Agile
Project Management

Agile Methodology

- **Traditional versus Agile Methods**
- Traditional approaches to project management concentrate firmly on thorough **planning up front**.
- The **rationale** is that if you plan, execute your plan, and take corrective action on deviations from plan, you have a high probability of success.
- Once the project scope has been firmly established, every detail of the project is defined through the WBS.

Agile Methodology

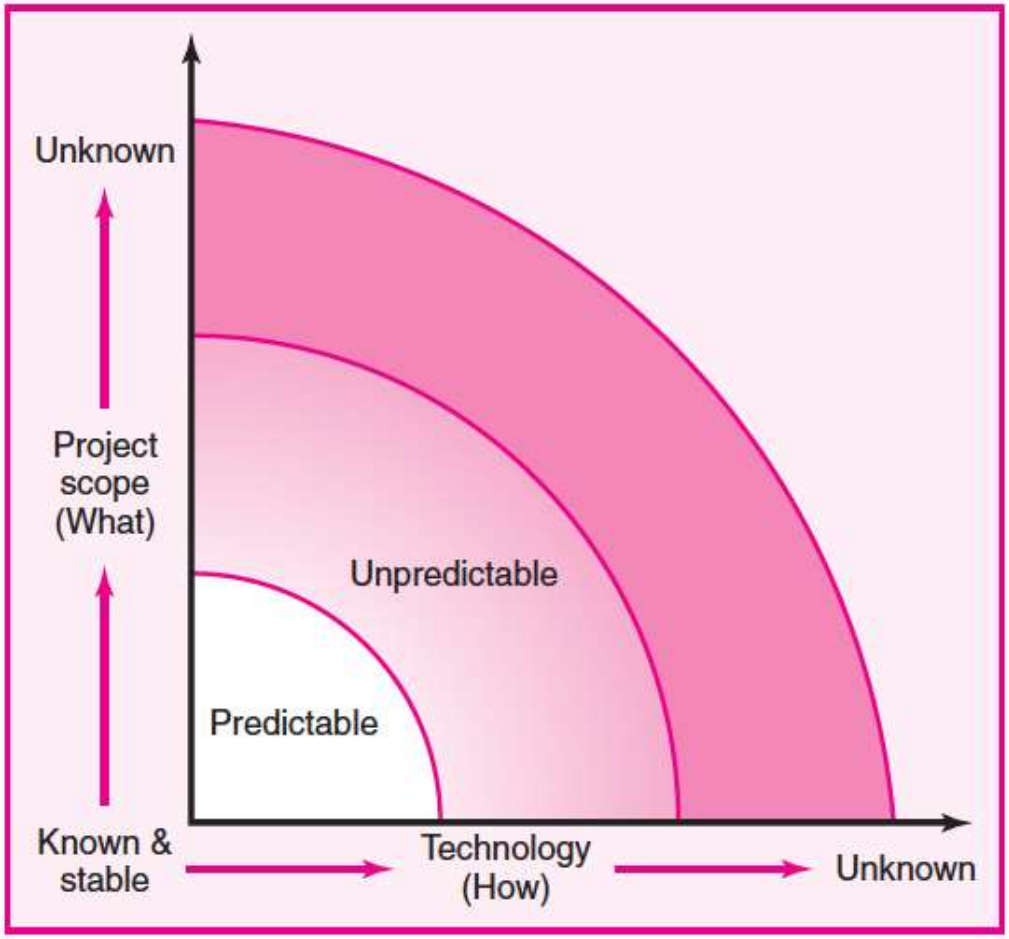
- **Traditional versus Agile Methods**
- **Problems, Risks, Estimates and Control**
- Most problems and risks are identified and assessed before the project begins.
- Estimates are made, resources assigned, adjustments made, and ultimately a baseline schedule and budget are created.
- Control of the project is a comparison of plan versus actual and corrective action to get back on plan.

Agile Methodology

- **Traditional versus Agile Methods**
- **Predictability**
- Traditional project management requires a fairly high degree of predictability to be effective.
- For plans to be useful managers have to have a firm idea on **what is to be accomplished and how to do it.**
- For example, when it comes to building a bridge across a river, engineers can draw upon proven technology and design principles to plan and execute the project.
- **Not all projects enjoy such certainty.**

Agile Methodology

FIGURE 17.1
Project Uncertainty



Agile Methodology

- **Traditional versus Agile Methods**
- **Scope and Technology? Know vs Unknown**
- Project uncertainty varies according to the extent the project scope is known and stable and the technology to be used is known and proven.
- Many projects, like the bridge example, as well as other construction projects, events, product extensions, marketing campaigns, and so forth have well-established scopes and use proven technology that provides a degree of predictability for effective planning.

