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SSW-555: Agile Methods for Software Development

Feature Driven Development (FDD)

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Acknowledgements

Some of the material in these slides came from Jeff De Luca's website: <http://www.nebulon.com>

Some material came from Stephen Palmer's website: <http://www.step-10.com/SoftwareProcess/FeatureDrivenDevelopment/index.html>

Some material from The Coad Letter: <http://www.featuredrivendevelopment.com/node/517>

Today's topics

Motivation: Large projects

Origins of FDD

FDD Roles

FDD Processes

FDD Practices

Similarities and differences from other Agile Methods

Palmer, 2013 starts with some interesting quotations….

"Kanban is the science of not trying to do too much at once" Stephen Palmer, 2012

"We try to solve the problem by rushing through the design process so that enough time is left at the end of the project to uncover the errors that were made because we rushed through the design process" Glenford Myers (via Jeff De Luca)

"Agile software development is about iteration not oscillation" Jim Highsmith (paraphrased), Agile 2009

Motivation: Some Cocomo estimates

So far, we've looked at applying Agile Methods to relatively small projects

How do we scale Agile Methods to larger projects?

- Many more developers working much longer times
- Techniques we've discussed so far won't work for very large projects

KLOC	Effort (Staff Months)	Calendar Months	Software Construction Staff Months	Software Construction Calendar Months	#Staff
1	0.5	2	0.4	1.2	0.3
10	5.8	4.4	4.4	2.7	1.6
100	64.2	9.7	48.8	6	8.1
1,000	**708.4**	**21.3**	**538.4**	**13.3**	**40.4**
10,000	**7815.5**	**47.1**	**5939.7**	**29.4**	**201.7**

All project attributes set for "agile-like" teams and problems

Agile Manifesto (2001)

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

- **Individuals and interactions** over processes 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.

FDD's view on the Agile Manifesto

Responding to change over following a plan

doesn't mean you **shouldn't** plan

instead, planning is important

but you must be willing to **change the plan**

Working software over comprehensive documentation

doesn't mean you **shouldn't** write documentation

instead, documentation is important and required

but documentation without working code is a path to failure

http://www.nebulon.com/fdd/index.html

FDD's view on Process

A system for building systems is necessary in order to scale to larger projects

A simple, but well-defined process works best

Process steps should be logical and their worth immediately obvious to each team member

"Process pride" can keep the real work from happening

Good processes move to the background so team members can focus on results

Short, iterative, feature-driven life cycles are best

Source: pp. 273, Jim Highsmith, *Agile Software Development Ecosystems*

FDD Origins

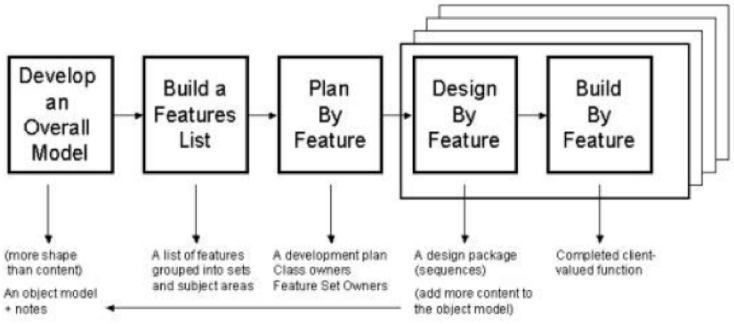
Developed in 1997 by Jeff DeLuca on *Singapore project* with help from Peter Coad and Stephen Palmer

FDD depends on ***strong OO modeling*** at ***start of project***

Assumes overall model of the system at the beginning

Adopted short iterations to address shorter business cycles

Lightweight process specification relative to plan based methods used in the past, but heavier weight than some Agile methods



Singapore Project

Banking domain – lending instruments

Failed 2 year project by a "well-known systems integration firm"

- 3500 pages of "useless cases" (vs. use cases)
- Hundreds of OO classes
- Thousand of attributes
- No code

