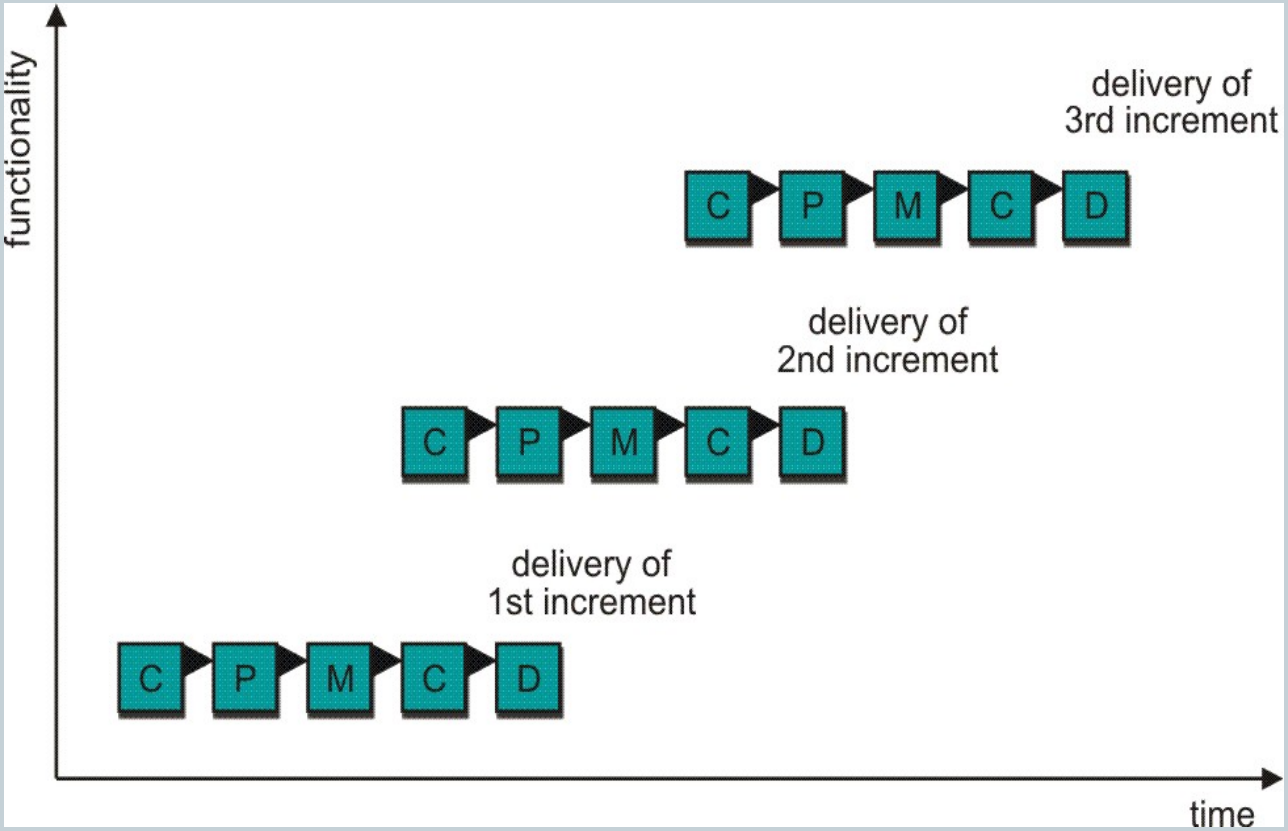
SOFTWARE ENGINEERING
(15B11CI513)

Credits :- 4 **Contact Hours :-** 3-1-0

Lecture 3: Software Process Model (cont…)

Incremental Process Model



C- Communication
P - Planning
M – Modeling
C - Construction
D - Deployment

Delivers software in small but usable pieces, each piece builds on pieces already delivered

Incremental Process Model

- The development and delivery is broken down into increments; with each increment delivering part of the required functionality.
- First Increment is often core product
  - Includes basic requirement
  - Many supplementary features (known & unknown) remain undelivered
- A plan of next increment is prepared
  - Modifications of the first increment
  - Additional features of the first increment
- It is particularly useful when enough staffing is not available for the whole project
- Increments can be planned to manage technical risks.
- Incremental model focus more on delivery of operation product with each increment.

