CSc 131
Computer Software Engineering

Chapter 2
SW Product Life Cycle

Herbert G. Mayer, CSU CSC

Status9/4/2019

Syllabus

- **Caveat**

- **Definition of PLC**

- **Four Phases of PLC**

- **Six Phases of Software PLC**

- **Overview of PLC**

- **SWE Action Over PLC Phases**

- **PLC Summary**

- **References**

Definition of SW PLC

**The SW Product life cycle (PLC)
describes a framework
by which an organization manages
the development of its products
from inception to EOL**

Caveat

- **Several similar PLC models have been published**

- **Key differences are**

    - **The dates of their publication**

    - **The number of consecutive PLC phases**

    - **And slight variations of names for the same concept**

- **But they generally are equally valid, quite similar**

- **As long as your SW development organization strictly adheres to the sound engineering principles of any one of them:**

    - **your product, your SW organization will have great potential of benefit**

- **We'll discuss 2 in CSc 131**

Four Phases of Software PLC

1. **Exploration**
2. **Planning**
3. **Development**
4. **Refresh**

Six Phases of Software PLC

1. **Requirements Gathering**

2. **Requirements Specification**

3. **Architecture Design**

4. **Detailed Design**

5. **Implementation**
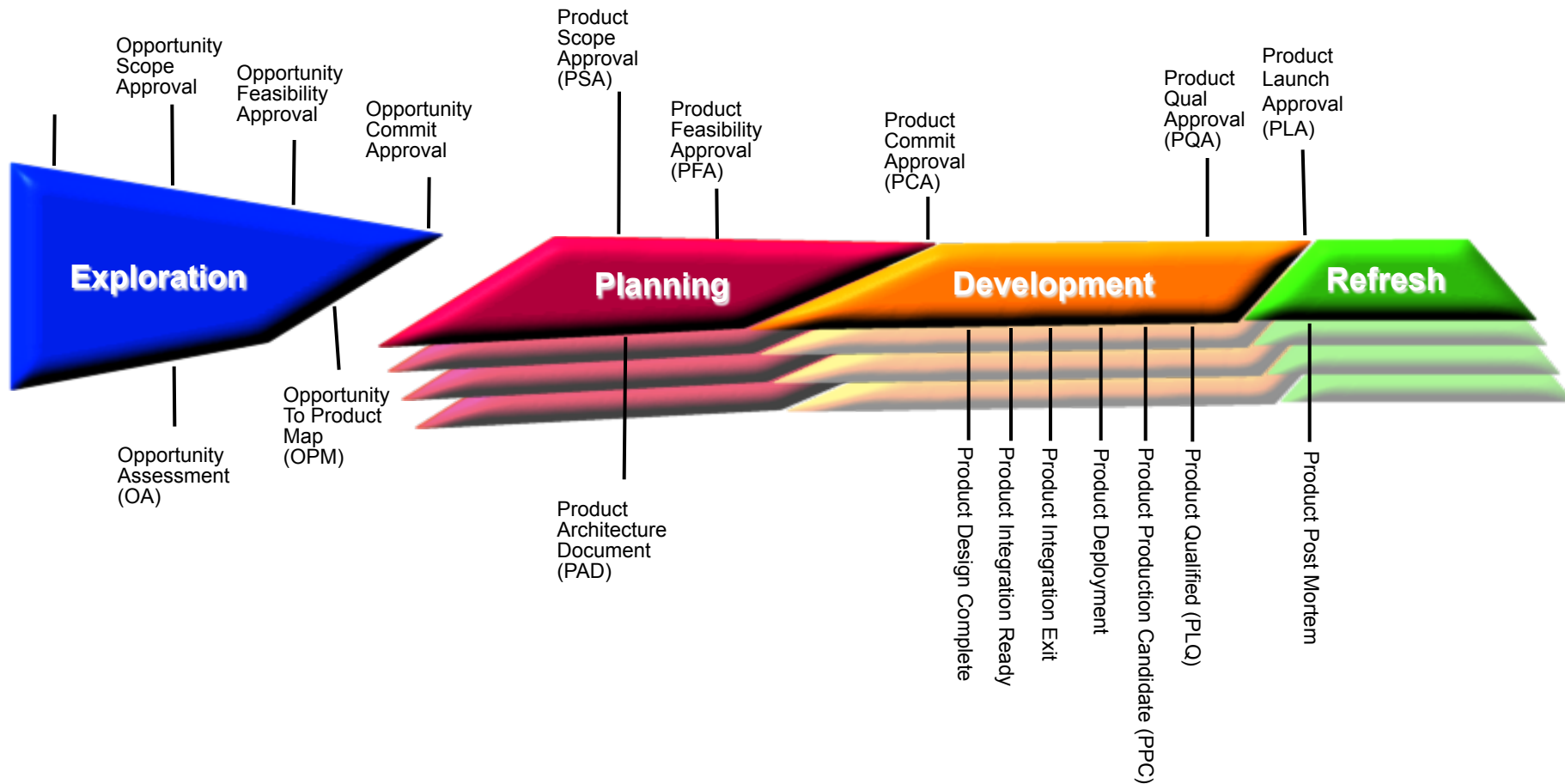
6. **Validation and Verification**

