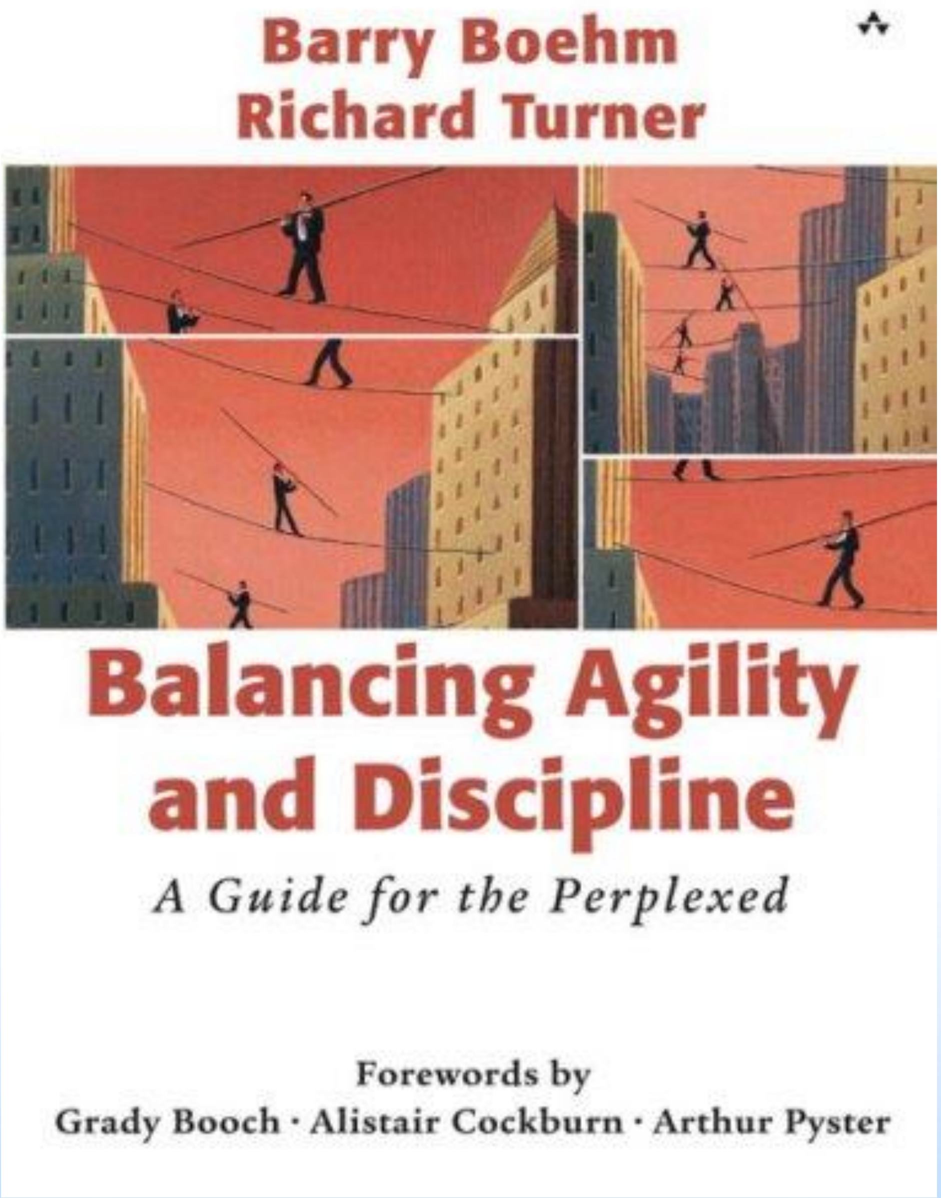
Discipline vs. Agility

EECS810: Software Engineering

EECS811: SW Project Management



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Balancing Agility and Discipline

A Guide for the Perplexed

Forewords by
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Topics

- **What is discipline?**
- What is agility?
- What are the misconceptions?
- Contrasts and home grounds
- Five critical factors

Where did discipline come from?

