Introduction to
Agile Software Development

WE'RE GOING TO TRY SOMETHING CALLED AGILE PROGRAMMING.
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www.dilbert.com
THAT MEANS NO MORE PLANNING AND NO MORE DOCUMENTATION. JUST START WRITING CODE AND COMPLAINING.
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THAT WAS YOUR TRAINING.

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Word Association

Write down the first word or phrase that pops in your head when you hear:

- ***Extreme Programming (XP)***
- ***Team (or Personal) Software Process (TSP/PSP)***
- ***Plan-driven software development***
- ***Agile software development***

Process Methodology Myths

✓ Agile Methods

- *cowboys and hackers*
- *undisciplined*
- *low quality*

✓ Plan Driven Methods

- *process worship*
- *document laden*
- *excessive discipline*

✓ It’s not that black and white. The process spectrum spans a range of gray.

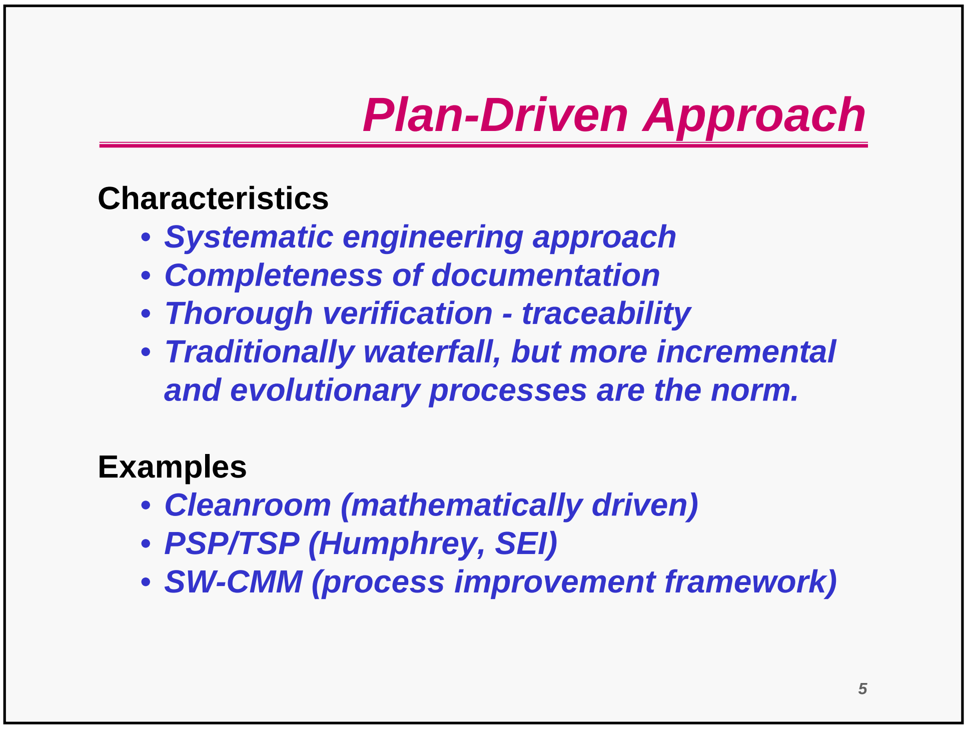
Important Concepts

Plan-Driven

- *Process Improvement*
- *Process Capability*
- *Organizational Maturity*
- *Process Group*
- *Risk Management*
- *Verification (building the product right)*
- *Validation (building the right product)*
- *System Architecture*

Agile

- *Embrace Change*
- *Frequent Delivery*
- *Simple Design*
- *Refactoring*
- *Pair Programming*
- *Retrospective*
- *Tacit Knowledge*
- *Test-Driven Development (TDD)*



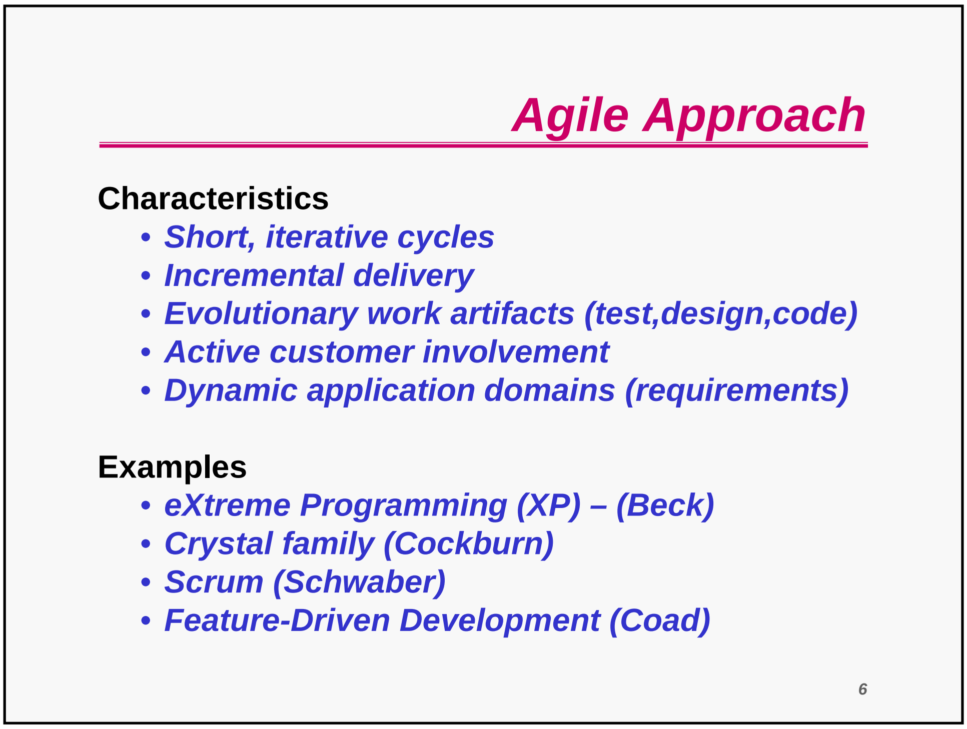
Plan-Driven Approach

Characteristics

- *Systematic engineering approach*
- *Completeness of documentation*
- *Thorough verification - traceability*
- *Traditionally waterfall, but more incremental and evolutionary processes are the norm.*