Overview of Product Life Cycle

Exploration · **Planning** · **Development** · **Refresh**

- *Exploration Phase*
- *Planning Phase*
- *Development Phase*
- *Refresh Phase*

All partly overlapping

Overview of Product Life Cycle

Opportunity Scope Approval

Opportunity Feasibility Approval

Opportunity Commit Approval

Product Scope Approval (PSA)

Product Feasibility Approval (PFA)

Product Commit Approval (PCA)

Product Qual Approval (PQA)

Product Launch Approval (PLA)

Exploration

Planning

Development

Refresh

Opportunity To Product Map (OPM)

Opportunity Assessment (OA)

Product Architecture Document (PAD)

Product Design Complete

Product Integration Ready

Product Integration Exit

Product Deployment

Product Production Candidate (PPC)

Product Qualified (PLQ)

Product Post Mortem
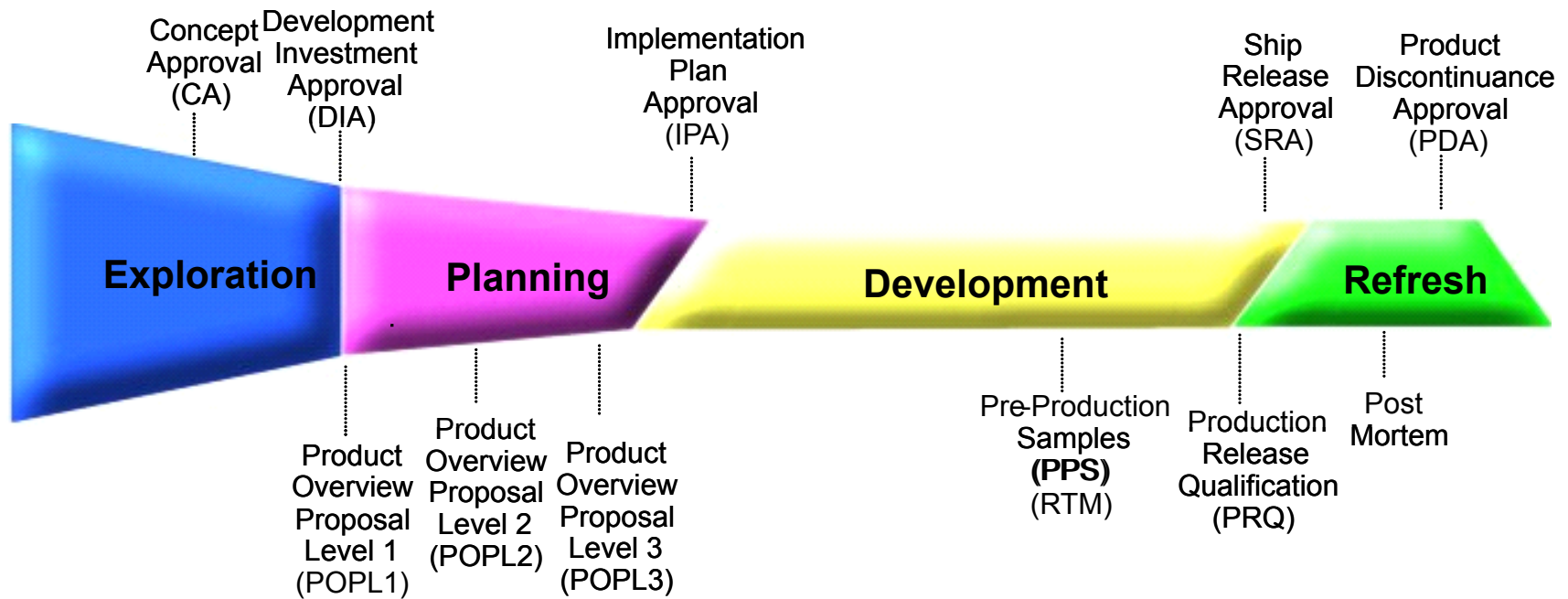
Product Life Cycle

- *Exploration Phase* analyzes market, business and technology trends & opportunities which identify product solutions, which are implementable and of clear added value

- *Planning Phase* formalizes next level of detail including market requirements, decision times, product scope, usage, features, technology integration, and POR

- *Development Phase* implements requirements defined in Planning Phase; its Milestones are synchronization points to quantify progress toward goal

