

Balancing Agility and Discipline

A Guide for the Perplexed

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EECS 811: Software Project Management

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Outline

- Introduction
 - Why this topic is important and who should pay attention
 - What exactly is discipline and agility?
 - Enter perplexity...
- Meet the contenders; plan-driven and agile methods
- The Home Grounds
 - Application Characteristics
 - Primary Goals
 - Size
 - Environment



Outline

- The Home Grounds continued
 - Management Characteristics
 - Customer Relations
 - Planning and Control
 - Project Communication
 - Technical Characteristics
 - Requirements
 - Development
 - Testing
 - Personnel Characteristics
 - Customers
 - Developers
 - Culture



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- The Home Grounds continued
 - Misconceptions
 - Five critical decision factors
- Expanding the Home Grounds
 - Using plans to scale up agile methods
 - Using agility to streamline plan-driven methods
- Using Risk to Balance Agility and Discipline
 - An overview
 - Case study
- Conclusion



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Why this topic is important and who should pay attention

- The battle begins...
- Choose a side?
- Should you care?
 - Project managers
 - Developers
 - Students
 - Academicians
 - Proponents of both sides
 - CIOs



What exactly is discipline and agility?

- Discipline
 - Provides strength and comfort
 - Creates well-organized memories, history and experience
- Agility
 - Counterpart of discipline
 - Releases and invents
 - Applies memory and history to adjust to new environments



What exactly is discipline and agility?

- Successful projects need both
 - Discipline without agility leads to bureaucracy and stagnation
 - Agility without discipline is unencumbered enthusiasm
- The software environment is changing
 - Traditional development focuses on plans and architectures
 - Agile methods lighten process
 - A balanced approach is possible



Enter perplexity...

- Strong opinions, misunderstanding, and marketing contribute to complexity
- Multiple Definitions
- Distinguishing method use from method misuse
- Listen to who screams the loudest
- One size fits all
- Purist interpretations
- Hopefully after this presentation there will be some clarity



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Meet the contenders; plan-driven and agile methods

- Plan-Driven Methods
 - “Traditional” way to develop software
 - Based on concepts drawn from the mainline engineering fields
 - Based on engineering disciplines and large aerospace development
 - DoD began to develop guidance documents
 - Strengths are in comparability and repeatability



Meet the contenders; plan-driven and agile methods

- Plan-Driven Methods
 - Important concepts
 - Process improvement
 - Process capability
 - Organizational maturity
 - Process group
 - Risk management
 - Verification
 - Validation
 - Software system architecture



Meet the contenders; plan-driven and agile methods

- Plan-Driven Methods
 - Requirements for success
 - Management support and infrastructure are key
 - Trained and supportive staff
- Agile Methods
 - Outgrowth of rapid prototyping
 - Resurgence of programming as a craft
 - Targets chaotic work
 - Developed Agile Manifesto
 - Basically are lightweight process, short iterations, and reliance on tacit knowledge



Meet the contenders; plan-driven and agile methods

- Agile Methods
 - Important concepts
 - Embracing change
 - Fast cycle/frequent delivery
 - Simple design – YAGNI
 - Refactoring
 - Pair programming
 - Retrospective
 - Tacit knowledge
 - Test-driven development



Meet the contenders; plan-driven and agile methods

- Agile Methods
 - Requirements for success
 - Close relationship with the customer
 - Tacit knowledge maintained within a well-qualified team
 - Cultural acceptance
- Middle Ground?
 - Be pragmatic not a true believer
 - Know the home grounds
 - Risk is key



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The Home Grounds

- Application Characteristics
 - Primary goals
 - Agile goals are rapid value and responsiveness
 - 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



The Home Grounds

- Management Characteristics
 - Customer relations
 - Agile encourages a dedicated collocated customer
 - Plan-driven methods depend on contracts and specifications
 - Agile methods use working software to build trust
 - Plan-driven methods use established process maturity
 - Planning and control
 - Agilists see planning as a means to an end
 - Plan-driven methods use plans to communicate and coordinate
 - Agile is “planning driven,” rather than “plan-driven”



