

COURSE NAME

SOFTWARE
ENGINEERING

CSC 3114

(UNDERGRADUATE)

CHAPTER 2

SOFTWARE DEVELOPMENT PROCESS MODEL

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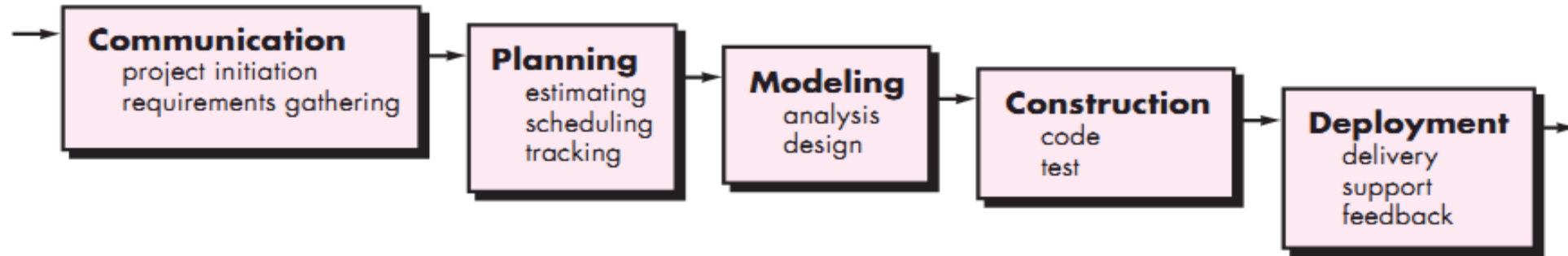
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SOFTWARE PROCESS

- ❑ A structured set of activities required to develop a software system
- ❑ A software process model is an abstract representation of a process.
It presents a description of a process from some particular perspective

WATERFALL MODEL



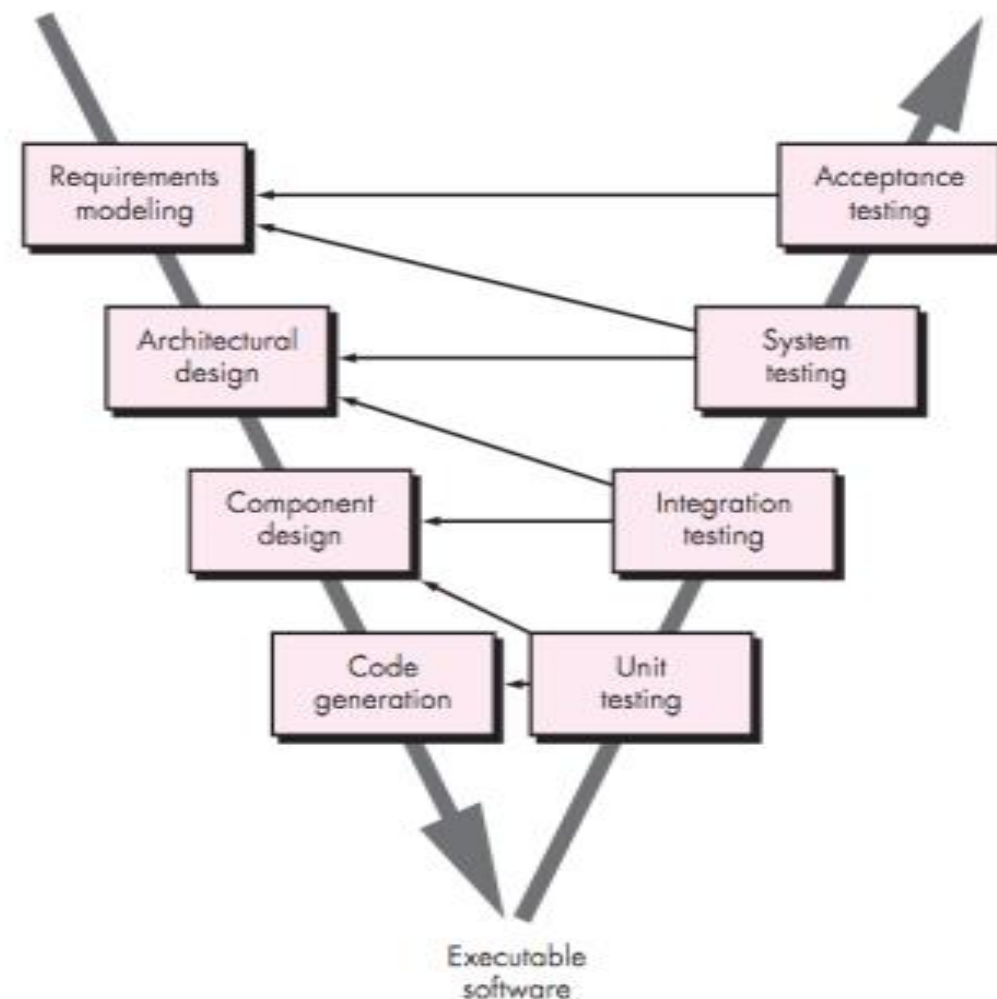
❑ The waterfall or linear sequential model

