



# Introduction to Software Engineering

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ITSC 3155 – Software Engineering  
Department of Computer Science  
College of Computing and Informatics

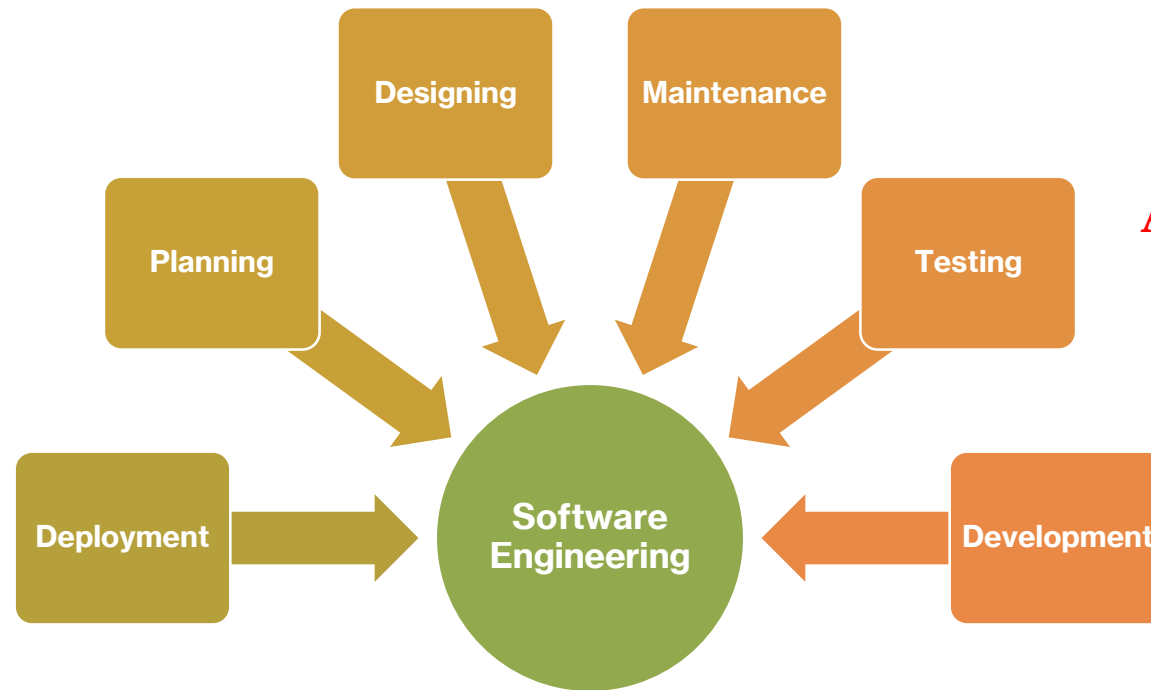
# Agenda

- What is Software Engineering?
- Why Software Engineering?
- History of Software Engineering.
- Challenges in Software Engineering.
- Software Engineering functions.
- What does a software engineer do?

# What is Software Engineering?

Software engineering is “a systematic approach to the analysis, design, assessment, implementation, test, maintenance and reengineering of software”, that is, the application of engineering to software.

Nobody seems to know and everyone has an opinion!



Any method you use to make a software can be considered Software Engineering

## Software Production Techniques!



The background of the slide is a photograph of the Vasa warship, a 17th-century Swedish galleon, displayed in a museum. The ship is made of dark wood and features multiple masts with complex rigging. The hull is adorned with intricate carvings and sculptures. The ship is positioned diagonally across the frame, with its bow pointing towards the upper left. The museum's interior is visible in the background, with other exhibits and structural elements.

# Why Software Engineering – Vasa Syndrome

When it launched in 1628 the Vasa was the world's most powerful warship. 20 minutes later it was at the bottom of Stockholm Harbor.

It's the syndrome where people are afraid to speak truth to power!



# Why Software Engineering – Vasa Syndrome

Every single part of that warship was designed and made by the most talented engineers at the time. Best materials, Best manufacturing...

