Practical Software and Systems Measurement

A foundation for objective project management

PSM Workshop: Measures for Spiral/Evolutionary Development

PSM Users Group Conference

Department of Defense
U.S. Army

Measures for Spiral/Evolutionary Development

- ***Facilitator: Dave Zubrow***
- ***Scribe: Ron Kohl***

Workshop Participants

- *Ron Kohl*
- *Terry Rout*
- *Jack McGarry*
- *Jim Moore*
- *Mia Hernandez*
- *Mike Brooks*
- *Peter Kind*
- *Virginia Thompson*
- *Jerry Moore*
- *Eneida I. Breaux*
- *Chui Fan Cheng*
- *Harpal Dhama*
- *Chris Miller*

Objectives of the Workshop

- ***Identify the Issues and Information Needs Associated with Spiral and Evolutionary Development***
- ***Identify practical measures that can address the issues and meet the needs***

Workshop Format

Agenda

1 - 1:15 Introductions and Review of Objective

1:15 - 2 Brain Storm Information Needs

- ***Understand Spiral Model***
- ***Identify Unique Aspects***
- ***List Issues and Information Needs***

2 - 3:15 Consolidate Issues and Map Measures

- ***Affinitize Issues***
- ***Map Measures***

3:15 - 3:45 Break

3:45 - 4:30 Map Measures (cont.)

4:30 - 5:00 Review Results, Next Steps

Workshop Format

- ***Process***
- ***Brainstorm***
- ***Small teams***
- ***Multivoting***

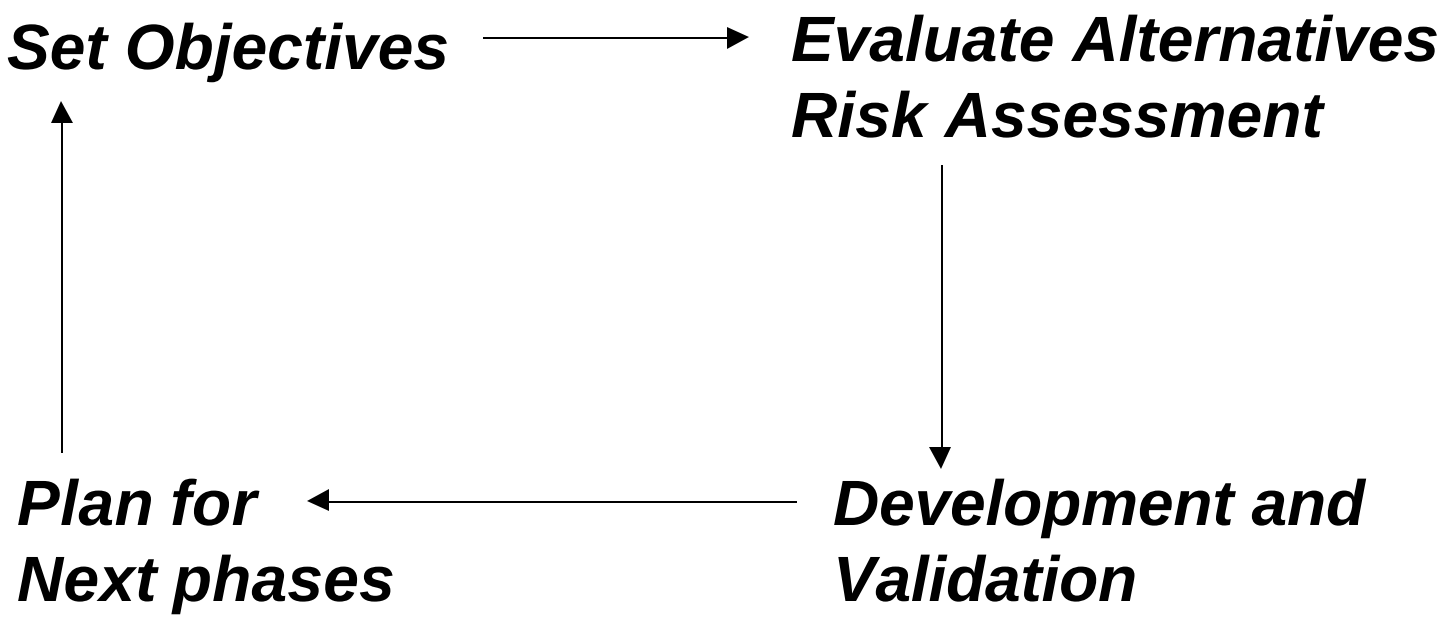
Workshop Background

- ***PSM history in this area***
  - ***PSM for Objective Program Insight***
- ***Where we're heading***
  - ***Meeting needs as Spiral/Evolutionary development becomes the preferred life-cycle for DoD system development***
- ***Issues, questions, and topics***
  - ***What's the same***
  - ***What's different***

