

Project Management - A Historical Timeline

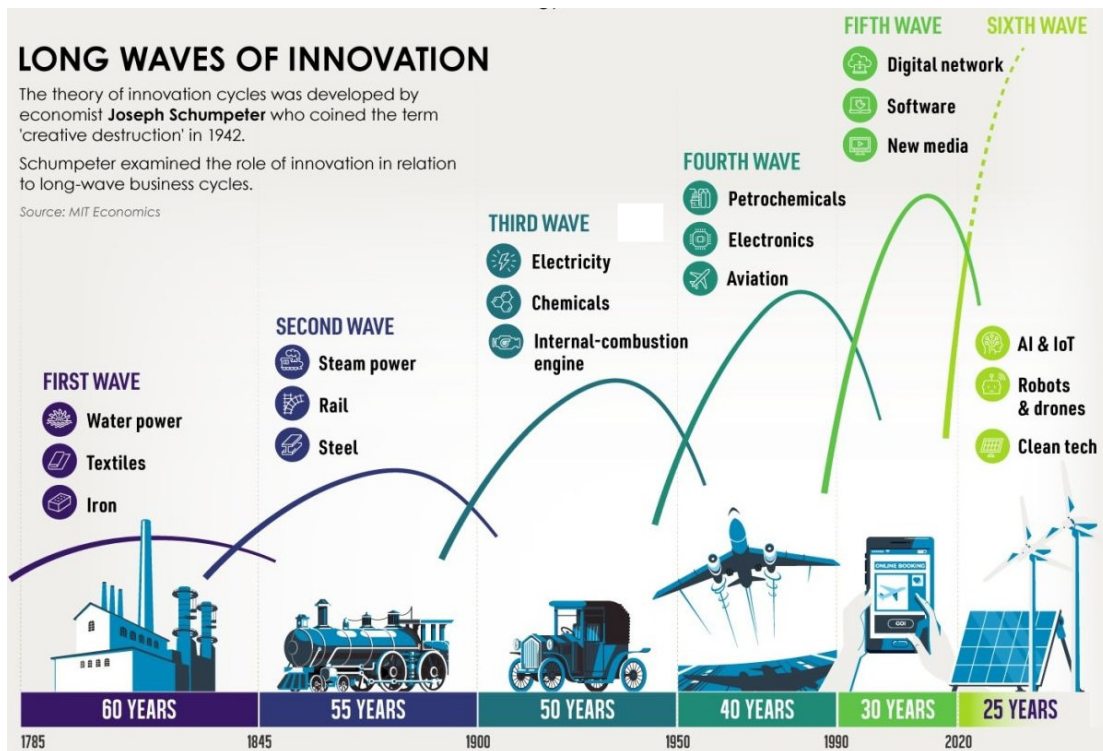
The objective of this paper is to put the development of management, and project management capabilities into a wider historical perspective. This is done by associating some of the significant events in history with the advances in management thinking documented in our papers and a brief selection of important engineering and other achievements. Each of our papers tends to be topic specific, for example focused on advances in cost engineering or the creation of bar charts. This paper juxtaposes the documented advances in each of the separate papers, and places them in the context of general history.

The intent, to quote Joseph Priestley (1733 – 1804) is that a well-constructed timeline becomes “*a most excellent mechanical help to the knowledge of history*”¹, and may identify cross linkages that may be worth further research – history does not occur in isolation. Other coincidences may be simply interesting, for example Henri Fayol (France) and Henry Gantt (USA) both published significant books on the management of factories in 1916 while World War 1 was raging.

The advances in project, and general management knowledge documented in the various historical papers we have published are identified by the inclusion of a ‘*Referenced Document*’ alongside the dated event. Other broader historical events have been drawn from a wide range of sources and are not specifically referenced.

Eras and phases of development

Phases in the development of management and project management



¹ For more on the charts produced by Joseph Priestley see: <https://mosaicprojects.wordpress.com/2022/12/22/bar-charts-invented-by-joseph-priestley-in-1756/>



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Neither the phases of general management development, or project management development, are included in the tabulation below, primarily because the transition between phases is far from precise. Most of the time there was a gentle evolution in the management approach used, rather than a distinct change. The phases of general management development shown above are described by Hargroves K, Smith M. in *The Natural Advantage of Nations* (Earthscan, London 2005 p17) and are considered in more depth in *The Origins of Modern Management*².

The phases of project management development from earliest times are defined in *The Evolution of Project Management*³. A brief extract of the phases in the current era (CE) are:

Anointed. From the collapse of the Roman Empire to the 15th century. Kings or Bishops would decide on the need for a new castle, cathedral or other facility and either oversee the work directly, or anoint a trusted noble, or artisan, to manage the endeavour on their behalf.

Appointed Professionals. The way projects were funded and project managers appointed gradually shifted to a selection process based on perceived competence. Control remained with the project owner.

Appointed Contractors. The shift to a main contractor taking full responsibility for the works including delivering the agreed scope on time, for an agreed cost, seems to be an 19th century development that continues to the present.

Paleo Project Coordination and Leadership – 1920s to 1950s. The modern concept of project management as a cross discipline function that required leading, coordinating, and/or managing the work of others started to emerge in the 1920s.

Modern Project Management Phase 1 – Convergence (1960s to 2010s). The concept of project management as a single unified practice capable of successfully delivering most projects, most of the time, emerged in the 1960s and saw a rapid expansion of project management world-wide.

Modern Project Management Phase 2 – Divergence (2010s to the present time). The publication of the Manifesto for Agile Software Development in 2001 started the trend towards divergence in the way projects are managed.