- DoD guidance documents
  - MIL-STD-1521
  - DoD-STD-2167
  - MIL-STD-498
- Large commercial companies
  - IBM
  - Hitachi
  - Siemens

What is disciplined?

- Adjectives
  - Predictive
  - Plan-driven
  - Documentation
  - Systematic

Related concepts

- Process improvement
- Process capability
- Organizational maturity
- Process group
- Risk management
- Verification
- Validation

Topics

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Where did agility come from?

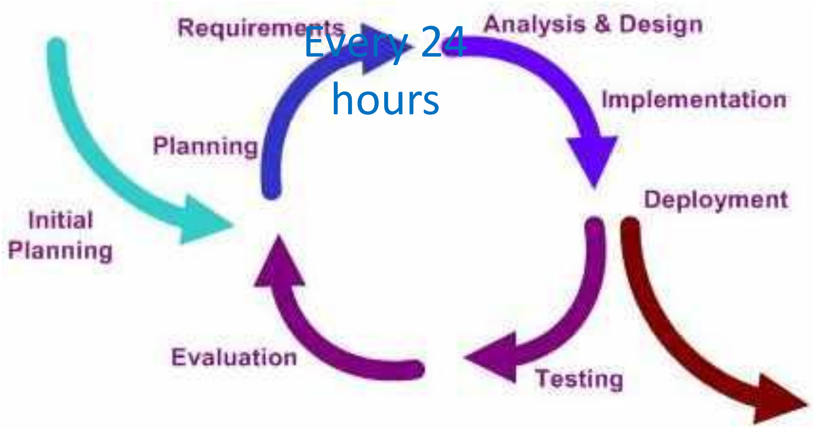
- Outgrowth of rapid prototyping
- Programming more of a craft than a process
- Address a common problem: After a long development cycle the product doesn’t meet expectations

What is agile? [1/3]

- Agile manifesto: We value
  - Individuals and interactions over process and tools
  - Working software over comprehensive documentation
  - Customer collaboration 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 is agile? [2/3]

- Adjectives:
  - Iterations
  - Test-driven
  - Customer collaboration
- Methods:
  - eXtreme Programming (XP)
  - Adaptive Software Development
  - Feature Driven Development
  - Scrum



Every 24 hours

What is agile? [3/3]

- Embrace change
- Fast cycle/frequent delivery
- Simple design
- Refactoring
- Pair programming
- Retrospective
- Test-driven development

Sounds great, why not use it?

- Agile has trouble scaling
  - Size of project
  - Size of group
- Cost can go up with group size
- Plan-driven has trouble trimming
  - Heavy documentation
  - Late cycle delivery
- No silver bullet

What are the key differences?

- Plan-driven models value process over people; agile models value people over process
- Document, document, document – chants the disciplined