Using FDD, they successfully developed 2000 features in 15 months with 50 staff

- Developed initial model in 1 month
- Planned features in 2 weeks

FDD Features

Cross-functional team

Focus on collaboration

- Developers working closely with customers

Time boxed activity

Start project with:

- Shared understanding of the project
- Shared vocabulary between developers and customers
- Conceptual framework
- Overall Model of the system

Roles in FDD

Domain Experts – voice of customer

Project Manager (DeLuca) – administrative lead

Chief Architect (Coad) – responsible for overall design

Development Manager (Palmer) – team management

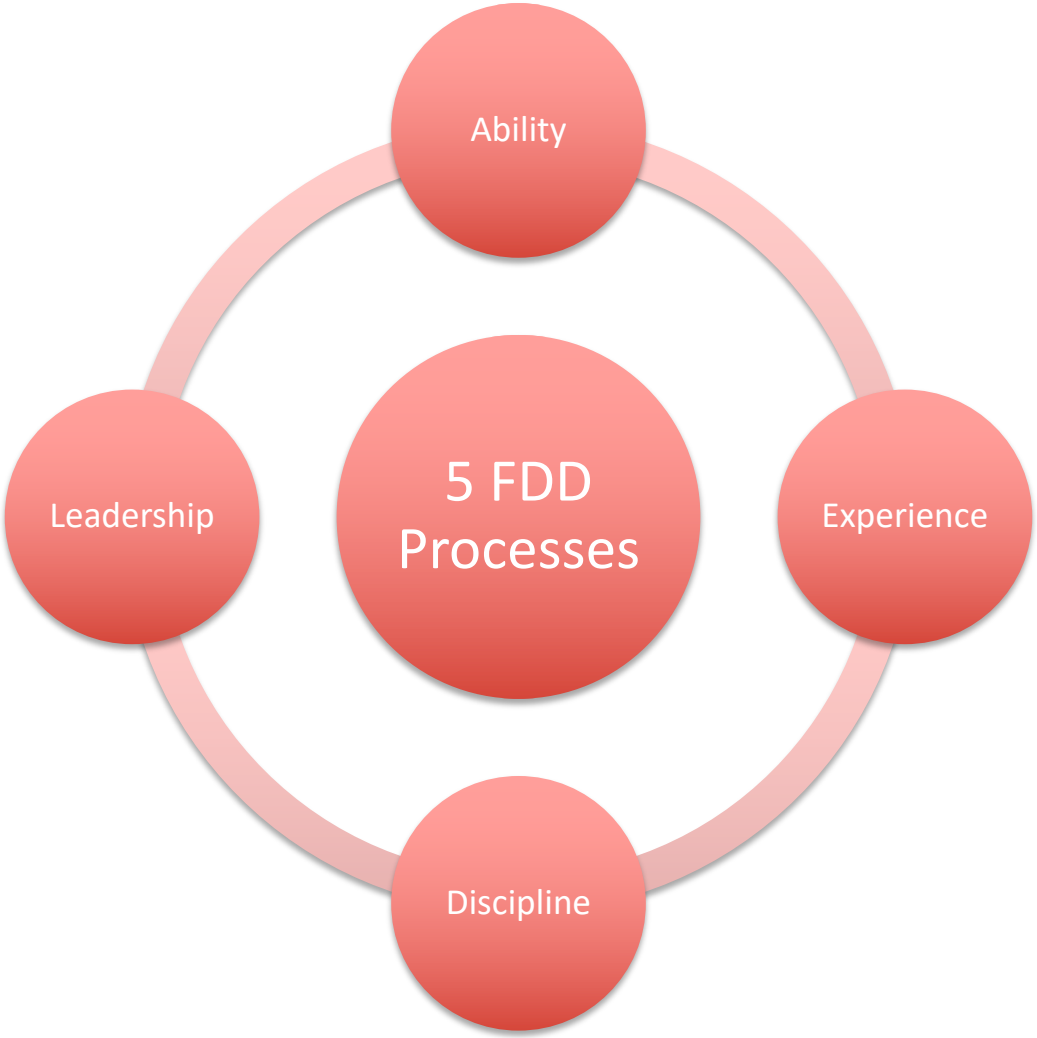
Chief Programmers – lead teams in design of features