- *Refresh Phase* constitutes further product revisions (or EOL) after initial product launch; may include updates to software, hardware, and other technologies

SWE Action Over PLC Phases

Concept Approval (CA)

Development Investment Approval (DIA)

Implementation Plan Approval (IPA)

Ship Release Approval (SRA)

Product Discontinuance Approval (PDA)

Exploration

Planning

Development

Refresh

Product Overview Proposal Level 1 (POPL1)

Product Overview Proposal Level 2 (POPL2)

Product Overview Proposal Level 3 (POPL3)

Pre-Production Samples **(PPS)** (RTM)

Production Release Qualification (PRQ)

Post Mortem

SWE Action Over PLC Phases

- **Concept Approval:**
  - **First phase; note, may result in non-approval**
  - **Approval pre-condition for start of next phase**
  - **Approval means: technology appears sound, financing available, human, compute, and other resources available**

- **Planning:**
  - **Consists of 3 product overview proposals**
  - **Always with decision: go on, or else abort**
  - **You will use three successive plans in your NWT project**

# SWE Action Over PLC Phases

- **Development:**
  - Detailed design
  - Coding and implementation
  - Include document creation
  - Design reviews
  - Code walk-through
  - ID early adopters and users of beta product, AKA pre-production samples
  - SW product release