Eras as used in the tabulation below

Medieval 1000 to 1485, alternatively described as the High Middle Ages (10th to 13th centuries) and Late Middle Ages (14th and 15th centuries). The overthrow of the Saxon kingdom of England in 1066 transformed the country. The Normans changed how England was organized and governed, its language, customs, and architecture. This period includes the crusades, the 100 Year's War with France. The era ends with the Wars of the Roses and the death of Richard III at the Battle of Bosworth.

Tudor 1485 to 1603. Henry VII's victory at the Battle of Bosworth began the Tudor dynasty. The country underwent huge changes during the reigns of three generations of Tudor monarchs. Henry VIII ushered in a new state religion, and the increasing confidence of the state under Elizabeth I coincided with the growth of a distinctively English culture and the beginnings of the British Empire through exploration voyages and the founding of overseas trading companies. The Renaissance of

² These phases of management development are discussed in *The Origins of Modern Management*: https://mosaicprojects.com.au/PDF_Papers/P050_Origins_of_Modern_Management.pdf

³ Download *The Evolution of Project Management* from: https://mosaicprojects.com.au/Mag_Articles/AA021_The_evolution_of_project_management.pdf



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the 15th and 16th centuries was associated with great social change, and discoveries and innovations transformed science, architecture, and everyday life.

Stuarts 1603 to 1714. The Stuart era began when James I, who was also James VI of Scotland, succeeded Elizabeth I after she had died childless in 1603. James's ascension to the throne brought together the two long-warring nations of England and Scotland. The Stuart period witnessed intense religious and political conflicts, the English Civil War, Oliver Cromwell's 'Commonwealth', followed by the restoration of the monarchy, but with a significant shift of power from the monarchy to parliament. The first successful British colonies established⁴.

Early Georgian 1714 to 1785. When Queen Anne died in 1714 with no surviving children, the next in the line of succession were the German Hanoverians. The crowning of George I began the Georgian age – named after the first four Hanoverian kings, all called George. This period saw Britain establish itself as an international power at the centre of an expanding empire, and accelerating change from the 1770s onwards made it the world's first industrialized nation. (**Note:** The Hanoverians continued to reign through to the Victorian Era). This era coincides with the Enlightenment, a period of rigorous scientific, political, and philosophical discourse that characterized European society from the late 17th century to the ending of the Napoleonic Wars in 1815. The Enlightenment was a period of huge change in thought and reason, which underpinned the creation of the modern world.

Industrial Revolution 1785 to 1837. The lives of many people, especially in the north and midlands of England, were transformed by the rapid progress of the Industrial Revolution. Britain was turned into the 'workshop of the world' by new technologies such as steam power, improved transport networks, and enterprising men like the iron-founding Darbys of Iron Bridge fame, the pottery manufacturer Josiah Wedgwood, and the cotton mill owner Richard Arkwright. Key to the success of many industries were the new manufactories (or factories). The mechanization of farming led to large numbers of displaced workers moving to the cities to work in appalling conditions, with mine and factory owners exploiting men, women, and children.

Victorian 1837 to 1901. Queen Victoria came to the throne when she was just 18 years old and ruled Britain for over 60 years. During this long reign, the country acquired unprecedented power and wealth, some of which flowed through to better working conditions. Britain's reach extended across the globe, powered by its empire, political stability, and revolutionary developments in transport and communication. Many of the intellectual and cultural achievements of this period are still with us today.

Edwardian 1901 to 1914, alternatively called the Post Victorian era. The brief but unexpectedly successful reign of the flamboyantly enthusiastic Edward VII (r.1901–10) is sometimes seen as an untroubled 'Indian Summer', an appendix to the Victorian age, with great country houses at their apogee and an ever-growing middle class. Living conditions for the urban and rural poor, however, were often squalid and forces of radical change were already at work. The social reforms of the Liberal government of 1906–14 laid the foundations of what would later become the welfare state.

Interwar Period 1914 to 1945. Two world wars, the roaring 20s, the Great Depression of the 30s, define this period. The rate of technical change accelerated, and technology ranging from motorcars to domestic appliances started to be part of everyday life. The pressures of global conflict accelerated the development of science, engineering, and other disciplines with both the management and engineering professions increasing in importance.

⁴ For a timeline see: <https://www.historic-uk.com/HistoryUK/HistoryofBritain/Timeline-Of-The-British-Empire/>





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The 50s 1945 to 1960. The post war era saw an unprecedented growth in wealth and consumerism. The period included reconstruction in Europe and East Asia, the Cold War, the Korean War, the start of the Vietnam war, the civil rights movement, and massive decolonization.

Modern Project Management 1960 to the current time. The post-war era continues, but for the purposes of this paper, the concept of project management as a single unified practice emerged in the 1960s, capable of successfully delivering most projects, most of the time, and continues to be an important aspect of management and development through to the present time.

Tabulation of key events


The tabulation below maps some of the key events in history to the developments in project management and allied disciplines contained in the referenced papers.

Era	Year	<ul style="list-style-type: none"> • Historical Landmark Event ◇ Management Publication / Innovation ⊡ Engineering Event / Innovation 	<i>Document reference</i>
Medieval Period	1000	• Start of time-line.	
	1054	• The Great Schism, the break between the Roman Catholic and Eastern Orthodox churches.	
	1066	• Battle of Hastings, Norman invasion of Britain.	
	1079	⊡ William I (William the Conqueror) appointed Bishop Walkelin as Bishop of Winchester in 1070, and Walkelin sponsored the construction of Winchester Cathedral. The actual building work started in 1079, led by Hugh of Chilcomb, a mason hired by the Bishop (he was allocated 2 ploughlands).	
			<i>The Evolution of Project Management</i>
	1102	◇ The ecclesiastical Council of London banned the slave trade within England.	
	1121	⊡ Fossdyke (or Foss Dyke), dredged and returned to use originally built by the Romans in around 120 AD.	<i>Early Canal Projects</i>
	1202	◇ Leonardo Pisano Bigollo (known as Fibonacci) publishes <i>Liber Abaci</i> introducing modern numbers (0 to 9) to Western Europe.	<i>Are numbers real?</i>
	1235	◇ Robert Grosseteste develops the concept of the general (or subject) index at Oxford University.	<i>Finding information - Indexing</i>
	1283	⊡ Edward I appointed Master James of St George* to design and build six castles in newly conquered North Wales between 1283 and 1330. These are still some of the most well-known castles in the UK and include Caernarfon, Conwy, Harlech which alone cost £50,000.00 to build. *An architect from the province of Savoy in the modern French, Italian, Swiss borderlands.	
		<i>The Evolution of Project Management</i>	