Problems of Waterfall Model

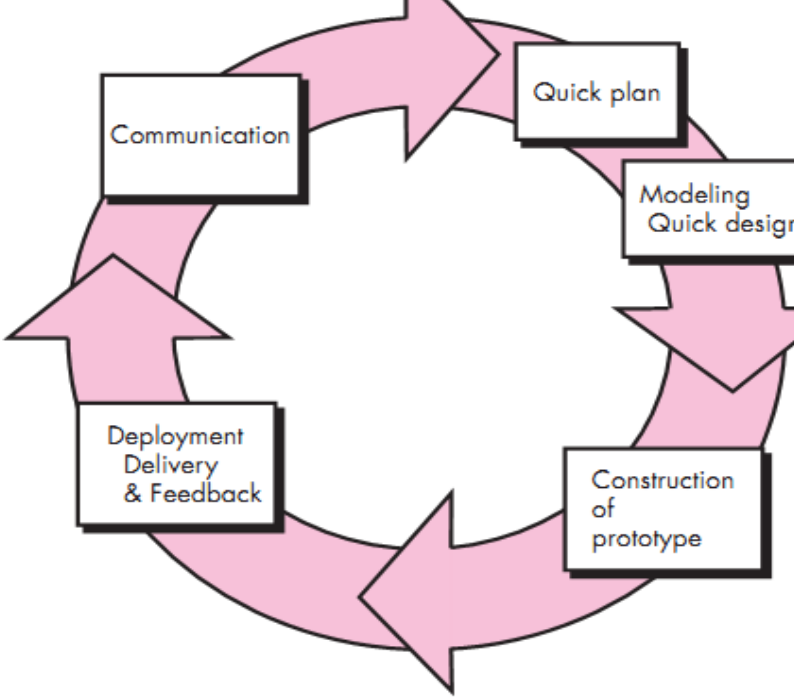
- Inflexible partitioning of the project into distinct stages where next phase starts only after completion of the previous phase
- This makes it difficult to respond to changing customer requirements (no backtracking)
- Therefore, this model is only appropriate when the requirements are well-understood

V - MODEL

- ❑ The V-model is a SDLC model where execution of processes happens in a sequential manner in V-shape. It is also known as **Verification and Validation** model.
- ❑ V-Model is an extension of the waterfall model and is based on association of a **testing phase** for each corresponding development stage. This means that for every single phase in the development cycle there is a directly associated testing phase.
- ❑ This is a highly disciplined model and next phase starts only after completion of the previous phase.