Feature Teams – temporary groups of developers implementing features

Class Owners – developers who own individual classes

Different from XP's collective code ownership

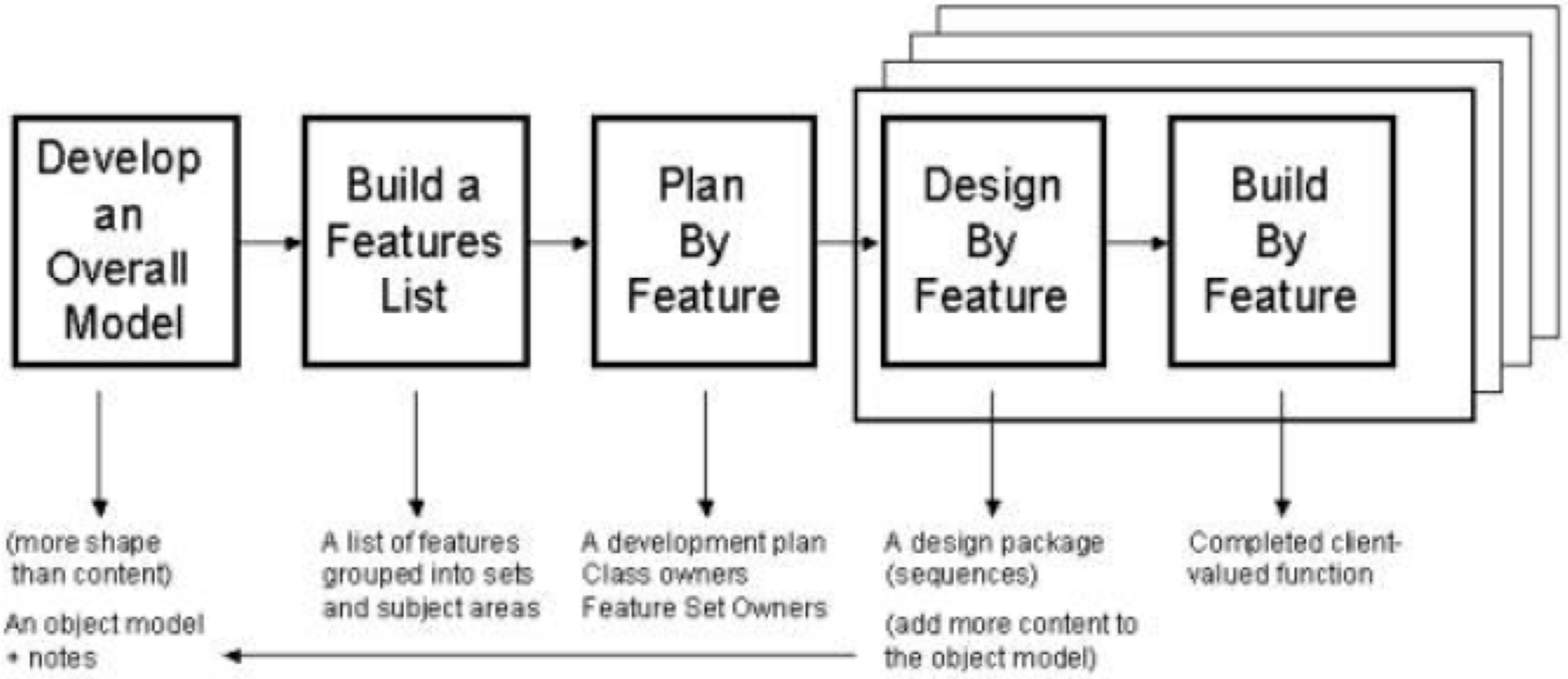
Teams also require…



The 5 FDD Processes

Jedi (Just Enough Design Initially) approach

Not BDUF (Big Design Up Front) as in Plan driven approaches



source: Palmer2013

General effort guidelines

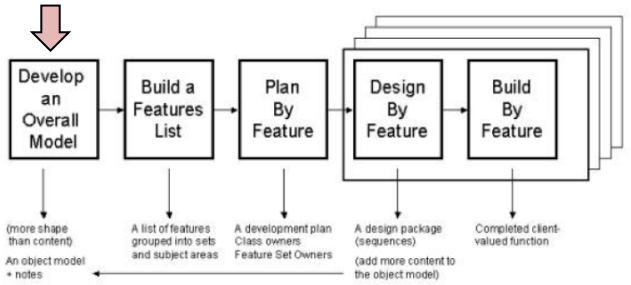
Process	Initial	Ongoing
1. Develop an Overall Model	10%	4%
2. Build a Features List	4%	1%
3. Plan by Feature	2%	2%
4. Design by Feature	77%	
5. Build by Feature		

Process 1: Develop an Overall Model

1. Form the modeling team (led by Chief Architect)
   Includes Domain experts, Chief Programmers
2. Perform domain walk-through
3. Study relevant documents to understand domain knowledge
4. Develop the model (led by Chief Architect)

   Define overall "**shape**" of the model, rather than the details

   More details will be added during the Design by Feature process
5. Refine the overall object model
6. Write model notes
7. Internal and external assessment



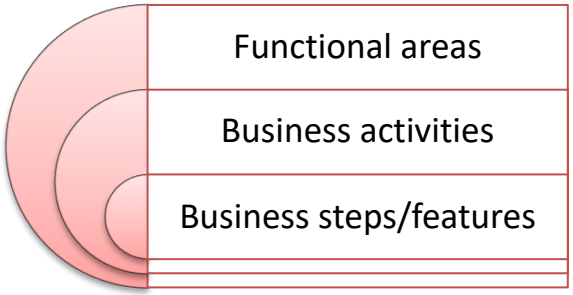
Process 2: Build a Features List