Examples

- *Cleanroom (mathematically driven)*
- *PSP/TSP (Humphrey, SEI)*
- *SW-CMM (process improvement framework)*



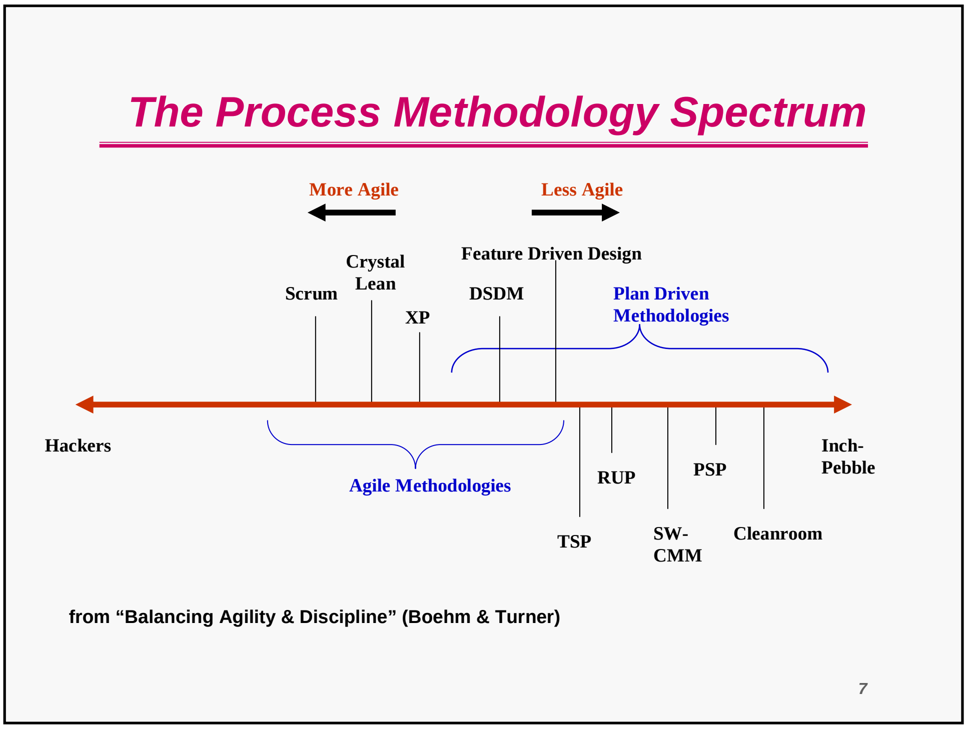
Agile Approach

Characteristics

- *Short, iterative cycles*
- *Incremental delivery*
- *Evolutionary work artifacts (test,design,code)*
- *Active customer involvement*
- *Dynamic application domains (requirements)*

Examples

- *eXtreme Programming (XP) – (Beck)*
- *Crystal family (Cockburn)*
- *Scrum (Schwaber)*
- *Feature-Driven Development (Coad)*



The Process Methodology Spectrum

More Agile

Less Agile

Scrum

Crystal
Lean

XP

Feature Driven Design

DSDM

Plan Driven
Methodologies

Hackers

Agile Methodologies

TSP

RUP

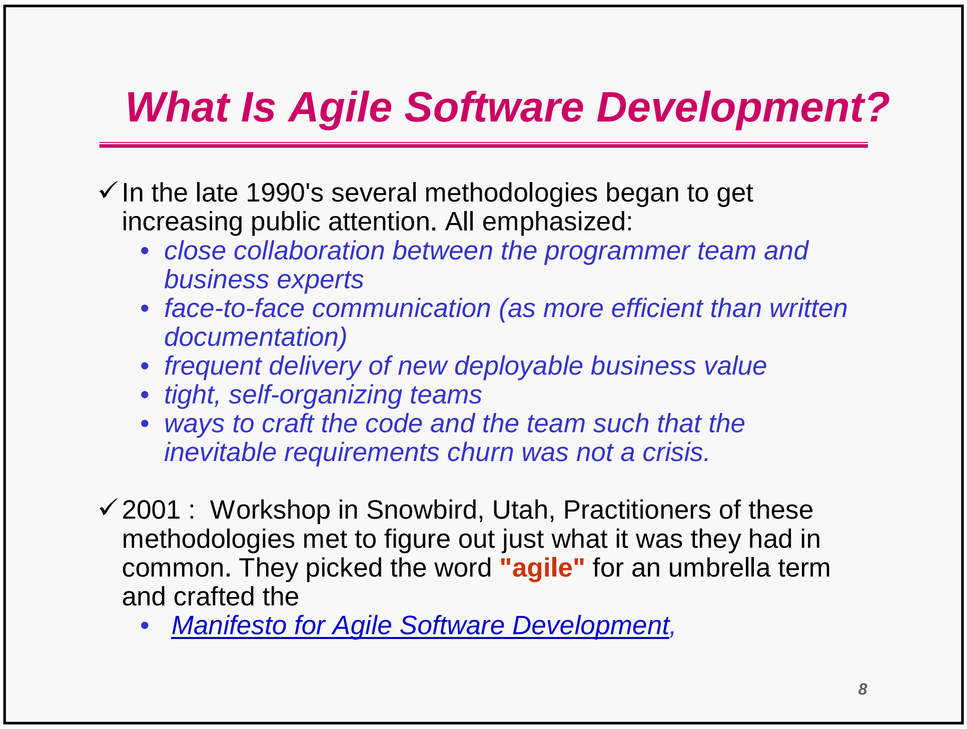
SW-
CMM

PSP

Cleanroom

Inch-
Pebble

from “Balancing Agility & Discipline” (Boehm & Turner)



What Is Agile Software Development?

