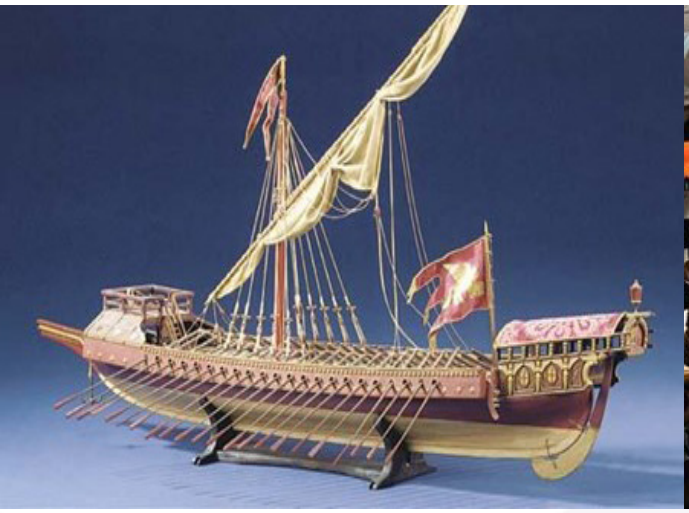
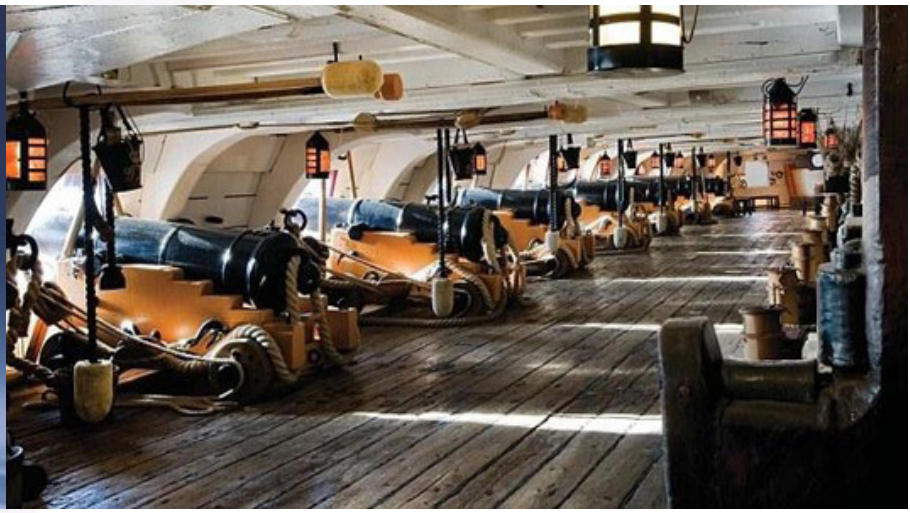
Where does **LEAN** come from?

Lean Six Sigma is a management approach that focuses on teamwork to improve operation processes, efficiency, and to save money by removing waste and defects. Its history began in the 1450s in Venice when shipbuilders managed to standardize the technological process of galley shipbuilding at the Venetian Arsenal. They improved on efficiency, quality, and safety which make up the three basic concepts of Lean consulting today. The manufacturing of ships during the 15th century was so complex that it would take a whole year to build one; the processes were disjointed and poorly organised. However, when the Venetians decided to optimize their construction time and methods by standardizing their processes, they were able to reduce the improvement time of one ship to less than two weeks.

Over the years, shipbuilding technology has improved, resulting in more efficient vessels in battles. From the end of the 16th century, all warships were armed with different types of battle guns. The standardization of the production of naval equipment and uniform placement on the ship changed the way military operations took place. In the image we can see that each gun station is the same, this means that the operation of loading and firing the gun is the same at each station and so is far more efficient.





1799 Eli Whitney

Eli Whitney has played an important role in the popularization of the concept of JIT manufacturing (Just in Time). In 1799, when Congress voted to get the nation ready for war with France, Eli Whitney was contracted by the US Army to manufacture muskets. He used standardized sets of parts that can easily be assembled and disassembled resulting in faster changeover times and product uniformity. This means that even unskilled workers could build finished products faster and at a much lower cost, resulting in cheaper muskets assembled in record speed. Although the idea was first introduced by Eli Whitney, he did not yet have a name for it. In 1816, Samuel Colt used the process in his gun factory, and called it 'replacement parts'. But in 1886, seventeen years after the term 'replacement parts' was first used, a man named Oliver Byrne wrote that it is possible to produce interchangeable screws without using any standard sizes. Byrne then labelled this method "screw interchangeability", and later on the concept got renamed to what we call 'lean manufacturing' today.