1. Form the features list team (Chief Programmers)

   Goal is to define all of the features (product backlog)

2. Build features list – oriented to the business needs

   Hierarchical, not flat, like user stories

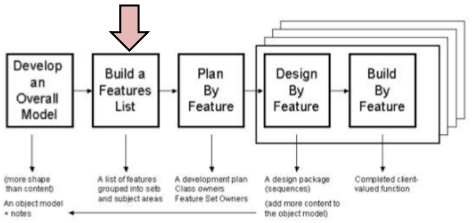


Features should be small enough to implement in 10 days

Describe each feature with the template:

<action> <result> <object>

E.g., calculate the total of a sale

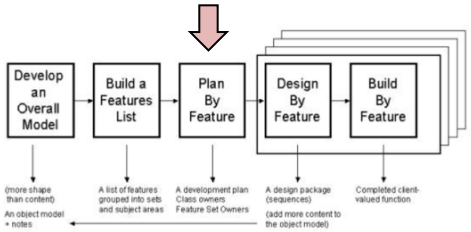


Process 3: Plan by Feature

Goal is to create a plan to deliver all features

1. Form the planning team

   (Development Manager, Chief Programmers)



2. Determine the development sequence

   Some dependencies are obvious but others are more subtle

   May depend upon resource availability

3. Assign business activities to Chief Programmers

4. Assign classes to developers

   Unlike XP's collective ownership, classes are owned by individual developers

Process 4: Design by Feature

1. Form feature team (Chief Programmer, developers)

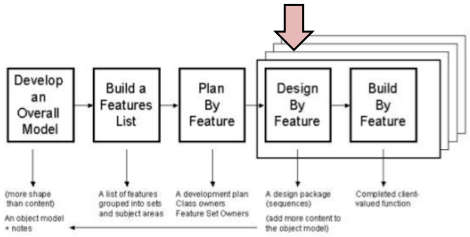
   Dynamic team, formed for this feature

2. Domain walk-through (domain expert)
3. Study the referenced documents (team)
4. Develop the UML sequence diagrams (team)