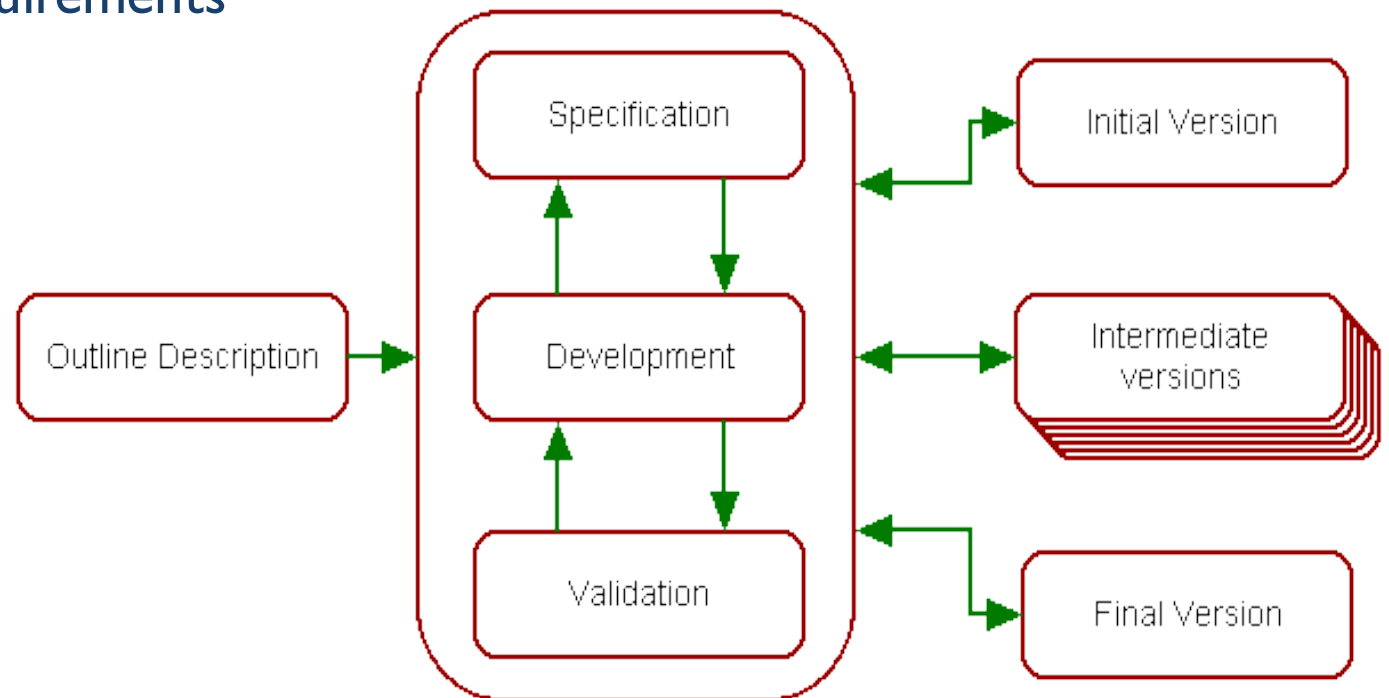


PROTOTYPING MODEL

- ❑ Requirements are not clear and prototype serves as a mechanism for identifying software requirements
 - ❑ Iteration occurs as the prototype is tuned to satisfy the needs of the customer
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- ❑ System requirements **ALWAYS** evolve in the course of a project, so process iteration is useful where earlier stages are reworked is always part of the process for large systems

