

Monitoring

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Risk Monitoring

- ✍ Continuous iterative process
- ✍ Performed regularly
 - ✍ Compare reality with plan
- ✍ Related to project management monitoring
 - ✍ Difference in emphasis

Project Management Monitoring

- ✍ Protection of envelope
- ✍ Solve immediate problems using short term tactics
- ✍ Few viable options due to task interdependencies
- ✍ Inappropriate tactics make things worse

Risk Management Monitoring





- ✍ Early problem detection
 - Protect project strategy
- ✍ Identify and track triggers
- ✍ Data depends on viable project plans by enlarge, review them regularly

Identifying Triggers for Contingency Plans

Top level manifestation

-  Project 6 months late observed too late for recovery action

Need hazard symptom

-  Indicate hazard is imminent
-  Increased probability of occurrence
-  May derive from low level hazards
-  Triggers are critical levels of symptoms

Symptomless Hazards

- ✍ Fire
- ✍ Earthquake
- ✍ Sudden Illness
- ✍ Special Contingency Plans
- ✍ Crisis Management

Hazards, Symptoms, Triggers

- ✍ Top level hazard:
- ✍ Detectable earlier hazard:
- ✍ Activity plan
 - ✍ Identifies problem
 - ✍ Define symptoms to be monitored

Loss of skilled Personnel

Symptoms

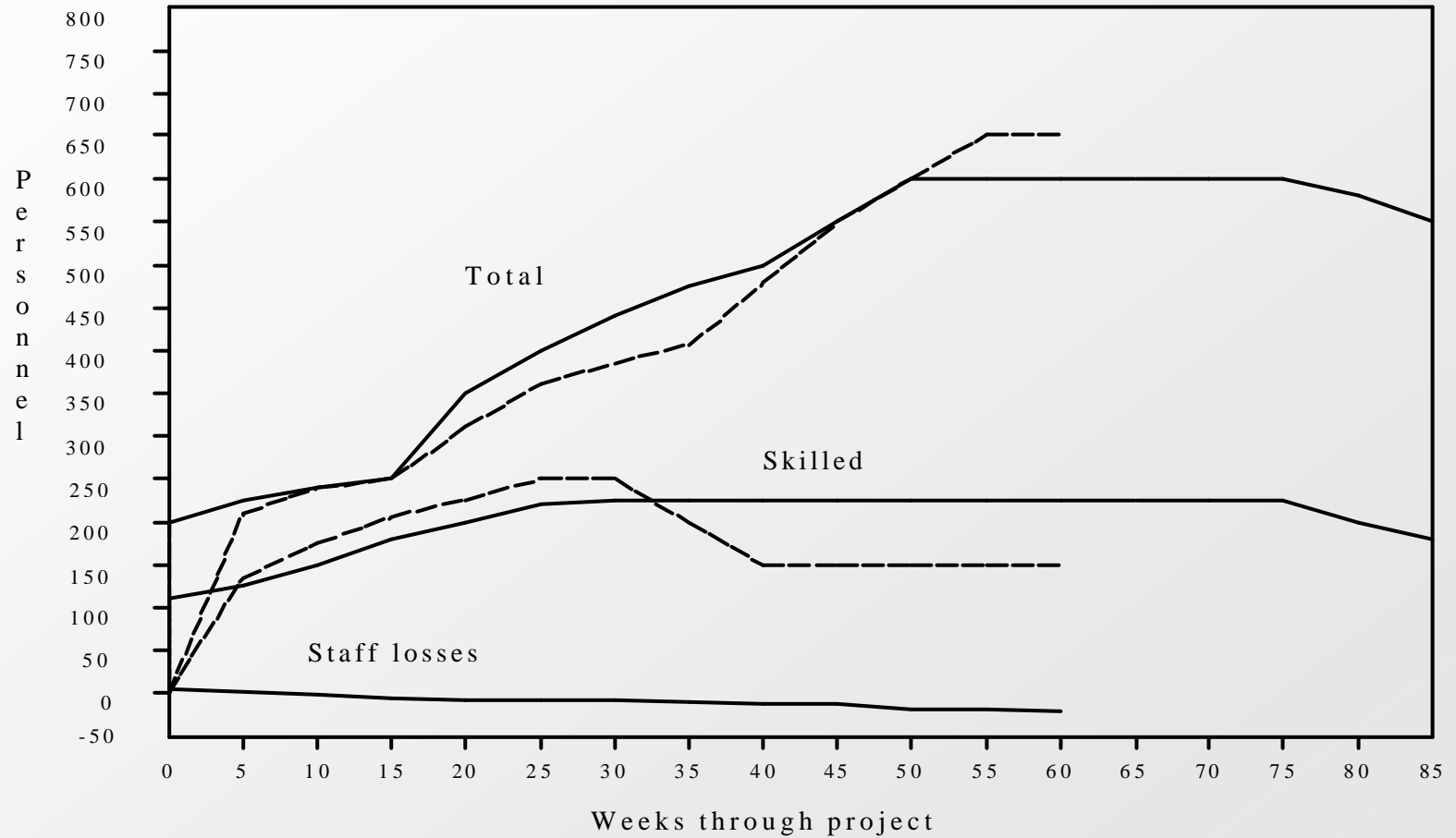
- High Personnel Turnover Rate
- Profile of Staff Skills Changes
- Proportion of Highly Skilled too low

