Software Engineering

Lecture 2.1
Introduction to Software Processes

SAURABH SRIVASTAVA

ASSISTANT PROFESSOR

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IIT (ISM) DHANBAD

Let's cook some Paneer Manchurian :-D

Here's the recipe !!

Ingredients:
250 gms (1/2 lbs) **Paneer (cottage cheese)**
2 tablespoons Maida (all purpose flour)
4 tablespoons Cornflour (corn starch)
1/2 teaspoon Garlic Paste
1/2 teaspoon Ginger Paste
Cooking Oil
Salt
1/4 cup Water
For Sauté
1/2 teaspoon Garlic Paste
1/2 teaspoon Ginger Paste
1/4 cup finely chopped Capsicum
1 small Onion, finely chopped
1 Green Chilli, finely chopped
2 tablespoons finely chopped Spring Onion
2 tablespoons Cooking Oil
1 tablespoons Soy Sauce
1/2 tablespoon Chilli Sauce
2 tablespoons Tomato Ketchup
Salt

Directions for Manchurian:

1. Cut paneer (cottage cheese) into small cubes. Mix maida flour, cornflour, salt, ginger paste and garlic paste with 1/4 cup water in a bowl and make a thick batter. Add paneer cubes in prepared batter, mix and let them marinate for 20 minutes.
2. Heat oil in kadai (pan). Deep fry marinated, batter coated paneer cubes over medium flame until they turn golden brown.
3. Drain and transfer them to plate having absorbent kitchen paper spread on it (to remove excess oil).

Directions for Sauté:

1. Heat 2 tablespoons oil in a wide, thin-bottomed pan on medium flame. Add ginger paste, garlic paste and sauté for 30 seconds on medium flame.
2. Add chopped green chilli, diced capsicum and diced onion. Sauté for 2-3 minutes.
3. Add soy sauce, tomato ketchup, chilli sauce and salt. Add fried paneer pieces and spring onion; mix well. Toss everything multiple times and cook for 1-2 minutes on high flame.
4. Paneer manchurian dry is ready. Garnish with chopped spring onion and serve.

Source: https://foodviva.com/chinese-recipes/paneer-manchurian-recipe/

Let's cook some Paneer Manchurian :-D

Ingredients for Paneer Manchurian Recipe

- Paneer (cottage cheese) cut into ½ inch cubes 200 grams
- Oil 1 tablespoon
- Garlic chopped 10-12 cloves
- Ginger chopped 1 inch piece
- Green chillies chopped 2-3
- Onion sliced 1 medium
- Vegetable stock 3 cups
- Soy sauce 2 tablespoons
- Salt to taste
- Black pepper powder 1 teaspoon
- Cornflour/ corn starch 1 teaspoon
- Spring onions chopped 2

Method

Step 1

Heat oil in a wok, add garlic, ginger and green chillies and sauté. Add onion and sauté till translucent.

Step 2

Add the stock and bring the mixture to a boil. Stir in soy sauce, salt and pepper powder. In a bowl mix the cornflour with one fourth cup of water and add it to the above sauce and cook till the sauce thickens.

Step 3

Add the cottage cheese pieces and spring onions. Simmer for two minutes. Serve hot.

… and here's one too !!

Source:
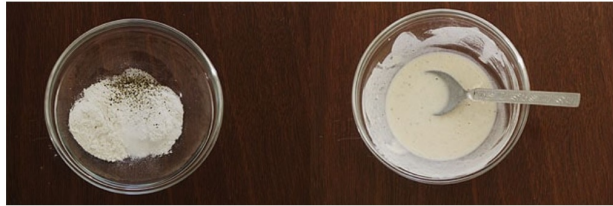https://www.sanjeevkapoor.com/recipe/Paneer-Manchurian.html

Let's cook some Paneer Manchurian :-D

Step By Step Photo Instructions:

1) First heat the oil in pan for deep frying. While the oil is getting hot, take all purpose flour, cornstarch, salt and pepper in a bowl and mix.

2) Add water to make thick, runny and lump-free batter.

3) Once the oil is hot enough for frying, take paneer pieces one by one and dip into the batter from all the sides.

4) And gently drop/slide into the hot oil.

… and if you want it with more details,

Source:
https://www.spiceupthecurry.com/paneer-manchurian-dry-recipe/

Let's cook some Paneer Manchurian :-D

Step By Step Photo Instructions:

5) Keep moving and turning around occasionally for even frying and browning.

1) F
flou

6) Once they are light golden brown from all the sides, remove them using slotted spatula and keep on paper towel lined plate.

2) A

7) Now heat 1 ½ tablespoons of oil in a pan on medium heat. Once hot add chopped
3) (ginger, garlic, green chili and celery.
the

8) Saute for 40-60 seconds or till the raw smell of ginger garlic goes away. Be careful
4) A not to burn the garlic.

... and if you want it with more details,

Source:
https://www.spiceupthecurry.com/paneer-manchurian-dry-recipe/

Let's cook some Paneer Manchurian :-D

Step By Step Photo Instructions:

5) Keep moving and turning around occasionally for even frying and browning.

1) P

flou 6) (

spa

2) A

9) Now add chopped onions and sprinkle little salt.

10) Mix and cook till onions get soft and translucent or light pink in color.

7) N

3) (gin 11) Now add black pepper powder and red chili flakes, mix.

the

8) S 12) Add soy sauce,

4) not

13) Followed by ketchup.