✓In the late 1990's several methodologies began to get increasing public attention. All emphasized:

- *close collaboration between the programmer team and business experts*
- *face-to-face communication (as more efficient than written documentation)*
- *frequent delivery of new deployable business value*
- *tight, self-organizing teams*
- *ways to craft the code and the team such that the inevitable requirements churn was not a crisis.*

✓2001 : Workshop in Snowbird, Utah, Practitioners of these methodologies met to figure out just what it was they had in common. They picked the word **"agile"** for an umbrella term and crafted the

- *Manifesto for Agile Software Development,*

Manifesto for Agile Software Development

Statement of shared development values:

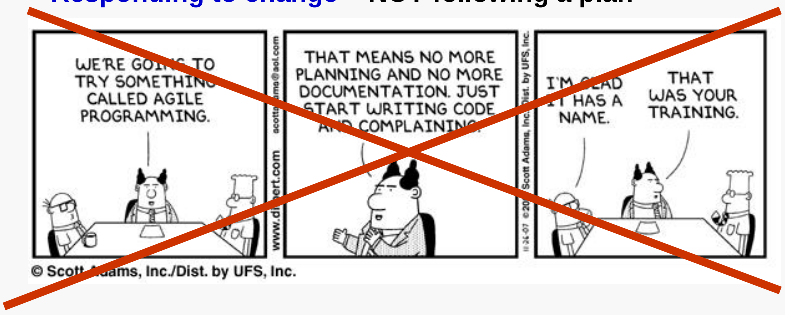
- ✓ **Individuals and Interactions – over process and tools**
- ✓ **Working software - over comprehensive documentation**
- ✓ **Customer collaboration - over contract negotiation**
- ✓ **Responding to change - over following a plan**

> **“That is, while *there is value in the items on the right*, we value the items on the left more. “**

What traditional developers heard

Statement of shared development values:

- ✓ **Individuals and Interactions = NO process**
- ✓ **Working software = NO documentation**
- ✓ **Customer collaboration = NO contracts**
- ✓ **Responding to change = NOT following a plan**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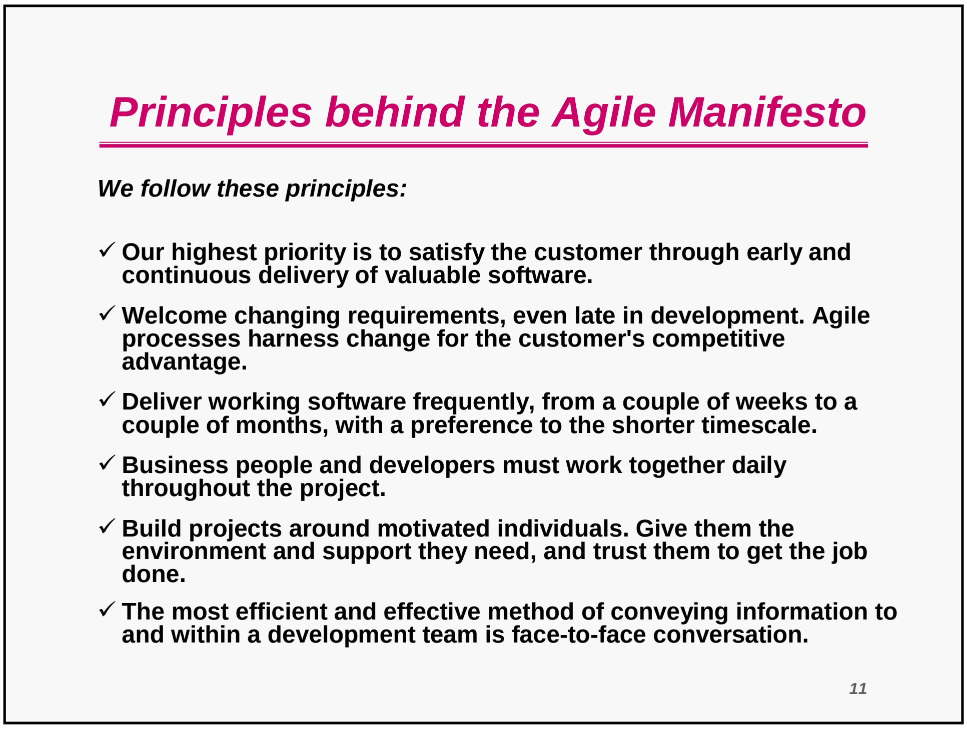
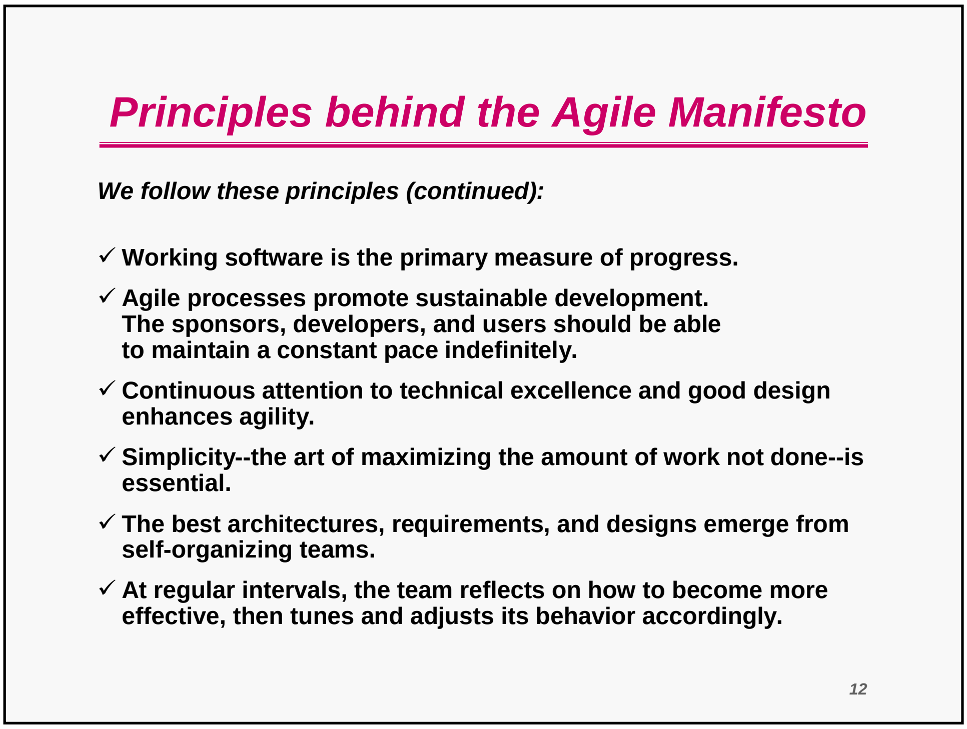