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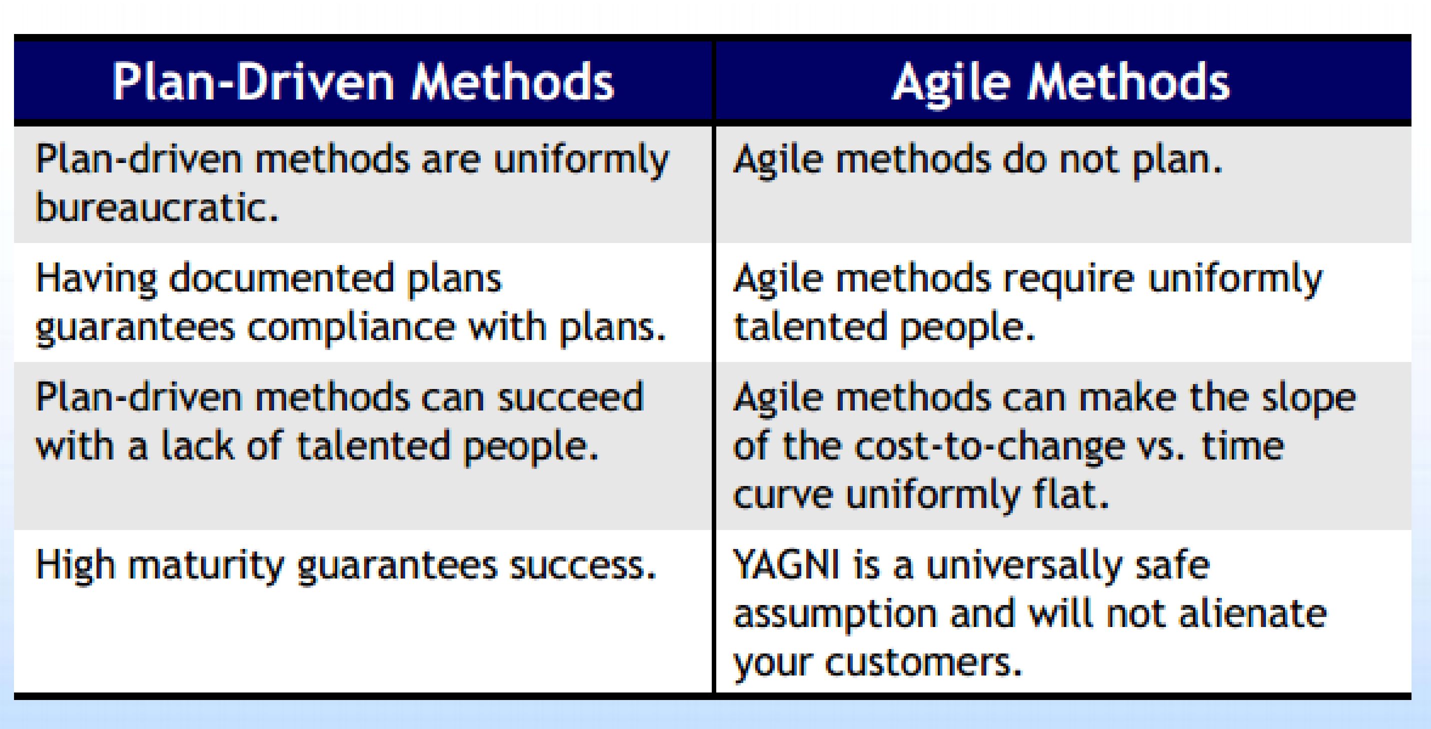
What are the misconceptions?



Plan-Driven Methods	Agile Methods
Plan-driven methods are uniformly bureaucratic.	Agile methods do not plan.
Having documented plans guarantees compliance with plans.	Agile methods require uniformly talented people.
Plan-driven methods can succeed with a lack of talented people.	Agile methods can make the slope of the cost-to-change vs. time curve uniformly flat.
High maturity guarantees success.	YAGNI is a universally safe assumption and will not alienate your customers.

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Application characteristics contrasts and home grounds

- Primary goals
  - Agile goals are rapid value and responsiveness to change
  - Plan-driven goals are predictability, stability, and high assurance
- Size
  - Agile works best on smaller projects
  - Plan-driven is a necessity on large complex projects
- Environment
  - Agile approaches are comfortable in high-change environments with some risks
  - Plan-driven methods need stability

Management characteristics contrasts and home grounds

- Customer relations
  - Agile encourages a dedicated collocated customer
  - Plan-driven methods depend on contracts and specifications
- Planning and control
  - Agilists see planning as a means to an end
  - Plan-driven methods use plans to communicate and coordinate
- Project communication
  - Agile methods depend on tacit knowledge
  - Plan-driven approaches use explicit, documented knowledge

Technical Characteristics Contrasts and Home Grounds

- Requirements
  - Agile uses informal, user-prioritized stories as requirements
  - Plan-driven methods prefer specific, formalized requirements
- Development
  - Agile advocates simple design
  - Plan-driven methods advocate architecture to anticipate changes
- Testing
  - Agile methods develop tests before code, and test incrementally
  - Plan-driven methods test to specifications

