Lecture # 7

Requirements Engineering Processes – 2

Recap of Last Lecture - 1

- We introduced the concept of requirements engineering process
- We discussed inputs and outputs of the requirements engineering process

Recap of Last Lecture - 2

- We introduced high-level activities in the requirements engineering process
  - Requirements elicitation
  - Requirements analysis and negotiation
  - Requirements specification
  - Requirements validation
  - Requirements management

Today's Topics

- Actors and stakeholders in the requirements engineering process
- Process and process improvement for requirements engineering

Who are Actors?

- Actors in a process are the people involved in the execution of that process
- Actors are normally identified by their roles rather than individually, e.g., project manager, purchasing director, and system engineer

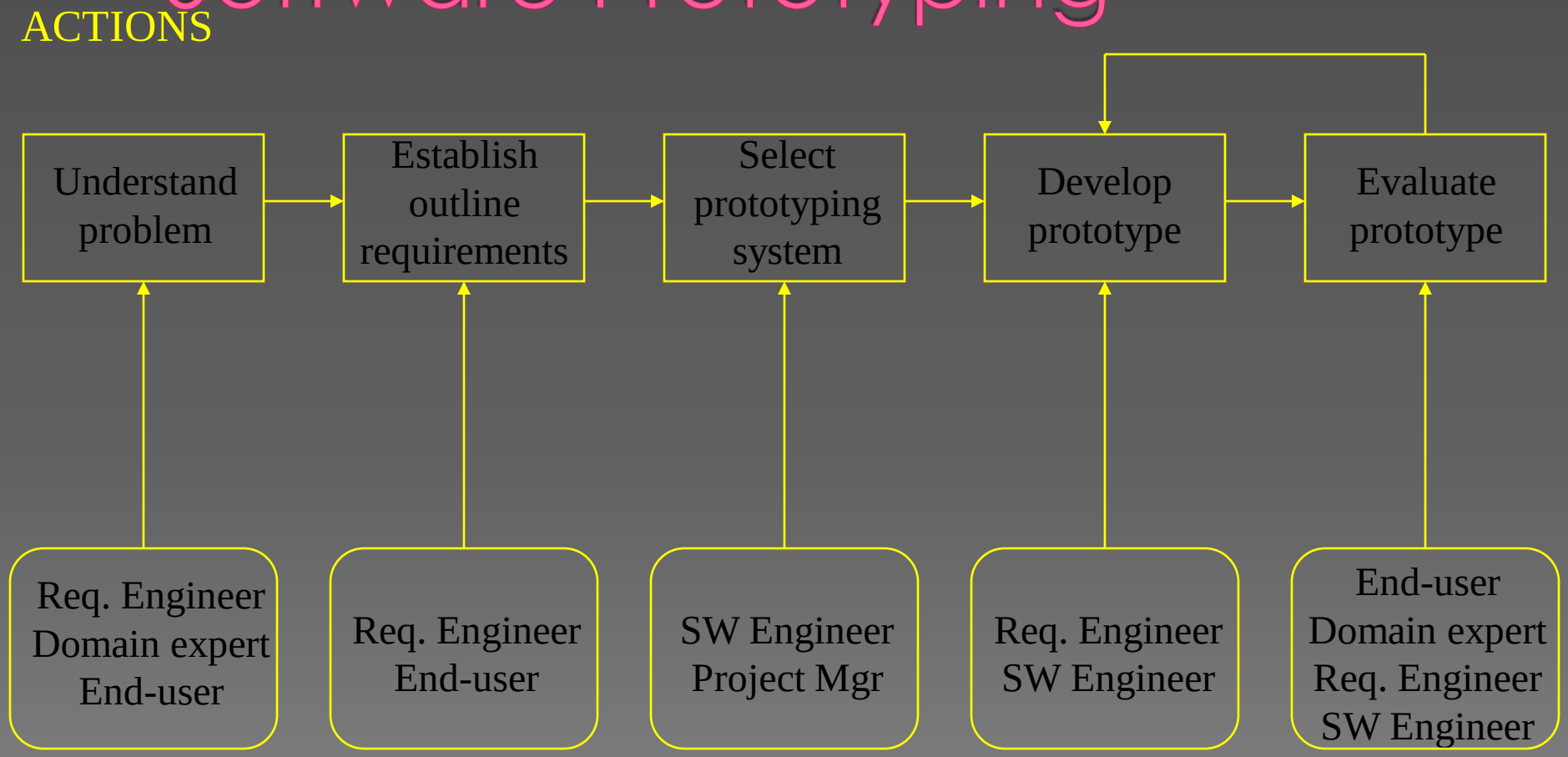
Actors in the RE Process - 1

- Requirements engineering involves people who are primarily interested in the problem to be solved (end-users, etc) as well as people interested in the solution (system designers, etc.)
- Another group of people, such as health & safety regulators, and maintenance engineers may be effected by the existence of the system

Actors in the RE Process - 2

- Role-action diagrams are process models which show the actors associated with different process activities
- They document the information needs of different people involved in the process
- They use model of prototype software system as part of requirements elicitation process

Role-Action Diagram for Software Prototyping



Role Descriptions - 1

Role	Description
Domain Expert	Responsible for proving information about the application domain and the specific problem in that domain, which is to be solved

Role Descriptions - 2

Role	Description
System End-user	Responsible for using the system after delivery

Role Descriptions - 3

Role	Description
Requirements Engineer	Responsible for eliciting and specifying the system requirements

Role Descriptions - 4

Role	Description