Principles behind the Agile Manifesto

We follow these principles:

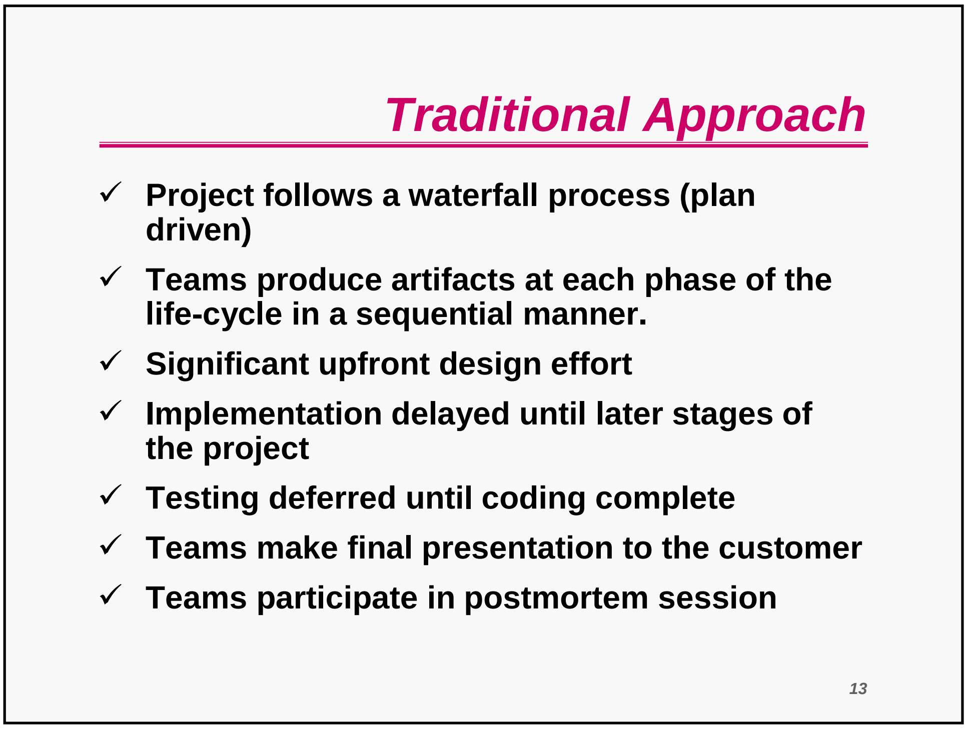
- ✓ Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
- ✓ Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
- ✓ Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
- ✓ Business people and developers must work together daily throughout the project.
- ✓ Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
- ✓ The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.



Principles behind the Agile Manifesto

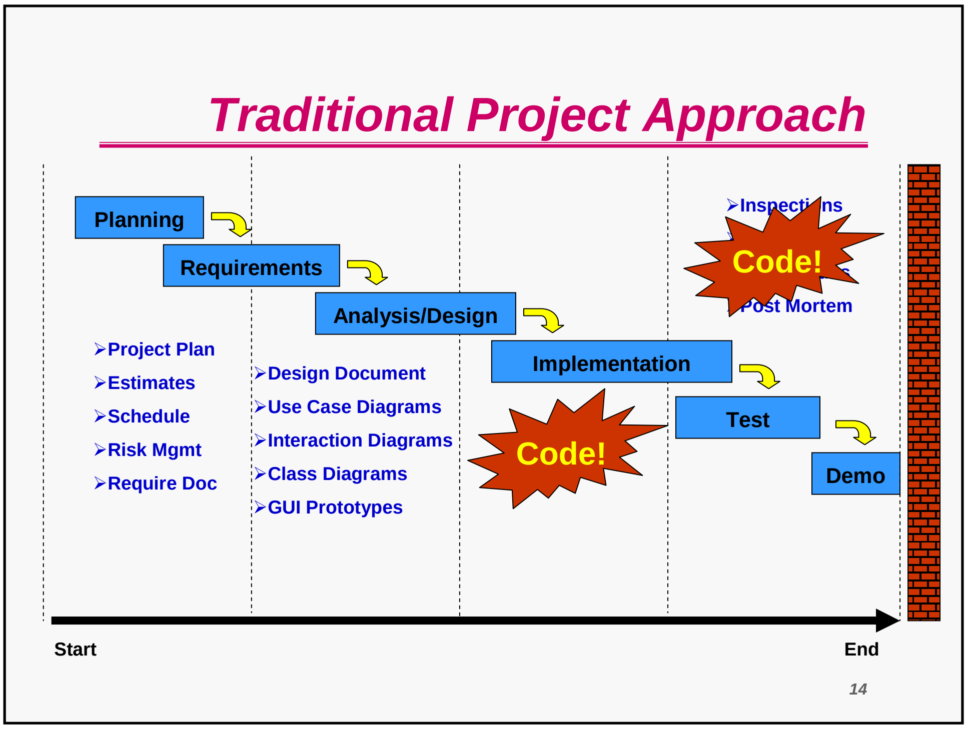
We follow these principles (continued):

- ✓ Working software is the primary measure of progress.
- ✓ Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
- ✓ Continuous attention to technical excellence and good design enhances agility.
- ✓ Simplicity--the art of maximizing the amount of work not done--is essential.
- ✓ The best architectures, requirements, and designs emerge from self-organizing teams.
- ✓ At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