Intended Output

- ***A list of info needs unique to Spiral development***
- ***A marked up ICM table showing mapping of existing measures to Spiral Info Needs***
- ***Draft measurement specifications for the unique info needs (may not get this far)***

Spiral Model



Spiral Model Characteristics

- ***Risk reduction is key differentiator of Spiral from all other development models***
- ***Spiral is subset of Evolutionary (see fig 1)***
- ***Short cycles***
- ***Allows inclusion of lifecycles within phases***
- ***Rework is allowed for***
- ***Reqmts (and other artifacts) change is embraced***
- ***Need to control amount of rework in order to finish, control iterations***
- ***Not all requirements are known before moving on(different from waterfall)***

Spiral Model Characteristics (2)

- ***Need to control amount of spiraling (termination criteria, etc?)***
- ***Larger mix of skills earlier in lifecycle***
- ***Architectural considerations addressed early***
- ***Planned date of convergence of system with real requirements is externally set***
- ***Lots of replanning is anticipated and high degree of customer involvement***
- ***Necessary that customer/acquirer share risk with supplier, developer***

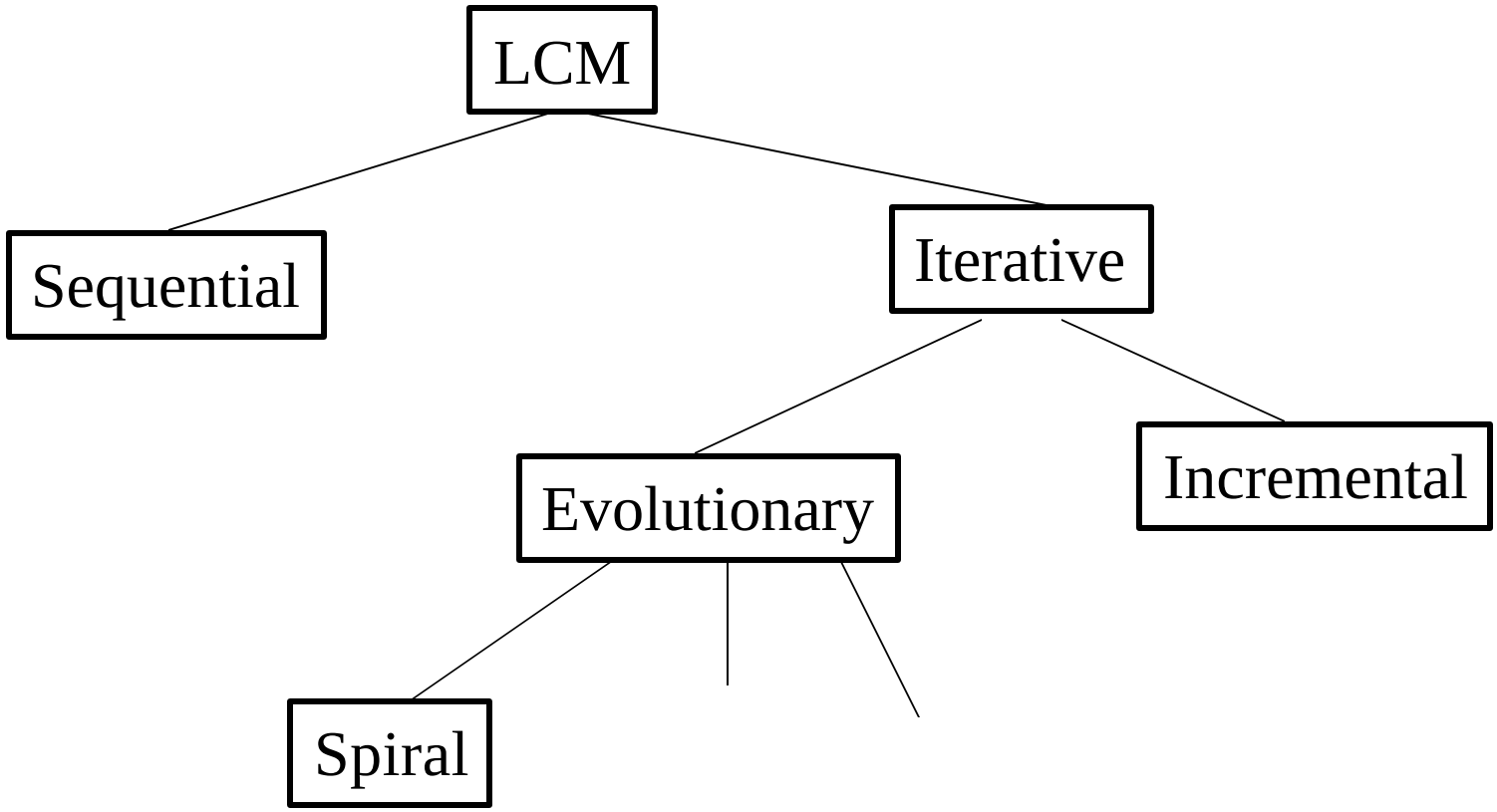
Spiral model characteristics (3)