The Home Grounds

- Management Characteristics
 - Project communication
 - Agile methods depend on tacit knowledge
 - Plan-driven approaches use explicit, documented knowledge
- Technical Characteristics
 - Requirements
 - Agile uses informal, user-prioritized stories as requirements
 - Plan-driven methods prefer specific, formalized requirements



The Home Grounds

- Technical Characteristics
 - 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



The Home Grounds

- Personnel Characteristics
 - Customers
 - Both methods need CRACK performers – Collaborative, Representative, Authorized, Committed, and Knowledgeable
 - 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



The Home Grounds

- Personnel Characteristics
 - Culture
 - Agilists like many degrees of freedom
 - Plan-driven people need clear process and roles



The Home Grounds

Characteristics	Agile	Plan-Driven
<i>Application</i>		
Primary Goals	Rapid value; responding to change	Predictability, stability, high assurance
Size	Smaller teams and projects	Larger teams and projects
Environment	Turbulent; high change; project-focused	Stable; low-change; project/organization focused
<i>Management</i>		
Customer Relations	Dedicated on-sight customers	As-needed customer interactions
Planning and Control	Internalized plans; qualitative control	Documented plans; quantitative control
Communication	Tacit interpersonal knowledge	Explicit documented knowledge



The Home Grounds

Characteristics	Agile	Plan-Driven
<i>Technical</i>		
Requirements	Prioritized informal stories	Formalized project, foreseeable evolution requirements
Development	Simple design; short increments	Extensive design; longer increments
Testing	Executable test cases define requirements	Documented test plans and procedures
<i>Personnel</i>		
Customers	Dedicated CRACK performer	Part-time CRACK performer
Developers	More higher skilled developers necessary	Less higher skilled developers needed
Culture	Many degrees of freedom	Enjoy policies and procedures



The Home Grounds

- Misconceptions

Misconceptions	Realities
<i>Plan-Driven Methods</i>	
Plan-driven methods are uniformly bureaucratic	Overly bureaucratic cultures and methods can stultify software development
Having document plans guarantees compliance with plans	Not necessarily
Plan-driven methods can succeed with a lack of talented people	Plan-driven methods can succeed with a smaller percentage of talented people
High maturity guarantees success	Explicit, documented plans provide more of a safety net than tacit plans
There are no penalties in applying plan-driven methods when change is unforeseeable	Plan-driven methods work best in accommodating foreseeable change



The Home Grounds

Misconceptions	Realities
<i>Agile Methods</i>	
Agile methods don't plan	Agile methods get much of their speed and agility through creating and exploiting tacit knowledge
Agile methods require uniformly talented people	Agile methods work best when there is a critical mass of highly talented people involved
YAGNI is a universally safe assumption, and won't alienate your customers	YAGNI helps handle unforeseeable change, but is risky when change is foreseeable



