ELICITING REQUIREMENTS

- Requirements elicitation (also called requirements gathering) combines elements of problem solving, elaboration, negotiation, and specification.
- In order to encourage a collaborative, team-oriented approach to requirements gathering, stakeholders work together to identify the problem, propose elements of the solution, negotiate different approaches, and specify a preliminary set of solution requirements.

• Collaborative Requirements Gathering:

- Many different approaches to collaborative requirements gathering have been proposed.
- Each makes use of a slightly different scenario, but all apply some variation on the following basic guidelines:

- Meetings (either real or virtual) are conducted and attended by both software engineers and other stakeholders.
- Rules for preparation and participation are established.
- An agenda is suggested that is formal enough to cover all important points but informal enough to encourage the free flow of ideas.
- A "facilitator" (can be a customer, a developer, or an outsider) controls the meeting.
- A "definition mechanism" (can be work sheets, flip charts, or wall stickers or an electronic bulletin board, chat room, or virtual forum) is used.

- The goal is to identify the problem, propose elements of the solution, negotiate different approaches, and specify a preliminary set of solution requirements.
- A one- or two-page “product request” is generated during inception.
- A meeting place, time, and date are selected; a facilitator is chosen; and attendees from the software team and other stakeholder organizations are invited to participate.
- The product request is distributed to all attendees before the meeting date.
- As an example, consider an excerpt from a product request written by a marketing person involved in the **SafeHome** project. This person writes the following narrative about the home security function that is to be part of SafeHome:

Our research indicates that the market for home management systems is growing at a rate of 40 percent per year. The first *SafeHome* function we bring to market should be the home security function. Most people are familiar with "alarm systems" so this would be an easy sell.

The home security function would protect against and/or recognize a variety of undesirable "situations" such as illegal entry, fire, flooding, carbon monoxide levels, and others. It'll use our wireless sensors to detect each situation, can be programmed by the homeowner, and will automatically telephone a monitoring agency when a situation is detected.

- While reviewing the product request in the days before the meeting, each attendee is asked to make a list of objects that are part of the environment that surrounds the system, other objects that are to be produced by the system, and objects that are used by the system to perform its functions.
- In addition, each attendee is asked to make another list of services (processes or functions) that manipulate or interact with the objects.
- Finally, lists of constraints (e.g., cost, size, business rules) and performance criteria (e.g., speed, accuracy) are also developed.
- The attendees are informed that the lists are not expected to be exhaustive but are expected to reflect each person's perception of the system.

- Objects described for SafeHome might include the control panel, smoke detectors, window and door sensors, motion detectors, an alarm, an event (a sensor has been activated), a display, a PC, telephone numbers, a telephone call, and so on.
- The list of services might include configuring the system, setting the alarm, monitoring the sensors, dialing the phone, programming the control panel, and reading the display (note that services act on objects).
- In a similar fashion, each attendee will develop lists of constraints (e.g., the system must recognize when sensors are not operating, must be user friendly, must interface directly to a standard phone line) and performance criteria (e.g., a sensor event should be recognized within one second, and an event priority scheme should be implemented).

- The lists of objects can be pinned to the walls of the room using large sheets of paper, stuck to the walls using adhesive-backed sheets, or written on a wall board.
- Alternatively, the lists may have been posted on a group forum, at an internal website, or posed in a social networking environment for review prior to the meeting.
- Ideally, each listed entry should be capable of being manipulated separately so that lists can be combined, entries can be deleted, and additions can be made.
- At this stage, critique and debate are strictly prohibited.

- After individual lists are presented in one topic area, the group creates a combined list by eliminating redundant entries, adding any new ideas that come up during the discussion, but not deleting anything.
- After you create combined lists for all topic areas, discussion—coordinated by the facilitator—ensues.
- The combined list is shortened, lengthened, or reworded to properly reflect the product or system to be developed.
- The objective is to develop a consensus list of objects, services, constraints, and performance for the system to be built.

- Many stakeholder concerns (e.g., accuracy, data accessibility, security) are the basis for nonfunctional system requirements.
- As stakeholders enunciate these concerns, software engineers must consider them within the context of the system to be built. Among the questions that must be answered are as follows:

- Can we build the system?
- Will this development process allow us to beat our competitors to market?
- Do adequate resources exist to build and maintain the proposed system?
- Will the system performance meet the needs of our customers?

- The answers to these and other questions will evolve over time.

• Quality Function Deployment (QFD):

- Quality function deployment (QFD) is a quality management technique that translates the needs of the customer into technical requirements for software.
- QFD "concentrates on maximizing customer satisfaction from the software engineering process" .
- To accomplish this, QFD emphasizes an understanding of what is valuable to the customer and then deploys these values throughout the engineering process.

- Within the context of QFD , normal requirements identify the objectives and goals that are stated for a product or system during meetings with the customer.
- If these requirements are present, the customer is satisfied.
- Expected requirements are implicit to the product or system and may be so fundamental that the customer does not explicitly state them.
- Their absence will be a cause for significant dissatisfaction.
- Exciting requirements go beyond the customer's expectations and prove to be very satisfying when present.

- **Usage Scenarios:**

- As requirements are gathered, an overall vision of system functions and features begin to materialize.
- However, it is difficult to move into more technical software engineering activities until you understand how these functions and features will be used by different classes of end users.
- To accomplish this, developers and users can create a set of scenarios that identify a thread of usage for the system to be constructed.
- The scenarios, often called use cases, provide a description of how the system will be used.

• Elicitation Work Products:

- The work products produced as a consequence of requirements elicitation will vary depending on the size of the system or product to be built.
- For most systems, the work products include:

1) a statement of need and feasibility
2) a bounded statement of scope for the system or product
3) a list of customers, users, and other stakeholders who participated in requirements elicitation
4) a description of the system's technical environment
5) a list of requirements (preferably organized by function) and the domain constraints that applies to each
6) a set of usage scenarios that provide insight into the use of the system or product under different operating conditions, and
7) any prototypes developed to better define requirements.

- Each of these work products is reviewed by all people who have participated in requirements elicitation.