When

- Change over points (milestones)
- Monthly Reviews

Monitored By

Software Personnel Plot



Techniques for Assessing Project Progress

Monitoring Costs and Schedules

- ✍ Project axis of project envelope
- ✍ Normal project management helps to monitor these risks
- ✍ Three Techniques
 - Earned Value Analysis
 - Cost to Complete
 - Phase Completion

Earned Value Analysis

- ✍ Identify critical resources to be tracked
- ✍ Allocate resource budgets to systems components and processes
- ✍ When satisfactorily completed compare budgeted to actual

$$\text{Cost Performance index}(CPI) = \frac{? \left(\frac{AA_i}{BA_i} \right)}{n}$$

Cost to complete

$$\%comp = \sum_{allphases} ? \frac{(\%opc * \%step)}{100}$$

$$\%remain = 100 - \%comp$$

Monitoring Completion

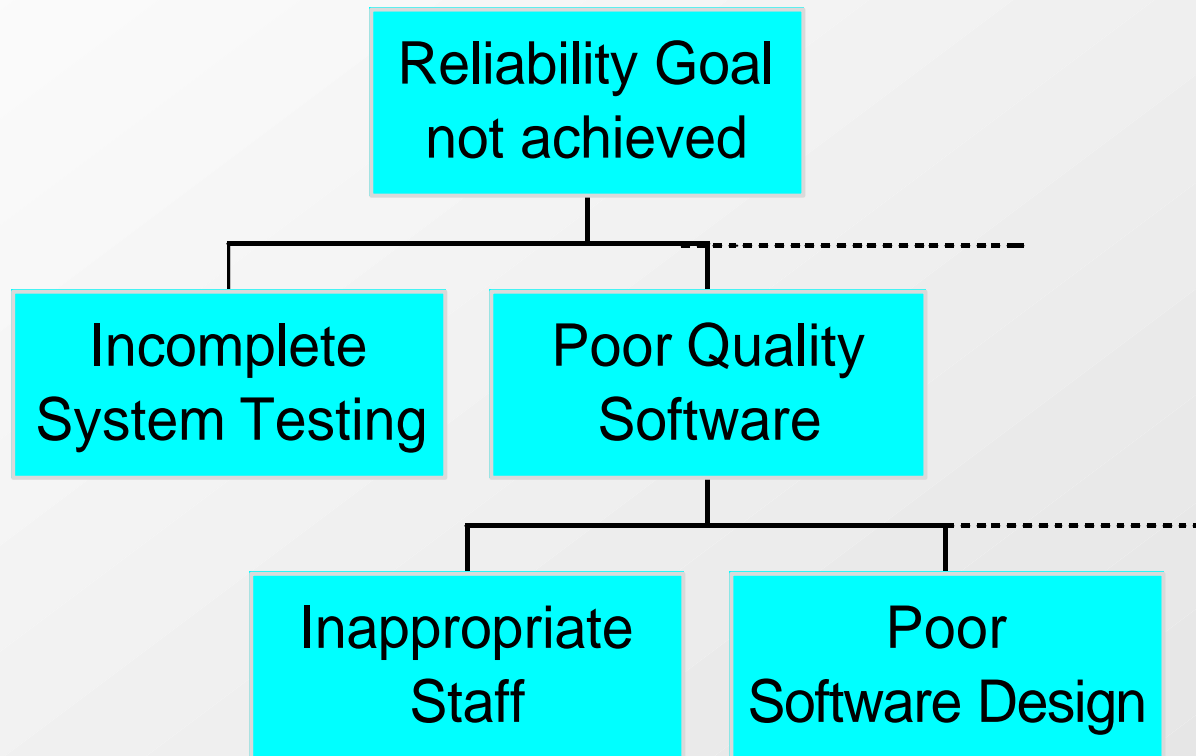
- ✍ Needs good phase end definition and measurement
 - ✍ Preliminary Design
 - ✍ % of requirements through preliminary design review
 - ✍ Detailed Design
 - ✍ % of modules through detailed design review
 - ✍ Code and Unit Test
 - ✍ % of modules released to integration
 - ✍ Integration Test
 - ✍ % of modules integrated
 - ✍ System Test
 - ✍ % of requirements tested

