood by others, they saw a future that may have happened with or without them. Gantt and Taylor, however, led the way into this brave new world.

REFERENCES

Peter B. Darmody, PSP
Senior Project Scheduling Engineer
Washington Metropolitan Area Transit Authority
CEPM/Office of Construction
1595 Spring Hill Rd Ste 700
Vienna, VA 22182, US
Phone: +1.703.280.7079
Email: peter.darmody@dullesmetro.com