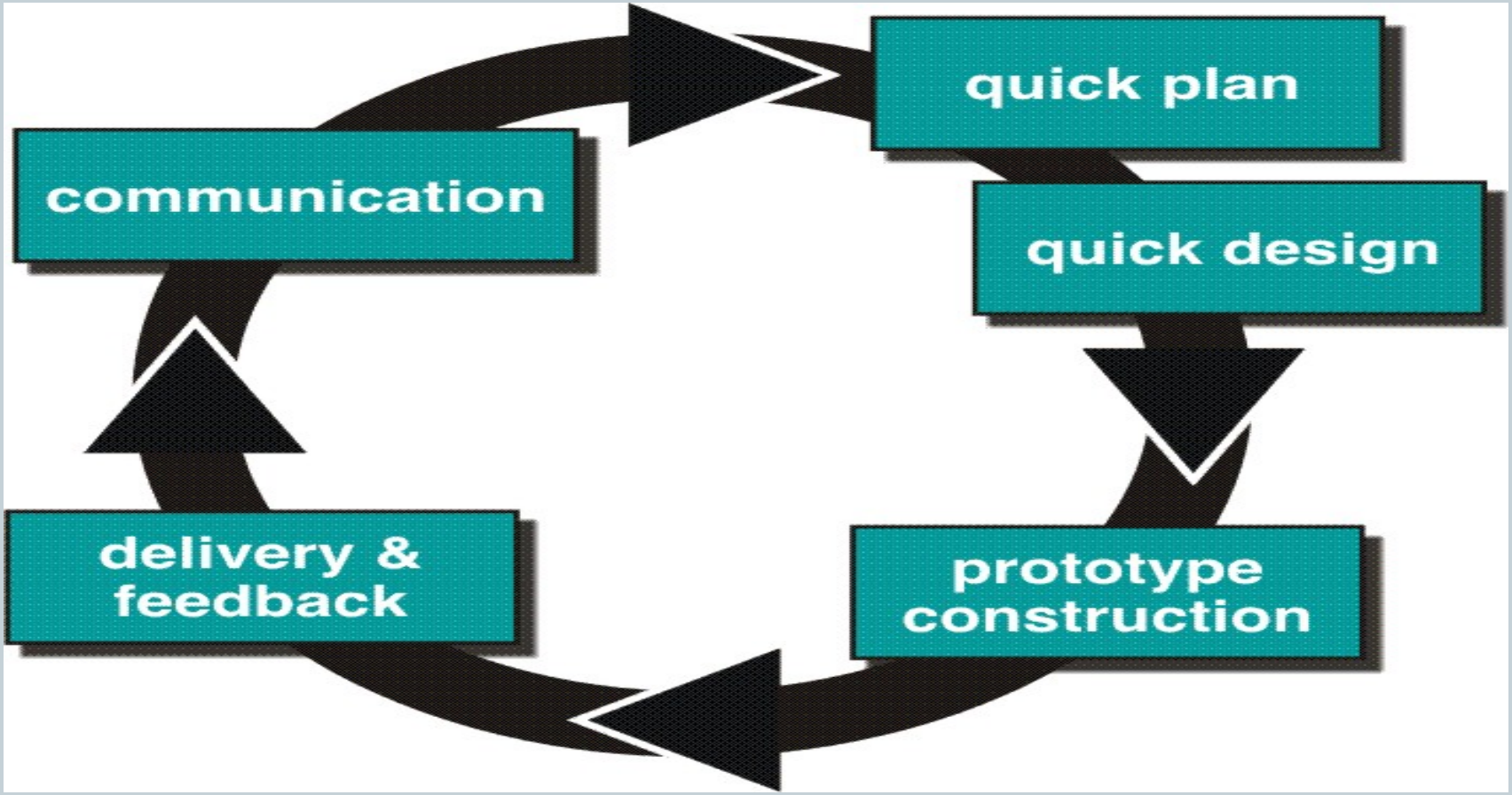
Incremental Process Model

- 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.
- Early increments act as a prototype to help elicit (develop) requirements for later increments.
- Lower risk of overall project failure.

Evolutionary Process Model

- Produce an increasingly more complete version of the software with each iteration.
- Evolutionary Models are iterative.
- Evolutionary models are:
  - Prototyping
  - Spiral Model
  - Concurrent Development Model
  - Fourth Generation Techniques (4GT)
- Here will focus only on the first two models.

Evolutionary Process Models : Prototyping



Evolutionary Process Model :Prototyping

- **Best approach when**:
  - *Objectives defined by customer are general but does not have details like input, processing, or output requirement.*
  - *Developer may be unsure of the efficiency of an algorithm, O.S., or the form that human machine interaction should take.*
- It can be used as standalone process model.
- Model assist software engineer and customer to better understand what is to be built when requirement are fuzzy.
- Prototyping start with communication, between a customer and software engineer to define overall objective, identify requirements and make a boundary.
- Going ahead, planned quickly and modeling (software layout visible to the customers/end-user) occurs.