- ***Requirements are negotiable throughout the lifecycle***
- ***Parallel artifact development at any one time***

Spiral Phase Outputs

- *1st time could be paper study*
- *Needs to produce an output*
- *Modules*
- *Prototype*
- *Mock up*
- *Can have multiple spirals occurring simultaneously*

Figure 1: Lifecycle Model Schema



Spiral Issues and Info Needs

- ***How to characterize overall project status***
- ***How to practically implement Spiral model***
- ***How to incorporate measurement***
- ***Current Spiral and previous Spiral rework***
- ***Local optimization within a phase may lead to global suboptimization of the product development effort***

Spiral Issues and Info Needs (2)

- ***Award fees need to encourage overall product completion, not just a single spiral***
- ***2 levels of measurement required, current spiral and overall project***
- ***Staffing needs vs plan***
- ***Staffing turnover***
- ***Managing multiple artifact development in parallel***
- ***Managing concurrent spirals***

Spiral Issues and Info Needs (3)

- ***Will existing measurement system support spiral model?***
- ***Does existing knowledge + research on staffing apply to spiral development?***
- ***Risk reduction does not mean avoiding technological risk; Spiral may allow tech risk change during project***
- ***How to incorporate customer feedback? Spiral supports more frequent participation in project planning and insight into progress***
- ***Measures may be the same as for other approaches but application may be different***

Spiral Issues and Info Needs (4)

- ***Need to manage functionality in addition to cost, schedule, and quality***
- ***Tracing rqmts across spirals***
- ***CM over all spirals is more demanding***
- ***Test related measures***
- ***Mix of projects in an org doing Spiral vs others, impact on availability of experienced staff***
- ***Rqmts change impacts testing (need to be informed ASAP, rework budget impacted)***
- ***Proj. mgmt more complicated and demanding***

Spiral Issues and Info Needs (5)

- ***Need Risk process and measures***
- ***More frequent analysis of risk and how to interpret it***
- ***Program manager wants the shortest, optimal trajectory to convergence between the real requirements and the as-is system under development***