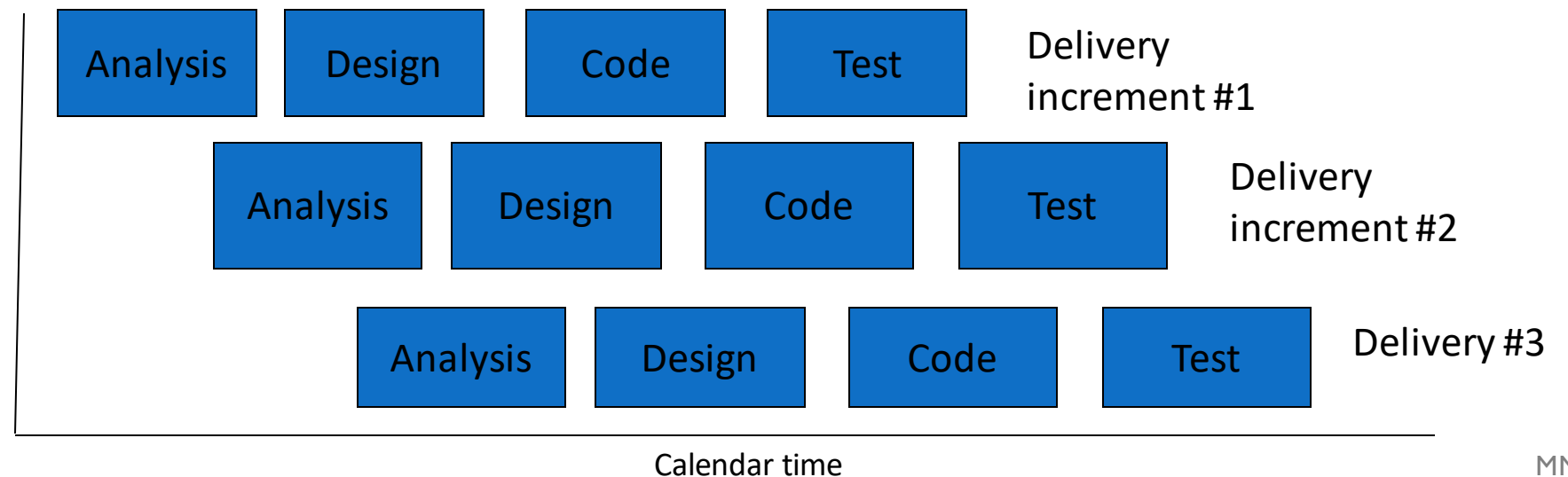
EVOLUTIONARY DEVELOPMENT

- ❑ **Exploratory development:** Objective is to work with customers and to evolve a final system from an initial outline specification. Should start with well-understood requirements
- ❑ **Throw-away prototyping:** Objective is to understand the system requirements. Should start with poorly understood requirements



INCREMENTAL DEVELOPMENT

- ❑ Rather than deliver the system as a single delivery, the development and **delivery is broken down into increments** with each increment delivering part of the required functionality (SPIRAL).
The requirements are relatively certain but there are many complexities that leads to frequent changes.
- ❑ User requirements are prioritised and the **highest priority requirements** are included in early increments
- ❑ Once the development of an increment is started, the **requirements are frozen** though requirements for later increments can continue to evolve



INCREMENTAL DEVELOPMENT

❑ **Advantages of Incremental Development**

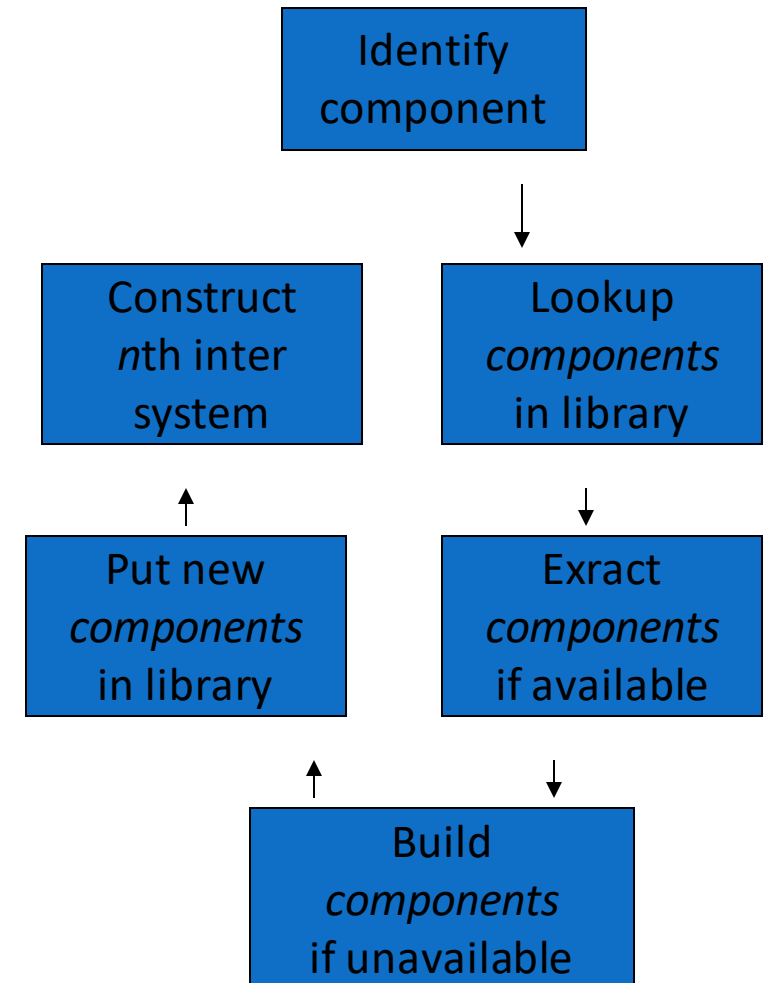
- Customer value can be delivered with each increment so system functionality is available earlier
- Deliver the core product first
- Early increments act as a prototype to help elicit requirements for later increments
- Lower risk of overall project failure
- The highest priority system services tend to receive the most testing