Agile Methodology

- **Traditional versus Agile Methods**
- **Change in needs? Know vs Unknown**
- However, when the project scope and/or technology are not fully known, things become much less predictable.
- For example, **software development projects, which are notorious for coming in late and over budget**, typically involve many different customers with different needs.
- **These needs frequently change and are often difficult to articulate.**

Agile Methodology

- **Traditional versus Agile Methods**
- **Why detailed scope is difficult?**
- In many cases, customers only begin to understand **what they actually desire when they are provided with someone's impression of what they want.**
- Under these conditions it would be difficult if not futile to develop a detailed list of scope requirements at project launch.

Agile Methodology

- **Technology and Unpredictability**
- Technology can be another source of unpredictability.
- For example, a development team charged with designing the next generation electric car may know they are to **build a car that seats four adults comfortably and travels over 200 miles before being charged**, but they may not know if the **battery technology** exists to power such a vehicle.
- Again it would be very difficult to develop a reliable schedule when such questions exist.

Agile Methodology

- **Traditional versus Agile Methods**
- **Technology and Unpredictability**
- The key point is that traditional PM techniques were developed to operate in the predictable zone where the scope of the project is fairly well defined and technology to be used is established.
- Contrary to traditional the Agile lives in the unpredictable zone.
- Agile PM represents a fundamental shift away from the traditional plan-driven project management approach by **adopting a more experimental and adaptive approach to managing projects**.
- Projects evolve rather than are executed.

Agile Methodology

TABLE 17.1
Traditional Project Management versus Agile Project Management

Traditional	Agile
Design up front	Continuous design
Fixed scope	Flexible scope
Deliverables	Features/requirements
Freeze design as early as possible	Freeze design as late as possible
Low uncertainty	High uncertainty
Avoid change	Embrace change
Low customer interaction	High customer interaction
Conventional project teams	Self-organized project teams

Agile Methodology

- **What is Agile PM?**
- Fundamentally, Agile PM is related to the **rolling wave planning and scheduling project methodology**.
- That is, the final project design is not known in great detail and is continuously developed through a series of incremental iterations over time.

Agile Methodology

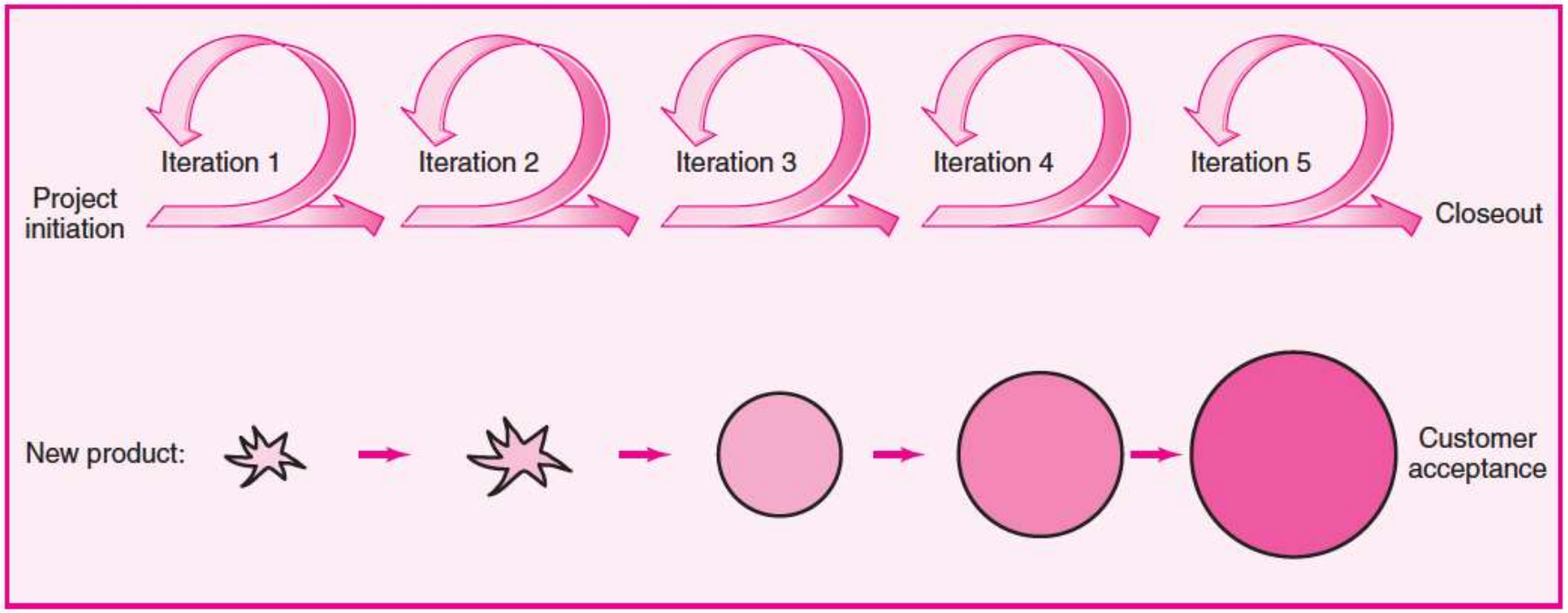
- **What is Agile PM?**
- Iterations are **short time frames** (“time boxes”) that typically last from one to four weeks.
- The **goal of each iteration** is to develop a workable product that satisfies one or more desired product features to demonstrate to the customer and other key stakeholders.
- At the **end of each iteration**, stakeholders and customers review progress and re-evaluate priorities to ensure alignment with customer needs and company goals.