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Medieval Period

- 1306 ♦ Piece rates included in the contract between Richard of Stow, mason, and the Dean and Chapter of Lincoln Cathedral, for the cutting of plain walling stones, cutting complex stones was paid by the hour. *Incentive Payment Schemes*
- 1323 ⏏ The Pharos of Alexander finally collapses after a third major earthquake. Originally built in 280 BCE the lighthouse was in operation for 17 centuries.
- 1377 ♦ Nicole d'Oresme publishes '*Tractatus de configurationibus qualitatum et motuum*' (approximate date). He developed the concept of rectangular coordinates and graphs. *The Origins of Bar Charting*
- 1387 ♦ *The Canterbury Tales*, written in Middle English by Geoffrey Chaucer between 1387 and 1400.
- 1405 ⏏ Fixed price, incentive fee (FPIF) contract signed for the glazing of the Great East Window in York Minster cathedral. *Incentive contracts are not new*
- 1436 ⏏ Filippo Brunelleschi completes the dome on Florence Cathedral - Santa Maria del Fiore. Work on the Cathedral started in 1296 under the direction of the Opera del Duomo, but the original architect Arnolfo di Cambio died before the dome could be started and while the shape was predetermined, no one knew how to construct it. For more on how Brunelleschi built the dome between 1420 and 1436, see: <https://mosaicprojects.wordpress.com/2023/02/07/project-management-in-the-15th-century/>
- 
- 1450 • Johannes Gutenberg introduced the metal movable-type printing press in Europe, along with innovations in casting the type based on a matrix and hand mould. This was several centuries after similar innovations in China, and replaced woodblock printing in Europe.
- 1453 • Fall of Constantinople and the end of the Byzantine (Eastern Roman) Empire.
- 1458 ♦ Bernedetto Cotrugli publishes '*Della Mercatura et del Mercante Perfetto*' describing double-entry bookkeeping. The practice may have originated in India, and in 1340 the *Messari* (Italian: Treasurer's) accounts of the Republic of Genoa were published using the double-entry system. *The Origins and History of Cost Engineering*
- 1485 • Battle of Bosworth Field ends Plantagenet rule, Henry VII crowned.
- 1492 • End of Muslim rule in Spain after 700 years.
• Christophorus Columbus makes his first voyage to the Caribbean.
- 1496 ⏏ The world's first working dry dock with gates built at Portsmouth Dockyard. *The First Dry Docks*
- 1498 • Vasco da Gama became the first European to sail from Europe (Portugal) to India via the Cape of Good Hope, reaching India on 20th May.
- 1500 ♦ Approximately, early developments in cost accounting emerge as independent woollen manufactures managed their businesses and set prices in a competitive

Tudor Period



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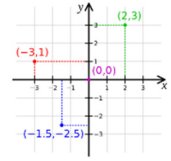
Tudor Period	<p>environment, this required the understanding of the unit cost of production. <i>The Origins and History of Cost Engineering</i></p>
	<p>1514 ♦ Nicolaus Copernicus published <i>The Commentariolus</i> (Little Commentary) a brief outline of his revolutionary heliocentric theory of the universe. The full version <i>De revolutionibus orbium coelestium</i> (On the Revolutions of the Heavenly Spheres), and dedicated to the Pope was published just before his death in 1543.</p>
	<p>1517 • Martin Luther begins the Protestant Reformation with the publication of his Ninety-Five Theses. Henry VIII founded the Church of England in 1534 based on these ideas.</p>
	<p>1556 ♦ Georgius Agricola published '<i>De re metallica</i>' describing early rail wagons used for mining - <i>Hund</i> carts appear to be used primarily underground, <i>Reisen</i> for transporting ore above ground. <i>The First Railway Projects</i></p>
	<p>1564 ⏏ Exeter Ship Canal constructed by John Trew of Glamorgan (1564 – 67). This canal was the first to use pound locks in the UK. <i>Early Canal Projects</i></p>
	<p>1580 ♦ Mathew Baker documents the design of ships (an early use of designs being made on paper (vellum) his manuscript was christened '<i>Fragments of Ancient English Shipwightry</i>' when it was acquired and preserved by Samuel Pepys. <i>The Origins of Bar Charting</i></p>
	<p>1582 • Gregorian calendar reforms correct errors in the Julian calendar. <i>The origins of the Coordinated Universal Time (UTC) calendar</i></p>
	<p>1588 • Spanish Armada.</p>
	<p>1599 ⏏ The Globe Theatre opened by Shakespeare's playing company in Southwark, London, close to the south bank of the Thames.</p>
	<p>1604 ⏏ The Wollaton Wagonway (2 miles) constructed in the East Midlands of England to transport coal. <i>The First Railway Project</i></p>
	<p>1605 • Guy Fawkes gunpowder plot to blow up Parliament starts 200 years of Catholic oppression.</p>
	<p>1607 • First British colony in the US founded at Jamestown, Virginia.</p>
	<p>1614 ♦ John Napier publishes <i>Mirifici Logarithmorum Canonis Descriptio</i> describing the use of logarithms as an aid to calculations. The full understanding of natural logarithms and the value of <i>e</i> did not occur until 1737.</p>
	<p>1615 ♦ Galileo Galilei's writings on heliocentrism were submitted to the Roman Inquisition for the first time, and a second time in 1633. The findings against Galileo appear to be based in religious politics but resulted in the banning of his and Copernicus' works. The prohibitions on the publication were not lifted until 1718.</p>
	<p>1618 • 30 Years War starts (Central Europe).</p>
	<p>1620 ♦ Francis Bacon publishes <i>Novum Organum</i> defining the scientific method this is seen as the start of the scientific revolution in Western Europe. <i>The Origins of Modern Management</i></p>
The Stuarts	