… and if you want it with more details,

Source:
https://www.spiceupthecurry.com/paneer-manchurian-dry-recipe/

Let's cook some Paneer Manchurian :-D

Step By Step Photo Instructions:

1) P...

flou 6) ...

spa...

2) A...

5) Keep moving and turning around occasionally for even frying and browning.

9) Now add chopped onions and sprinkle little salt.

14) Also add red chili sauce.

15) And add vinegar.

16) Mix everything well and cook for a minute. Then turn off the stove and let it cool for a minute.

7) N...

3) gin 11)...

the...

8) S 12)...

4) not...

13)...

17) Now add fried paneer and half of spring onion greens.

… and if you want it with more details,

Source:
https://www.spiceupthecurry.com/paneer-manchurian-dry-recipe/

Let's cook some Paneer Manchurian :-D

Step By Step Photo Instructions:

5) Keep moving and turning around occasionally for even frying and browning.
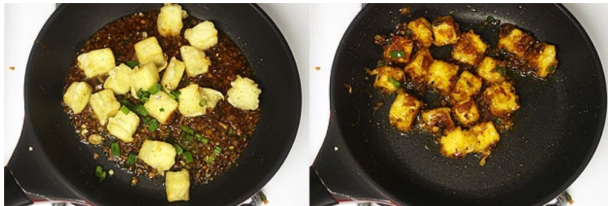
9) Now add chopped onions and sprinkle little salt.

14) Also add red chili sauce.

15) And add vinegar.

16) Mix everything well and cook for a minute. Then turn off the stove and let it cool for a minute.

18) Mix well so the sauce is coated to the paneer pieces.

17) Remove it to a serving plate and garnish with remaining spring onion greens.

... and if you want it with more details, here they are :D

Some people are too methodical !!

Source: https://www.spiceupthecurry.com/paneer-manchurian-dry-recipe/

Process Affects the Product

So how did all these Manchurian servings differ from each other?
- Well, most probably, <mark>in texture, taste, odor and many other attributes</mark>
- Even though, they are all "Paneer Manchurian"

The process that was used to make the dish affects the dish heavily
- All the more reason that you should learn cooking :P

Software Products are no different
- You may claim to have prepared the same final product as say, your competitor …
- … but your product could be significantly better or worse as compared to theirs

In this unit, we will have a look at the "process of developing a software"

Process, Activities, Actions and Tasks

Process
- ◦ A process is a collection of activities, actions, and tasks that are performed when some work product is to be created.

Activity
- ◦ An activity strives to achieve a broad objective (e.g., communication with stakeholders) and is applied regardless of the application domain, size of the project, complexity of the effort, or degree of rigor with which software engineering is to be applied.

Action
- ◦ An action (e.g., architectural design) encompasses a set of tasks that produce a major work product (e.g., an architectural model).
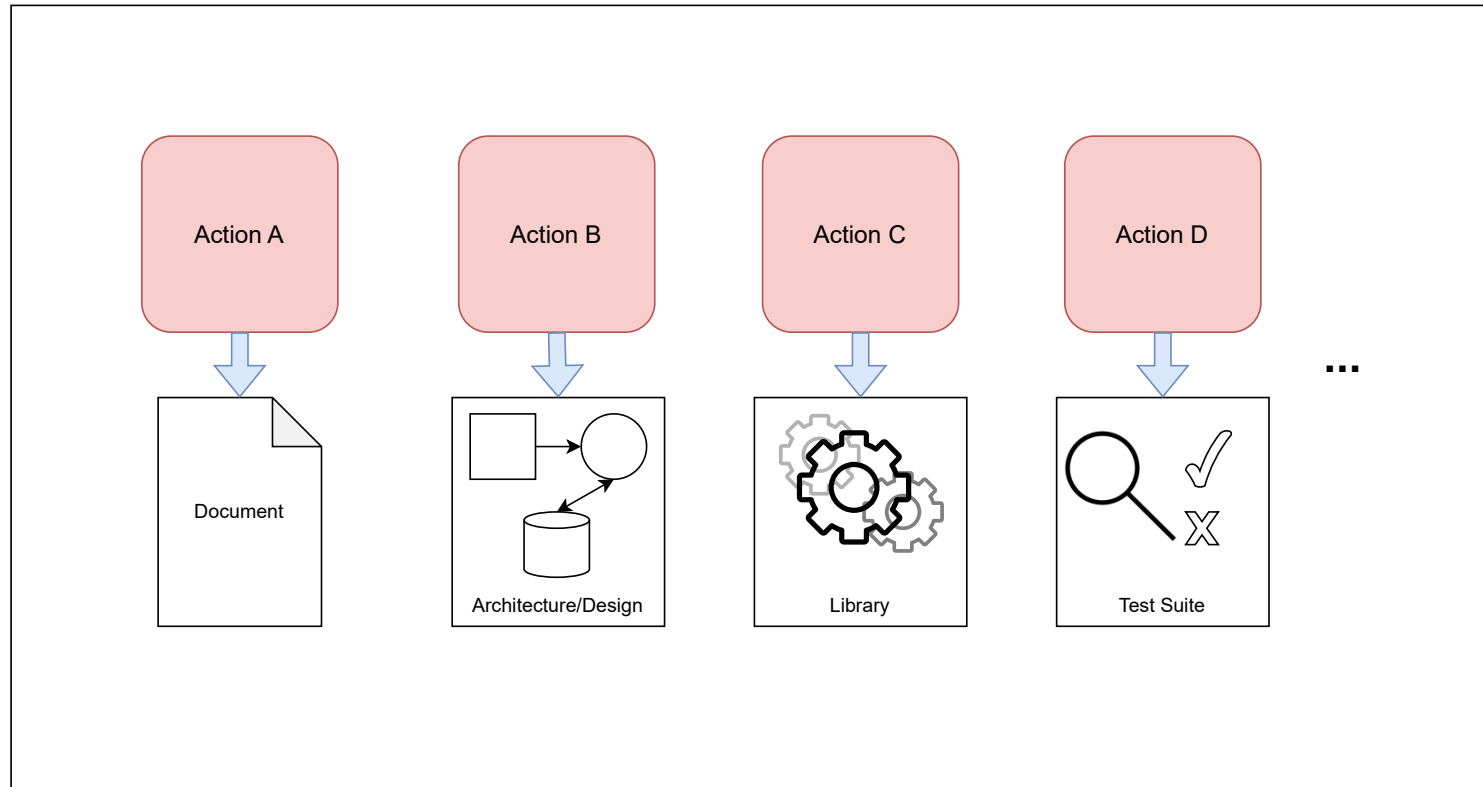
Task
- ◦ A task focuses on a small, but well-defined objective (e.g., conducting a unit test) that produces a tangible outcome.