Agile Methodology

- **What is Agile PM?**
- **Adjustments** are made and a different iterative cycle begins.
- Each **new iteration subsumes the work of the previous iterations** and adds new capabilities to the evolving product to produce a next, expanded version of the product.

Agile Methodology

FIGURE 17.2 Iterative, Incremental Product Development



Agile Methodology

- **Advantages of Iterative Approach**
- Iterative development processes provide the following important advantages:

1. Continuous integration, verification, and validation of the evolving product.
2. Frequent demonstration of progress to increase the likelihood that the end product will satisfy customer needs.
3. Early detection of defects and problems.

- There is growing evidence that iterative and evolutionary development is superior to traditional plan-driven project management when it comes to creating new products .

Agile Methodology

- **Agile Family of Methods**
- It should be noted that Agile PM is not one set method, but a family of methods designed to respond to the challenges of unpredictable projects.
- A few of the more popular ones are listed here:

1. Scrum
2. RUP (Rational Unified Process)
3. Extreme Programming (XP)
4. Crystal Clear
5. Agile Modeling
6. Dynamic Systems Development Method (DSDM)
7. Lean Development
8. Rapid Product Development (RPD)

Agile Methodology

- **Agile principles**
- While each of these methods has unique elements and applications, most are based on the following Agile principles:

1. **Focus on customer value**—Employ business-driven prioritizations of requirements and features.
2. **Iterative and incremental delivery**—Create a flow of value to customers by "chunking" project delivery into small, functioning increments.
3. **Experimentation and adaptation**—Test assumptions early and build working prototypes to solicit customer feedback and refine product requirements.
4. **Self-organization**—Team members decide amongst themselves who and what should be done.
5. **Continuous improvement**—Teams reflect, learn, and adapt to change; work informs the plan.

Agile Methodology

- **Agile PM in Action: Scrum**
- Scrum can be traced back to the work of **Hirotaka Takeuchi and Ikujiro Nonaka** who in 1986 described a new holistic approach in new commercial product development efforts.
- They compare this approach of a cross-functional team collaborating to develop a new product to rugby, where the whole team “tries to go the distance as a unit, passing the ball back and forth.”
- The scrum metaphor has been expanded and refined into a fairly prescriptive framework that has enjoyed success on high-tech and software development projects.

Agile Methodology

- **Agile PM in Action: Scrum**
- Scrum, like other Agile methods, begins with a high-level scope definition and ballpark time and cost estimates for the project.
- The scope and cost estimates should be complete enough that management is comfortable with the estimates.
- The theory is that since requirements evolve over time, detailed up-front planning will be wasted.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Feature:**
- In place of a product WBS, Scrum uses product features as deliverables. A feature is defined as a piece of a product that delivers some useful functionality to a customer.
- In the case of a software project, a feature may be a bank customer being able to change her PIN.
- In the case of a high-tech product, it may be 3G wireless access.
- **Features are prioritized** by their perceived highest value.