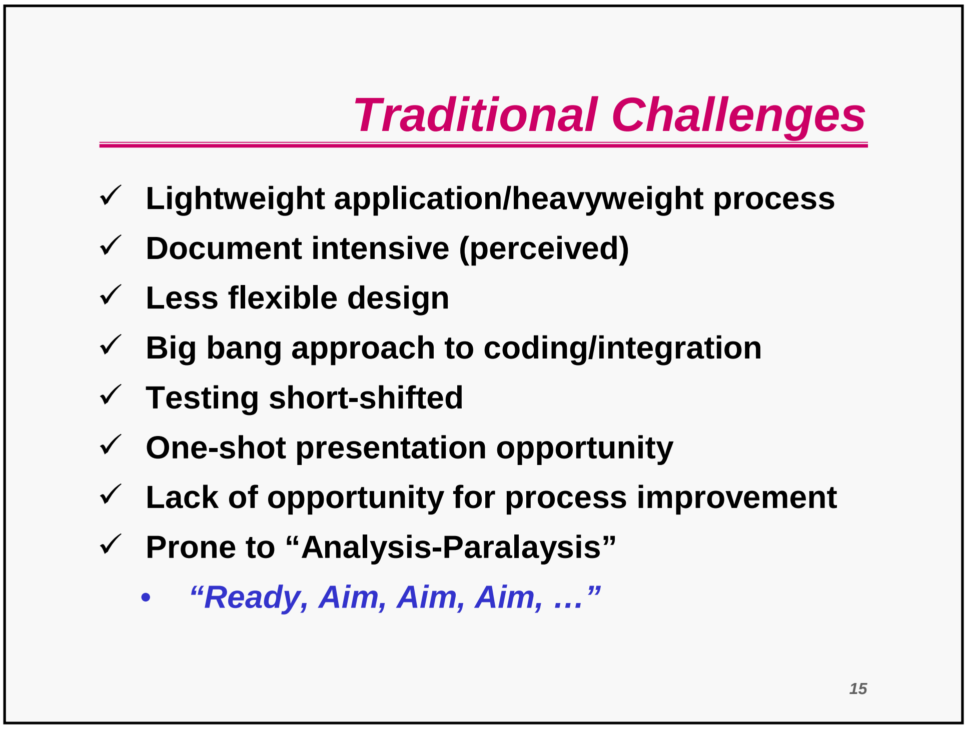


Traditional Approach

- ✓ Project follows a waterfall process (plan driven)
- ✓ Teams produce artifacts at each phase of the life-cycle in a sequential manner.
- ✓ Significant upfront design effort
- ✓ Implementation delayed until later stages of the project
- ✓ Testing deferred until coding complete
- ✓ Teams make final presentation to the customer
- ✓ Teams participate in postmortem session

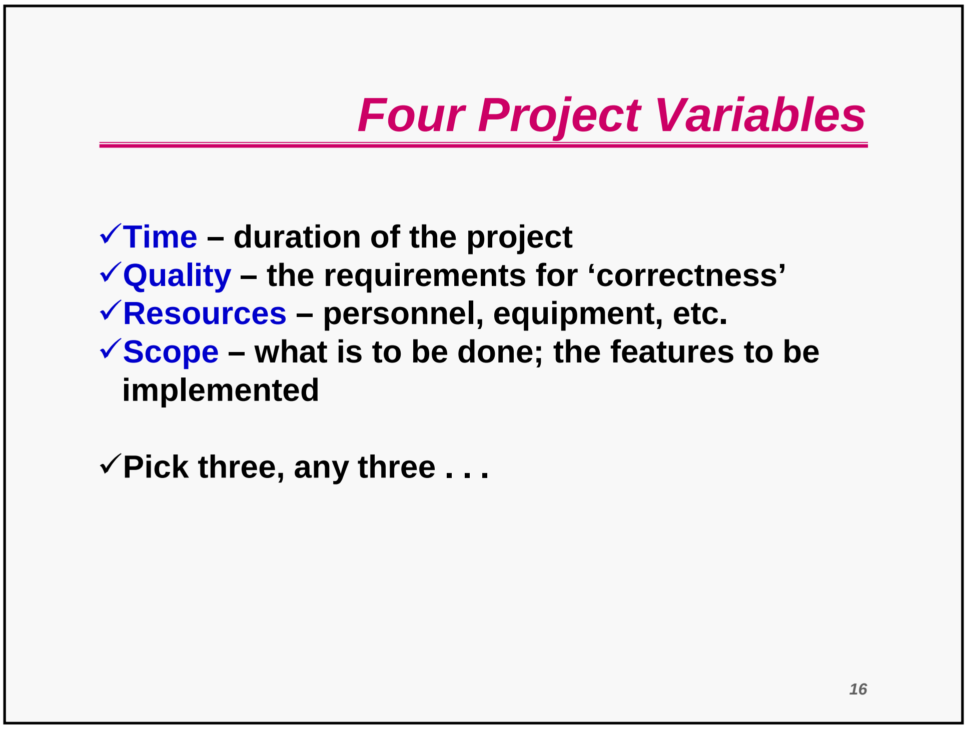


Traditional Project Approach



Traditional Challenges

- ✓ Lightweight application/heavyweight process
- ✓ Document intensive (perceived)
- ✓ Less flexible design
- ✓ Big bang approach to coding/integration
- ✓ Testing short-shifted
- ✓ One-shot presentation opportunity
- ✓ Lack of opportunity for process improvement
- ✓ Prone to “Analysis-Paralaysis”
  - *“Ready, Aim, Aim, Aim, …”*



Four Project Variables

✓Time – duration of the project
✓Quality – the requirements for ‘correctness’
✓Resources – personnel, equipment, etc.
✓Scope – what is to be done; the features to be implemented

✓Pick three, any three . . .

Planning

“The plan is nothing; the planning is everything”

- ✓ Dwight Eisenhower
- ✓Allied supreme commander during World War II
- ✓34th President of United States (1953-61)

Where are the risks?