- Software Engineering – A Practitioner's Approach, 8th Edition [**Roger S. Pressman** and **Bruce R. Maxim**]
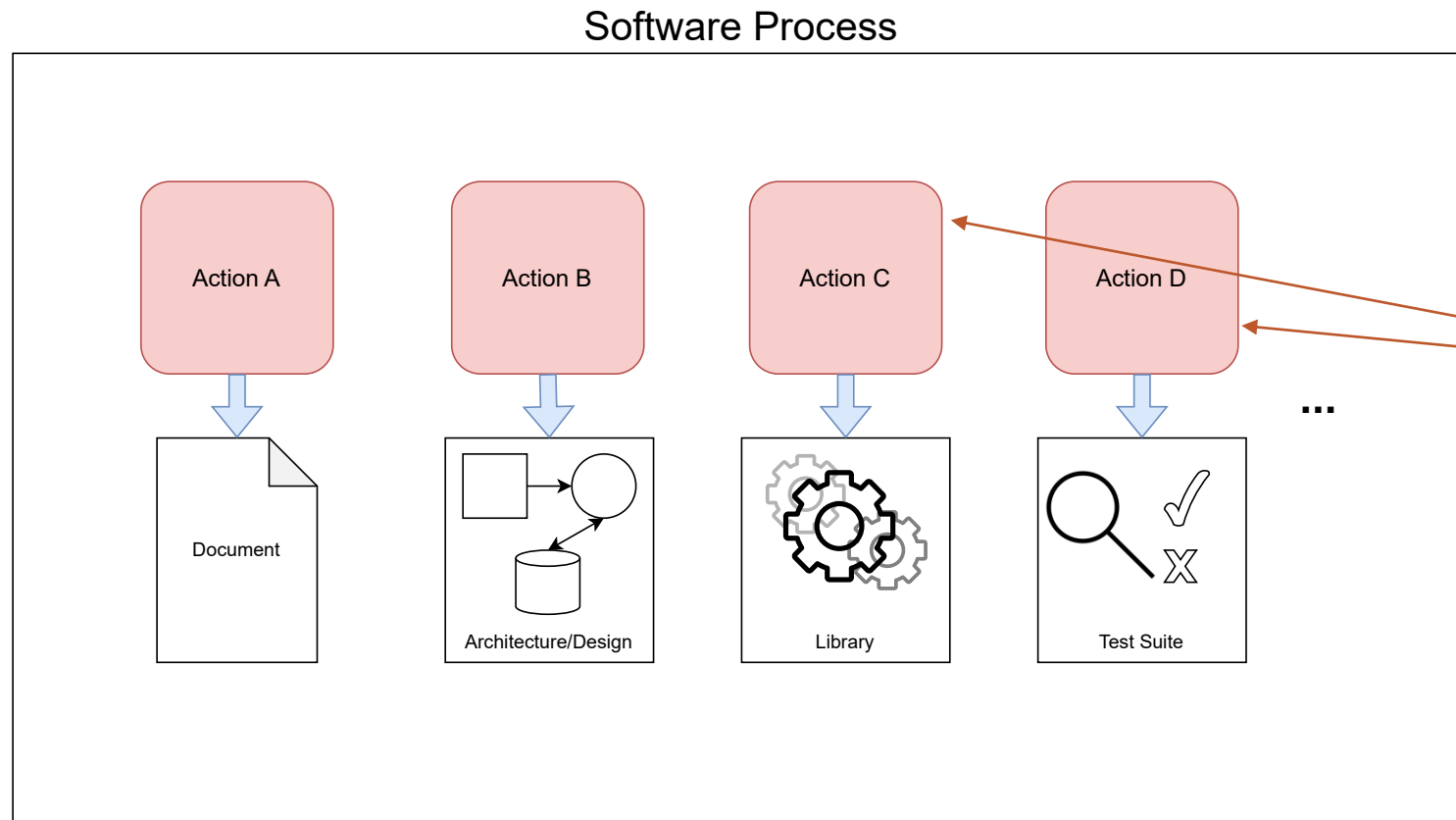
A Generic View of a Software Process