Warnings

- ✍ Is past effort typical of future effort
- ✍ Are the hardest components still outstanding
 - May need to use weights

Risk to Quality

Failure Cause Analysis



Indicators of Poor Design

Strong Coupling

 Many links between modules

Weak cohesion

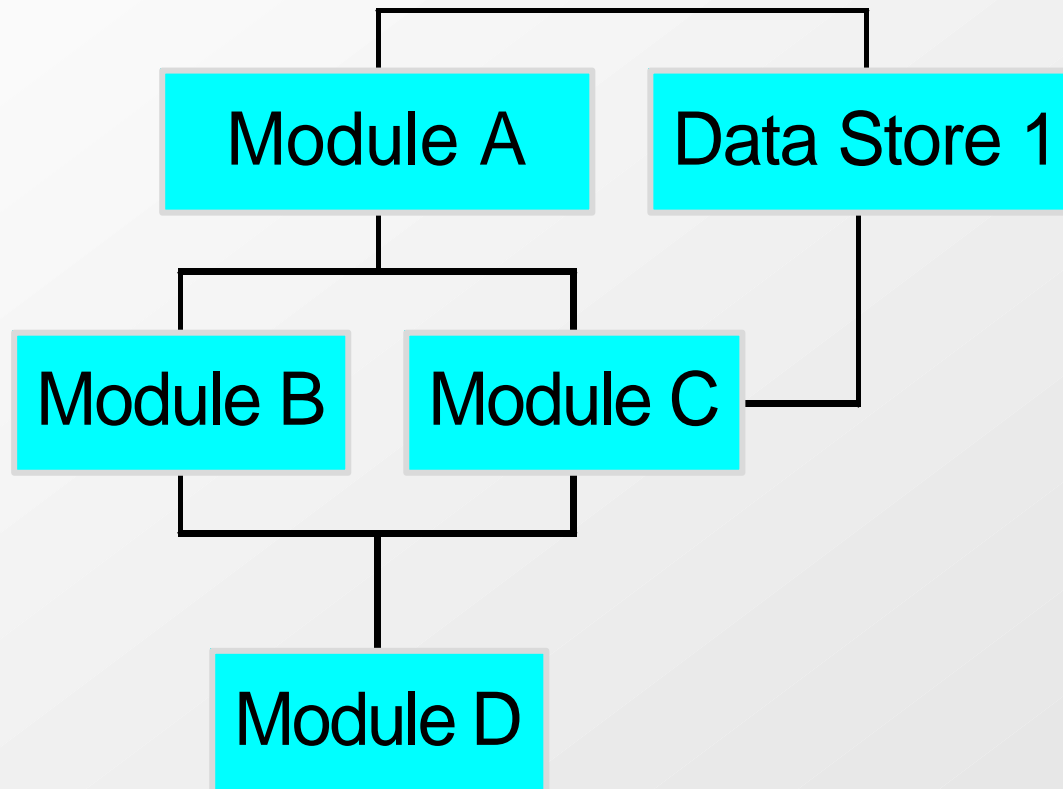
 Modules performing many functions

Reliability/Performance Critical

 Modules used in many calling paths

Must identify measures that indicate problems

Module Fan-in and Fan-Out



Quality Conclusions

- ✍ Do an FCA for those aspects important to your project
- ✍ Identify the data needed and how to analysis
- ✍ Make people aware of the targets