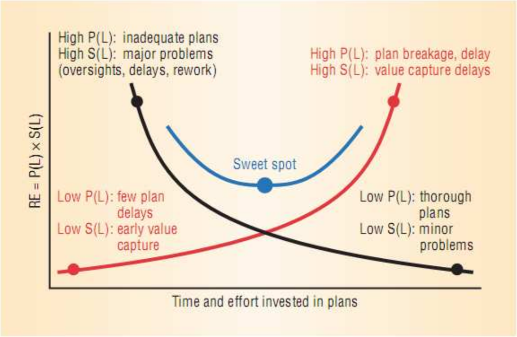


Figure 2. Risk exposure (RE) profile. This planning detail for a sample e-services company shows the probability of loss P(L) and size of loss S(L) for several significant factors.

“Getting Readu for Agile Methods With Care”, Barry Boehm – IEEE Computer, 2002

Agile RE Profile

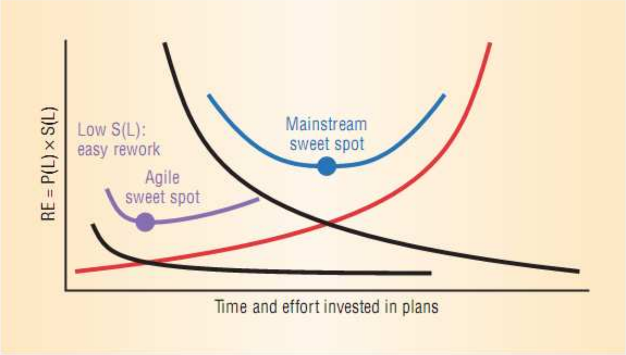


Figure 3. Comparative RE profile for an agile home-ground company with a small installed base and less need for high assurance.

“Getting Readu for Agile Methods With Care”, Barry Boehm – IEEE Computer, 2002

Plan-Driven RE Profile

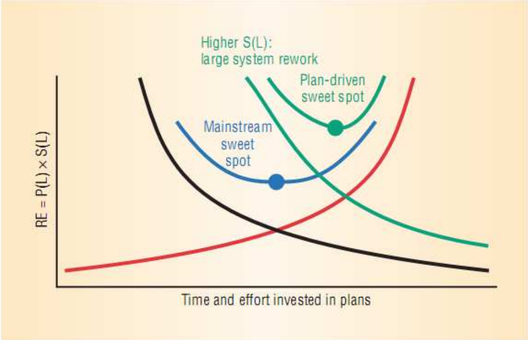
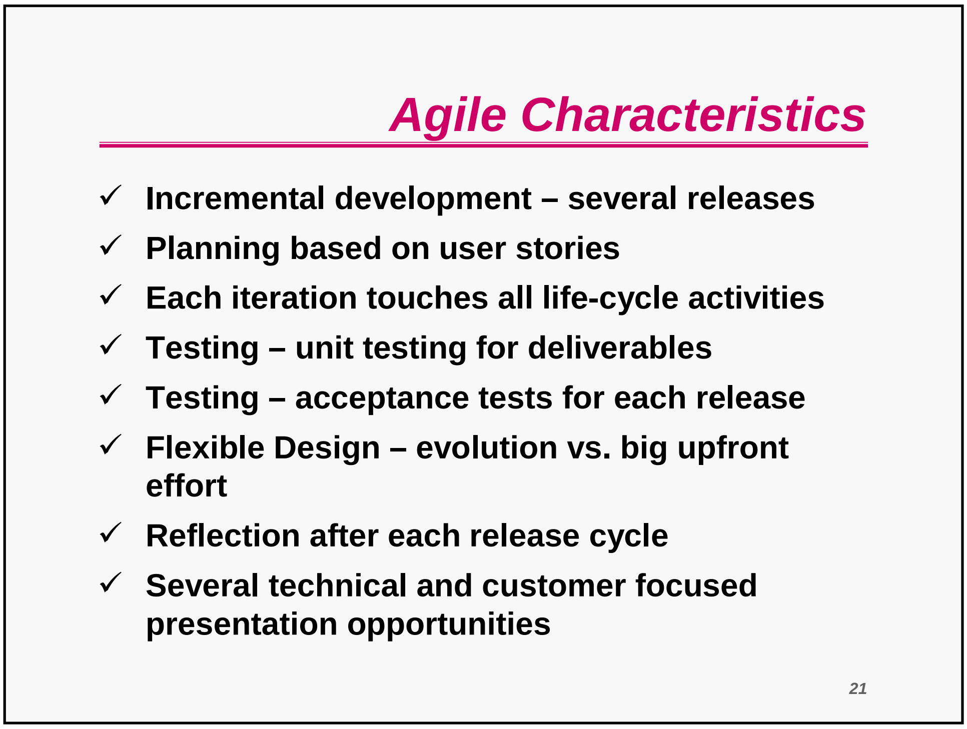


Figure 4. Comparative RE profile for a plan-driven home-ground company that produces large, safety-critical systems.

“Getting Readu for Agile Methods With Care”, Barry Boehm – IEEE Computer, 2002



Agile Characteristics

- ✓ Incremental development – several releases
- ✓ Planning based on user stories
- ✓ Each iteration touches all life-cycle activities
- ✓ Testing – unit testing for deliverables
- ✓ Testing – acceptance tests for each release
- ✓ Flexible Design – evolution vs. big upfront effort
- ✓ Reflection after each release cycle
- ✓ Several technical and customer focused presentation opportunities