The Home Grounds

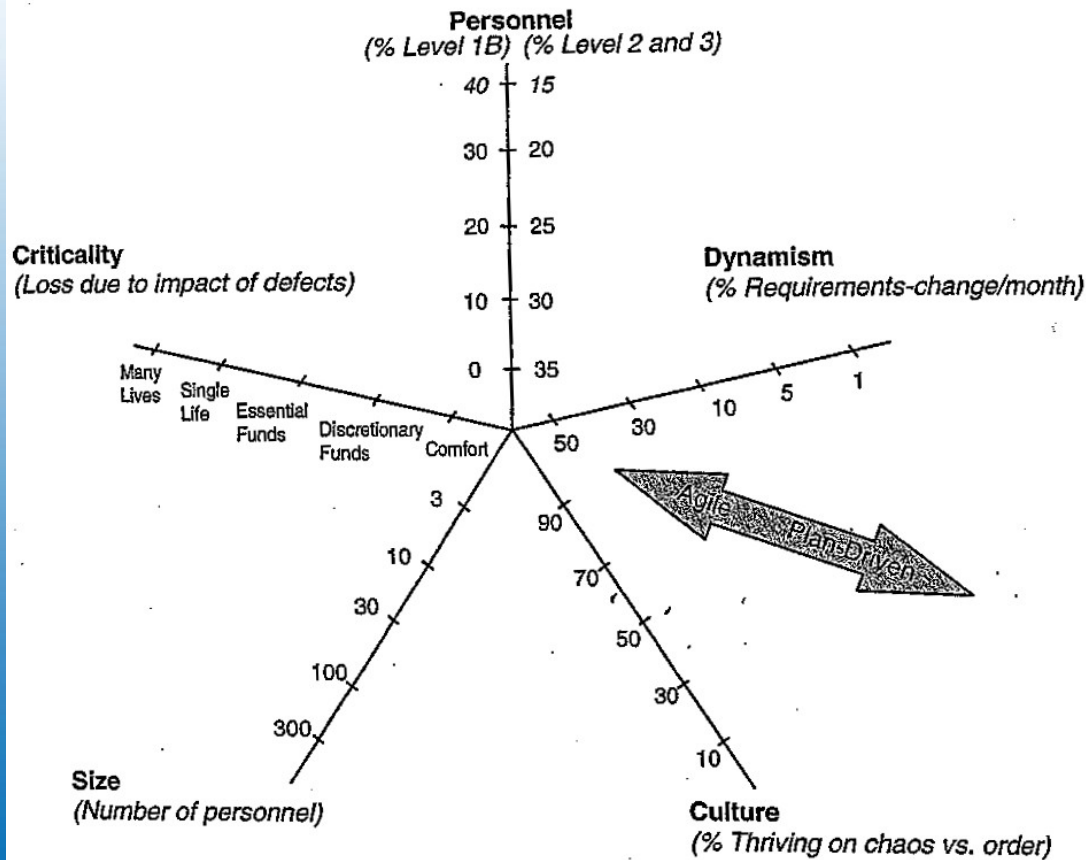


Figure 2-2 Dimensions Affecting Method Selection

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- The Home Grounds continued
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 - Five critical decision factors
- Expanding the Home Grounds
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Expanding the Home Grounds

- Using Plans to Scale Up Agile Methods
 - Example introduction
 - Incorrect assumptions
 - The effort to develop or modify a story does not increase with time and story number
 - Trusting people to get everything done on time is compatible with fixed schedules and diseconomies of scale
 - Simple design and YANI scale up easily to large projects



Extending the Home Grounds

- Using Plans to Scale Up Agile Methods
 - Summing it up...
 - Architecture necessary
 - Define what finished really means
 - If it is foreseeable change, architect it



Expanding the Home Ground

- Using Agility to Streamline Plan-Driven Methods
 - Example Introduction
 - Agile principles
 - Individual and interactions over processes and tools
 - Working software over comprehensive documentation
 - Customer collaboration over contract negotiation