Techniques for Identifying Potential (General) Problems

Phase-based monitoring

-  Monitoring against plans

Anomaly Detection

-  Modules/Documents with unusual characteristics

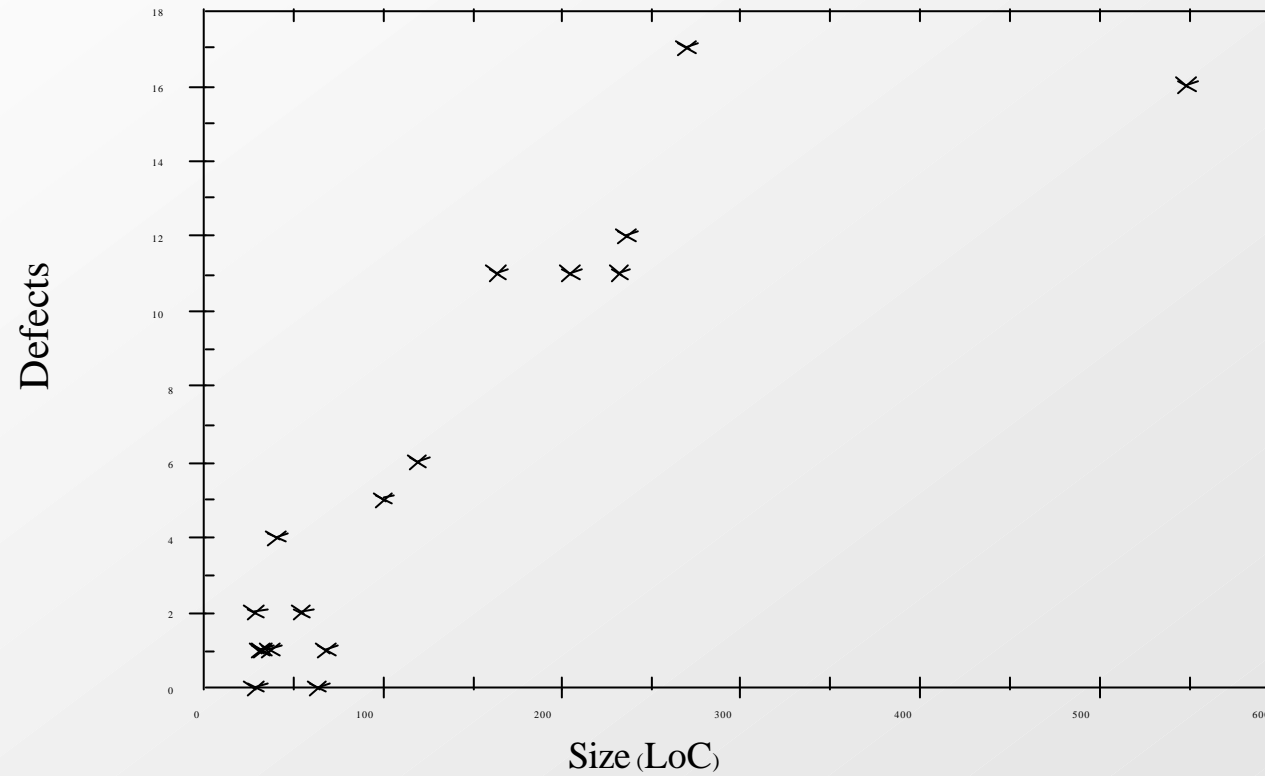
-  Use scatterplots and quality control charts