   Done as group activity

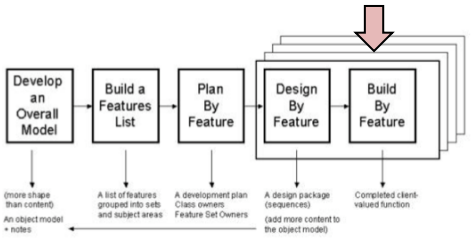
   Scribe records notes

5. Refine the object model (Chief Programmer)
6. Write class and method prologues (developers)
7. Design inspection (team)



Process 5: Build by Feature

1. Implement classes and methods (class owner)
2. Code inspection (feature team)
3. Unit test (class owner)
4. Promote to the build (class owner with Chief Programmer)
5. Disband the team



FDD Practices

Domain Object Modeling

Developing by Feature

Individual Class/Code Ownership

Feature Teams

Inspections

Regular Builds

Configuration Management

Reporting / Visibility of Results

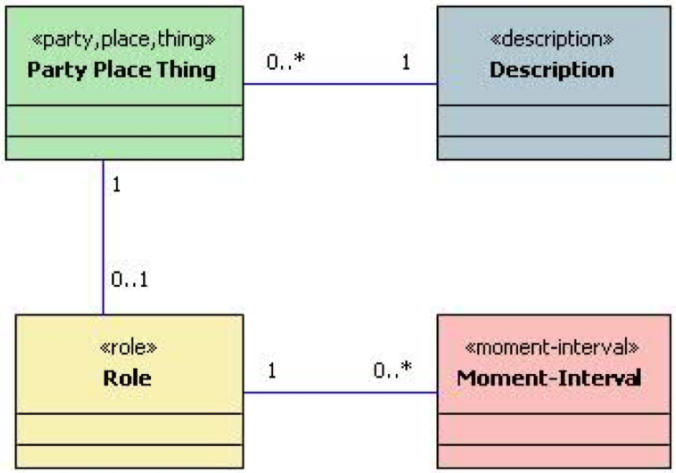
Domain object modeling

Construct class diagrams for ***all*** significant object types

Define the class names and description, but not all details

Supplement with UML sequence diagrams showing interactions between objects

Coad developed modeling in color during Singapore project to standardize class patterns



Developing by feature

A feature is a small, client valued function expressed in the form:
<action> <result> <object>

Examples:

Calculate the total of a sale
Assess the performance of a salesman
Validate the password of a user

Feature template provides clues to operations and classes to which they should be applied

'Calculate the total of a sale' suggests:
calculateTotal() operation in a Sale class

'Assess the performance of a salesman' suggests:
assessPerformance() operation in a Salesman class

Individual class/code ownership

Each class is owned by one developer

Opposite of collective ownership in XP

Advantages:

- Owner maintains conceptual integrity of class
- Each class has an expert associated with it
- Owner can implement changes faster than anyone else
- Owners can take pride in their classes

Disadvantages

- Dependencies between classes (owner A needs owner B to make changes to their classes)
- Risk of loss of owners during development

Feature Teams

Each feature is owned by a Feature Team

- Team is created dynamically to design and build a feature
- Disbanded after the feature is complete

Each team consists of 2-5 class owners (developers) led by a Chief Programmer

Each team contains all the owners it needs to create the feature

- Everyone needed to develop the feature is on the team
- Don't depend on anyone outside the team

Owners may be on multiple feature teams at the same time

Chief programmers may also be class owners

Inspections

FDD inspections usually performed by feature teams on their own features

- FDD suggests inspections over Pair Programming

Designs and code are inspected by team members

Advantages:

- Most effective technique for discovering defects
- Provide educational benefits: domain knowledge, technical skills
- Promotes and enforces standards

Regular builds

Some teams build weekly, others daily and others continuously

Advantages of regular builds:

- Early detection of integration problems
- Always have something to demonstrate to client, even if not doing frequent releases

Regular build process can be enhanced to:

- Generate documentation
- Run audit and metric scripts to highlight potential problem areas and to check for standards compliance.
- Run automated regression tests
- Construct new build and release notes listing new features added, defects fixed, etc.