Software Engineer	Responsible for developing the prototype software system

Role Descriptions - 5

Role	Description
Project Manager	Responsible for planning and estimating the prototyping project

Human and Social Factors

- Requirements engineering processes are dominated by human, social and organizational factors because they always involve a range of stakeholders from different backgrounds and with different individual and organizational goals
- System stakeholders may come from a range of technical and non-technical background and from different disciplines

Stakeholder Types

- Software engineers
- System end-users
- Managers of system end-users
- External regulators
- Domain experts

Factors Influencing Requirements

- Personality and status of stakeholders
- The personal goals of individuals within an organization
- The degree of political influence of stakeholders within an organization

Process Support

- One way to minimize errors in the requirements engineering is to use process models and to use CASE tools
- The most mature CASE tools support well-understood activities such as programming and testing and the use of structured methods
- Support for requirements engineering is still limited because of the informality and the variability of the process

CASE Tools for RE

- Modeling and validation tools support the development of system models which can be used to specify the system and the checking of these models for completeness and consistency
- Management tools help manage a database of requirements and support the management of changes to these requirements

Process Improvement

- Process improvement is concerned with modifying processes in order to meet some improvement objectives
- Improvement objectives
  - Quality improvement
  - Schedule reduction
  - Resource reduction

Planning Process Improvement

Some important questions arise:

- What are the problems with current processes?
- What are the improvement goals?
- How can process improvement be introduced to achieve these goals?
- How should process improvements be controlled and managed?