Trend Analysis

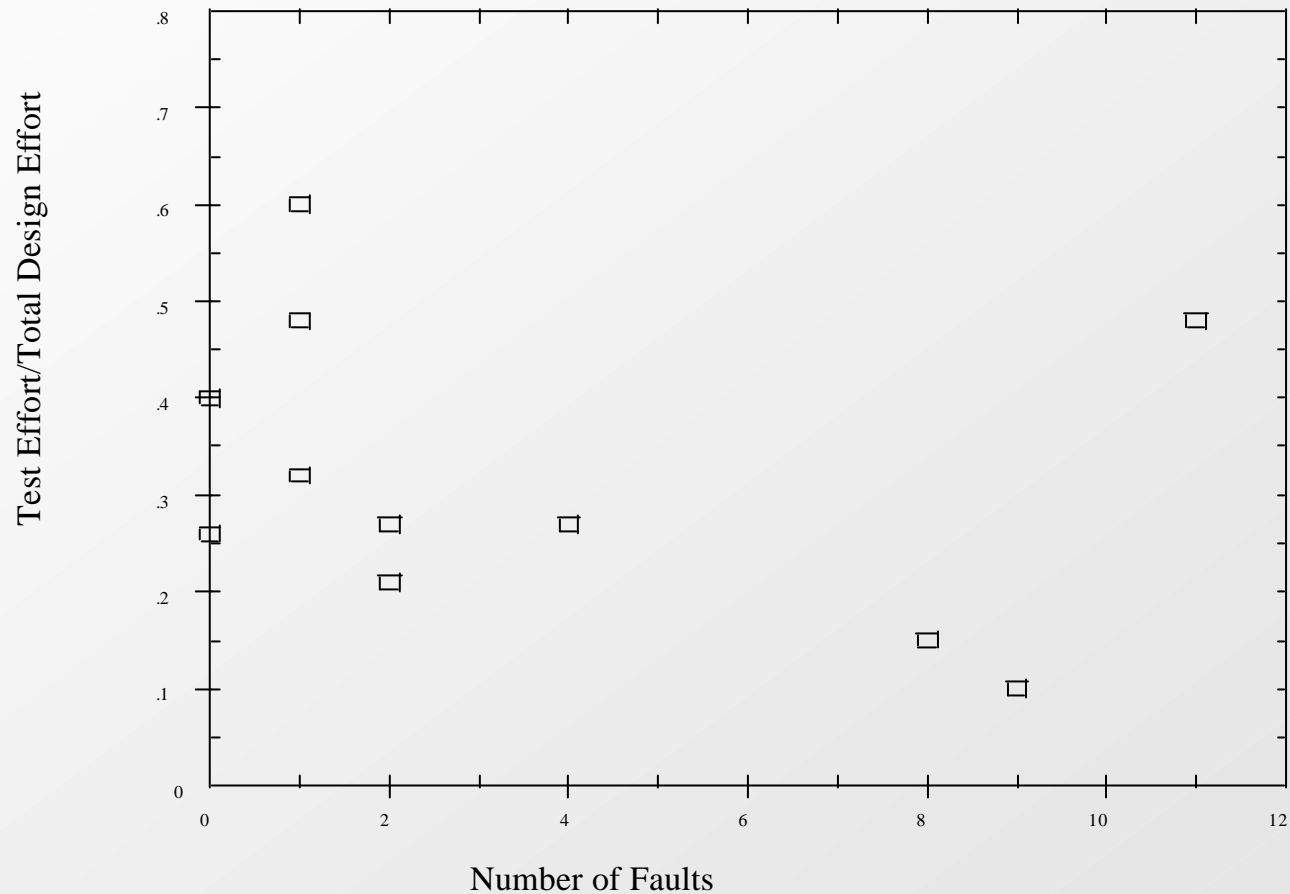
-  Plot characteristics over time

-  Look for unexpected patterns

Scatterplot of Size against Defects