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The Stuarts

1637 ♦ René Descarte develops the concept of cartesian geometry this idea was expanded to show an x and y axis by Frans van Schooten in 1649.



The Origins of Bar Charting

1642 ⊞ Middle Level Navigations in East Anglia, UK, built by Dutch engineer Cornelius Vermuyden⁵.

Early Canal Projects

1648 • 30 Years War ends, 8+ million casualties. Also, the end of the 80 Year War resulting in the independence of the Netherlands from Spanish rule.

1649 • King Charles 1 executed after the English civil war (1642 – 48).

1660 • Restoration of the Monarchy (Charles II) after the Commonwealth.

1666 • Great Fire of London.

1683 • Ottoman Empire siege of Vienna. The lifting of the siege by a combined force led by John III Sobieski of Poland marked the beginning of the end of Ottoman domination in eastern Europe.

1687 ♦ Isaac Newton publishes *‘Philosophiæ Naturalis Principia Mathematica (Principia)’* that expounds his laws of motion and law of universal gravitation.

1688 • Glorious Revolution – William of Orange invited to replace James II of England.

1697 ♦ Daniel Defoe publishes *‘An essay upon projects’*.

The Origins of Modern Project Management

1704 • Battle of Blenheim (War of Spanish succession 1701 – 14).

1711 ⊞ Reconstruction of St. Paul’s Cathedral, London, completed. Rebuilding started in 1670 with demolition of the remains of the old cathedral. Supervising architect Sir Christopher Wren was responsible for this and many other concurrent projects.



1714 • George I crowned – start of the Georgian era.

1721 • The Great (Second) Northern War (1700–1721) ends with the power of Sweden significantly reduced and Russia becomes the dominant power in the Baltic region.

1725 ⊞ The Causey Arch, the world's oldest purpose-built railway bridge built as part of the Tanfield Railway in County Durham, England – this railway is still in use.

The First Railway Project

1730 ♦ Abraham de Moivre suggested the structure of this Normal Distribution – the ‘bell curve’ – and discovered the concept of the Standard Deviation.

Early Georgian

⁵ Note: The construction of canals and river navigations in Europe were significantly ahead of the UK and USA.

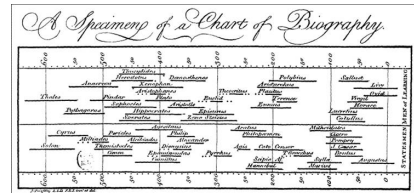


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Early Georgian

- 1742 ⊞ Newry Canal, Northern Ireland appears to be the first true canal built in the UK.
Cost Overruns on Early Canal & Railway Projects
- 1756 • Seven Years War starts (global conflict).
- 1742 ⊞ Sankey Canal, the first British canal to be opened during the Industrial Revolution.
Cost Overruns on Early Canal & Railway Projects
- 1754 • (British) French-Indian wars start in the Americas as part of the Seven Years War - 1759 capture of Quebec, 1760 capture of Montreal, war continues to 1763.
- 1763 • Seven Years War ends.

1765 ◆ Joseph Priestley publishes his 'Chart of Biography' plotting some 2000 famous lifetimes on a time scaled bar chart "...a longer or a shorter space of time may be most commodiously and advantageously represented by a longer or a shorter line."



A Brief History of Scheduling

- 1765 • Royal Observatory in Greenwich founded.
- 1765 ⊞ HMS Victory launched at Chatham Dockyard at a cost of £63,176 3s 0d.
- 1769 ⊞ Richard Arkwright developed the prototype of the modern factory.
The Origins of Modern Management
- 1775 • American Revolutionary War starts.
- 1776 ◆ Adam Smith publishes 'The Wealth of Nations'.
- 1778 • Anglo-French/Spanish (1779)/Dutch (1780) wars start (as part of the Revolutionary War).
- 1783 • American Revolutionary War ends when the French and Spanish are defeated at the Great Siege of Gibraltar (1779 – 1783).
The Origins of Military Engineers
- 1783 ⊞ First manned flight in French Bros. Montgolfier's hot air balloon
Gas balloons (hydrogen) were developed in France in the same year.