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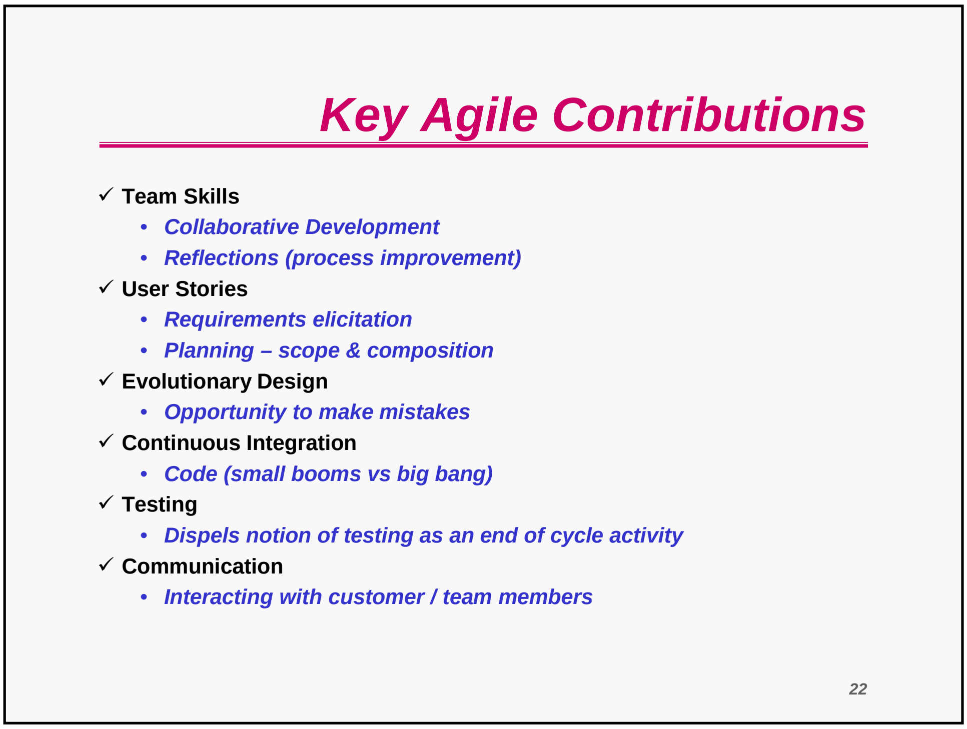

Key Agile Contributions

- ✓ Team Skills
  - *Collaborative Development*
  - *Reflections (process improvement)*
- ✓ User Stories
  - *Requirements elicitation*
  - *Planning – scope & composition*
- ✓ Evolutionary Design
  - *Opportunity to make mistakes*
- ✓ Continuous Integration
  - *Code (small booms vs big bang)*
- ✓ Testing
  - *Dispels notion of testing as an end of cycle activity*
- ✓ Communication
  - *Interacting with customer / team members*

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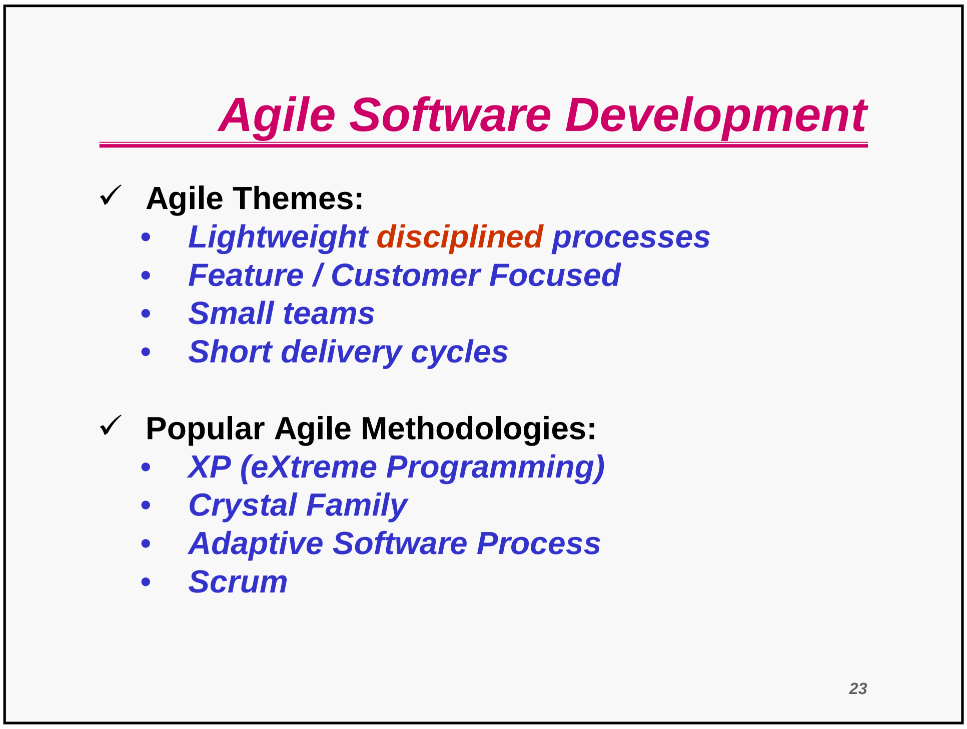