Software Process

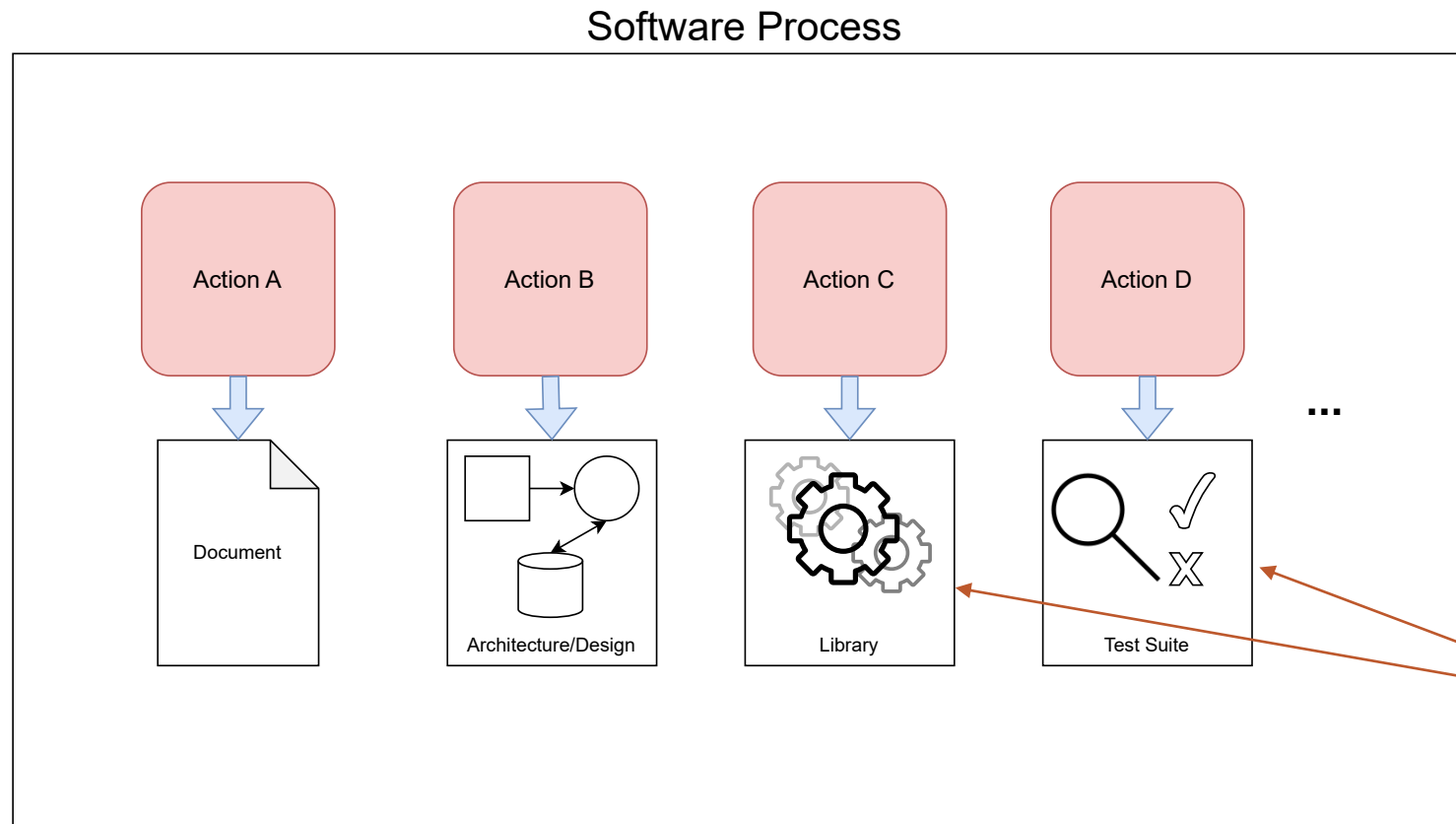A software process may be seen as a collection of multiple Actions

Action A

Action B

Action C

Action D

...

Document

Architecture/Design

Library

Test Suite

A Generic View of a Software Process

Software Process

Action A

Action B

Action C

Action D

Document

Architecture/Design

Library

Test Suite

...

A software process may be seen as a collection of multiple Actions

Each Action produces some Work Product

A Generic View of a Software Process

Software Process

Action A

Action B

Action C

Action D

...