1786 ◆ William Playfair publishes his 'Commercial and Political Atlas' using a range of statistical charts including the line, bar (histogram), and pie charts.
A Brief History of Scheduling

Industrial Revolution

- 1788 • First Fleet arrives in Sydney, Australia to start British settlement.
- 1793 • Anglo-French war starts (French revolutionary wars).
- 1783 ⊞ The *École Polytechnique* opens in Paris to train engineers and technical specialist.
- 1798 ◆ Gaspard Monge publishes 'Géométrie descriptive' which formalized the concept of modern engineering design using orthographic projection.
The Origins of Schedule Management



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Industrial Revolution

- 1799 • French Revolution ends (1789 – 1799).
- 1803 • Napoleonic Wars start.
- 1805 • Battle of Trafalgar. Nelson's flagship HMS Victory was launched in 1765, 40 years before the battle.
- 1807 • The Slave Trade Act abolishes slavery in the British Empire.
- 1812 • War of 1812 (USA) starts (1812 – 1815).
- 1812 • Battle of Leipzig, over ½ million men involved, the largest battle in Europe prior to WW1 French defeat leading to the first exile of Napoleon in 1813.
- 1812 ⏏ The first practical railway locomotive built in Yorkshire by John Blenkinsop.
Cost Overruns on Early Canal & Railway Projects
- 1815 • Battle of Waterloo in June ends Napoleonic wars following his return to France in March.
- 1818 • Institution of Civil Engineers (ICE) founded in London.
- 1825 ⏏ The first public railway to use steam traction for passenger and freight opened between Stockton and Darlington. *Cost Overruns on Early Canal & Railway Projects*
- 1829 ⏏ George Stephenson builds the world's first standard gauge railway of 4 feet, 8½ inches (1.435 m) between Liverpool and Manchester.
The Origins of Standard Gauge Railways
- 1832 ◇ Charles Babbage publishes 'On The Economy Of Machinery and Manufactures' describing the measurement of production and payment of bonuses.
The Origins of Modern Management
- 1834 • The Royal Institute of British Architects (RIBA) and The Chartered Institute of Building (CIOB) formed in London. Other trade/professional societies founded in following years.
- 1835 • The City of Melbourne founded (Mosaic is based in South Melbourne).
<https://mosaicprojects.wordpress.com/2022/06/15/the-evolution-of-south-melbourne/>
- 1837 • Queen Victoria crowned.
- 1842 ⏏ The Blue Print process for reproducing technical drawings invented by John Herschel (USA).
- 1843 ◇ Ada Lovelace translated an article by Italian military engineer Luigi Menabrea about Charles Babbage's Analytical Engine, supplementing it with an elaborate set of notes containing the first computer program, an algorithm designed to be carried out by a machine (the Analytical Engine).
- 1844 ◇ The British Parliament introduced the first Joint Stock Companies Act which introduced the registration and incorporation of companies.
The origins of governance
- 1845 • Irish potato famine.
- 1846 ◇ The Railway Regulation (Gauge) Act 1846 establishes the standard railway gauge in the UK.
The Origins of Standard Gauge Railways

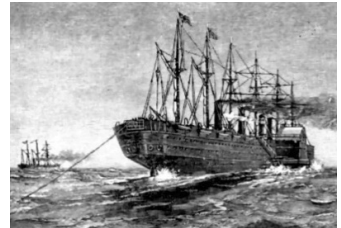


Victorian



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- 1848 ♦ Karl Marx publishes the *Communist Manifesto*.
- 1851 ⊞ The Great Exhibition opened on the 1st May 1851, in the Crystal Palace. Work on the 70,000 m² building started on the 15th July 1850.
The Building of the Crystal Palace
- 1852 • American Society of Civil Engineers (ASCE) founded.
- 1853 ⊞ Emperor Napoleon III directed Georges-Eugène Haussmann to commence work, on the remodelling of Paris to its modern form, this work continued until 1927.
- 1854 ⊞ The first steam powered railway in Australia opens in Melbourne.
The First Steam Powered Railway in Australia
- 1855 ♦ Engineer Daniel McCallum (1815–1878) creates the first organizational chart of an American business.
The Origins of WBS & Management Charts
- 1856 • Crimean War ends (1853 – 56).
- 1857 • American Institute of Architects formed.
- 1858 ⊞ First trans-Atlantic telegraph cable completed (1854 – 1857).
- 1859 ♦ Charles Darwin publishes the *On the Origin of Species* 23 years after completing his voyage around the world on HMS Beagle.
- 1859 • First War of Independence (Indian Mutiny) ends (1857 – 59).
- 1861 ⊞ Launch of HMS Warrior starts European powers building pre-Dreadnought armoured battleships. Timber 'ships of the line' become obsolete overnight.
- 1863 ⊞ London Metropolitan line opened. The world's first underground passenger railway line.
- 1865 • American Civil War ends (1861 – 65).
- 1869 ⊞ USA Transcontinental Railway & Suez Canal (Egypt) opened.
- 1870 • Franco Prussian War, leads to unification of both Germany and Italy in 1871.
- 1871 • Stanley finds explorer David Livingstone in the village of Ujiji by Lake Tanganyika.
- 1871 ⊞ The Iron Bridge over the River Severn in Shropshire, UK constructed, the first major bridge in the world to be made of cast iron.
The Origins and History of Cost Engineering
- 1871 • Taiping Rebellion (1850 – 71) finally ends with 20 to 30 million people killed or died.



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Victorian

- 1872 • The last Great Tea Clipper race from China to London between Cutty Sark and Thermopylae.
- 1872 ◡ Overland telegraph connects Australia to the UK & world.
- 1873 • Third Ashanti war in West Africa (modern Ghana)
- 1876 ◡ Alexander Graham Bell [USA] patents the telephone (similar devices in were invented in 1849 [Italy] and 1854 [France]).
- 1877 ◊ Arthur M. Wellington publishes '*The Economic Theory of the Location of Railways*'
The first chapter describes the principles of Cost Engineering.
The Origins and History of Cost Engineering
- 1884 • International Meridian Conference (Washington, D.C.) defines the Universal day based on local mean solar time at the Royal Observatory, Greenwich in England.
The origins of the Coordinated Universal Time (UTC) calendar
- 1885 • Capture of Khartoum by the Mardi, and death of Gordon. First Australian overseas military commitment to 2nd Suakin Expedition – Sudan.
- 1896 • Anglo Zanzibar War of 1896 lasted a total of 38 minutes making it the shortest war in history lives of 500 Zanzibaris and cemented British control over the East African island.
- 1896 ◊ Polish economist, engineer and management researcher Karol Adamiecki develops the *Harmonogram* (or *Harmonygraph*).
A Brief History of Scheduling
- 1898 • Spanish–American War.
- 1898 • Battle of Omdurman – Sudan. Around 30,000 Sudanese were killed, wounded or captured. Sudan became a condominium of the United Kingdom and Egypt.
- 1899 • Boer War starts in South Africa (ends 1902).
- 1901 • Queen Victoria dies.



