

Software Project Management

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What is a Project ?

- ❖ It is a temporary endeavor (having specific start and completion dates) undertaken to create a unique product or service...

Temporary

- End is reached when project's objectives have been achieved OR it is clear that objective will not be met. The project is terminated in such a situation
- The term temporary does not apply to a project's product or service (which is a lasting result)

Unique

- It means that the product or service is different in some distinguishing way from all similar products or services

What is a Project ? (Contd.)

- ❖ Projects may involve a single person or thousands
- ❖ Projects may be completed in hours, several months or years
- ❖ Examples of projects
 - Developing a new product or service
 - Designing a new vehicle
 - Constructing a building
 - Running a campaign for political office
 - Implementing a new business procedure or process
 - And so on ...

What is Management?

❖ Planning

- Pre-determining course of action to achieve the objectives

❖ Organizing

- Establishing relationship among work units and granting responsibility and authority to obtain the objectives

❖ Staffing

- Selecting and training people

❖ Directing (Leading)

- Creating an atmosphere that will assist & motivate people to achieve the desired end results

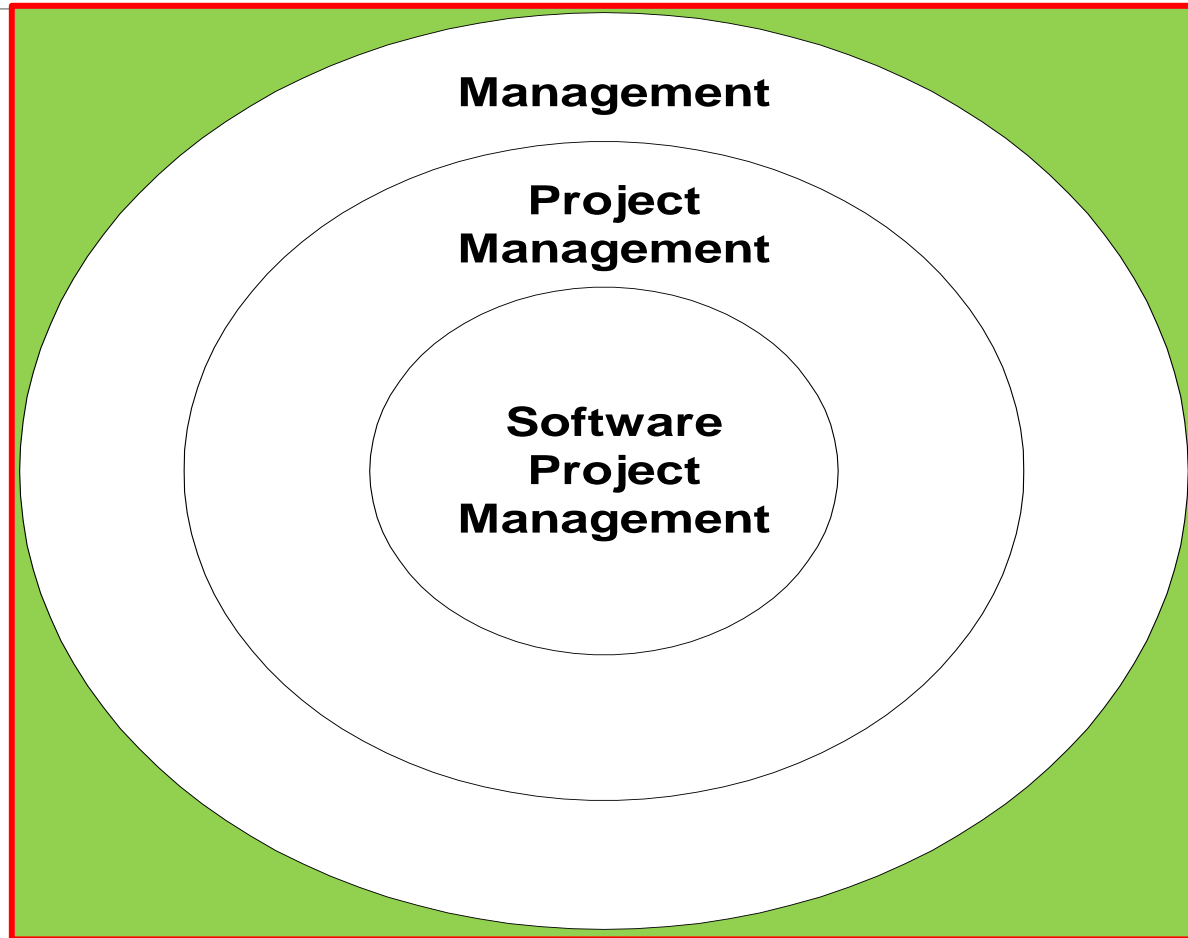
❖ Controlling

- Establishing, measuring, and evaluating performance of activities towards planned objectives