Agile Methodology

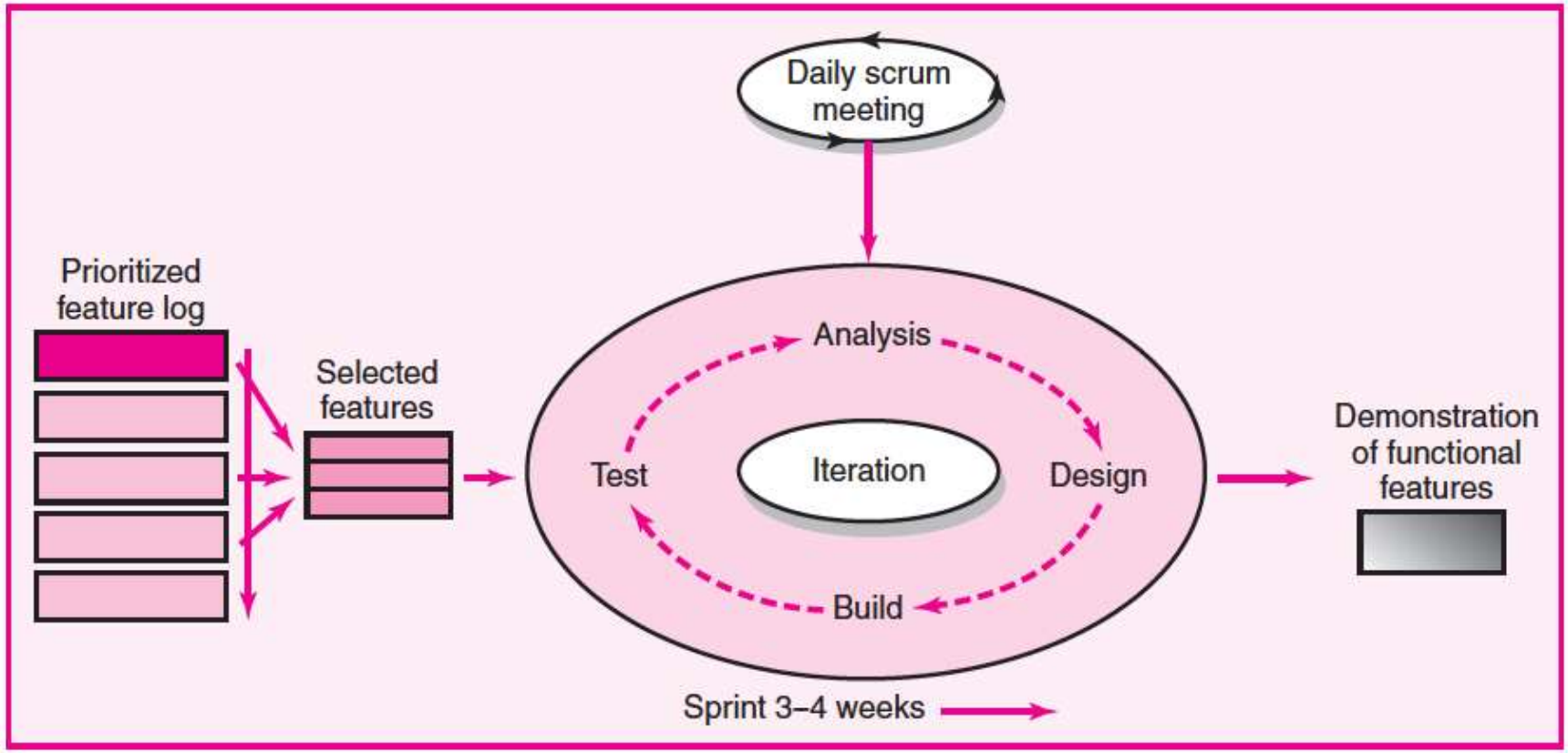
- **Agile PM in Action: Scrum**
- The project team tackles the highest, feasible priority features first. Priorities are re-evaluated after each iteration.
- **Sprints**
- Iterations are called sprints and its **duration** should last no longer than **four weeks**.
- The **goal of each sprint** is to produce fully functional features.
- This forces the team to tackle tough decisions early in order to create a workable demo.