Personnel characteristics contrasts and home grounds

- Customers
  - Both methods need collaborative, authorized, committed, and knowledgeable representative
  - Plan-driven does not require them full-time
- Developers
  - Agile developers need more than technical skills
  - Plan-driven methods need fewer highly talented people than agile
- Culture
  - Agilists like many degrees of freedom
  - Plan-driven people need clear process and roles

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Five Critical Factors

- Factors to measure:
  - Personnel
  - Size
  - Dynamism
  - Criticality
  - Culture

Five critical factors: personnel

- Agile
  - Requires continuous presence of critical mass of scarce Cockburn Level 2 or 3 experts; risky to use non-agile Level 1 people.
- Plan-driven
  - Needs a critical mass of level 2 and level 3 experts during project definition, but can work with fewer later in the project – unless the environment is highly dynamic; can usually accommodate some Level 1 people

Cockburn Scale

Levels of Software Method Understanding and Use	
Level	Characteristics
3	Able to revise in unprecedented situation
2	Able to tailor a method to fit new situation
1A	With training can perform discretionary steps, can train to level 2
1B	With training can perform basic procedural steps
-1	May have technical skills but unable or unwilling to collaborate

Five critical factors: size

- Agile
  - Well matched to small products and teams
- Plan-driven
  - Methods evolved to handle large products and teams

Five critical factors: dynamism

- Agile
  - Simple design and continuous refactoring are excellent for highly dynamic environments, but a source of potentially expensive rework for highly stable environments
- Plan-Driven
  - Detailed plans and big design up front excellent for highly stable environments, but a source of expensive rework for highly dynamic environments.

Five critical factors: criticality

- Agile
  - Untested on safety-critical products
  - Open to change in requirements
- Plan-driven
  - Methods evolved to handle highly critical products
  - Not open to change in requirements

Five critical factors: culture

- Agile
  - Thrives in a culture where people feel comfortable and empowered by having many degrees of freedom
- Plan-driven
  - Thrives in a culture where people feel comfortable and empowered by having their roles defined by clear policies and procedures