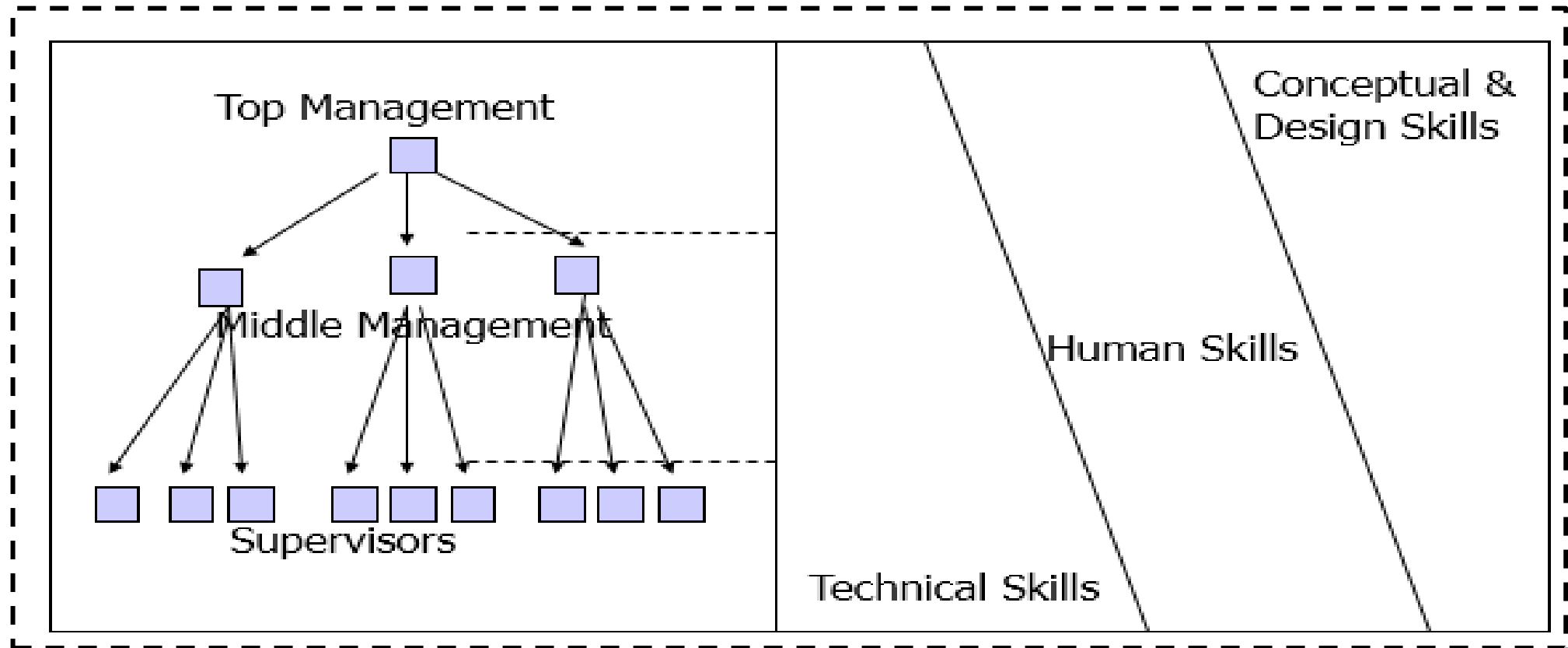
Project Management (Contd.)

- ❖ Following are related to Project Management
 - **Professional Organizations**
 - Project Management Institute (PMI) (pmi.org)
 - Software Engineering Institute (SEI)
 - IEEE Software Engineering Group
 - **Certifications** (offered by PMI)
 - PMP (Project Management Professional)
 - CAPM (Certified Associate in Project Management)
 - **PMBOK** – Project Management Body of Knowledge, published by PMI
 - **Tools**
 - MS Project
 - Primavera Project Manager

Project Management (Contd.)