Agile Methodology

- **Agile PM in Action: Scrum**
- Specific features are created according to four distinct phases: analysis, design, build, and test.
- Each feature can be thought of as a mini-project.
- The **first phase** is analysis and review of functional requirements that will be needed to complete the feature. The team commits to meet these requirements.
- The **second phase** is the development of a design that meets the requirements of the feature.
- The **third phase** is to build the feature so that it is functional.
- **Finally**, the feature is tested and documented.
- At the **end of each sprint**, features are demonstrated.
- Within this sprint framework, Scrum relies on specific roles, meetings, and documents/logs to manage the project.

Agile Methodology

FIGURE 17.3 Scrum Development Process



Agile Methodology

- **Agile PM in Action: Scrum**
- **Roles and Responsibilities**
- There are three key roles to the scrum process:
- **Product owner**
- **Development team**
- **Scrum Master**

Agile Methodology

- **Agile PM in Action: Scrum**
- **Roles and Responsibilities**
- **Product Owner**
- This person **acts on behalf of customers to represent their interests**.
- They are responsible for ensuring that the development team focuses their efforts on **developing a product that will fulfill the business objective of the project**.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Roles and Responsibilities**
- **Product Owner**
- The product owner establishes the **initial list of product features and prioritizes** them in the product backlog.
- The product owner **negotiates sprint goals and backlog items** with the development team.
- The product owner has the option to **change features and priorities** at the end of each sprint if desired.
- However, no changes should be made once a sprint has started.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Roles and Responsibilities**
- **Product Owner**
- The product owner is the **final arbiter on requirements** questions and is empowered to **accept or reject each product increment**.
- The product owner ultimately **decides whether the project is completed**.
- Product owners are the **keeper of the product vision and watch dog on the return on investment**.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Roles and Responsibilities**
- **Development Team**
- The team is responsible for delivering the product. A team is typically made up of five to nine people with cross-functional skill sets.
- There are no designated roles or titles; people take on different responsibilities depending on the nature of the work.
- The team is self organizing in the sense they decide both who and how the work is to be accomplished.
- Team members should be co-located so that intense face-to-face collaboration occurs. They are responsible for the achieving commitments they make at the sprint planning and sprint review meetings.

Agile Methodology

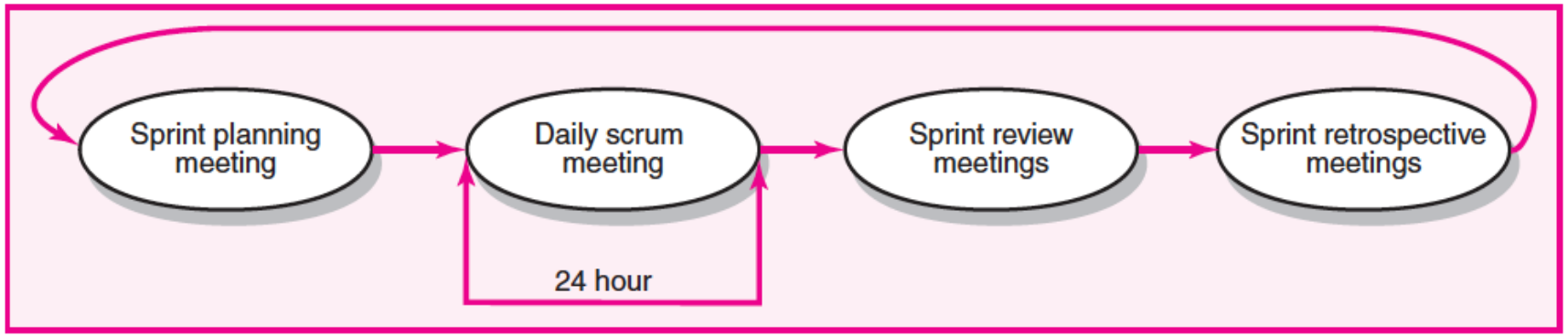
- **Agile PM in Action: Scrum**
- **Roles and Responsibilities**
- **Scrum Master (aka Project Manager)**
- The Scrum master **facilitates the scrum process and resolves impediments at the team and organization level**.
- The Scrum master is not the leader of the team (the team leads itself!) but **acts as a buffer between the team and outside interference**. They have no formal authority.
- Instead, they are responsible for making sure that the **Scrum process is adhered** to. They help the **product owner with planning** and try to keep the team energized.
- The Scrum master serves more as a **coach than a manager**.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- Scrum uses a series of coordinated meetings to manage the development process.
- **Sprint Planning**
- **Daily Scrum**
- **Sprint Review**
- **Sprint Retrospective**