Expanding the Home Ground

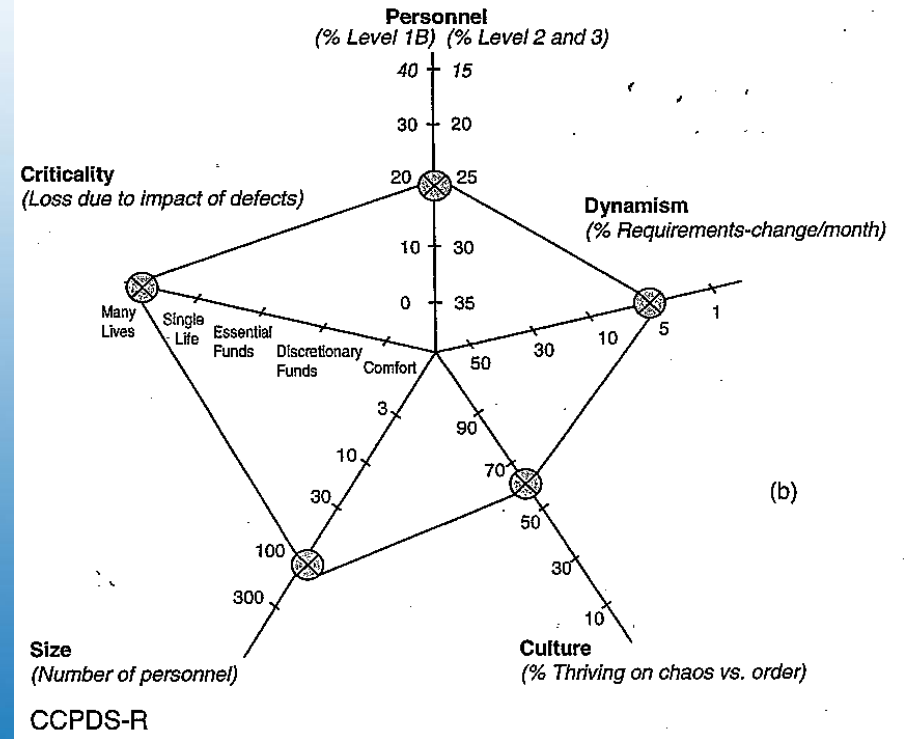
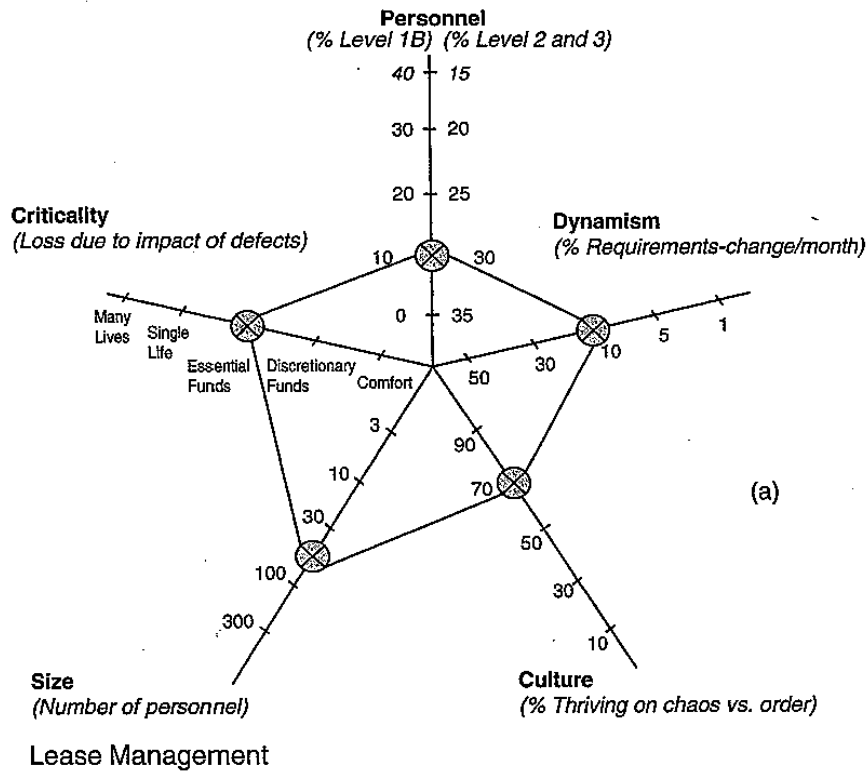


Figure 4-2 Home Ground Charts for the Case Studies



Expanding the Home Ground

- Combining Agile and Plan-Driven Methods: Misconceptions and Reality

Misconception	Reality
Agile and plan-driven methods are completely unmixable.	Agile and plan-driven methods have been successfully combined in a variety of situations.
There are one-size-fits-all process templates for balancing agile and plan-driven methods.	Variations in project risks and stakeholder value propositions lead to different balances of agile and plan-driven methods
Balancing agile and plan-driven methods is a one-dimensional pure-technology, pure-management, and only pure-personal activity.	Balancing agile and plan-driven methods involves multidimensional consideration of technology, management, and personnel factors.