Configuration management

Keep code under configuration management to manage conflicts and maintain consistency

Other items kept under configuration management:

- Requirements documents
- Analysis and design artifacts
- Test cases, test harnesses and scripts and even test results
- Version of the ***process*** you are using, any changes and adjustments that may be made during the construction and maintenance of the system
  - Useful for audits and measuring process effectiveness

Reporting/visibility of results

Track by feature

Roll up summaries to feature set level

- Parking lot chart for executives

Track progress with burn-up graph

- Similar to burn-down graph

Track by feature

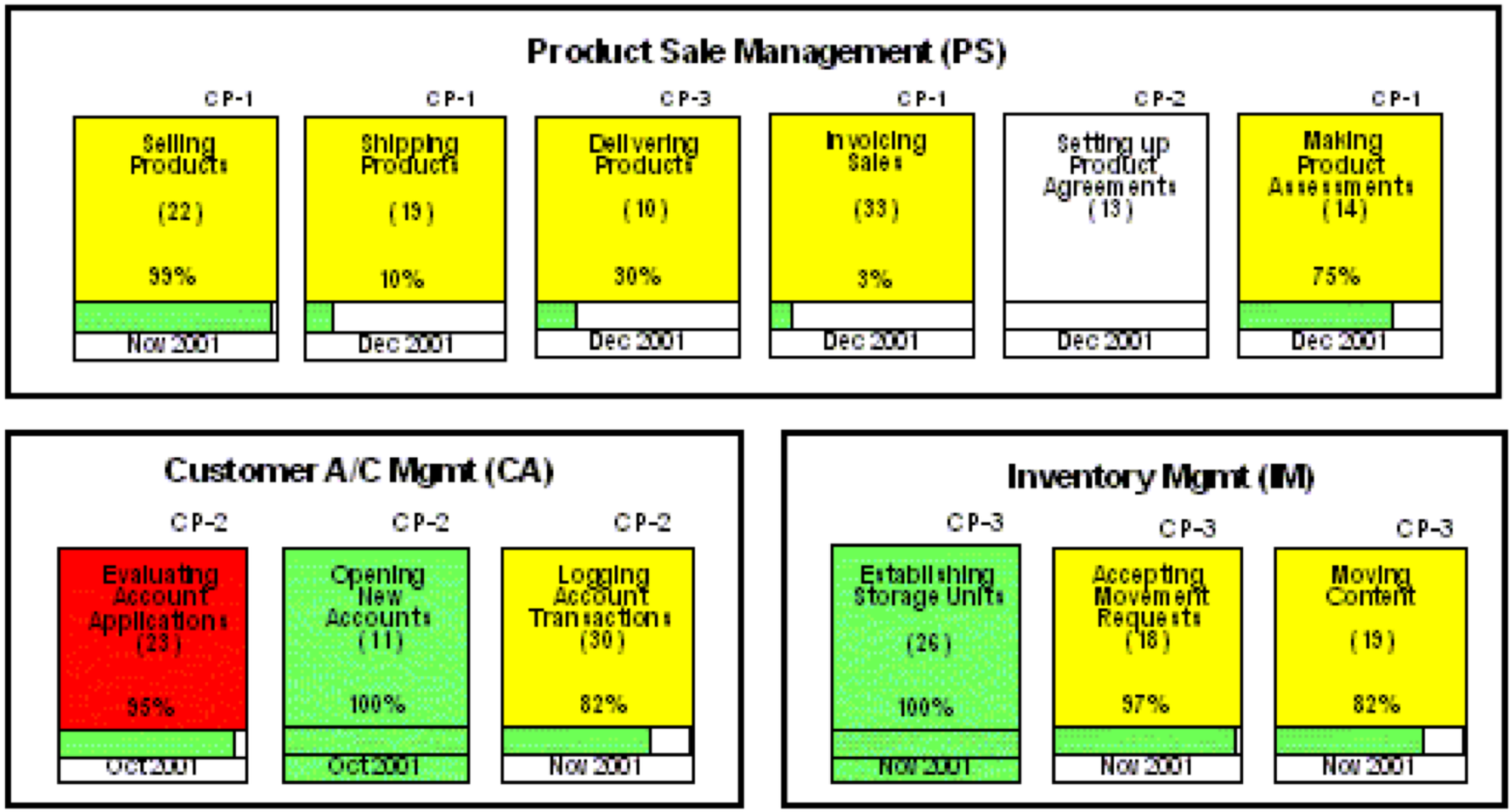
Authorisation (9)