**But didn't work!**



**Why?**

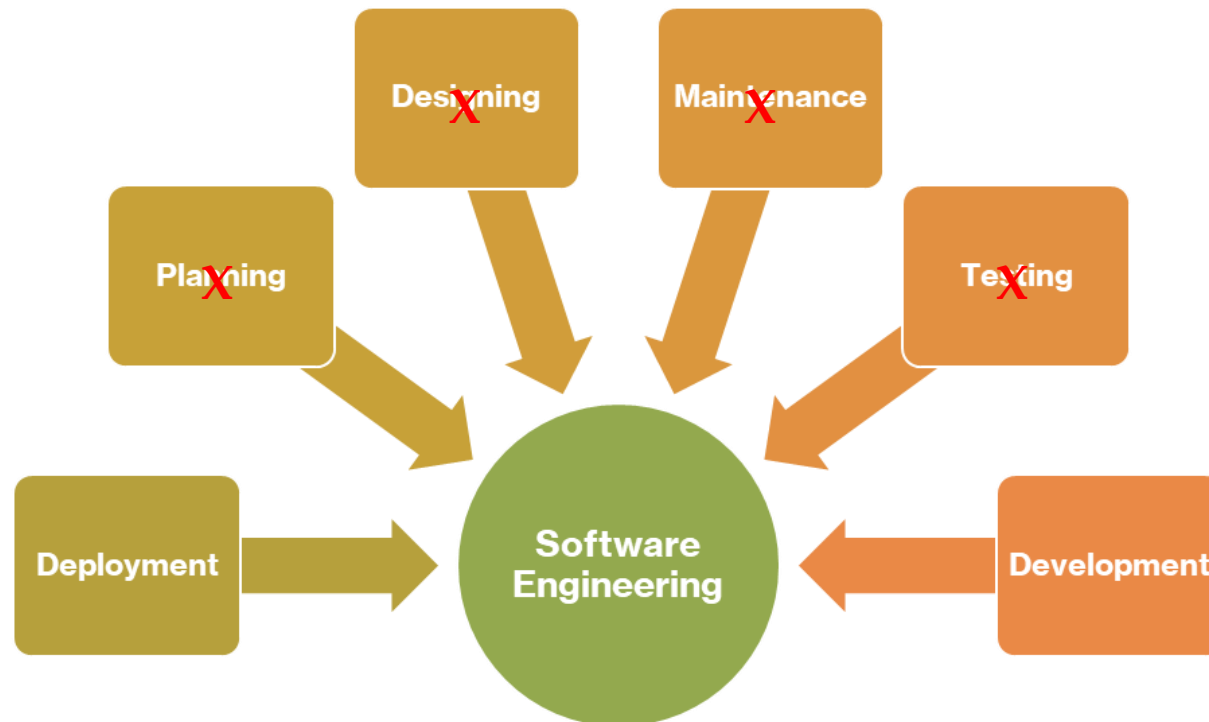
# Why Software Engineering – Vasa Syndrome

- She was decorated with hundreds of extremely massive sculptures that were meant to represent the ambitions of the Swedish king.
- The quantity and placement of her guns also had more to do with the king's aspirations than with sound maritime practice.
- The king's subordinates lacked the political courage to discuss the ship's structural problems.



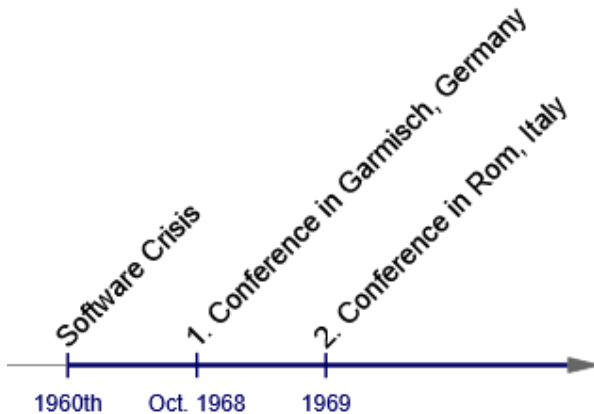
# Why Software Engineering – Vasa Syndrome

Software engineering as a whole allows us to all come together, create a central plan and to sort of prevent a lot of these bugs.



# History of Software Engineering

## 1968 NATO Conference on Software Engineering



**Margaret Hamilton**

Software systems are getting larger, miss deadlines, go over budget, and are brittle to change...

- American computer scientist who was one of the first computer software programmers
- she created the term software engineer.
- She played a critical role in the development of the flight software for NASA's Apollo program.





# Challenges in Software Engineering

The challenge in software engineering is to deliver **high-quality** software **on time** and **on budget** to customers.

Taking on these challenges means spending less time reworking defective software!