Agile Methodology

FIGURE 17.4 Scrum Meetings



Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- **Sprint Planning**
- At the start of each sprint, the **product owner and development team negotiate** which product backlog items the team will attempt this sprint.
- The product owner is responsible for **identifying which features are most important**, and the **team is responsible for determining what is possible within the sprint**.
- If it is impossible to complete a certain key item within four weeks, the team works with the **product owner to break the feature down into doable pieces**.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- **Sprint Planning**
- All **committed items are recorded in a product backlog.** The team uses this backlog to prioritize specific work to be done and assign initial responsibilities.
- These tasks are recorded in the **sprint backlog**.
- Once the meeting has adjourned the **goals for the Sprint cannot be changed**.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- **Daily Scrum**
- The heartbeat of an Agile project is the daily meetings which are commonly referred to as the “Scrum.”
- Each work day at the same time and place, team members stand in a circle and take turns answering the following key questions:

1. What have you done since the last Scrum?
2. What will you do between now and the next Scrum?
3. What is getting in the way (blocks) you from performing your work as effectively as possible?

- The meeting is limited to just those three core questions.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- **Daily Scrum**
- The Scrum, which typically lasts 15 minutes, is held next to a **whiteboard, at which time all tasks and blocks are recorded.**
- The Scrum master erases blocks once they have been removed.
- The meetings **must start on time**. A late fine (i.e., $1) collected by the Scrum master and donated to charity, is a popular rule.
- Members **stand to create a sense of urgency**.
- Immediately afterwards, **specific members may meet to resolve issues** that surfaced.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- **Daily Scrum**
- The value of the Scrum is that it creates a **daily mechanism to quickly inform the team about the state of the project**.
- It sustains a **sense of team identity** that encourages openness and resolution of problems in real time.
- Having everyone report **what they plan to do for that day generates a social promise to the group**, thereby **building accountability**.
- Notice again that the team is self-managed. **The Scrum master does not assign daily tasks** to team members; the **team decides amongst themselves.**
- The **Scrum master role is to see that the Scrum is running correctly**. They are not “master” of the team but rather “master” of the process.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- **Sprint Review**
- At the end of each sprint, the **team demonstrates the actual work product** increments they have built to the product owner and other relevant stakeholders.
- **Feedback** is solicited from the **product owner and other relevant stakeholders**.
- The product owner declares which **items are "done" and which items need further work and are returned to the product backlog**.
- The team can take this opportunity to **suggest improvements and new features for the product owner to accept or reject.**
- The sprint review meeting is an opportunity to **examine and adapt the product as it emerges and iteratively refine key requirements.**
- Such **refinements will be the subject of the next sprint planning meeting**.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- **Sprint Retrospective**
- The purpose of the retrospective meeting is to reflect on **how well the previous sprint went and identify specific actions that can improve future sprints**.
- The **Scrum master typically facilitates this meeting and the team decides which changes will be made in how they work together for the next sprint**.
- The retrospective **reflects Scrum's commitment to continuous improvement and the value it places on improving not only products but team interactions**.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- **Product and Sprint Backlogs**
- Each project has a **product backlog** and a **sprint backlog**.
- The team controls the sprint backlog.
- **Product backlog**
- The product owner controls the product backlog
- The product backlog is the customer's prioritized list of key features desired when the project is completed.

Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- **Product and Sprint Backlogs**
- **Product backlog**
- Only the product owner can change the **product backlog and its priorities**.
- The product backlog usually defines each feature and estimates of **time, cost, and work remaining**.
- By observing the feature completion rate (called the "**burn rate**"); the product owner can estimate the finish date and consider the trade-off of adding or reducing features.
- See Figure 17.5 for a partial product backlog for a software project.