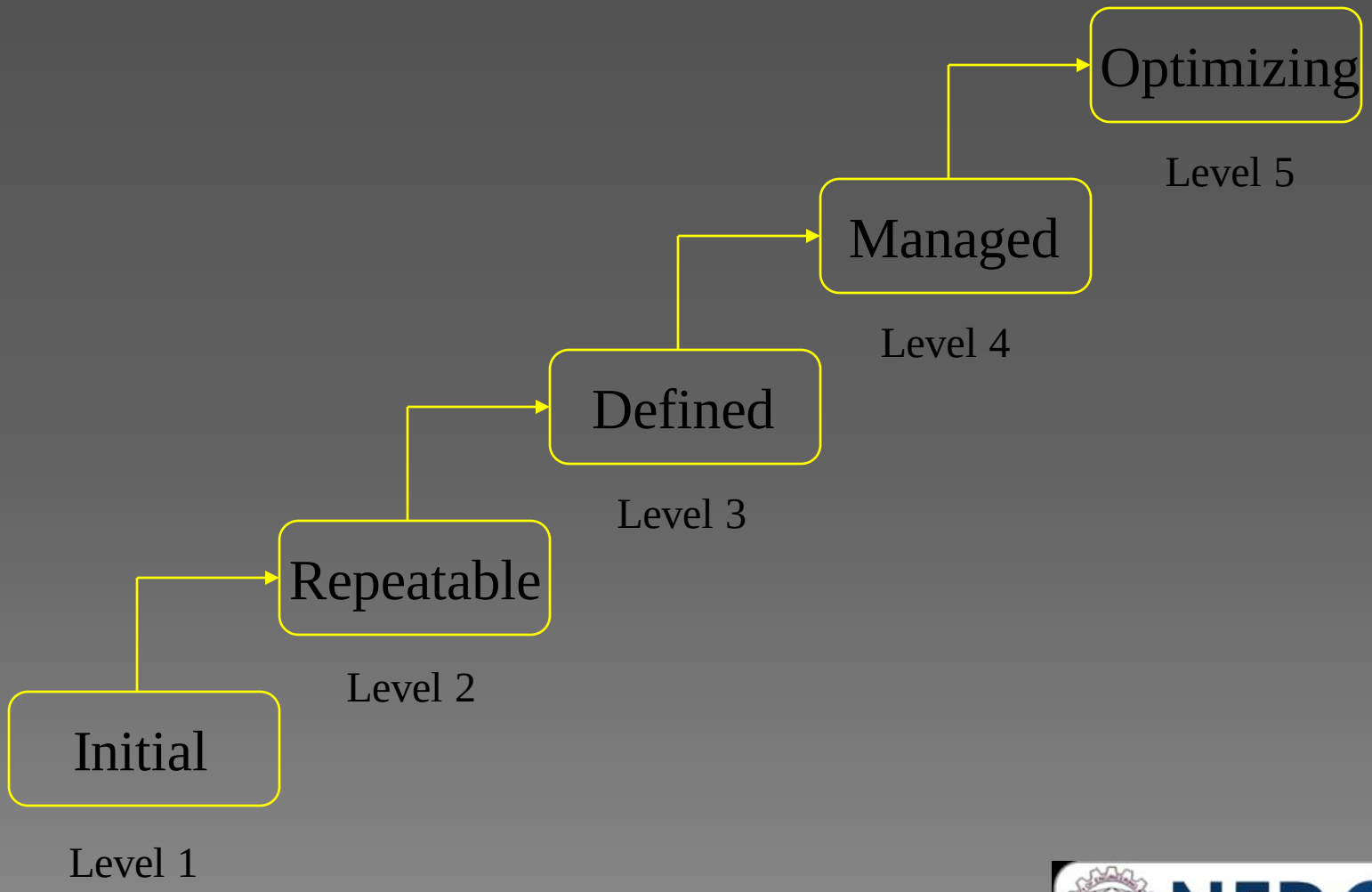
RE Process Problems

- Lack of stakeholder involvement
- Business needs not considered
- Lack of requirements management
- Lack of defined responsibilities
- Stakeholder communication problems
- Over-long schedules and poor quality requirements documents

Process Maturity

- Process maturity can be thought of as the extent that an organization has defined its processes, actively controls these processes and provides systematic human and computer-based support for them
- The SEI's Capability Maturity Model is a framework for assessing software process maturity in development organizations

Capability Maturity Model



CMM Level 1: Initial

- Organizations have an undisciplined process and it is left to individuals that how to manage the process and which development techniques to use

CMM Level 2: Repeatable

- Organizations have basic cost and schedule management procedures in place. They are likely to be able to make consistent budget and schedule predictions for projects in the same application area

CMM Level 3: Defined

- The software process for both management and engineering activities is documented, standardized and integrated into a standard software process for the organization