Document

Architecture/Design

Library

Test Suite

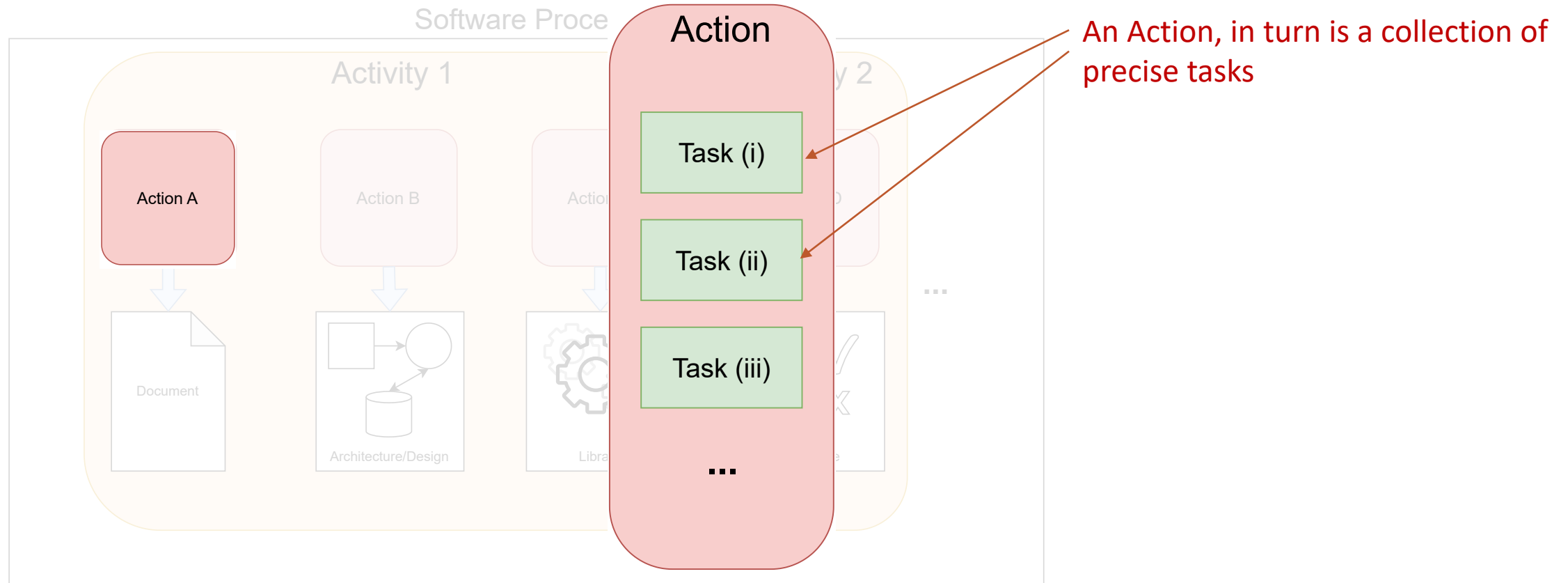A software process may be seen as a collection of multiple Actions

Each Action produces some Work Product

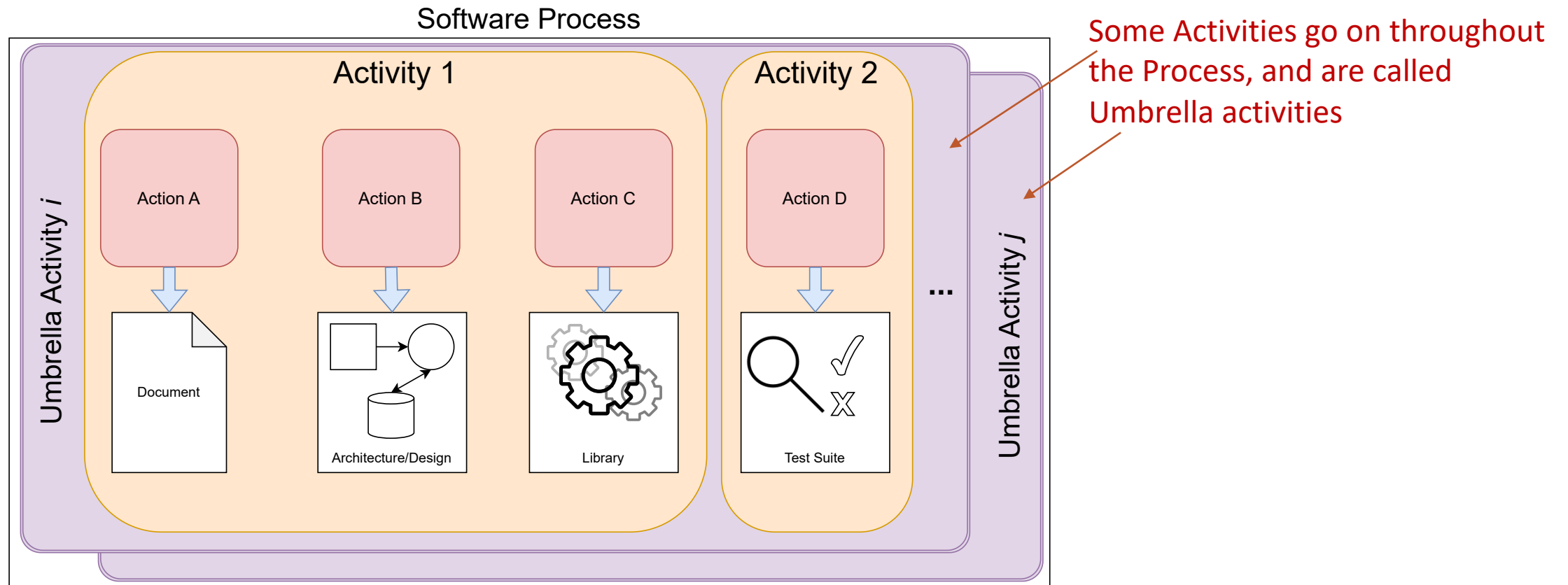Work Products could be anything – Documents, Test Cases, Code, Models etc.