Edwardian

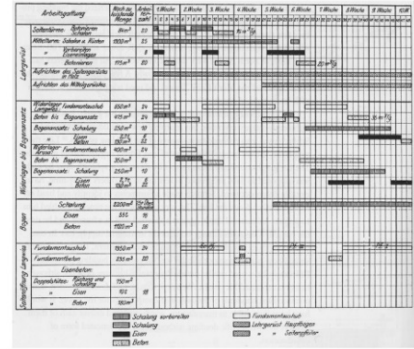
- 1902 ◡ Richard Pearse, Waitohi, New Zealand, March 31, world's first flight in a heavier than air craft
- 1903 ◡ Wright Bros. fly in a heavier than air craft
- 1906 ◡ HMS Dreadnought, a Royal Navy battleship whose design revolutionized naval power enters service.
- 1909 ◊ Halbert Powers Gillette and Richard Dana published:
'*Cost Keeping and Management Engineering: A Treatise for Engineers, Contractors and Superintendents Engaged in the Management of Engineering Construction*'
describing cost engineering, including cost breakdown structures.
The Origins and History of Cost Engineering
- 1911 ◊ Frederick Taylor published '*Principles of Scientific Management*'.
The Origins of Modern Management



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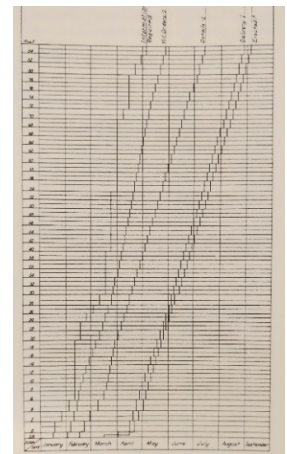
Edwardian

- 1912 ♦ The modern bar chart is fully developed and in use (at least in Germany) the information in the 'Schürch' bar chart and its supporting histograms appears to be far too sophisticated to be either 'one-off', or an original, development.



A Brief History of Scheduling

- 1914 • World War 1 starts.
- 1916 ♦ Henri Fayol (France) published 'General and Industrial Management'.
The Origins of Modern Management
- 1916 ♦ Henry Gantt published 'Work Wages & Profits'.
Henry L Gantt, A retrospective view of his work
- 1914 • World War 1 ends.
- 1919 ♦ Henry Gantt published 'Organizing for Work'.
Henry L Gantt, A retrospective view of his work
- 1920 ♦ A Manual for Planning and Progress for Construction Operations published Abstracted from the official completion report of the US Army Supply Base at Philadelphia, 1918 - 1919.
- 1920 ♦ Max Weber developed 'Bureaucratic Management Theory' published In 1922 after his death.
The Origins of Modern Management
- 1921 ♦ Frank and Lillian Gilbreth present the concept of process flow charts to The American Society of Mechanical Engineers.
The Origins of WBS & Management Charts
- 1923 ♦ Wallace Clark published 'The Gantt Chart a working tool of management'.
Henry L Gantt, A retrospective view of his work
- 1931 ♦ Flowline schedule used for the construction of the Empire State Building; this 103 story structure was completed in 1 year and 45 days.



The Origins of Schedule Management

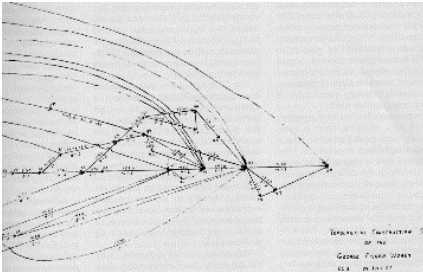
Interwar Period



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Interwar Period

The 50s

- 1938 ◆ The concept of Operational Research (OR) developed in the UK to apply scientific analysis to operational (rather than technical) problems. *The Origins of PERT and CPM*
- 1939 ● World War 2 Starts.
- 1940 ◆ George E Fouch uses *Line of Balance* (LoB) to monitor production at the Goodyear Tire and Rubber Company, the technique was later used in other context.
- 1942 ◆ The US Quartermaster Corps uses activity-on-arrow (AoA) notation for the planning of the US Pacific Island-hopping campaign during World War II.
Note: Kelley was a mathematician working for the US Navy during the war. *The Origins of PERT and CPM*
- 1943 ⊞ Colossus, the world's first programable computer built in England by Tommy Flowers to help in the cryptanalysis of the German Lorenz cipher.
- 1945 ● World War 2 ends, atomic age begins.
- 1945 ⊞ ENIAC, the world's first electronic digital computer operational in December
- 1949 ⊞ Australia's CSIRAC ran its first program in November, the world's 4th computer
- 1951 ⊞ Bechtel functions as the project manager on the 'Trans Mountain Oil Pipeline' in Canada (1951-53). *The Origins of Modern Project Management*
- 1953 ⊞ SAGE – world's first major software development project. *A Brief History of Agile*
- 1954 ◆ Bernard Schriever, coins the term **Project Management**
- 1956 ◆ Kelley & Walker start developing the first CPM network using the Univac 1 computer. Development complete 1957. 
- A Brief History of Scheduling*
- 1956 ● Association for the Advancement of Cost Engineering (AACE) founded.
- 1957 ⊞ USSR launches Sputnik 1 the first artificial Earth satellite. It was launched into an elliptical low Earth orbit.
- 1957 ◆ Fortran programming language developed, followed by ALGOL (1958) & COBOL (1959)
- 1957 ◆ US Navy starts the development of the PERT network analysis system⁶. Part of this project's legacy appears to be the Work Breakdown Structure (WBS). *A Brief History of Scheduling*