Agile Methodology

FIGURE 17.5
Partial Product Backlog

	A	B	C	D	E	F	G
1		Phone-In Prescription Software Project					
2		Product Backlog					
3							
4	ID	Product	Priority	Status	Estimate Hours	Actual Hours	
5							
6							
7	1	Customer Information	2	Complete	100	90	
8	2	Insurance Information	1	Complete	160	180	
9	3	Drug Information	3	Started	80		
10	4	Doctor Information	5	Not started	40		
11	5	Inventory status	4	Started	120		
12							

Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- **Product and Sprint Backlogs**
- **Sprint backlog**
- The sprint backlog is developed and controlled by the team.
- It represents the **amount of work the team commits to complete during the next sprint**.
- The sprint backlog **lists the tasks (activities) that must be completed to deliver a functional feature or segment of a feature**.
- The sprint **backlog also serves as a status document by listing the person responsible for each task, remaining hours of work, and recording the task as finished, in process, or not yet started**.
- See Figure 17.6 for a partial example of a sprint backlog.

Agile Methodology

FIGURE 17.6
Partial Sprint Backlog

	A	B	C	D	E	F	G	H	I
1		Phone-In Prescription Drug Project							
2		Sprint Backlog							
3									
4	Sprint Description	Responsible	Actual Hours	Remaining Hours	Defined	In Progress	Tested	Accepted	
5									
6									
7	Drug categories	RT	16	0	X	X	X	✔	
8	Generics	CG	32	0	X	X	X	✔	
9	Branded	AL	24	8	X	X	X		
10									
11									
12	Design drug inventory system	EL	40	0	X	X	X	✔	
13	Code inventory availability	CE		32					
14	Code manufacture order	MC		32					
15	Integrate all inventory systems	LE	4	16	X				
16									

Agile Methodology

- **Agile PM in Action: Scrum**
- **Scrum Meetings**
- **Product and Sprint Backlogs**
- Scrum does not use any of the conventional project management tools like Gantt charts or network diagrams.
- Instead it relies on the daily scrums and the active involvement of the product owner to manage work flow.
- Risk is mitigated by short developmental cycles and rigorous testing.

Agile Methodology

- **Applying Agile PM to Large Projects**
- Scrum and most other Agile methods are ideally suited for distinct projects that can be completed by **a small, five to nine person team**.
- Agile methods can be used on larger scale projects in which **several teams are working on different features at the same time**.
- In practice **this condition is called "scaling."** The chief challenge with scaling is integration—making sure that the different features being created work in harmony with each other.

Agile Methodology

- **Applying Agile PM to Large Projects**
- There are no easy solutions to the integration challenge.
- Significant up-front planning is required to manage the interdependences of different features that will be developed. This is called **“staging”** and often is the subject of the **first development iteration**.
- Here **protocols and roles for coordinating efforts and assuring compatibility** are established.
- This is supported by establishing a **clear product vision** so that trade-off decisions are consistent at the local team level.