Normalised Test Effort against Faults







Trend Analysis

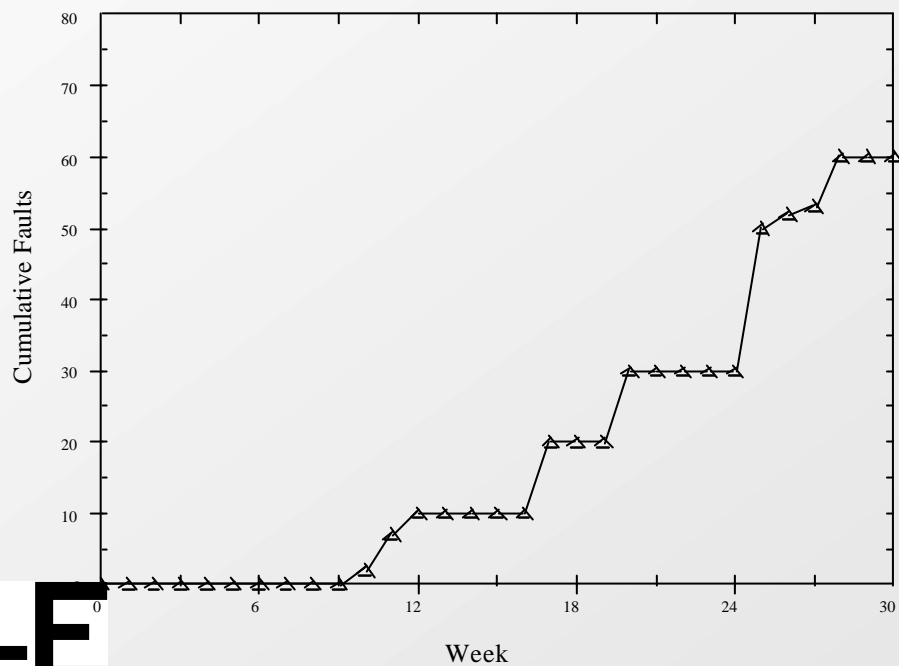
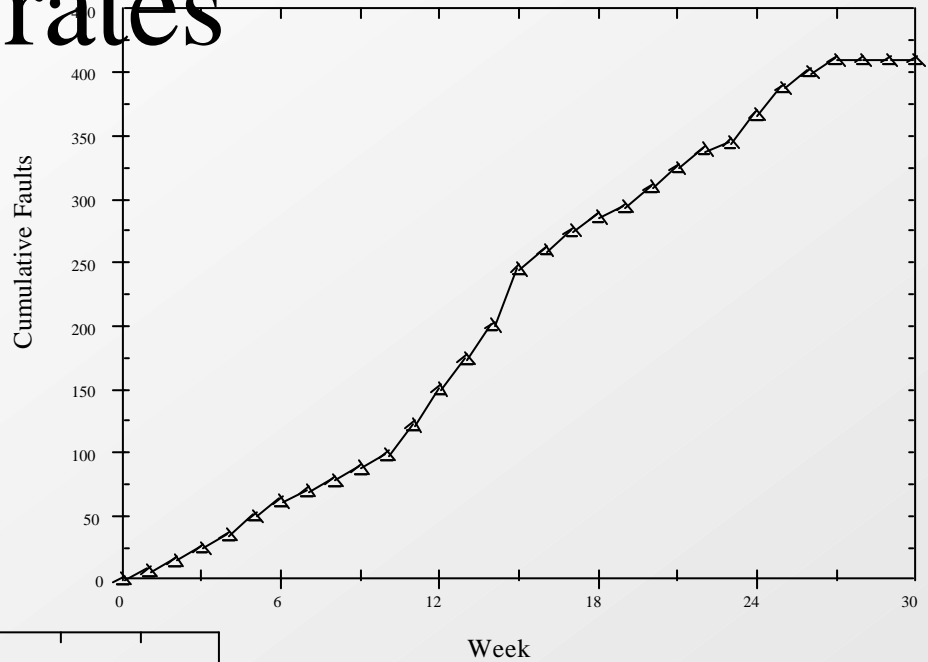
Time Based