⁶ Download the original 1959 paper by D.G. Malcolm, J.H. Roseboom, C.E. Clark, and W. Fazar; defining the PERT calculations, their development and their limitations, *Application of a Technique for Research and Development Program Evaluation* from: <https://mosaicprojects.com.au/PMKI-ZSY-030.php#Process2>



PM - A Historical Timeline

The 50s	1958	<ul style="list-style-type: none"> ◆ Metra Potential Method (MPM) developed in 1958 by Mr B. Roy (France), this is one of several similar CPM type systems developed in the UK and Europe. <i>A Brief History of Scheduling</i>
	1959	<ul style="list-style-type: none"> ◆ J. E. Kelley & R. M. Walker publish <i>Critical-Path Planning and Scheduling</i>⁷.
Modern Project Management	1960	<ul style="list-style-type: none"> ● Coordinated Universal Time (UTC), the primary time standard by which the world regulates time initiated by the International Radio Consultative Committee. <i>The origins of the Coordinated Universal Time (UTC) calendar</i>
	1961	<ul style="list-style-type: none"> ◆ Dr. John Fondahl (USA) publishes '<i>A Non-computer Approach to Critical Path Methods for the Construction Industry</i>⁸' introducing the Precedence (PDM) methodology of scheduling (previous systems used ADM). <i>A Brief History of Scheduling</i>
	1961	<ul style="list-style-type: none"> ⊠ Yuri Alekseyevich Gagarin, a Soviet cosmonaut became the first human to journey into outer space and complete an orbit of the earth.
	1962	<ul style="list-style-type: none"> ◆ PERT/COST adopted by USA DoD and NASA; the <i>DOD and NASA Guide, PERT/Cost Systems Design</i> issued, including the requirement to use a Work Breakdown Structure (WBS). <i>The Origins and History of Earned Value Management</i>
	1964	<ul style="list-style-type: none"> ⊠ The first section of the Tokaido Shinkansen (bullet train), starts operation in Japan shortly before the opening of the Tokyo Olympics.
	1964	<ul style="list-style-type: none"> ◆ IBM 1440 Project Control System (PCS) based on PDM networking launched. <i>A Brief History of Scheduling</i>
	1965	<ul style="list-style-type: none"> ◆ US Air Force <i>Cost/ Schedule Planning and Control Specification (C/SPEC)</i> published. <i>The Origins and History of Earned Value Management</i>
	1965	<ul style="list-style-type: none"> ● International Project Management Association (IPMA) founded in Europe as IMSA, the name then changed to INTERNET, the IPMA. <i>The Origins of Modern Project Management</i>
	1966	<ul style="list-style-type: none"> ◆ Pritsker, A. A. B., publishes '<i>GERT: Graphical Evaluation and Review Technique</i>', introducing conditional branching, loops and other features to facilitate the statistical analysis of uncertainty and risk. Developments included Q-GERT and R-GERT.
	1969	<ul style="list-style-type: none"> ● PMI founded in October at the Georgia Institute of Technology. <i>The Origins of Modern Project Management</i>
1969	<ul style="list-style-type: none"> ⊠ USA achieves the first manned moon landing. 	



⁷ Download James E. Kelly Jr., Morgan R. Walker, *Critical-Path Planning and Scheduling - Proceedings of the Eastern Joint Computer Conference (USA)* from: <https://mosaicprojects.com.au/PMKI-ZSY-030.php#Overview>

⁸ Download John W Fondahl, *A non-computer approach to the critical path method for the construction industry (2nd Ed.)* from: <https://mosaicprojects.com.au/PMKI-ZSY-030.php#Process1>



- 1969 ♦ Dr. Martin Barnes (UK) described the 'iron triangle' of time, cost and output (the correct scope at the correct quality). *The Origins of Modern Project Management*
- 1972 ♦ US Department of Defense Instruction (DoDI) 7000.2, *Performance Measurement for Selected Acquisitions* published requiring the use of C/SCSC (or C/SC²).
The Origins and History of Earned Value Management
- 1975 ♦ Fred Brooks publishes '*The Mythical Man Month*' – Brooks Law: Adding manpower to a late software project makes it later.
- 1975 ♦ The forerunner of PRINCE (PROMPT) developed in the UK.
The Origins of Modern Project Management
- 1976 • Australian Institute of Project Management (AIPM) founded as the Project Management Forum.
The Origins of Modern Project Management
- 1977 ◻ Apple II, Commodore PET, Atari 800, & TRS 80 microcomputers launched (the first generation of self-contained PCs). Several scheduling tools were developed for these PCs.
- 1977 ◻ Voyager 1 & 2 spacecraft launched, 45+ years later they are still working at a distance approaching 15 Billion miles (24 Billion Km) from earth.
- 1981 ♦ PMI Board authorizes the development of a project management body of knowledge (published 1983).
The Origins of Modern Project Management
- 1981 ◻ IBM PC 5150 launched running PC DOS / Microsoft DOS operating system (with options for 16k or 64k of built-in memory).
- 1984 ◻ Apple Macintosh released using a graphic interface and a mouse.
- 1984 ♦ Dr. Eliyahu M. Goldratt introduces the *Theory of Constraints (TOC)* leading to Critical Chain scheduling.
- 1984 ♦ PMI award first PMP credential. *The Origins of Modern Project Management*
- 1985 ◻ Microsoft Windows v1.0 released.
- 1994 • Scrum methodology created.
- 1996 ♦ Takeuchi and Nonaka named Scrum as a project management style In their paper, '*The New New Product Development Game*'.
- 1997 • Critical Chain Project Management (CCPM) invented.
- 1998 ♦ ANSI / EIA 748 *Earned Value Management Systems (EVMS)* – Initial release approved.
The Origins and History of Earned Value Management
- 2001 ♦ The Agile Manifesto published. *Trends in Modern Project Management Past, Present & Future*
- 2003 ♦ AS 4817 *Project Performance Measurement using Earned Value* published.
The Origins and History of Earned Value Management