Id	Description	Chief Prog.	Class Own.	Walkthrough		Design		Design Inspection		Code		Code Inspection		Promote to Build	
				Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
MD 125	validate the transactional limits of a CdO against an implementation instruction	CP	ABC	23/12/98	23/12/98	31/01/99	31/01/99	01/02/99	01/02/99	10/02/99		18/02/99		20/02/99	
MD 126	set the status of an implementation instruction	CP	ABC	23/12/98	23/12/98	31/01/99	31/01/99	01/02/99	01/02/99	10/02/99		18/02/99		20/02/99	
MD 127	specify the authorising office of an implementation instruction	CP	ABC	23/12/98	23/12/98	31/01/99	31/01/99	01/02/99	01/02/99	10/02/99		18/02/99		20/02/99	
MD 128	reject an implementation instruction authorisation for a set of lines	CP	ABC	STATUS: Inactive REMARKS: [added by CK: 3/3/99] No longer applicable											
MD 129	confirm an implementation instruction authorisation for a set of lines	CP	ABC	23/12/98	23/12/98	31/01/99	31/01/99	01/02/99	01/02/99	10/02/99		18/02/99		20/02/99	
MD 130	determine if all documents are completed for a borrower	CP	ABC	23/12/98	23/12/98	31/01/99	31/01/99	01/02/99	01/02/99	05/02/99		08/02/99		10/02/99	
				REMARKS: [added by SL: 3/2/99] Blocked on AS											
MD 131	validate the transactional limits of a CdO against a disbursement instruction	CP	ABC	23/12/98	23/12/98	31/01/99	31/01/99	01/02/99	01/02/99	05/02/99		08/02/99		10/02/99	
				REMARKS: [added by SL: 3/2/99] Behind schedule - sick leave											
MD 132	submit for authorisation an implementation instruction	CP	ABC	23/12/98	23/12/98	31/01/99	31/01/99	01/02/99	01/02/99	05/02/99	05/02/99	06/02/99	06/02/99	08/02/99	08/02/99
MD 133	validate the drawdown date of an implementation instruction	CP	ABC	23/12/98	23/12/98	31/01/99	31/01/99	01/02/99	01/02/99	05/02/99	05/02/99	06/02/99	06/02/99	08/02/99	08/02/99