- **Refresh:**
  - Correct existing errors
  - Add further capabilities dictated by user/customer
  - Decide: new refresh? or else EOL!
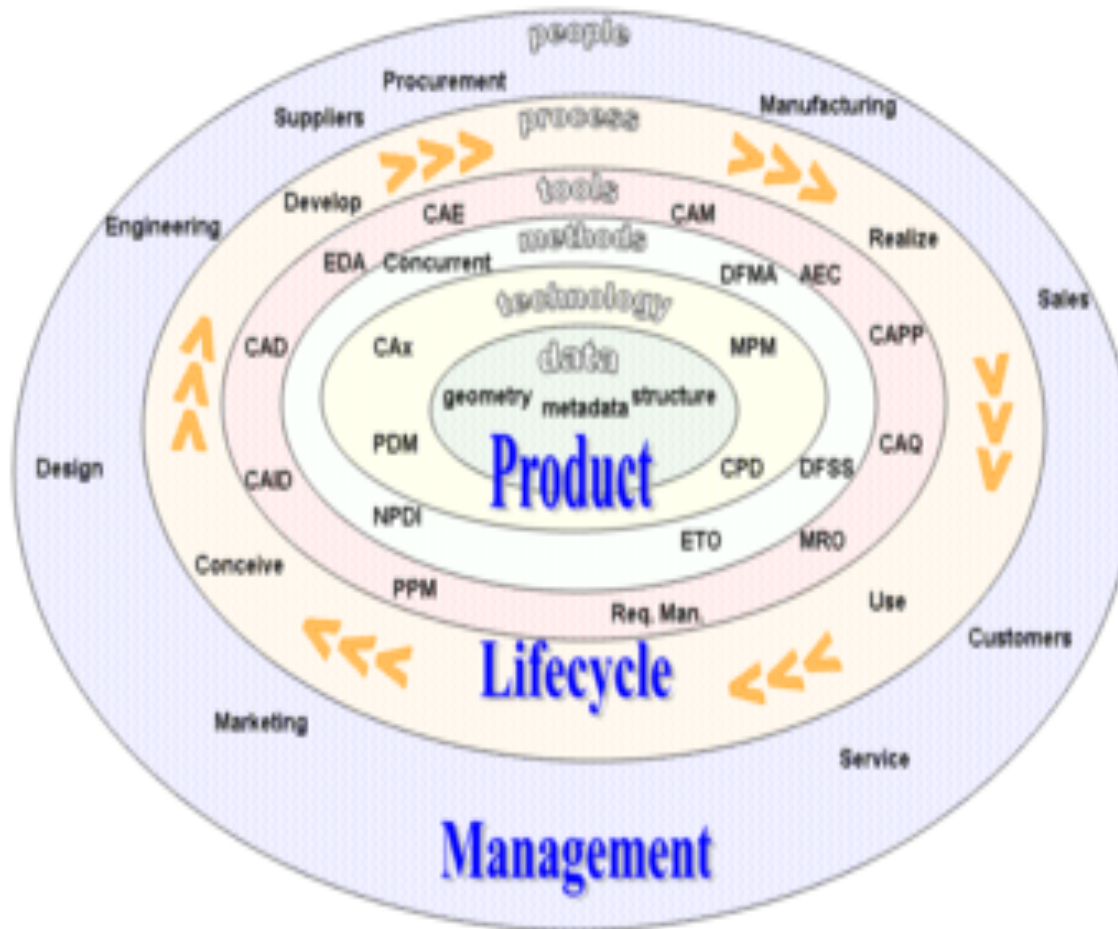 - At Termination: Post Mortem, learning for next SW products