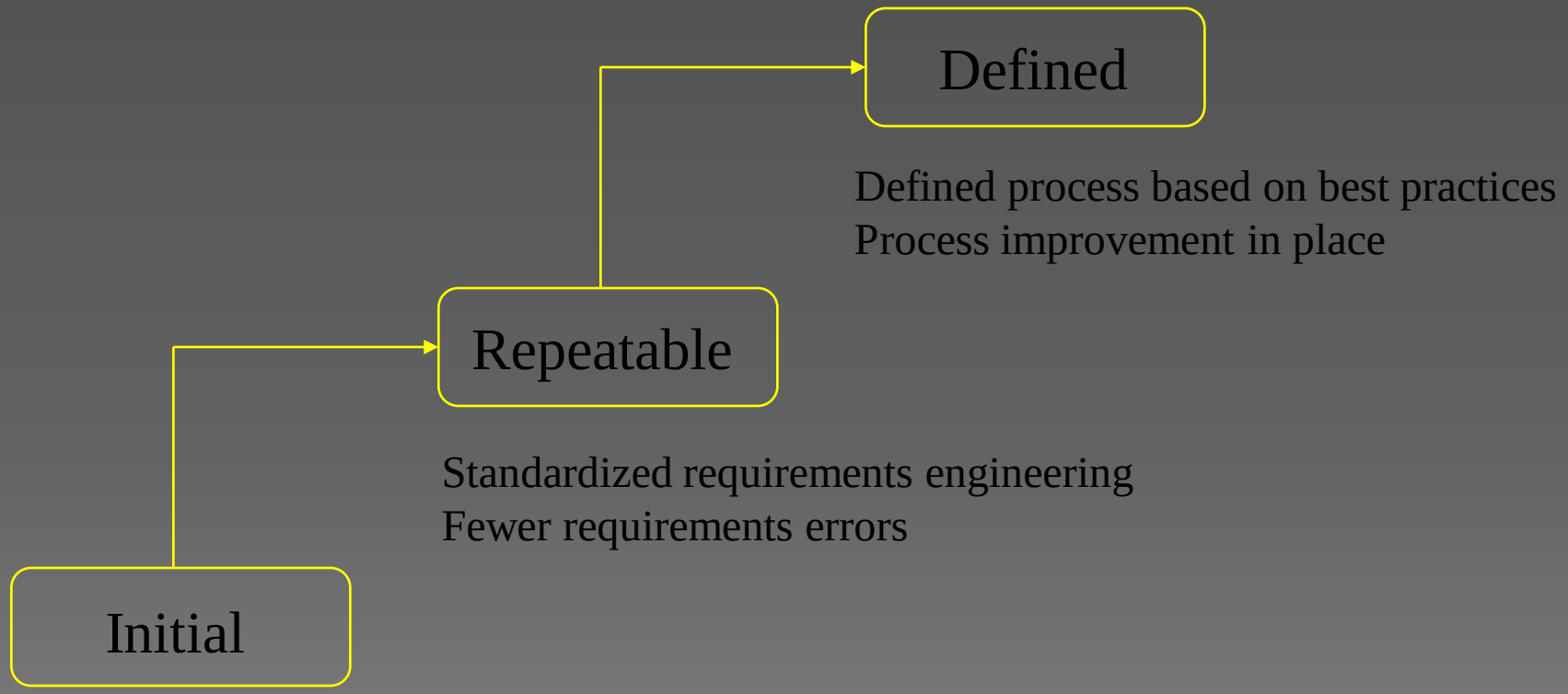
CMM Level 4: Managed

- Detailed measurements of both process and product quality are collected and used to control the process

CMM Level 5: Optimizing

- The organization has a continuous process improvement strategy, based on objective measurements, in place

RE Process Maturity Model



Initial RE Process Maturity Level

- There is no defined RE process.
- It suffer from requirements problems such as requirements volatility, unsatisfied stakeholders and high rework costs.
- It is dependent on individual skills and experience

Repeatable RE Process Maturity Level

- Defined standards for requirements documents, policies and procedures for requirements management

Defined RE Process Maturity Level

- Defined RE process based on good practices and techniques. Active process improvement process is in place

Best Practices for RE Process Improvement

- RE processes can be improved by the systematic introduction of best requirements engineering practices
- Each improvement cycle identifies best practice guidelines and works to introduce them in an organization
- Best practices will be discussed throughout the semester

Requirements Engineering Costs

- About fifteen percent (15%) of system development costs
- However, if the requirements engineering process is not executed properly, this cost can increase substantially

Summary

- Human, social and organizational factors are important influences on requirements engineering processes
- Requirements engineering process improvement is difficult and is best tackled in an incremental way
- Requirements engineering processes can be classified according to their degree of maturity