Project Management (Contd.)



Software Project Planning (SPM)

- ❖ SPM begins with various activities that are collectively known as PP.
- ❖ The two entity must estimate the work to be done,
 - ❖ Resources
 - ❖ Time
- ❖ However, software managers often lack the courteous stubbornness to make people wait for good product.

Observations On Estimating

- ❖ A leading executive, once asked what single characteristic was most important when selecting a project manager,
 - A person with the ability to know what will go wrong before it actually does .
- ❖ Estimation carries inherent risk and this risk leads to uncertainty.
- ❖ **Project complexity:**
 - A number of quantitative software complexity measures have been proposed [ZUS97].
 - Such as, the design or code level, and therefore difficult to use during software planning (before a design and code exist) , the function point.

Observations On Estimating

❖ Project size:

- it is another important factor that can affect the accuracy and efficacy of estimates.
- As the size increases, the interdependency among various elements of the software grows rapidly.
- Problem decomposition, an important approach to estimating, becomes more difficult because decomposed elements may still be formidable.

❖ Degree of structural uncertainty

- ❖ In this context, structure refers to the degree to which requirements have been solidified,

Software Scope

- ❖ Software project planning is the determination of software scope.
- ❖ Data and control process,
- ❖ Function,
- ❖ Performance,
- ❖ Constraints,
- ❖ Interfaces, and
- ❖ Reliability.

Necessary Information for SW Scope

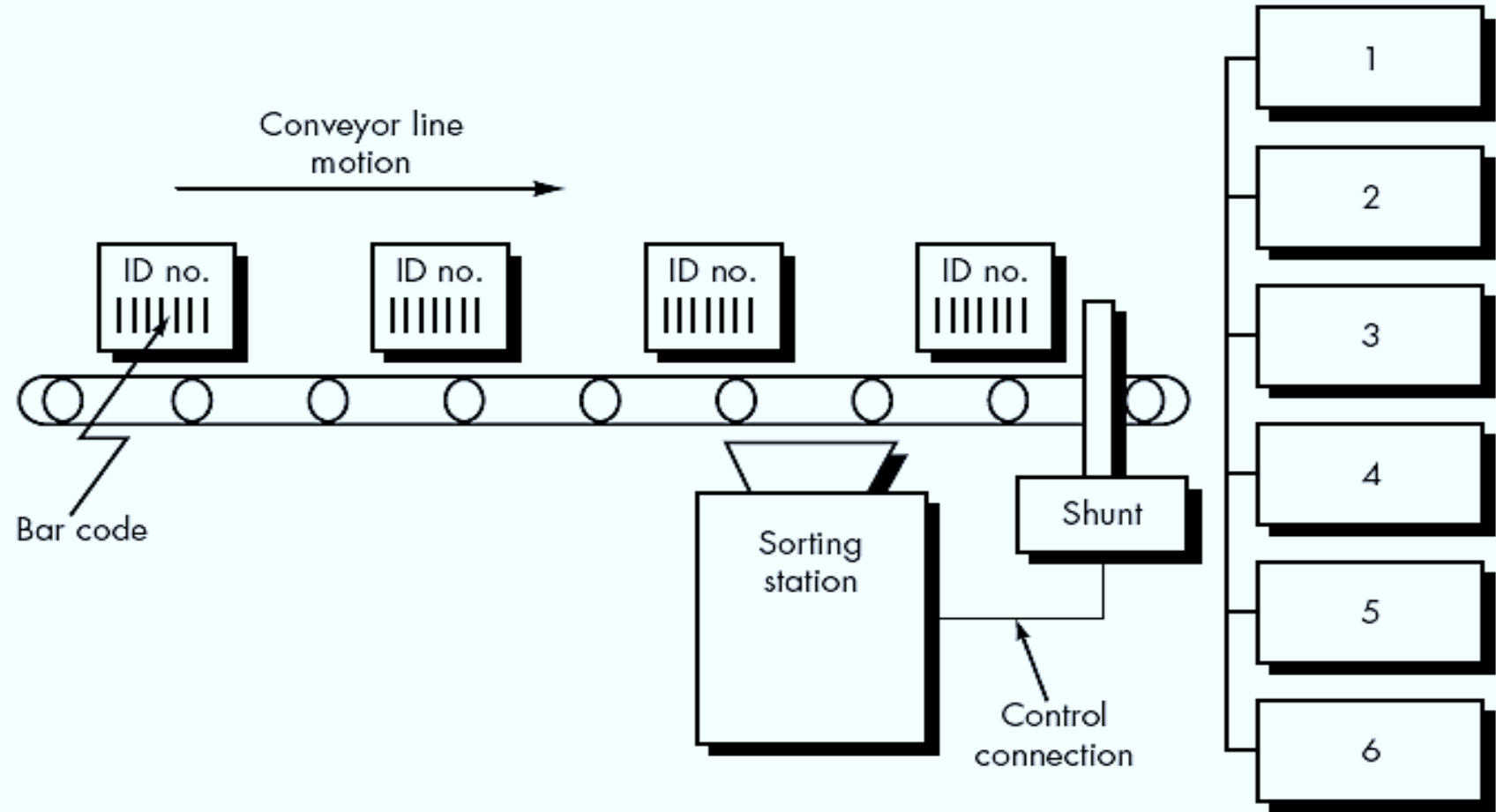
- ❖ The most commonly used technique to bridge the communication gap between the customer and developer and to get the communication process started is to conduct a preliminary meeting or interview (a prerequisite for estimation).
- ❖ A context-free questions, (**Gause and Weinberg [GAU89]**)
 - ❖ Who is behind the request for this work?
 - ❖ Who will use the solution?
 - ❖ What will be the economic benefit of a successful solution?
 - ❖ Is there another source for the solution?
- ❖ **Facilitated Application Specification Techniques (FAST).**
- ❖ **Feasibility?**