RAPID APPLICATION DEVELOPMENT (RAD)

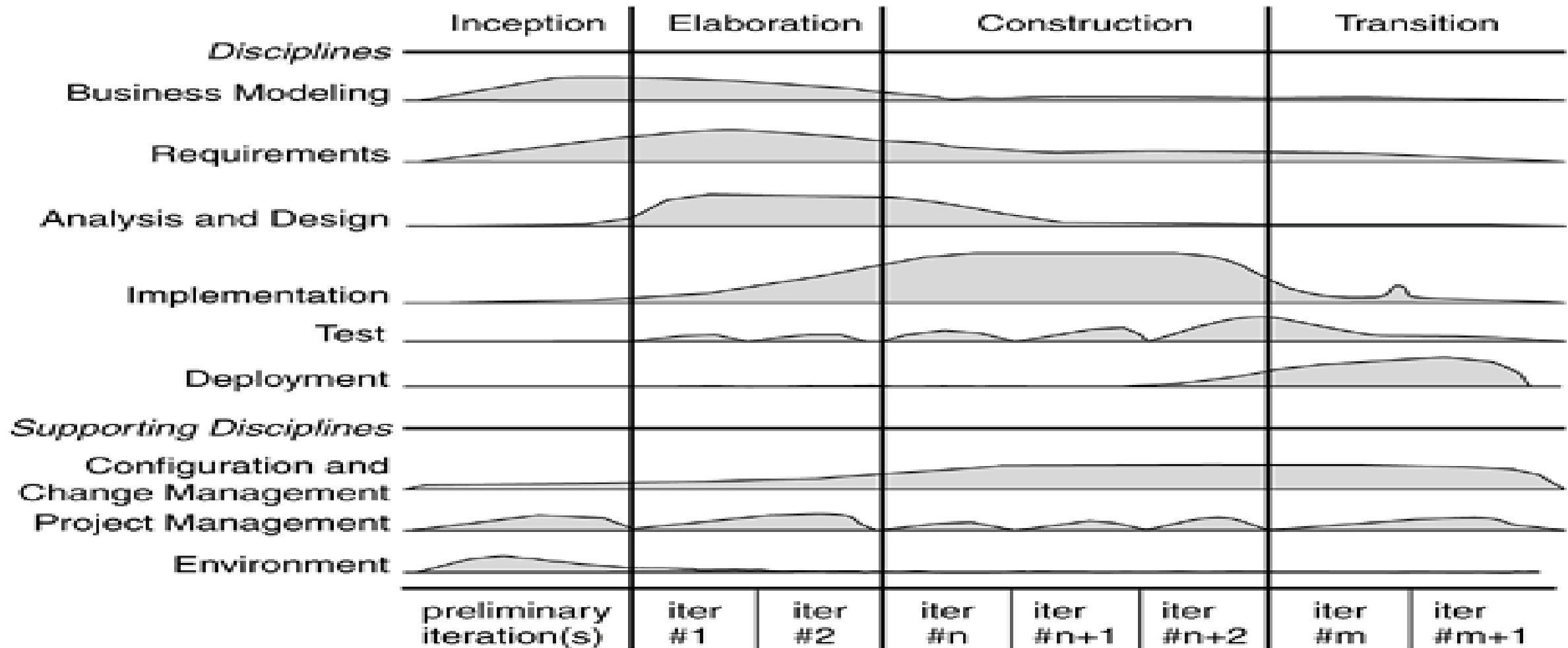
- ❑ It is a type of incremental model. The developments are time boxed, delivered and then assembled into a working prototype
- ❑ In RAD model the components or functions are **developed in parallel** as if they were mini projects (frozen requirements in each increments)
- ❑ This can quickly give the customer something to see and use and to provide feedback
- ❑ Delivers a fully functional system in **90 days**, give or take 30 days
- ❑ Phases of RAD are:
 - Requirements Planning
 - User Design (user interact with the system analysts)
 - Construction (program and application development)
 - Cutover (testing, changeover to new system, user training)

COMPONENT BASED DEVELOPMENT MODEL

- ❑ Suitable for re-usable object oriented classes
- ❑ Apply characteristics of spiral development