## Cost Of Poor Quality (COPQ)



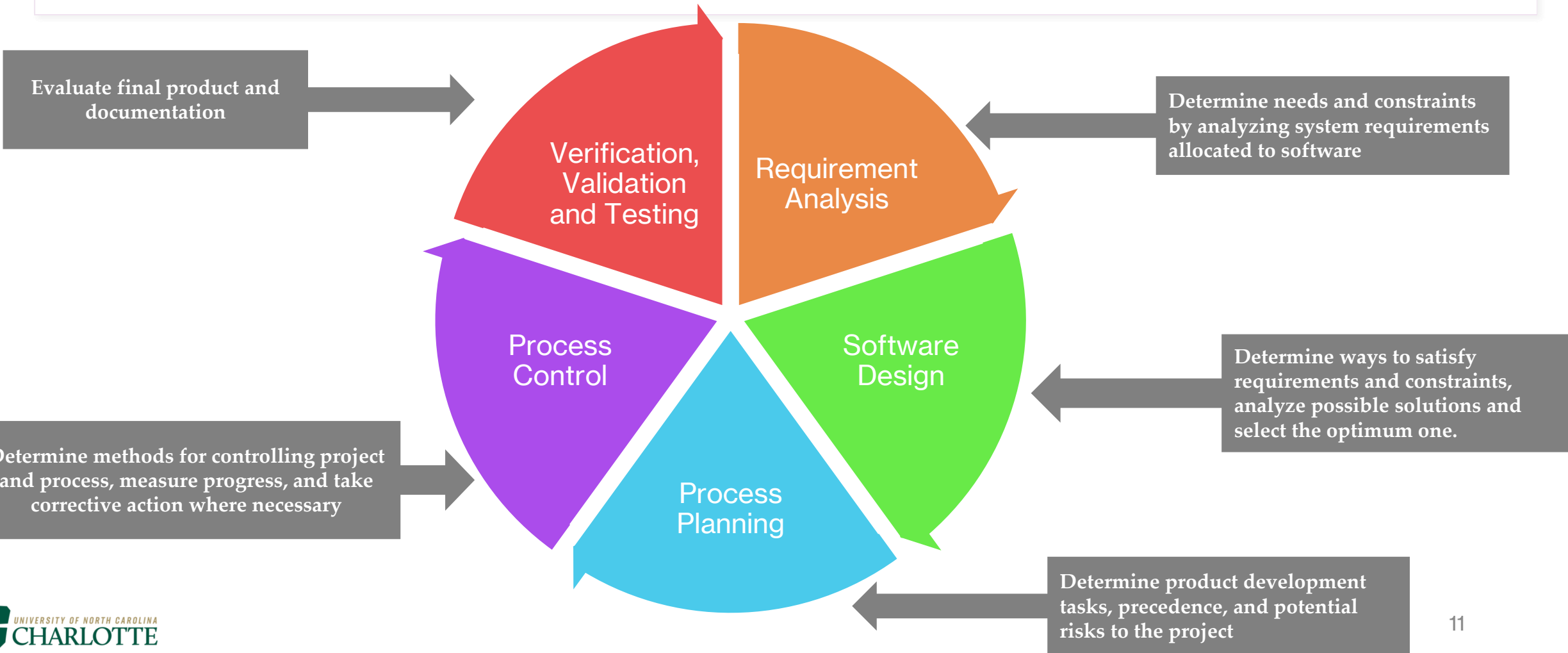
high-profile software failures, These failures led to embarrassment for the organizations, as well as the associated cost of replacement and correction.



**The code that exploded a rocket!**

[Watch on YouTube](#)