Walking the line: When to use one

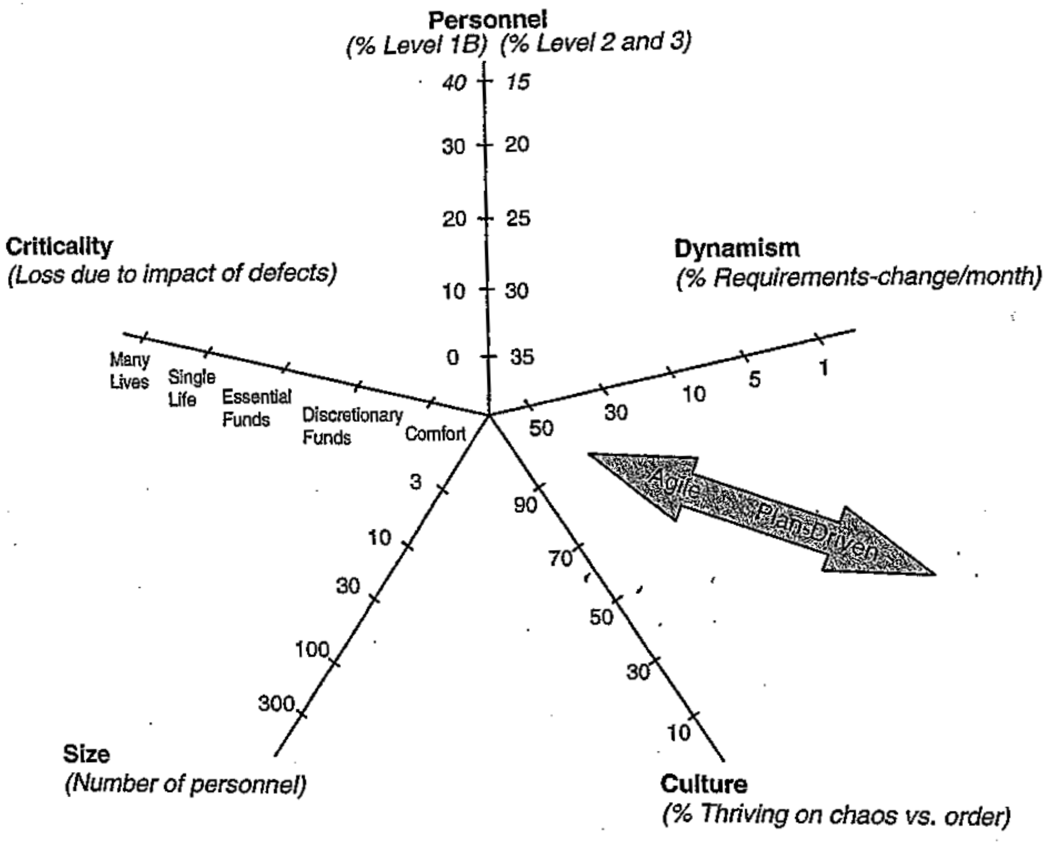
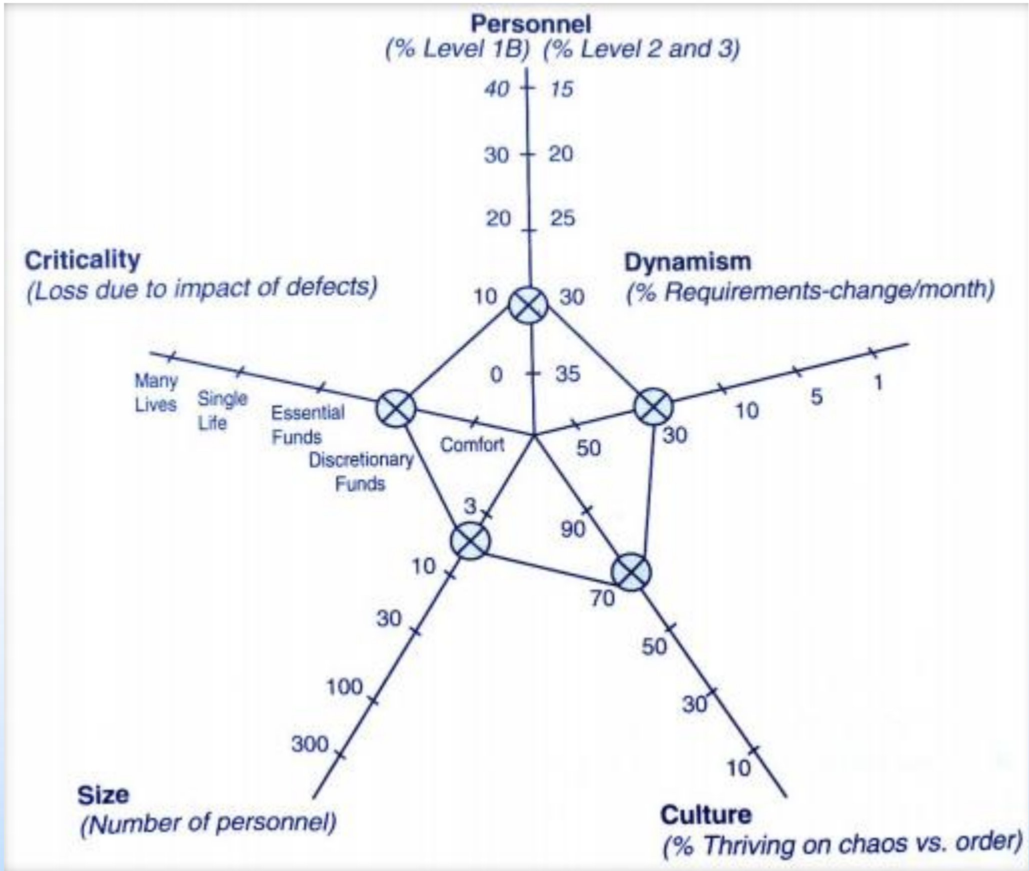
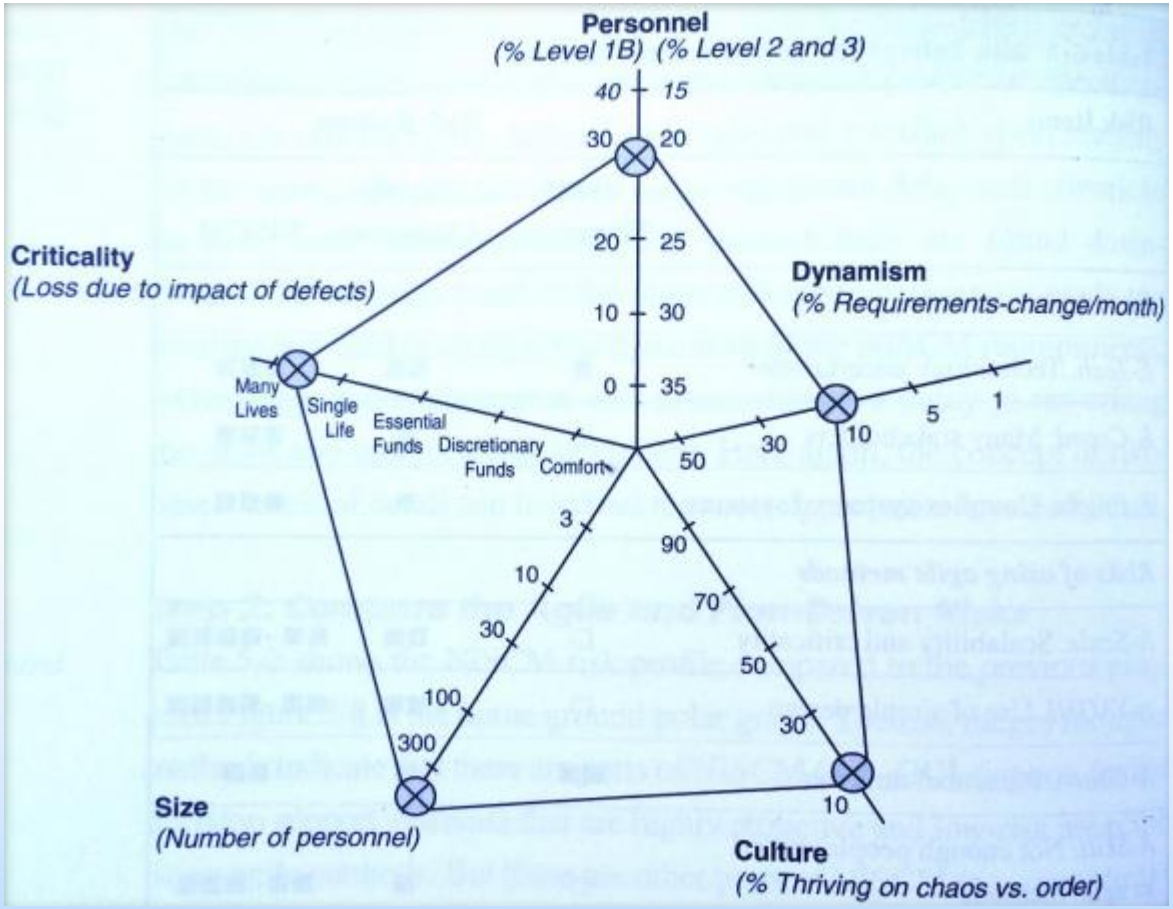


Figure 2-2 Dimensions Affecting Method Selection

An agile methodology is preferred



A disciplined methodology is preferred


Personnel
(% Level 1B) (% Level 2 and 3)
40 15
30 20
20 25
10 30
0 35
Criticality
(Loss due to impact of defects)
Many Lives
Single Life
Essential Funds
Discretionary Funds
Comfort
Dynamism
(% Requirements-change/month)
50
30
10
5
1
Size
(Number of personnel)
3
10
30
100
300
Culture
(% Thriving on chaos vs. order)
90
70
50
30
10