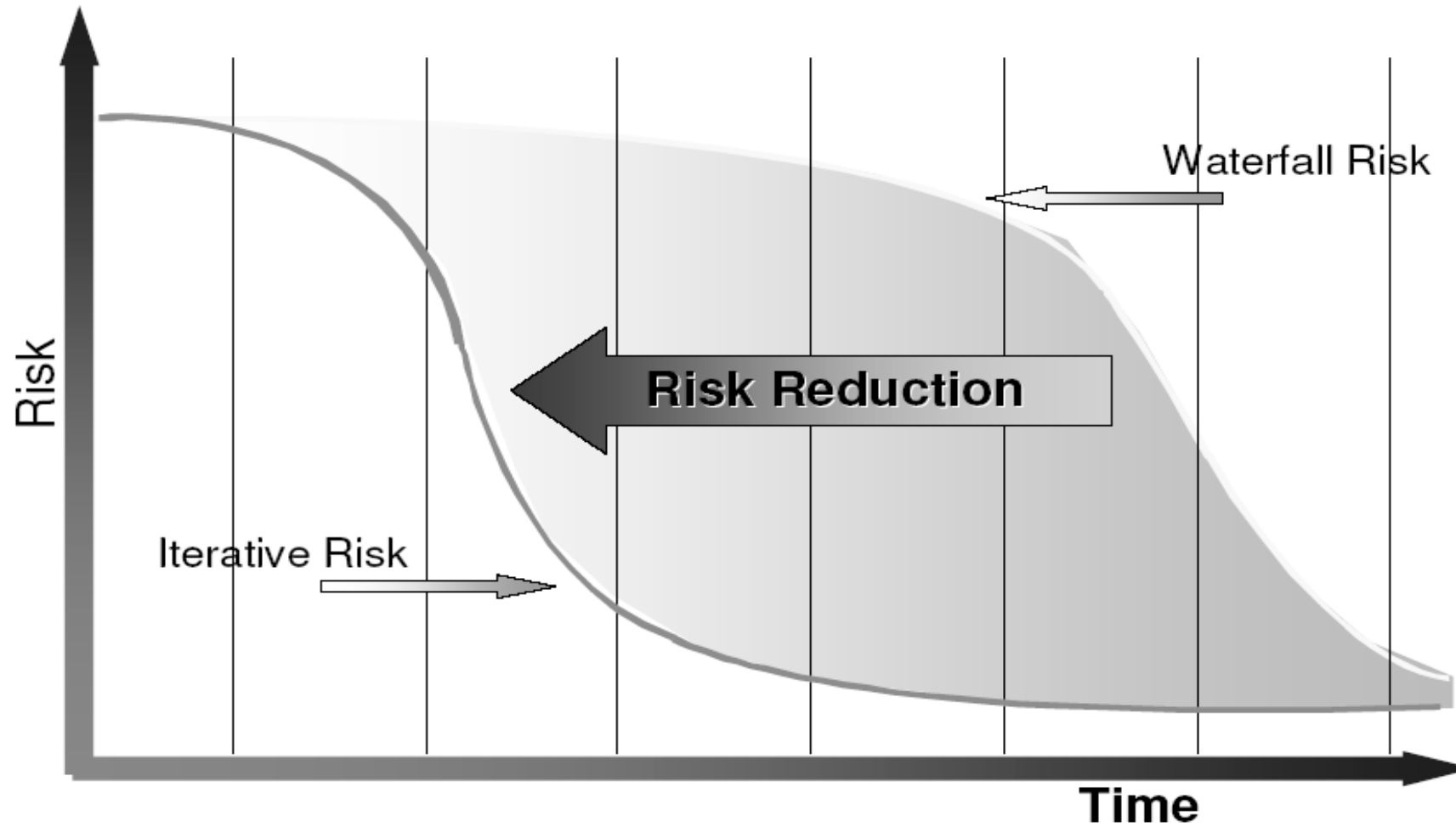


RATIONAL UNIFIED PROCESS (RUP)