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Using Risk to Balance Agility and Discipline

- An overview - risk based method
 - Uses risk analysis and a process framework to develop strategy
 - Uses risk analysis to balance too-much or too-little



Using Risk to Balance Agility and Discipline

Step 1	Rate the environment, if uncertain prototype
Step 2a	If agility risks dominate go risk-based plan-driven
Step 2b	If plan-driven risks dominate go risk-based agile
Step 3	If a mix the encapsulate each part and use appropriate method
Step 4	Establish strategy by integrating risk mitigation plans
Step 5	Monitor progress



Using Risk to Balance Agility and Discipline

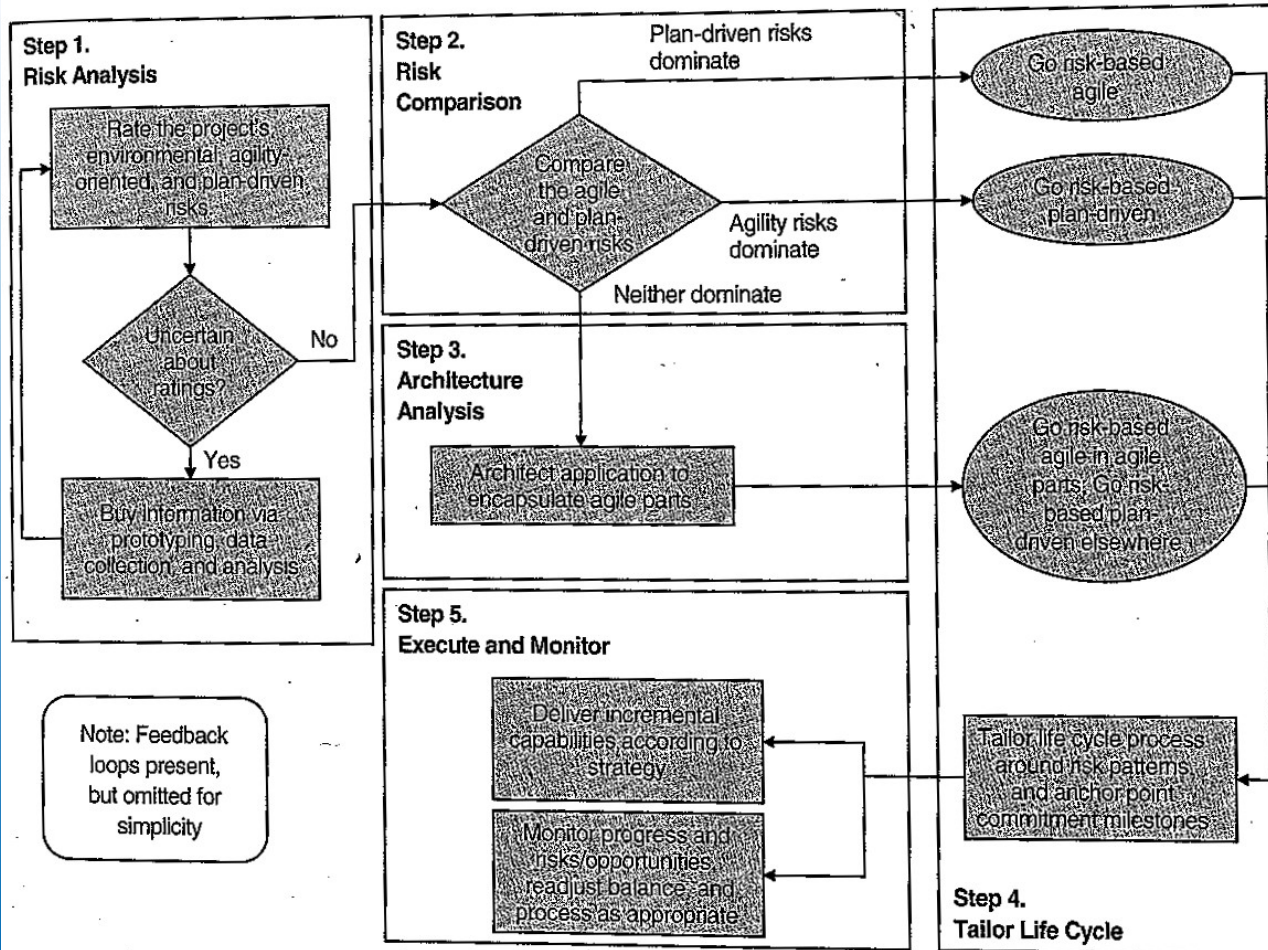


Figure 5-1 Summary of Risk-Based Method



Using Risk to Balance Agility and Discipline

- Step 1
 - Provides basis
 - Risk categories
 - Environmental
 - E-Tech – technology uncertainties
 - E-Coord – many diverse stakeholders to coordinate
 - E-Cmplx – complex system of systems
 - Agile Risks
 - A-Scale – scalability and criticality
 - A-YAGNI – use of simple design or YAGNI
 - A-Churn – personnel turnover or churn
 - A-Skill – not enough people skilled in agile methods



Using Risk to Balance Agility and Discipline

- Step 1
 - Risk categories
 - Plan-driven risks
 - P-Change - rapid change
 - P-Speed - need for rapid results
 - P-Emerge - emergent requirements
 - P-Skill - not enough people skilled in plan-driven methods
- Step 2
 - Looks for a consistent home ground



Using Risk to Balance Agility and Discipline

- Step 3
 - Deals with hybrid risks
- Step 4
 - The overall strategy is developed
- Step 5
 - Allows for strategy adjustment



Using Risk to Balance Agility and Discipline

- Case study
 - Meet SupplyChain.com
 - Step 1
 - Environmental Risks
 - Contains technical risks due to it being an agent based system (E-Tech)
 - Complex coordination between suppliers and distributors (E-Coord)
 - Agile Risks
 - Large 50 person team (A-Scale)
 - Changes and refactoring the business critical system are expensive (A-YAGNI)



Using Risk to Balance Agility and Discipline

- Step 1
 - Plan-driven risks
 - Needs to be developed quickly enough to keep up with market competition (P-Speed)
 - Rapid changes in technology, organizational structure, and market conditions would impact system requirements (P-Change)