A Scoping Example

- ❖ The Conveyor Line Sorting System (CLSS),
 - ❖ sorts boxes moving along a conveyor line.
- ❖ Each box is identified by a bar code that contains a part number and is sorted into one of six bins at the end of the line.
- ❖ The boxes pass by a sorting station that contains a bar code reader and a PC. The sorting station PC is connected to a shunting mechanism that sorts the boxes into the bins.
- ❖ Boxes pass in random order and are evenly spaced.
- ❖ The line is moving at five feet per minute.

A Scoping Example

A conveyor
line sorting
system



A Scoping Example

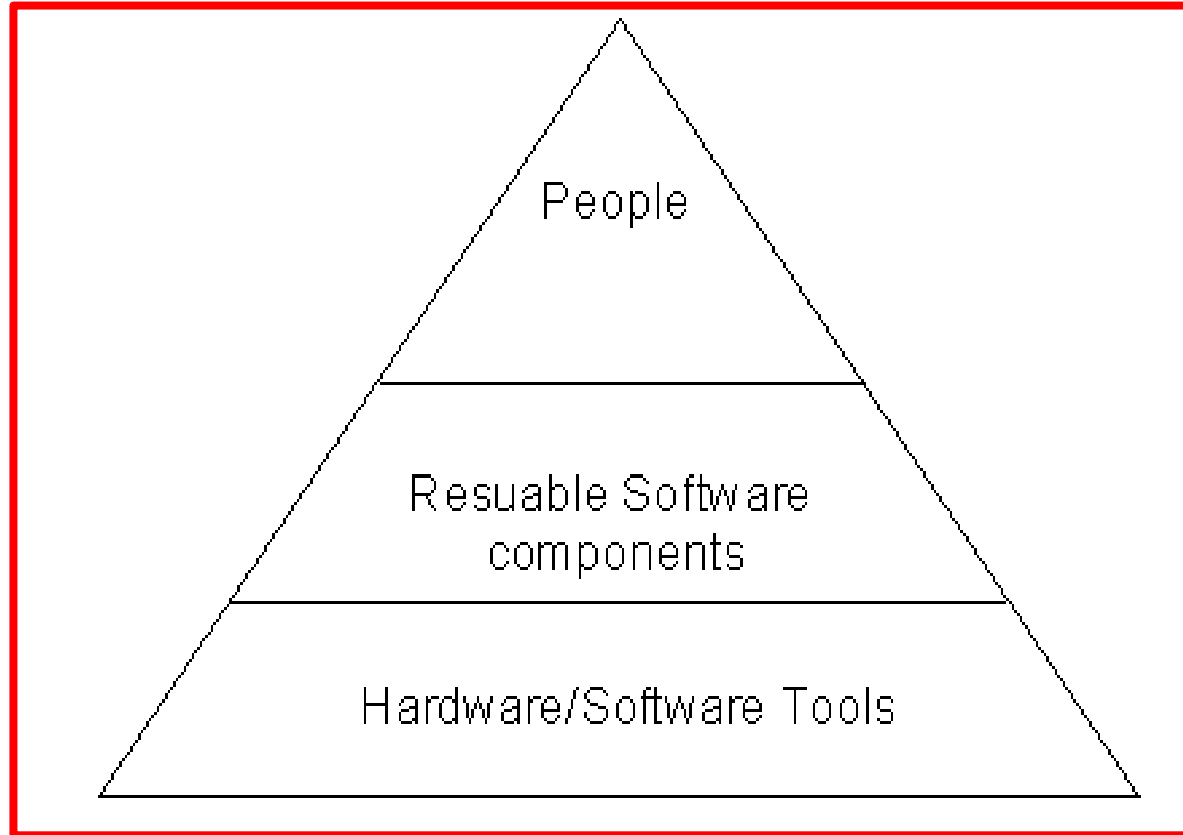
- ❖ The project planner examines the statement of scope and extracts all important software functions. **Decomposition**.
 - Read bar code input.
 - Read pulse tachometer.
 - Decode part code data.
 - Do database look-up.
- Determine bin location.
- Produce control signal for shunt.
- Maintain record of box destinations.