A Generic View of a Software Process

Software Process

Related actions could be grouped together into an Activity

A Generic View of a Software Process
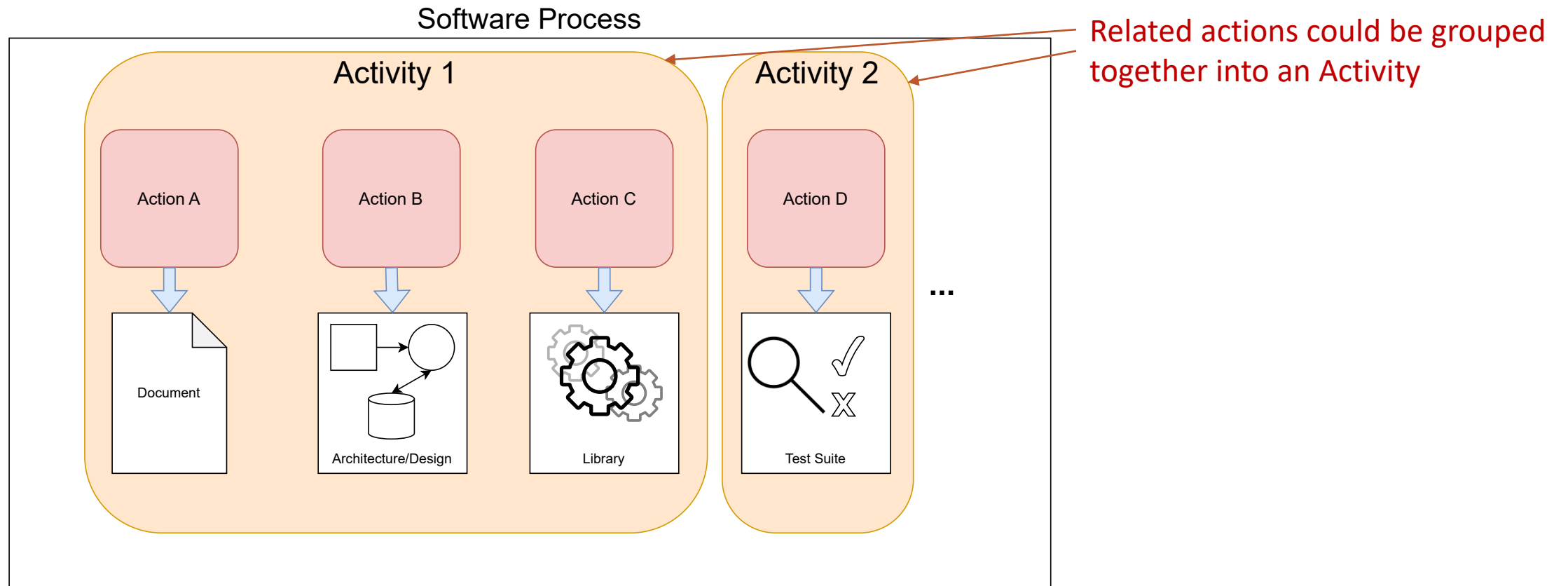
An Action, in turn is a collection of precise tasks

A Generic View of a Software Process

Examples

| Activity – Cook Paneer	Activity – Communication
◦ **Action : Get Paneer Cubes**	◦ **Action : Fix Appointment with Owner**
◦ Task 1: Purchase 200gm Paneer	◦ Task 1: Propose a meeting on next available day at 10 a.m.
◦ Task 2: Cut them into pieces not greater than inch in width	◦ Task 2: Confirm the meeting venue with the owner
◦ Produced Work Product – Paneer Cubes	◦ Produced Work Product – Client Meeting
◦ **Action : Heat up oil**	◦ **Action : Gather Requirements**
◦ Task 1: Switch on the burner	◦ Task 1: Ask questions about Requirements
◦ Task 2: Pour 100ml of Refined Soyabeen Oil	◦ Task 2: Apprise client of possible Project Milestones
◦ Produced Work Product – Hot Oil	◦ Task 3: Receive any existing documents (e.g., pamphlets)
◦ **Action : Fry Paneer Cubes**	◦ Produced Work Product – Crude Project Requirements
◦ Task 1: Ensure that oil's temperature is 80° C (heat it up or cool it down if it is not so)	◦ **Action : Refine and Confirm Requirements**
◦ Task 2: Put Paneer Cubes in the oil, stir for 1 minute and filter them out	◦ Task 1: Analyse Project Feasibility
◦ Produced Work Product – Fried Paneer	◦ Task 2: Prepare processed Requirements
	◦ Task 3: Send processed Requirements to Client for approval
	◦ Produced Work Product – Requirements Document
Cooking Paneer Manchurian	**Building Website for a Local Departmental Store**