Modern Project	2003	<p>♦ Walt Lipke publishes '<i>Schedule is Different</i>' introducing the concept of Earned Schedule (ES). <i>Earned Schedule - the First 20 Years</i></p>
	2012	<p>♦ <i>ISO 21500:2012, Guidance on Project Management</i> published.</p>
	2018	<p>♦ <i>ISO 21508:2018 Earned value management in project and programme management</i> and <i>ISO 21511:2018 Work breakdown structures for project and programme management</i> published. <i>The Origins and History of Earned Value Management</i></p>

Conclusion

The purpose of this paper is to place significant advances that led to the creation of modern project management into context with each other and the wider flow of history. The referenced papers below document the progression of ideas in a specific knowledge domain. A future project may look at the cross-discipline connections between these developments.

Referenced documents downloadable from the Mosaic Website

A Brief History of Agile

https://mosaicprojects.com.au/Mag_Articles/AA044_A_Brief_History_of_Agile.pdf

A Brief History of Scheduling:

https://mosaicprojects.com.au/PDF_Papers/P042_History_of_Scheduling.pdf

Are Numbers Real?:

https://mosaicprojects.com.au/Mag_Articles/P008_Are_Numbers_Real.pdf

Cost Overruns on Early Canal & Railway Projects:

https://mosaicprojects.com.au/PDF_Papers/P207_Canal+Wagonway_Cost_Overruns.pdf

Early Canal Projects:

https://mosaicprojects.com.au/PDF_Papers/P207_The_first_canal_projects.pdf

Earned Schedule - the First 20 Years

https://mosaicprojects.com.au/PDF_Papers/P207_Earned_Schedule_the_First_20_Years.pdf

Finding Information – Indexing:

https://mosaicprojects.com.au/Mag_Articles/AA023_Finding_Information-Indexing.pdf

Henry L Gantt, A retrospective view of his work:

https://mosaicprojects.com.au/PDF_Papers/P158_Henry_L_Gantt.pdf

Incentive contracts are not new

<https://mosaicprojects.wordpress.com/2023/02/20/incentive-contracts-are-not-new/>

Incentive Payment Schemes

https://mosaicprojects.com.au/Mag_Articles/SA1066_Incentivation_and_Performance.pdf



Myths and Legends - The Origins of Standard Gauge Railways:

https://mosaicprojects.com.au/Mag_Articles/AA016_The_Origins_of_Standard_Gauge_Railways.pdf

Project Governance & Control, The Building of the Crystal Palace:

https://mosaicprojects.com.au/PDF_Papers/P180-Project_Governance-Building_the_Crystal_Palace.pdf

The Evolution of Project Management:

https://mosaicprojects.com.au/Mag_Articles/AA021_The_evolution_of_project_management.pdf

The First Dry Docks:

https://mosaicprojects.com.au/Mag_Articles/AA018_The_first_Dry-Docks.pdf

The First Railway Projects:

https://mosaicprojects.com.au/PDF_Papers/P207_The_first_railway_projects.pdf

The First Steam Powered Railway in Australia:

https://mosaicprojects.com.au/Mag_Articles/AA034_First_Steam_Powered_Railway_in_Australia.pdf

The Origins and History of Cost Engineering:

https://mosaicprojects.com.au/PDF_Papers/P207_Cost_History.pdf

The Origins and History of Earned Value Management:

https://mosaicprojects.com.au/PDF_Papers/P207_EVM_History.pdf

The Origins of the Coordinated Universal Time (UTC) calendar:

https://mosaicprojects.com.au/PDF_Papers/P185-The_origin_of_calendars.pdf

The Origins of Bar Charting:

https://mosaicprojects.com.au/PDF_Papers/P182_The_origins_of_bar_charting.pdf

The Origins of Governance:

https://mosaicprojects.com.au/Mag_Articles/P020_The_origins_of_governance.pdf

The Origins of Military Engineers

<https://mosaicprojects.wordpress.com/2023/03/17/the-origins-of-military-engineers/>

The Origins of Modern Management:

https://mosaicprojects.com.au/PDF_Papers/P050_Origins_of_Modern_Management.pdf

The Origins of Modern Project Management:

https://mosaicprojects.com.au/PDF_Papers/P050_Origins_of_Modern_PM.pdf

The Origins of PERT and CPM:

https://mosaicprojects.com.au/Mag_Articles/P037_The_Origins_of_CPM.pdf

The Origins of Schedule Management:

https://mosaicprojects.com.au/PDF_Papers/P202_The_Origins_of_Schedule_Management.pdf

The Origins of WBS & Management Charts:

https://mosaicprojects.com.au/PDF_Papers/P207_WBS_History.pdf

Trends in Modern Project Management, Past, Present & Future:

https://mosaicprojects.com.au/PDF_Papers/P061_Trends_in_Modern_PM.pdf



First Published 21 December 2022 – **Augmented and Updated**



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