Agile Methodology

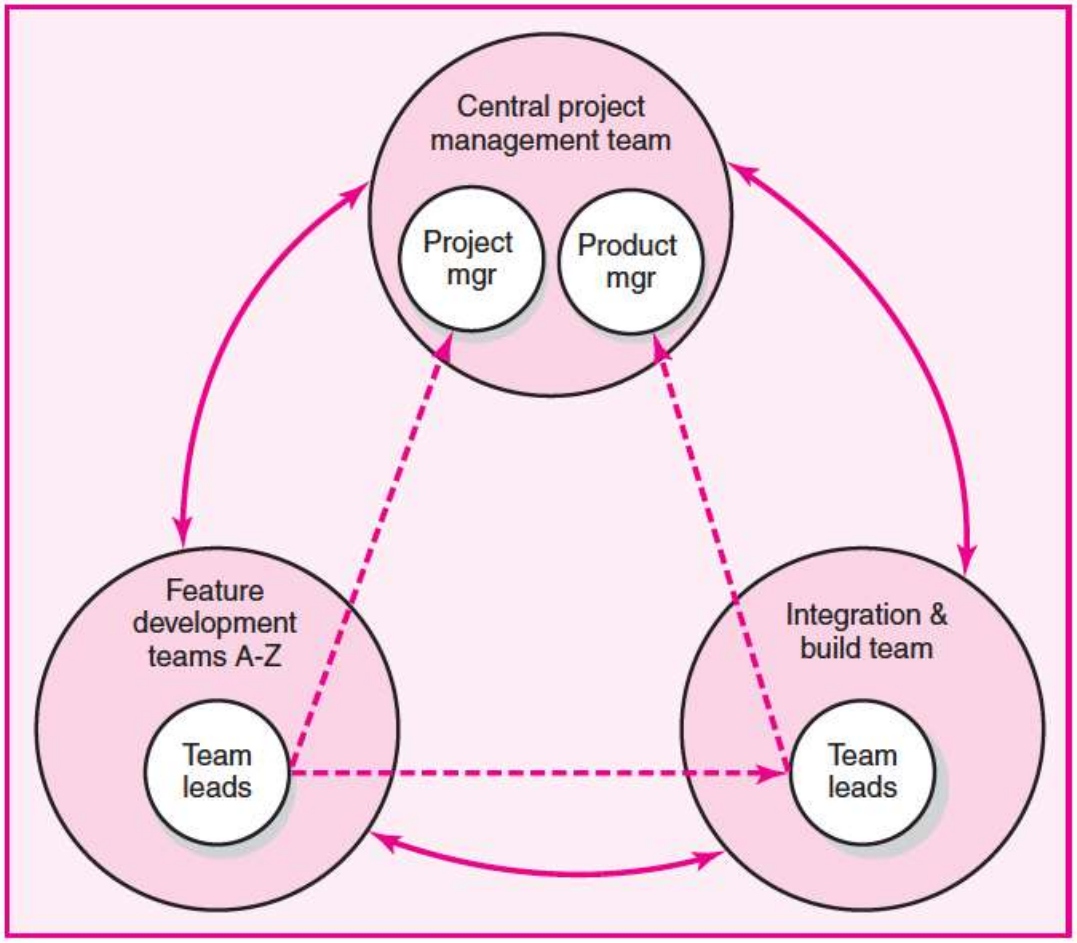
- **Applying Agile PM to Large Projects**
- Agile advocates recommend creating a hub structure with overlapping roles and responsibilities to manage large projects.
- There are several **feature development teams**.
- A separate **integration and build team** is formed consisting of part-time members of each feature team.
- This team tackles the sticky integration issue through testing and establishing requirements for the feature teams.
- To coordinate the multi-team structure a **central project management team** is created consisting of a higher level **project manager, a product manager** (who represents the interests of the customer), and the **leads** (“project managers”) from the feature development teams.

Agile Methodology

- **Applying Agile PM to Large Projects**
- The project management team provides coordination and facilitates project decision making. Their role is to steer rather than command the other teams.
- Teams may be real, virtual, or a combination. The entire system requires a spirit of collaboration to work.

Agile Methodology

FIGURE 17.7
Hub Project Management Structure



Agile Methodology

- **Limitations and Concerns**
- Agile methods in the software industry grew at a grass roots level.
- Many engineers saw traditional plan-driven project management as stifling effective development with too **much emphasis on processes and documentation and not enough on creativity and experimentation**.
- Early on there was a rebellious tone to the Agile movement, so much so, that several of the key founders published an **Agile Manifesto**.
- The manifesto affirmed a **different set of values than those currently being applied by management to projects they were working on**.

Agile Methodology

- **Limitations and Concerns**
- Agile PM does not satisfy top management's need for budget, scope, and schedule control.
- Agile methods by their very nature do not provide the **detail estimates of time and costs that management likes**.
- No matter how realistic "it depends" is, **management as well as customers are accustomed to working with a greater level of certainty than Agile provides**.
- In response to the financial concerns, many **organizations establish "ceilings**," **which is the maximum budget** that should not be exceeded in the development of a given product or service.

Agile Methodology

- **Limitations and Concerns**
- Many of the Agile principles, including **self-organizing teams and intense collaboration, are incompatible with corporate cultures.**
- Agile requires **active customer involvement**. Involvement comes in different shapes and forms.
- Designating an internal person to act as a product owner to represent the interests of customers is relatively easy.
- Not all customers want to be that actively involved. Many are simply too busy.

Agile Methodology

- **Limitations and Concerns**
- Agile PM frameworks, like Scrum, are used exclusively to complete software development projects from beginning to end.
- Other companies are using Agile PM only during the early exploratory phase of a project.
- Agile PM is used to **develop critical breakthrough technology or define essential features**.
- Once the features and technology are known then traditional project management is applied to complete the project.