# Software Engineering Functions

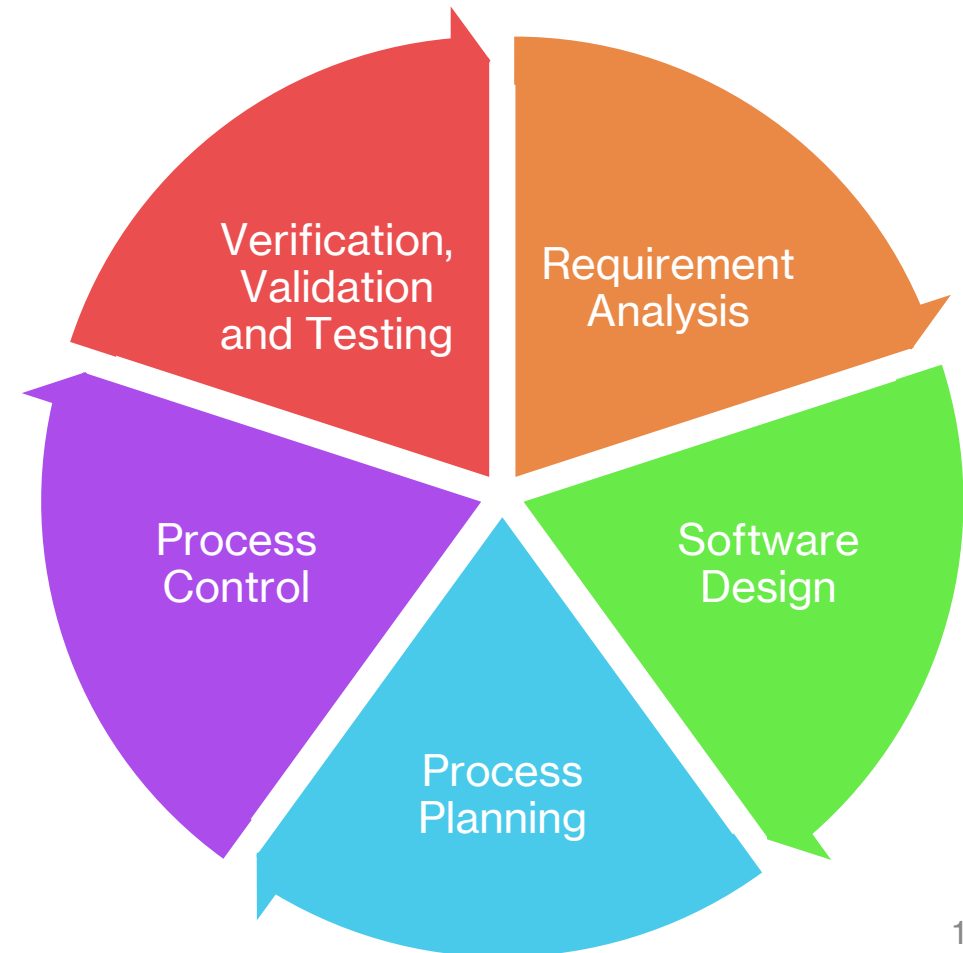




# Software Engineering Functions

**Where is coding!?**

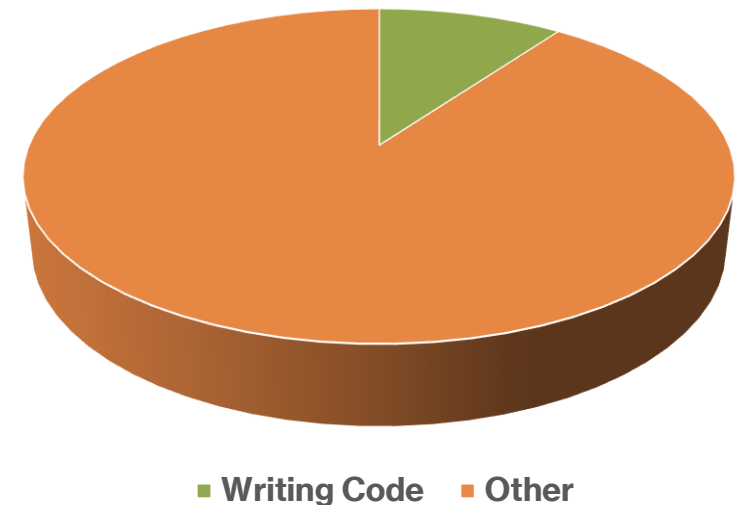
**In fact, the writing of code can be the least engineering-like activity that a software engineer can undertake.**



# What does a software engineer do?

- Extracting requirements
- Analyzing requirements
- Writing software requirements documents
- Building and analyzing prototypes
- Developing software designs
- Writing software design documents
- Researching application domain.
- Developing test strategies and test cases
- Testing the software and recording the results.
- Isolating problems and solving them.
- Learning how to use new software and hardware tools or install and set them up.
- Writing other documentation such as users manuals.
- Attending meetings with colleagues, customers, and supervisors.
- Archiving software or getting it ready for distribution

Software Engineer Time



Here are some of the best qualities a software engineer can have to guarantee long-term career success.

# Successful Software Engineers



**You're a lifelong learner**

**You know how to apply your broad technical knowledge**

**You're a good communicator and a team player**

**You are business-minded**

**You are tenacious and a creative problem-solver**

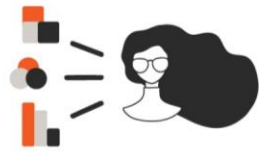
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# Software Engineers Responsibilities in Software Development

## Entry-Level Software Engineer



Implement **new features**

**React**  
**Ruby**  
**Python**

learn new **languages & frameworks**



Maintain **existing code**



Pair **programming**



Resolve **simple bugs / errors**



Refactor **code**

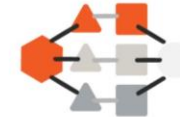


Practice **test driven development (TDD)**

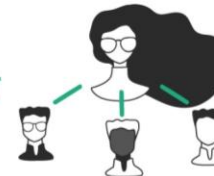
Decide which **framework & libraries** to use



Architect API **endpoints & data models**



**Mentor** junior engineers



Attend sprint planning meetings with **product managers & designers**



**Code reviews**



Refactor **legacy code**



Architect **scalable systems**



## Senior Software Engineer