Measurement Application in Spiral Development for Tracking and Monitoring

Waterfall

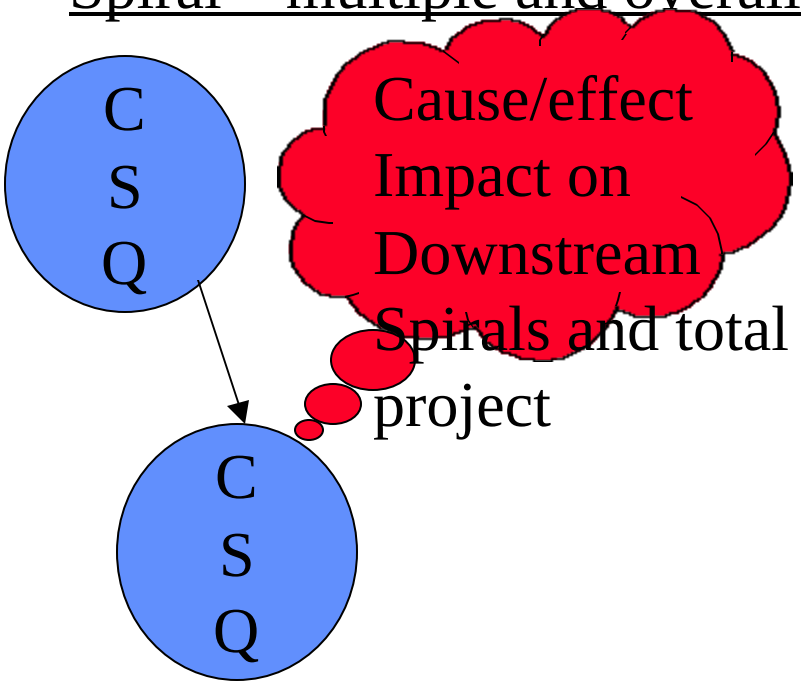
One

C

S

Q

Spiral – multiple and overall



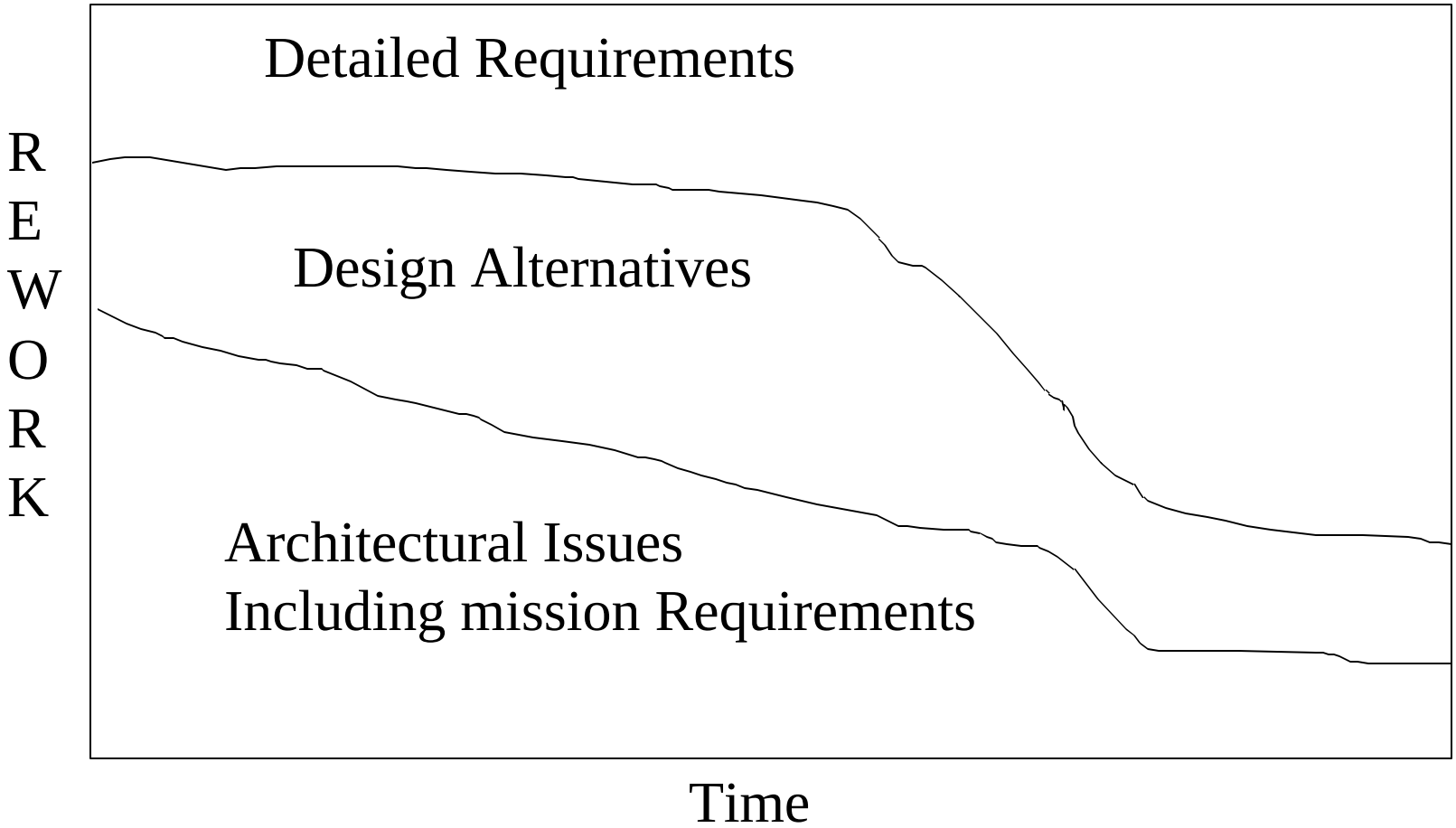
Issues and Risks:

C=cost

S=schedule

Q=quality, measure of meeting customer requirements

Notational Plan for Rework Tracking



Measures Related Discussion

- ***Identifying risks reduces unknowns***
- ***Ratio of requirements satisfied to total requirements***
- ***Satisfaction of key mission requirements***
- ***Trends in key mission requirements***
- ***Problem report measure need to differentiate problem because requirement not fully implemented from error of commission***
- ***Models calibrated using waterfall may not apply in spiral (eg. Supportability models)***
- ***Risk Status Measures***

Next Steps/Action Items

- ***Distribute to participants for comment***
- ***Post to the web***
- ***White paper drafted by 30-Sep-00***