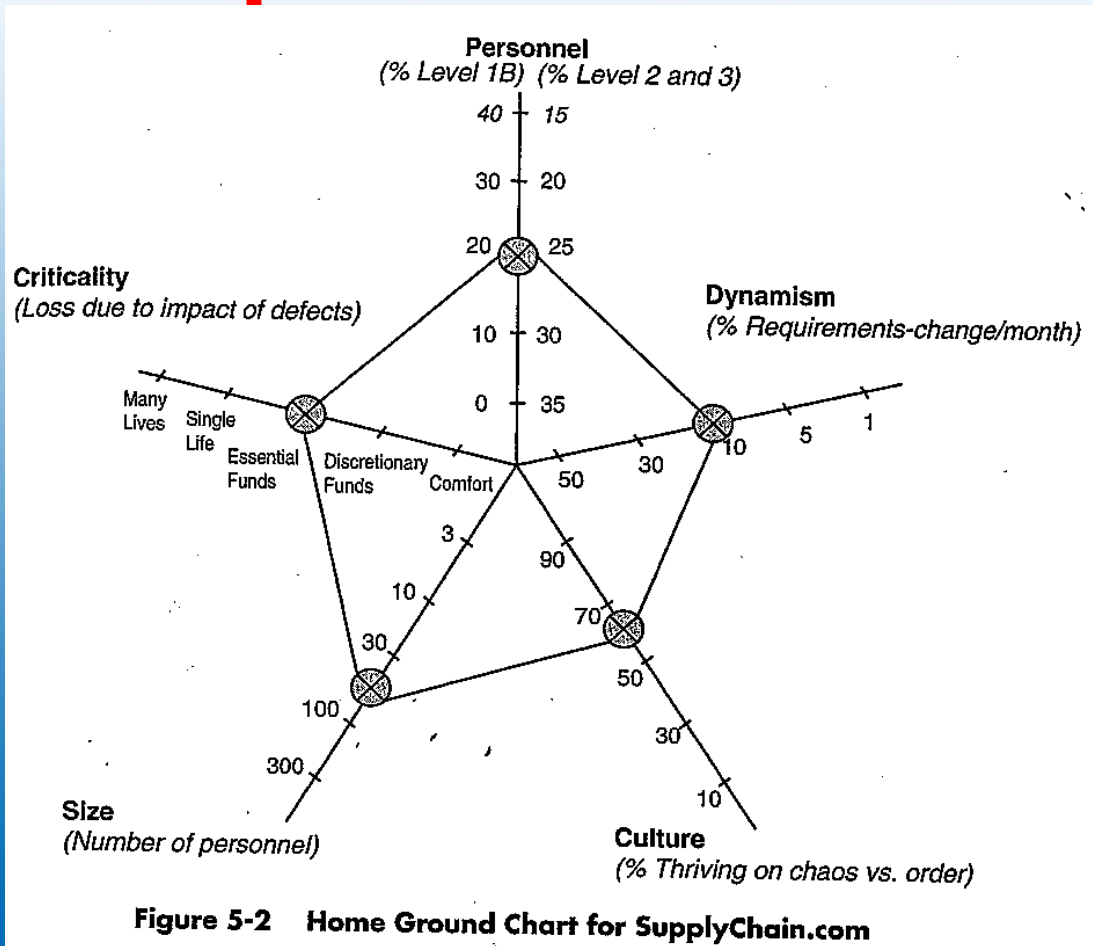


Using Risk to Balance Agility and Discipline

Table 5-3. Risk Ratings for SupplyChain.com	
Risk Items	Risk Ratings
<i>Environmental risks</i>	
<i>E-Tech.</i> Technology uncertainties	■ ■
<i>E-Coord.</i> Many stakeholders	■
<i>E-Cmplx.</i> Complex system of systems	■
<i>Risks of using agile methods</i>	
<i>A-Scale.</i> Scalability and criticality	■ ■
<i>A-YAGNI.</i> Use of simple design	■ ■
<i>A-Churn.</i> Personnel turnover	■
<i>A-Skill.</i> Not enough people skilled in agile methods	■
<i>Risks of using plan-driven methods</i>	
<i>P-Change.</i> Rapid change	■ ■
<i>P-Speed.</i> Need for rapid results	■ ■
<i>P-Emerge.</i> Emergent requirements	■ ■
<i>P-Skill.</i> Not enough people skilled in plan-driven methods	■
Risk rating scale: □—Minimal risk ■■■—Very serious but manageable risk ■—Moderate risk ■■■■—Showstopper risk ■■—Serious but manageable risk	



Using Risk to Balance Agility and Discipline



Using Risk to Balance Agility and Discipline

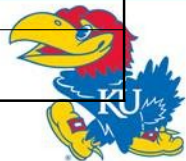
- Step 2
 - Simple step, based on the chart, plan-driven risks dominate so risk-based agile is chosen
- Step 3 - bypassed



Using Risk to Balance Agility and Discipline

- Step 4
 - Risk mitigation strategies are developed for risks identified in step 2

E-Tech	Risk-driven technology prototypes
E-Coord	Results chain; CRACK representatives
E-Cmplx	Architecture determination; early commitments on validated interfaces
A-Scale	Longer iterations as size/complexity grows
A-YAGNI	Balance with high-level change-prescient architecture; design patterns
A-Churn	Pair programming; project completion bonuses
A-Skill	Low-Risk



Using Risk to Balance Agility and Discipline

P-Change	Short iterations; balance simple design and change-prescient architecture
P-Speed	Short iterations; pair programming; timeboxing
P-Emerge	Short iterations; dedicated customer
P-Skill	Risk management team with agile and plan-driven method skills



Using Risk to Balance Agility and Discipline

- Step 5
 - Monitor risks and track progress, adjust plans as necessary



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Conclusion

- No agile or plan-driven silver bullet
- Agile and plan-driven methods have home grounds
- Future applications will need agility and discipline
- Balanced agility-discipline methods are emerging
- Build your methods up-don't tailor it down
- Focus less on methods—more on people, values, communication, and expectations management



Questions?



References

- Boehm, B. & Turner, R. 2004, *Balancing Agility and Discipline*, Addison-Wesley, Boston.