Similar Four Phase PLC Model

PRODUCT LIFE CYCLE

Sales

INTRODUCTION   GROWTH   MATURITY   DECLINE

Time

TheStreet.
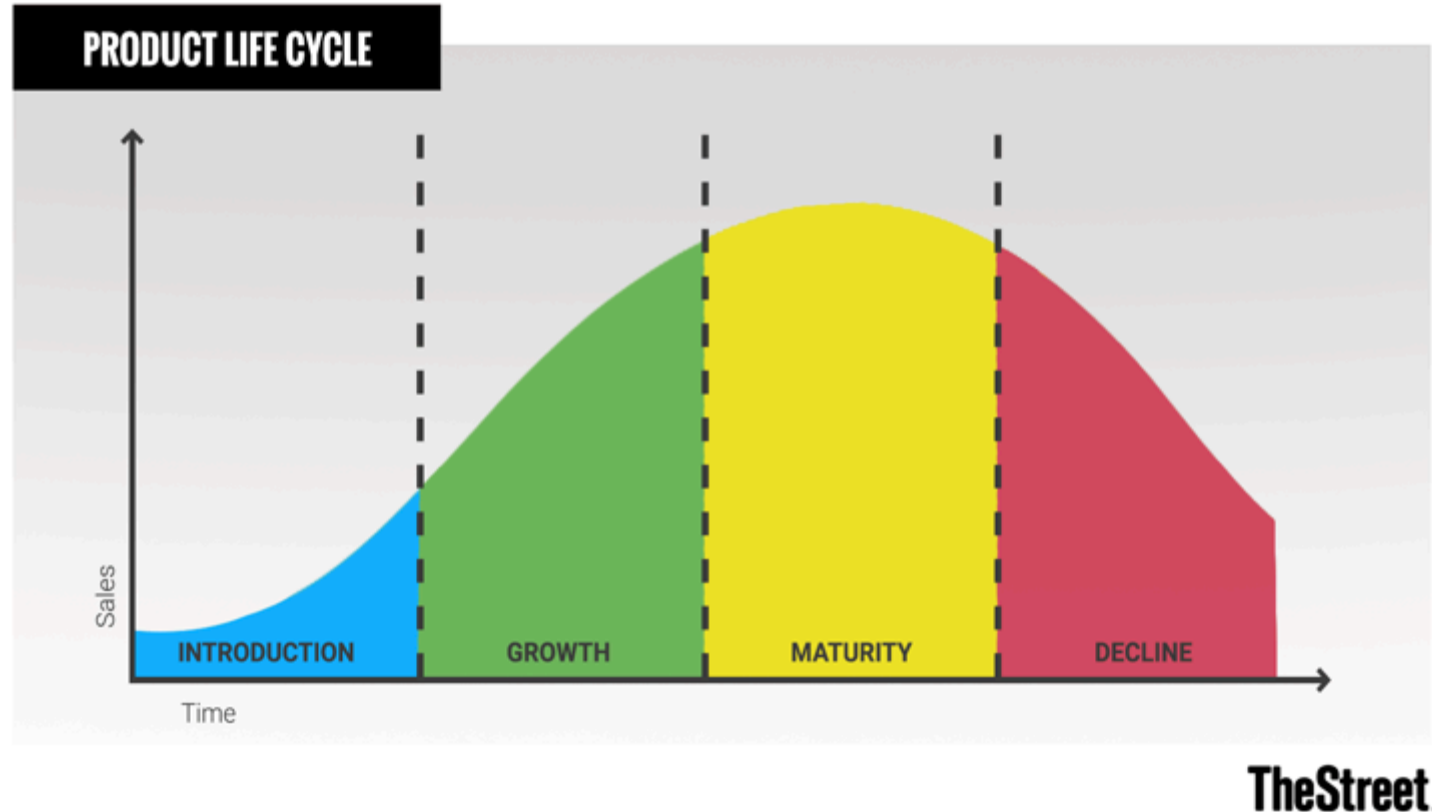
PLC Model from web, 4 phases:

Introduction Growth Maturity Decline

Other Four Phase Life Cycle Models
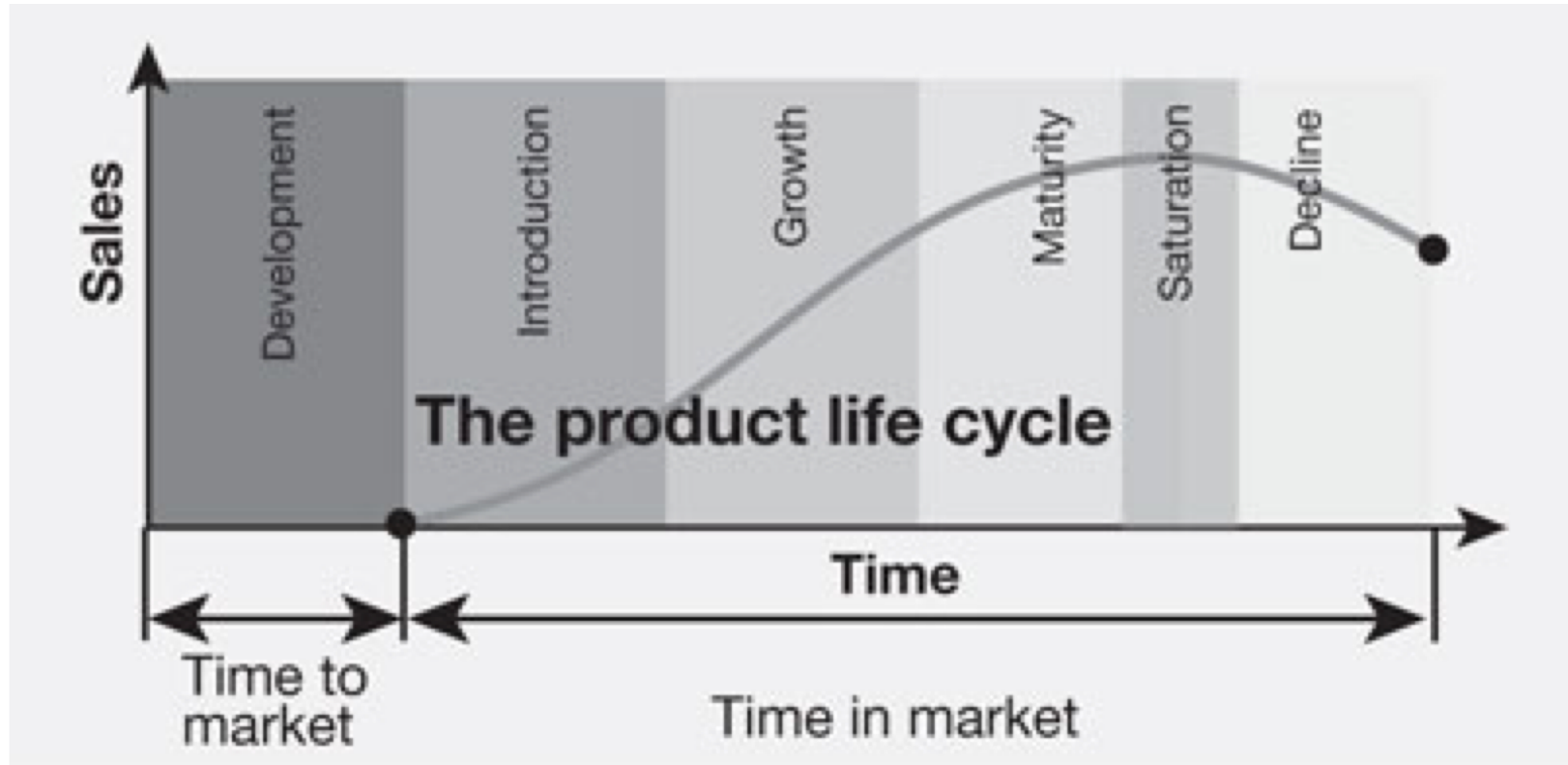

Phases:
Conceive Design Implement Service

14

Other *Four Phase* Life Cycle Models

- **Conceive**
  - **Specification**
  - **Concept design**

- **Design**
  - **Detailed design**
  - **Simulation**
  - **Related tool creation**

- **Implement**
  - **Plan**
  - **Manufacture**

- **Service**
  - **Sell and maintain**
  - **Enhance**
  - **Dispose**

Similar *Six Phase* PLC Model

1. **Development**
2. **Introduction**
3. **Growth**
4. **Maturity**
5. **Saturation**
6. **Decline**

Similar *Six Phase* PLC Model

The product life cycle

Sales / Time

Development | Introduction | Growth | Maturity | Saturation | Decline

Time to market

Time in market

Summary

- **Key for SWE manager is to have a model, any model, communicated and used consistently**
  - **A model that is acceptable to your SW development environment, e.g. financing, corporate managers**
  - **That is measurable, implementable, reasonable, and can thus be used**
  - **That has multiple phases with measurable completion milestones**
  - **So engineers can practice it consistently during product life**

- **Product Life Cycle is a model for tracking progress of project during development**

- **Can use 4-phase model of exploration, planning, development, refresh**

- **Or use 6-phase model of requirements gathering + specification, architectural design, implementation, V+V**

References

1. Four phase PLC: https://www.prnewswire.com/news-releases/all-4-stages-of-the-product-life-cycle-require-a-different-market-research-strategy-according-to-marketresearchcom-blog-270294311.html

2. See also PLC: https://en.wikipedia.org/wiki/Product_lifecycle