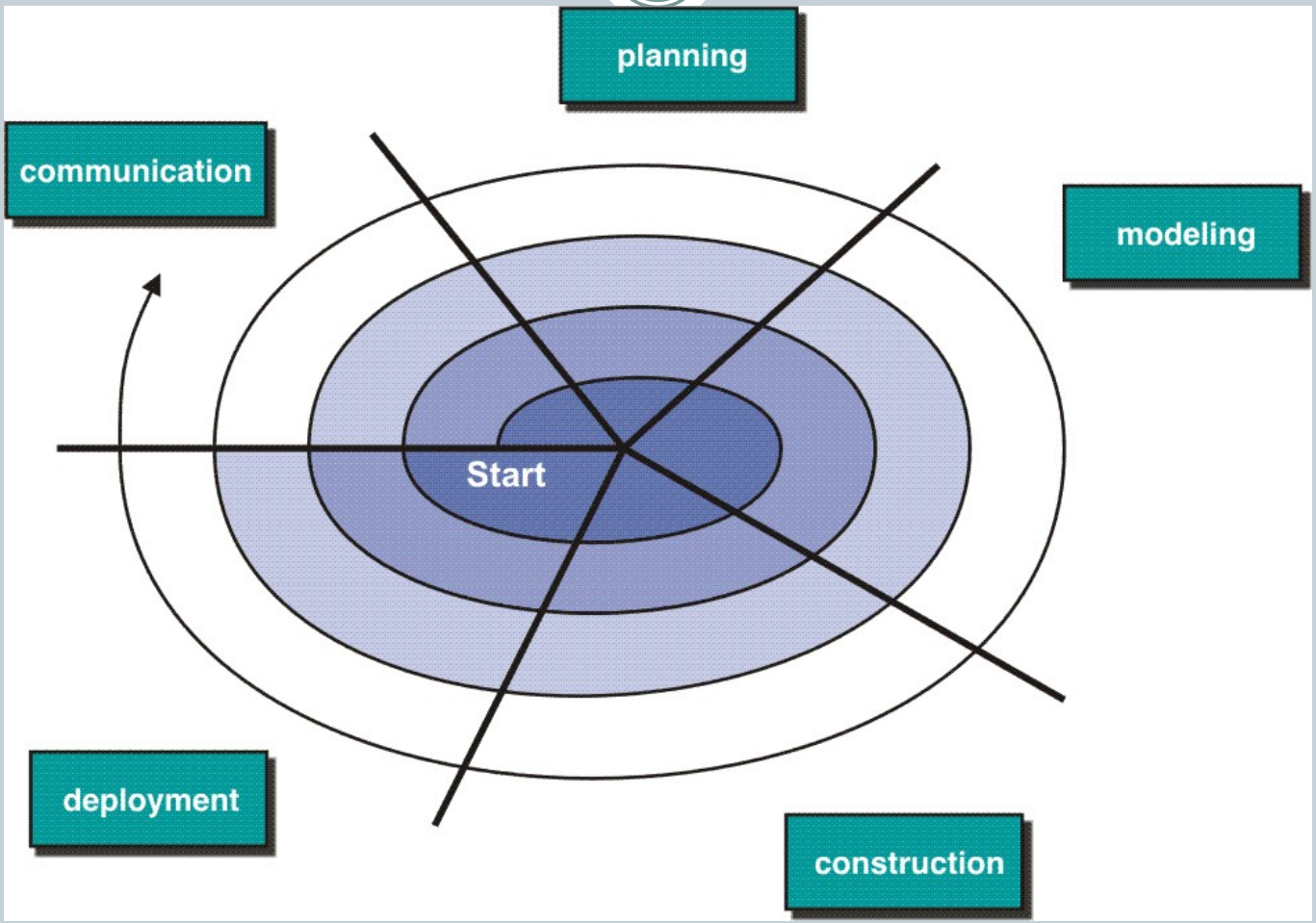
Evolutionary Process Model :Prototyping

- Quick design leads to prototype construction.
- Prototype is deployed and evaluated by the customer/user.
- Feedback from customer/end user will refine requirement and that is how iteration occurs during prototype to satisfy the needs of the customer.
- Prototype can be serve as “the first system”.
- Both customers and developers like the prototyping paradigm.
  - Customer/End user gets a feel for the actual system…very soon!
  - Developer get to build something immediately.

Prototyping Model: Problems

- Customer cries foul and demand that "a few fixes" be applied to make the prototype a working product, due to that software quality suffers as a result.
- Developer often makes implementation in order to get a prototype working quickly without considering other factors in mind like OS, Programming language, etc.
- Customer and developer both must be agree that the prototype is built to serve as a mechanism for defining requirement.