1900s Frank & Lillian Gilbreth

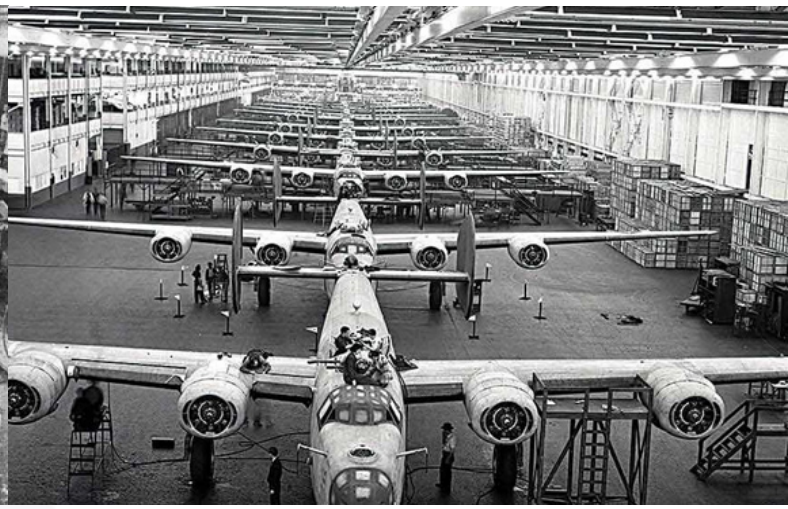
The Gilbreths were the first to begin using concept of Lean, recognising the link between efficiency and waste. In the early 1900s, Frank and Lillian Gilbreth cooperated to develop the study of motion as an engineering and management method. By observing those working within the building industry and factories, Frank and Lillian developed diagrams and maps illustrating the chain of events that are necessary to complete a product. It was the Gilbreths who created the concept of waste elimination, which is one of the basic principles of lean manufacturing.

1911 Frederick W. Taylor

Through observing workers in factories, Frederick Winslow Taylor realised that regardless of how hard someone worked, optimisation and standardisation of tasks was a more efficient and productive approach. He saw the answer to productivity as splitting up and facilitating tasks in such a way that even unskilled workers could perform them properly. In 1911, his book Principles of Scientific Management was published, in which Taylor showed how to apply the scientific approach on a management level in order to improve worker's productivity.

1913 Henry Ford

The first person to truly integrate the concept of lean manufacturing into the production process was Henry Ford. He was convinced that interchangeability was necessary to increase production. He also believed it was essential to facilitate production. In 1913, Henry Ford installed the first moving assembly line for mass production. This new technology made it possible to significantly reduce the time taken to assemble an entire automobile. So, the company was able to produce as many as 200,000 cars a year.



WW II Charles Sorensen

Ford's manufacturing methods, combined with Taylor's methods, played a crucial role in the allied victory in World War II. Charles Sorensen, who was working at Ford at the time, used his experience to help construct aircraft for the US Air Force. This contributed greatly to the victory of the war by allied nations, and he helped implement these methods in other American manufacturing companies as well. The role of Ford and Taylor, and other lean production strategies in the victory in WWII caught the attention of an innovative Japanese engineer during his visit to Ford's factory.

Post-WW II Toyota

Toyota team members realised that a series of simple innovations could drastically improve the quality of the management process and designed the Toyota Production System. Their concept organises production and logistics through to interaction with the customer. Eiji Toyoda introduced the concept of waste elimination in manufacturing to maximize the efficiency of the production process. The TPS approach led to the establishment of the "Just-in-Time" principle (JIT). The idea of this principle was to reduce inventory surplus, so the parts needed in the manufacturing process were purchased as required. During this period lean manufacturing became precisely what we know it to be today and is used around the world.

1990s Motorola

In the 1980s a young engineer Bill Smith who used to work at Motorola created the Six Sigma process. He forged the path of this concept through Motorola's CEO Bob Galvin. Bill proposed to minimize the amount of variation every time the company makes a new product to build on consistency and quality. So, the concept known as Six Sigma, which stands for "Six Standard Deviations", was created to help minimize the number of defects or flaws. They started to measure the defects, not per thousands of opportunities realised, as was traditional, but per million. Motorola developed the methodology with new standards which helped them to save Billions of dollars and become known around the world.

2000s Lean & Six Sigma merge

During the 2000s, the two different methodologies Lean and Six Sigma became one unique process. The two go hand in hand, to make sure a company works as efficiently as possible and the customers are happy with the result. Although Lean Six Sigma originated in manufacturing, it has been widely adopted in many other industries. Its methodologies and tools are incorporated into healthcare, construction, postal, retail, public, military, and transport sectors, and even government administration.