Process Flow

Activities within a process may have different ordering

◦ For instance, in Waterfall model, the Activities have a *linear* flow

Linear flow
Iterative process flow
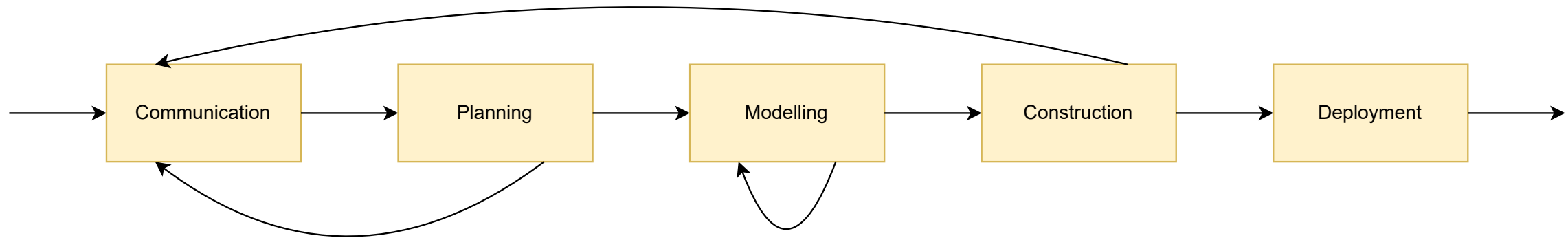
Linear Process Flow
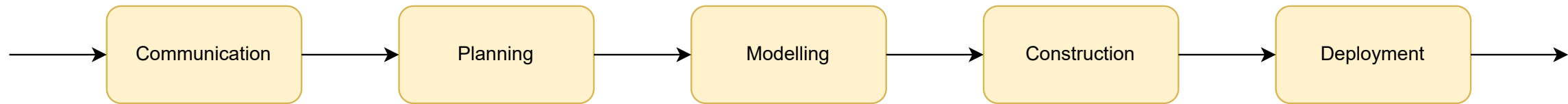
Process Flow

Activities within a process may have different ordering

◦ For instance, in Waterfall model, the Activities have a *linear* flow

An iterative Process may have some activities in a loop, before moving further

◦ For instance, there may be a back-and-forth ordering between Communication and Planning Activities

Iterative Process Flow

Process Flow

Activities within a process may have different ordering
- ◦ For instance, in Waterfall model, the Activities have a *linear* flow
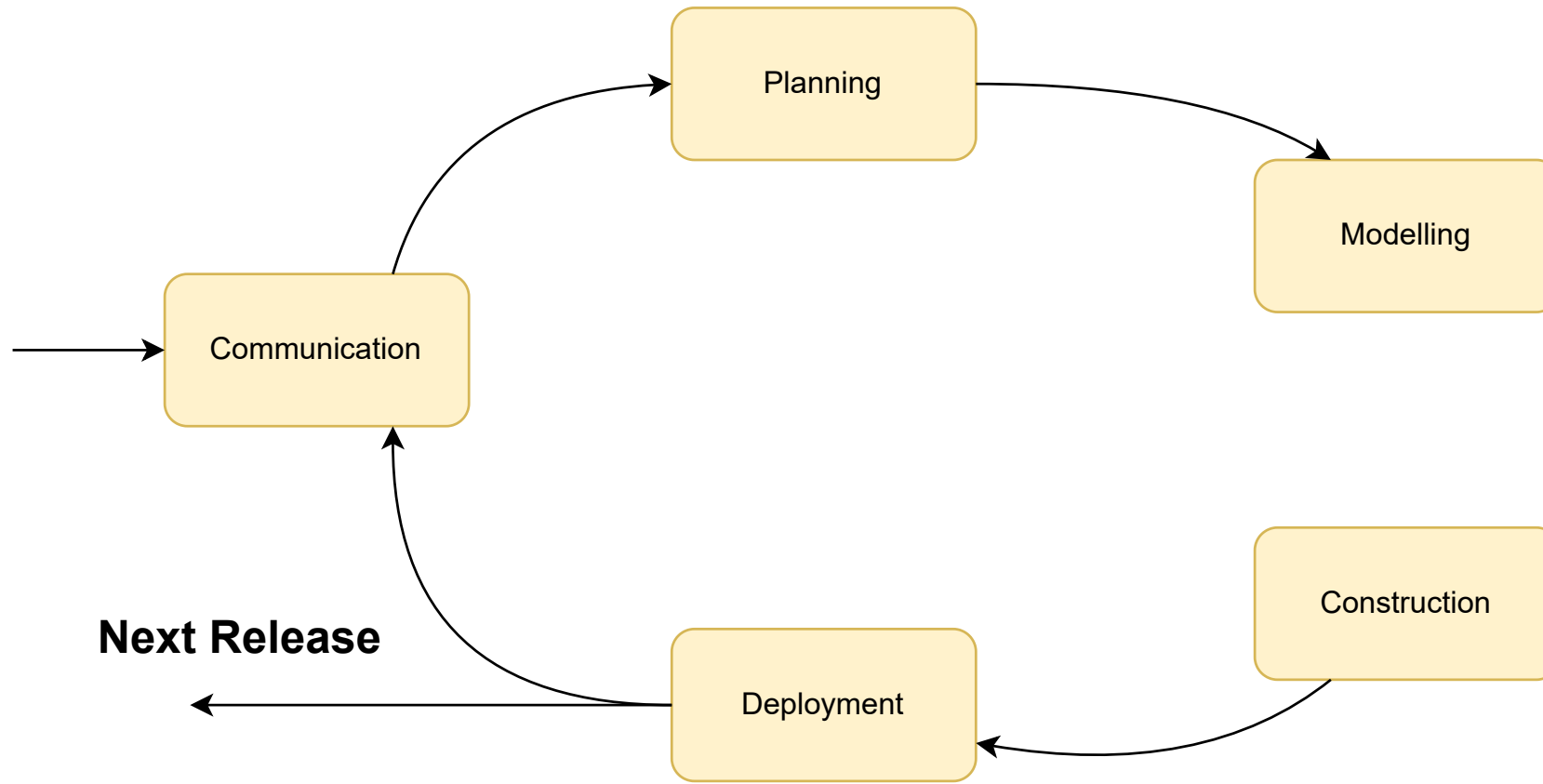
An iterative Process may have some activities in a loop, before moving further
- ◦ For instance, there may be a back-and-forth ordering between Communication and Planning Activities