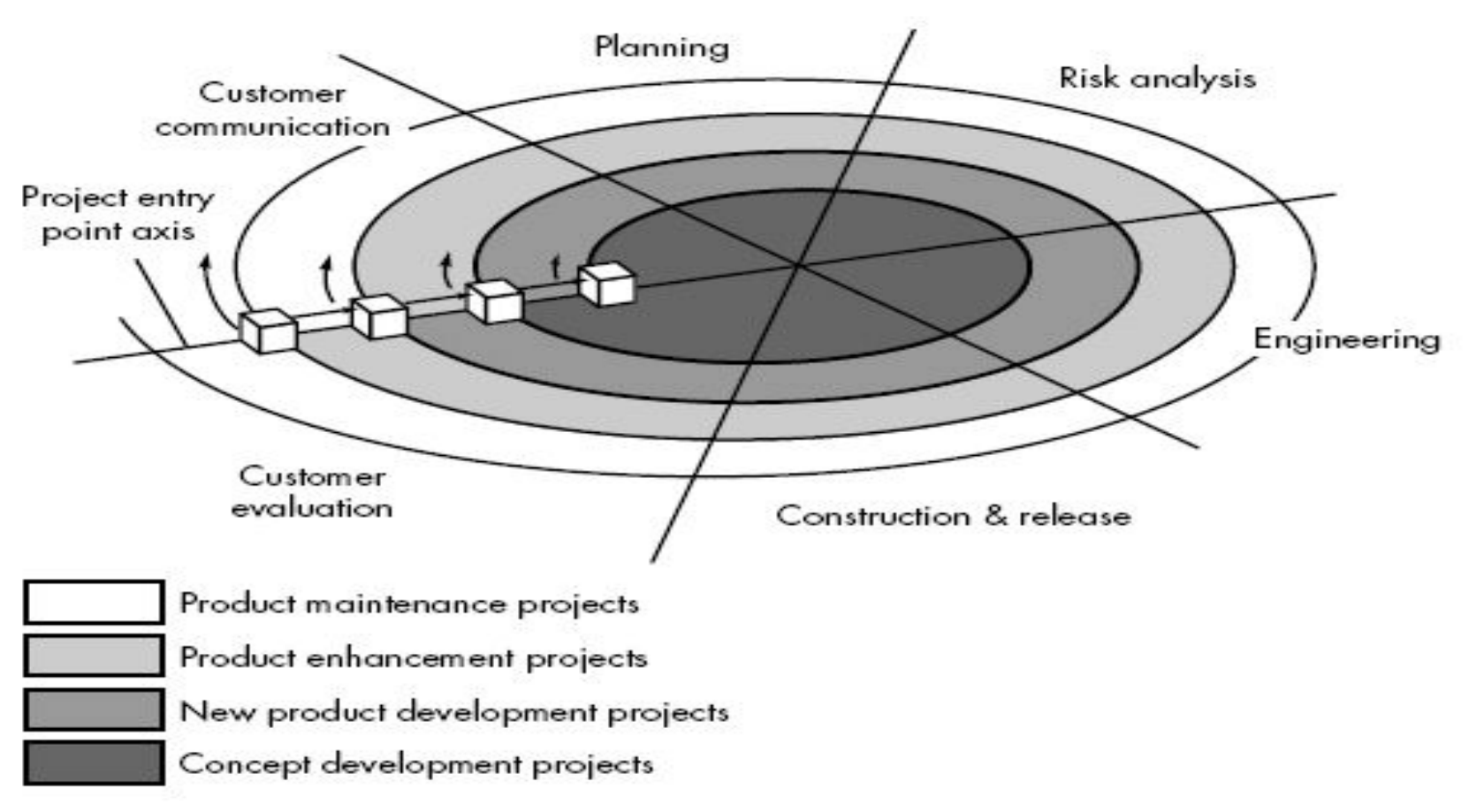
Evolutionary Model: Spiral Model



Evolutionary Model: Spiral Model

- Iterative nature of prototyping + Waterfall = Spiral
- Using spiral, software developed in as series of evolutionary release.
  - Early iteration, release might be on paper or prototype.
  - Later iteration, more complete version of software.
- Divided into framework activities (C,P,R,M,C,D). Each activity represent one segment.
- Evolutionary process begins in a clockwise direction, beginning at the center risk.
- *First circuit around the spiral might result in development of a product specification. Subsequently, develop a prototype and then progressively more sophisticated version of software.*

Evolutionary Model: Spiral Model



Evolutionary Model: Spiral Model

Concept Development Project:

- Start at the core and continues for multiple iterations until it is complete.
- If concept is developed into an actual product, the process proceeds outward on the spiral.

New Product Development Project:

- New product will evolve through a number of iterations around the spiral.
- Later, a circuit around spiral might be used to represent a "Product Enhancement Project"

Product Enhancement Project:

- There are times when process is dormant or software team not developing new things but change is initiated, process start at appropriate entry point.

Problem Area:

- It may be difficult to convince customers (particularly in contract situations) that the evolutionary approach is controllable.

- If a major risk is not uncovered and managed, problems will undoubtedly occur.