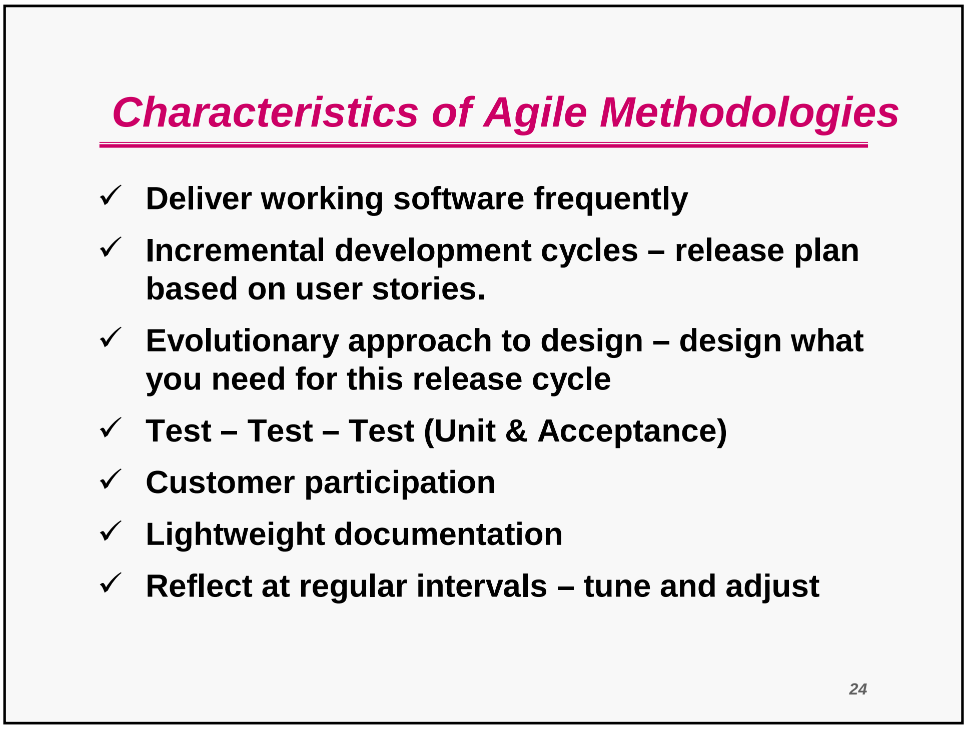
Agile Software Development

✓ Agile Themes:

- *Lightweight disciplined processes*
- *Feature / Customer Focused*
- *Small teams*
- *Short delivery cycles*

✓ Popular Agile Methodologies:

- *XP (eXtreme Programming)*
- *Crystal Family*
- *Adaptive Software Process*
- *Scrum*



Characteristics of Agile Methodologies

✓ Deliver working software frequently

✓ Incremental development cycles – release plan based on user stories.

✓ Evolutionary approach to design – design what you need for this release cycle

✓ Test – Test – Test (Unit & Acceptance)

✓ Customer participation

✓ Lightweight documentation

✓ Reflect at regular intervals – tune and adjust

Agile Benefits

✓ User stories drive planning and requirements in a manageable work units
  - *Customer perspective*
  - *Risk management*

✓ Frequent delivery of working software
  - *Process reflection opportunities*
  - *Implementation refactoring*
  - *Positive feedback to team*

✸ Testing Focus
  - *Test early and often*
  - *Change in attitude towards testing*

Transitioning to Agile

✓ Agile is not a **"Silver Bullet"** that will cure all your development woes. It will however brightly illuminate your opportunities.

✓ Where are the opportunities for improvement in our current process? How does Agile address those issues?

✓ Trust, Transparency, Patience

✓ Individual Opportunity - "Generalizing Specialists"

✓ The adoption of Agile is neither completely top-down or bottom-up. It must be a balance of both with a strong level of trust and commitment between all levels of the organization

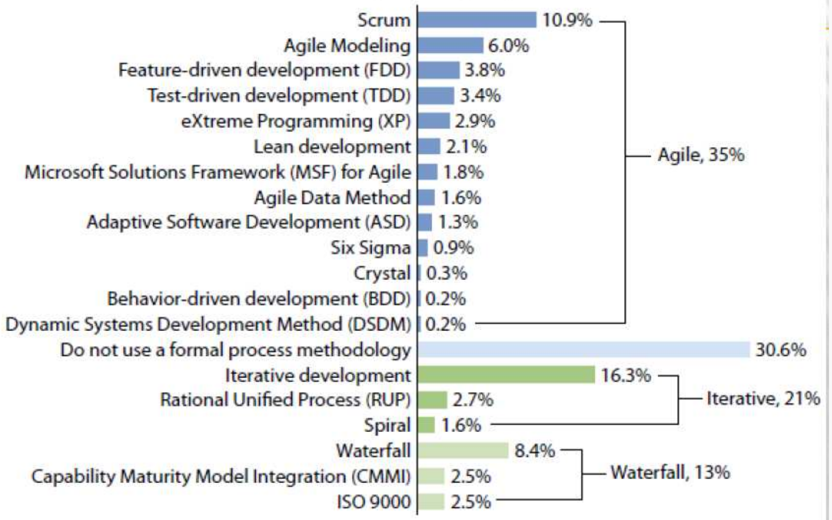
Common Issues

✓Typical issues/obstacles that arise include:

- *Lack of business ownership and the inability to make decisions*
- *Limited business buy-in into the concept of Agile*
- *Team communication, individual skills, and team fit*
- *Lack of trust in the team by the business*
- *Focus only on Agile development practices*

✓Agile permeates <u>all levels</u> of the organization

"Please select the methodology that most closely reflects the development process you are currently using."
(select only one)



Base: 1,298 IT professionals

Source: Forrester/Dr. Dobb's Global Developer Technographics® Survey, Q3 2009

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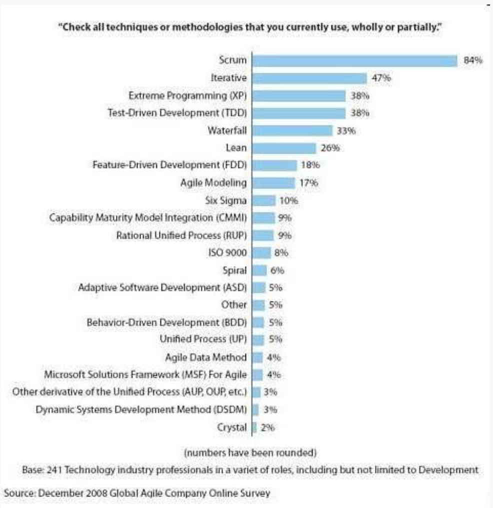
Methodology Distribution



"Check all techniques or methodologies that you currently use, wholly or partially."

(numbers have been rounded)

Base: 241 Technology industry professionals in a variet of roles, including but not limited to Development

Source: December 2008 Global Agile Company Online Survey

Resources

- *Agile Software Development Portal:* ***agile.csc.ncsu.edu/***
- *Agile Alliance –* ***www.agilealliance.com***
- ***www.extremeprogramming.org/***
- *Laurie Williams – North Carolina State:* ***collaboration.csc.ncsu.edu/laurie/index.html***