Resource estimation

- ❖ The next important task in software planning is estimation of resources. Various elements form resources required to develop a software project.
- ❖ Figure on the next slide shows a pyramid with hardware and software at the bottom. They provide the infrastructure for the development to be carried out.
- ❖ In the next level, there are software building blocks in the form of reusable software components. These can dramatically reduce development costs and accelerate delivery.
- ❖ At the top most level, we have the primary resource – people.



Resource estimation



Human resources

- ❖ Human resource estimation is done by evaluating scope and selecting skills required to complete the process of development.
- ❖ While larger projects and organizations can afford a large number of people, in smaller organizations with relatively smaller projects, the same people will perform all the roles.
- ❖ Human resource procurement is called **staffing** and involves **recruiting, hiring, training, rewarding, and retaining project members**.
- ❖ Traditional engineering projects required raw material in the form of equipment whereas the only “raw material” software engineering projects require are the brain power of the software engineers.

Reusable software resources

- ❖ Software resources are primarily reusable building blocks.
- ❖ These can be divided into four categories as described below:
 - **Fully experienced components**
 - **Partial experience components**
 - **Off-the-shelf components**
 - **New components**

Fully experienced components

- ❖ These are the specifications,
 - ❖ Designs, code or test data that were developed for previous projects and are similar to the software that is to be built.
- ❖ The team members are fully experienced in the application area represented by these components.
- ❖ Not only will the time required to develop the project be lesser but also modifications required for such fully-experienced components will carry less risk.

Off-the-shelf components & New components

Off-the-shelf components

- These are the components that can be acquired **from a third party** or may have been developed internally for a past project.
- These components are **ready to use** and do not require any modification.

New components

- Since these components do not exist in any form, new components have to be built by the team.
- This is **very time-consuming**.

Other resources

- The infrastructure in terms of hardware and software required to implement the project.
- The platform or the operating system,
- The necessary hardware components,
- And additional software utilities that may be required – all come under this category.

Software Project Estimation

- ❖ Today, software is the most expensive element of virtually all computer-based systems.
- ❖ For complex, custom systems, a large cost estimation error can make the difference between profit and loss. Cost overrun can be disastrous for the developer.
- ❖ Software cost and effort estimation will never be an exact science. Too many variables.
 - ❖ human, technical, environmental, political—can affect the ultimate cost of software and effort applied to develop it.

Software Project Estimation

❖ To achieve reliable cost and effort estimates, a number of options arise:

1. Delay estimation until late in the project (obviously, we can achieve 100% accurate estimates after the project is complete!).
2. Base estimates on similar projects that have already been completed.
3. Use relatively simple decomposition techniques to generate project cost and effort estimates.
4. Use one or more empirical models for software cost and effort estimation.

Decomposition Techniques

H.W