An Evolutionary process goes through all activities in a circle, to produce one version of the software
- ◦ Subsequent versions are made with a similar approach

Evolutionary Process Flow

Process Flow

Activities within a process may have different ordering
- ◦ For instance, in Waterfall model, the Activities have a *linear* flow

An iterative Process may have some activities in a loop, before moving further
- ◦ For instance, there may be a back-and-forth ordering between Communication and Planning Activities
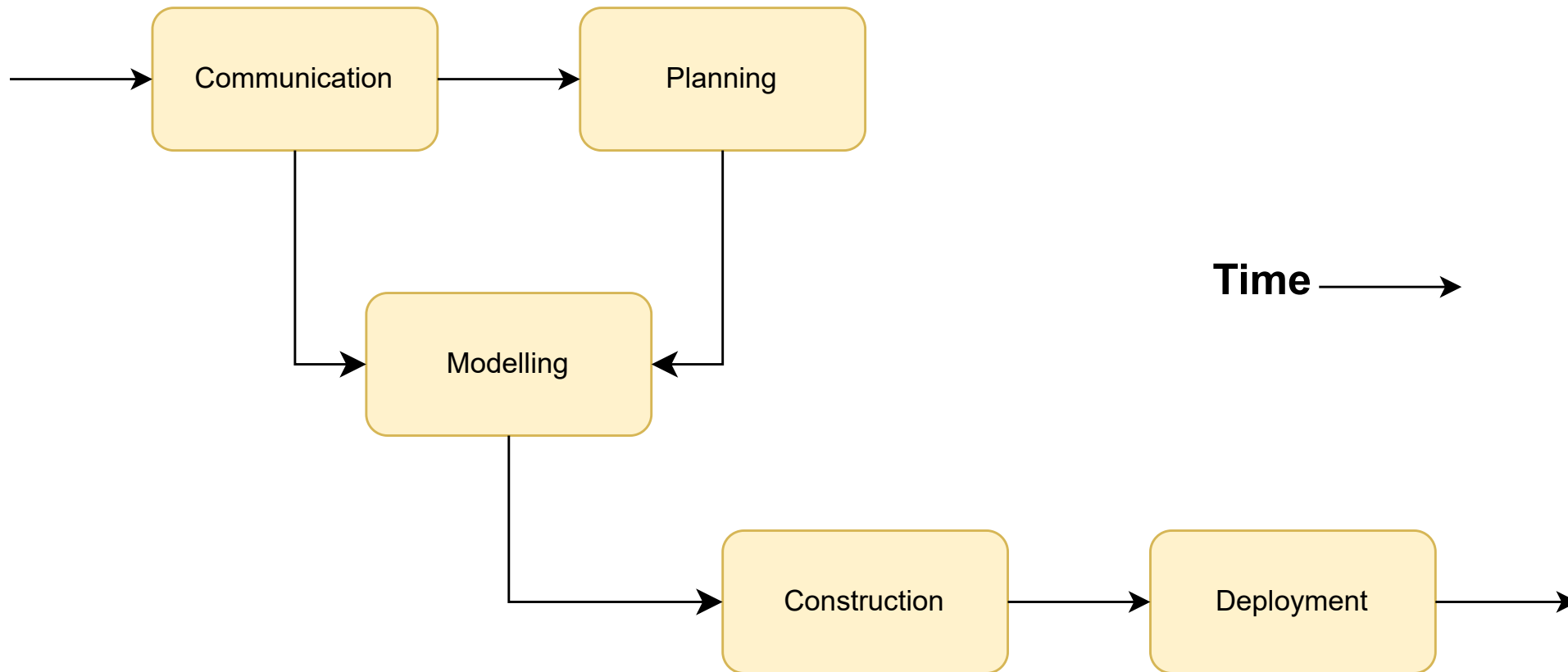
An Evolutionary process goes through all activities in a circle, to produce one version of the software
- ◦ Subsequent versions are made with a similar approach

A Parallel process may include performing two or more activities in parallel or overlapped fashion
- ◦ For example, planning may go on for more complex modules, while the construction of simple modules may start

Process Flow

Activities within a process may have different ordering
◦ For instance, in Waterfall model, the Activities have a *linear* flow

An iterative Process may have some activities in a loop, before moving further
◦ For instance, there may be a back-and-forth ordering between Communication and Planning Activities

An Evolutionary process goes through all activities in a circle, to produce one version of the software
◦ Subsequent versions are made with a similar approach

A Parallel process may include performing two or more activities in parallel or overlapped fashion
◦ For example, planning may go on for more complex modules, while the construction of simple modules may start

This unit is dedicated to exploring various process flow topologies
◦ We will see the merits (and possible demerits) of different flows

Homework

Most of the content in this Lecture is from Chapter 3, *Software Engineering – A Practitioner's Approach*, 8th Edition, **Roger S. Pressman** and **Bruce R. Maxim**

- If you have not yet done so, at least start with Chapter 1 now !!
- You have to eventually reach Chapter 3 :-D

linear
Iterative
Distributed
Parallel