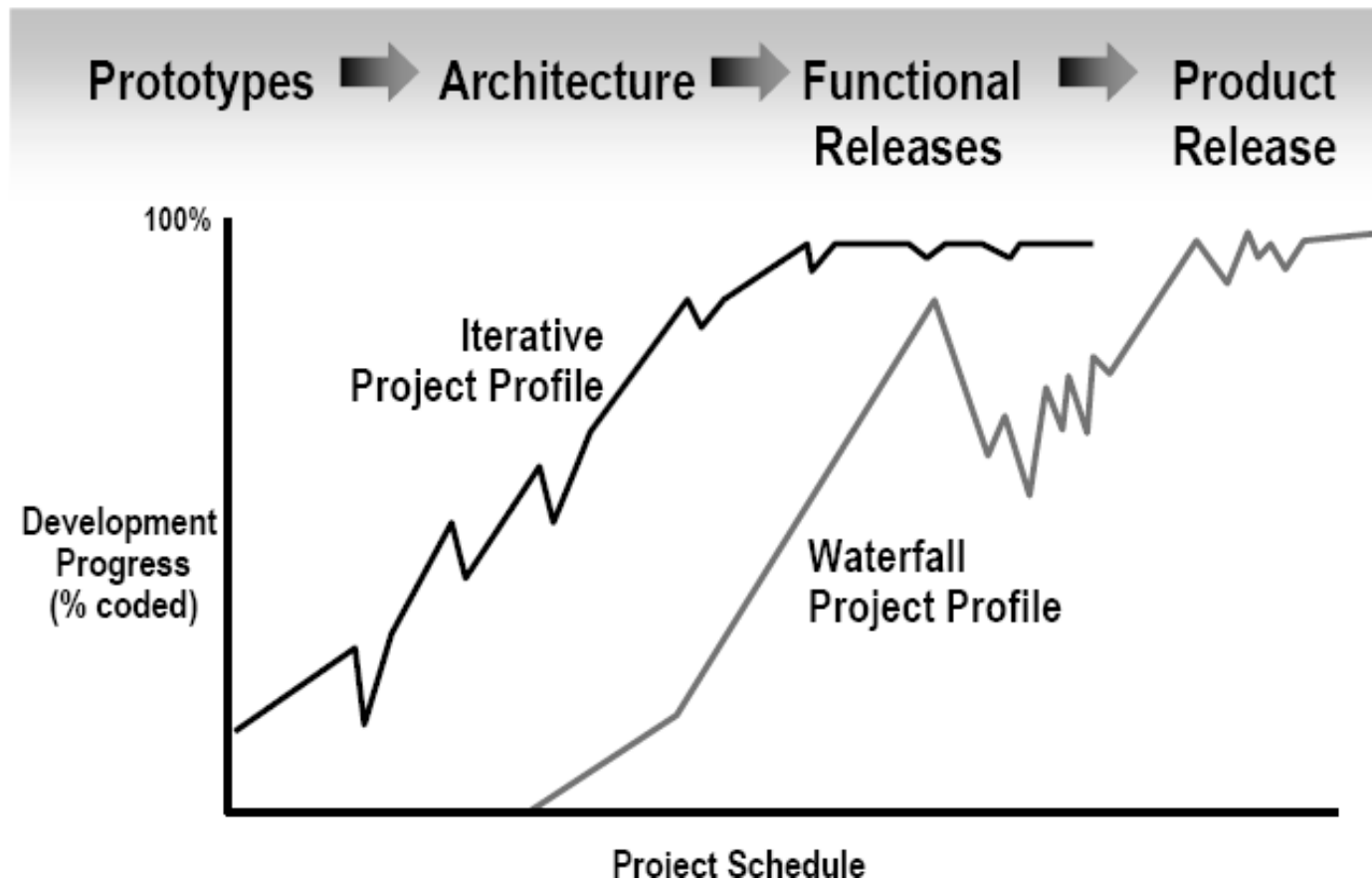


RISK PROFILE

Slide-12



REDUCE SCRAP/REWORK: USE AN ITERATIVE PROCESS



☐ Iterative Development

- Products are visible at an early stages of development
- Low probability of rework in case of defects in the deliverable product

REFERENCES

- R.S. Pressman & Associates, Inc. (2010). *Software Engineering: A Practitioner's Approach*.
- Kelly, J. C., Sherif, J. S., & Hops, J. (1992). An analysis of defect densities found during software inspections. *Journal of Systems and Software*, 17(2), 111-117.
- Bhandari, I., Halliday, M. J., Chaar, J., Chillarege, R., Jones, K., Atkinson, J. S., & Yonezawa, M. (1994). In-process improvement through defect data interpretation. *IBM Systems Journal*, 33(1), 182-214.