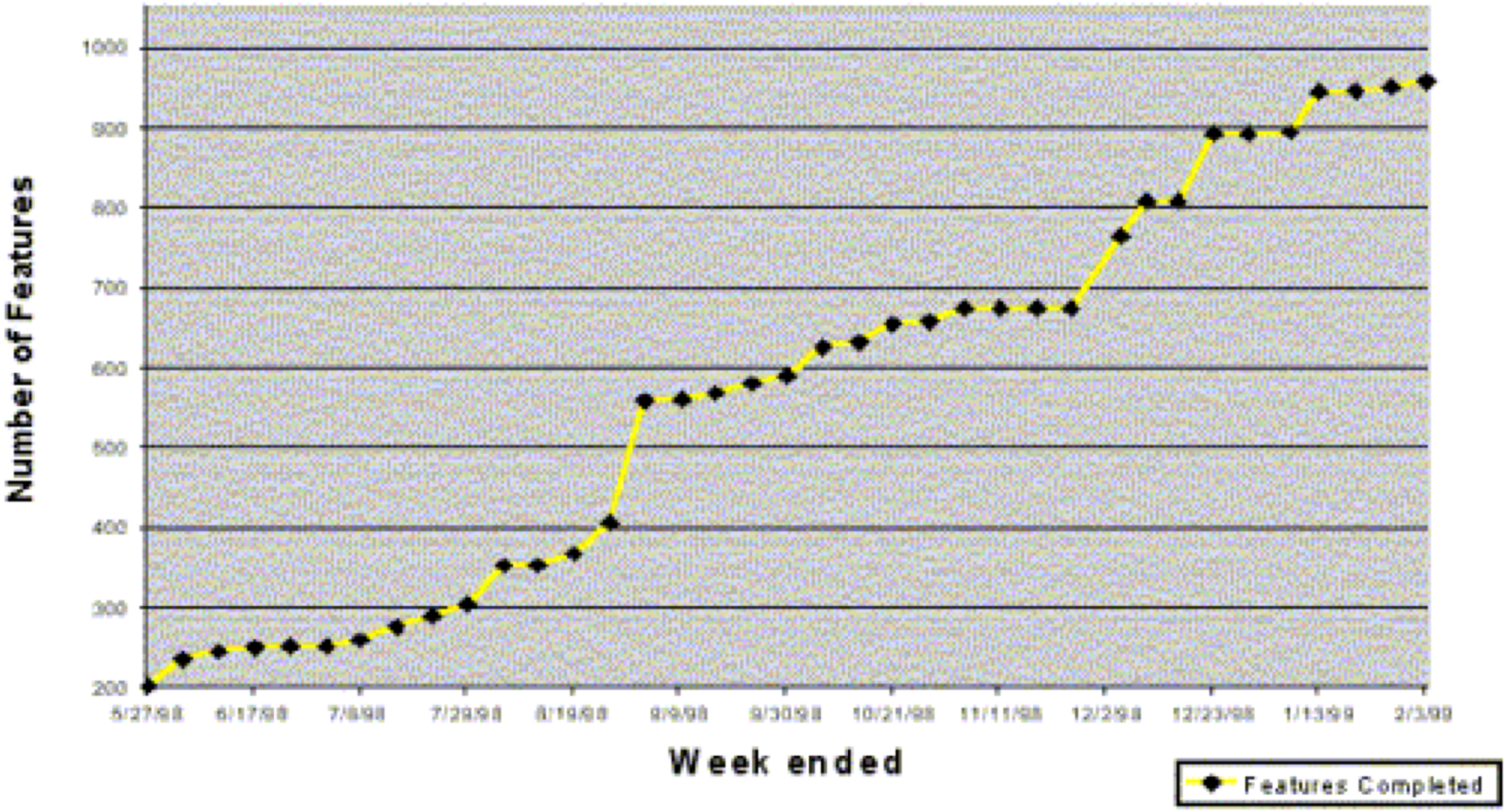
Progress sum for these features in feature set "Authorisation": 55%

Expected completion date: Mar 1999

Feature set level – Parking Lot Chart



Burn up graph



Similarities to other Agile Methods

Short, time-boxed iterations

Lightweight process

Requirements described as features

Customer participation in planning (but not as often, and at a higher level)

Differences from other Agile Methods

Up-front modeling – "Just Enough Design Initially (JEDI)", to avoid refactoring

- Bias toward getting it right the first time

FDD values documentation (models, notes, reference documents)

More emphasis on progress tracking and reporting

Dynamic feature teams

Chief Programmers vs. developers

Design and code owned by individuals

Code inspections/peer reviews instead of pair programming

Differences from other Agile Methods: Scheduling features

XP/Scrum:

Customer sets priorities at beginning of each sprint/iteration

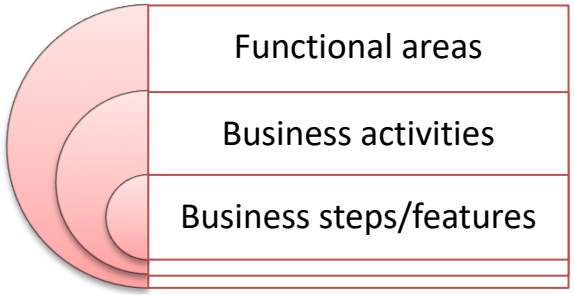
FDD:

Customer's overall priorities are set early

Business activities are scheduled by the customer

Scheduled at month/year granularity

Features are scheduled by the technical team



Questions?