-  Monitor individual objects over time
-  Assess deviation from expected trends

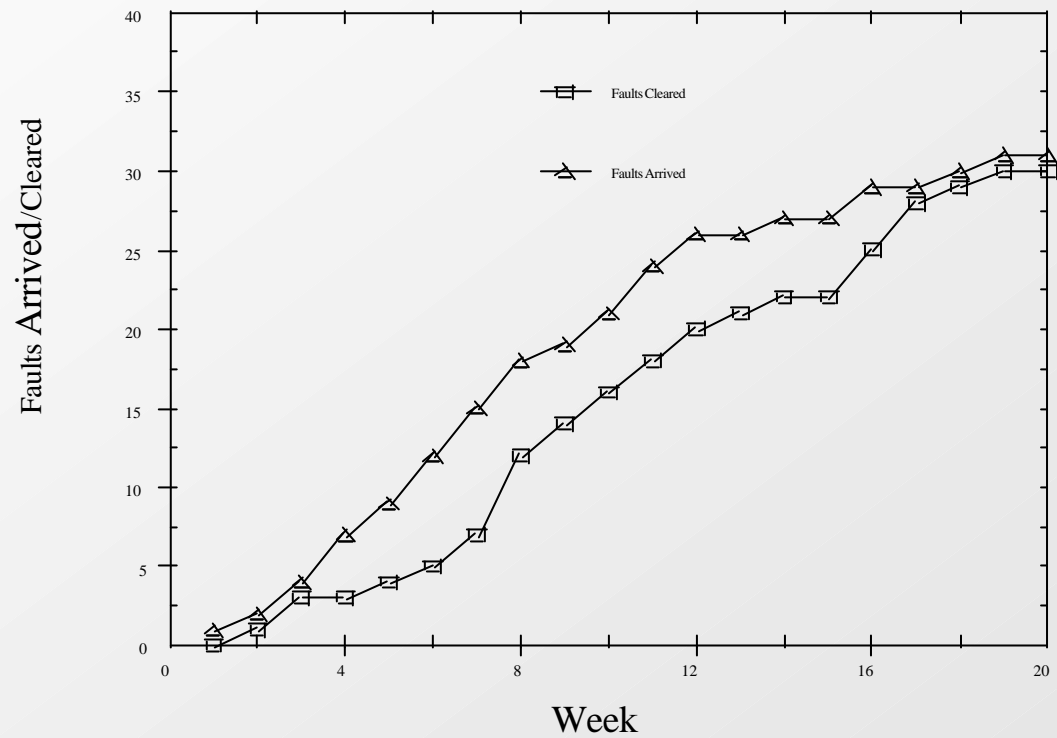
Intercheckpoint Monitoring

-  Build up of partial products towards a checkpoint
 -  Inspections performed to date
 -  cumulative modules through design, code, unit test
 -  system test runs per week

Fault rates



Fault Detection against Fault Removal



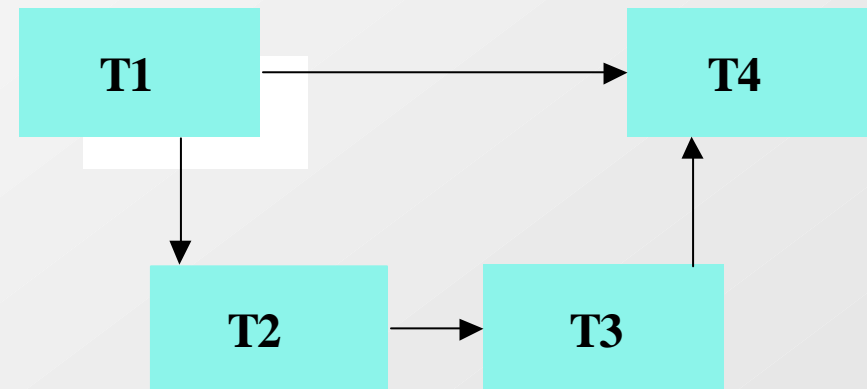
Management Hazards

- ✍ Many project hazards arise from poor project management
- ✍ Analyse plans for weakness/problems
- ✍ Anomaly detection for networks
- ✍ Review plans for:
 - ✍ uncertainties
 - ✍ optimistic assumptions

Project Plans

Each Task

- Optimistic duration estimate
- Most likely estimate
- Pessimistic duration estimate



Network Review

- ✍ Review ‘nearly’ critical paths
 - ✍ What would make them critical
- ✍ Review network structure
 - ✍ fan-in to and fan-out from nodes
 - ✍ large values may indicate
 - ✍ plan bottlenecks
 - ✍ incorrect dependency analysis
- ✍ Watch out for our own mistakes

Looking for uncertainties


Plans can hide

-  misplaced assumptions

-  lack of knowledge

Look out for large unanalysed ‘blobs’

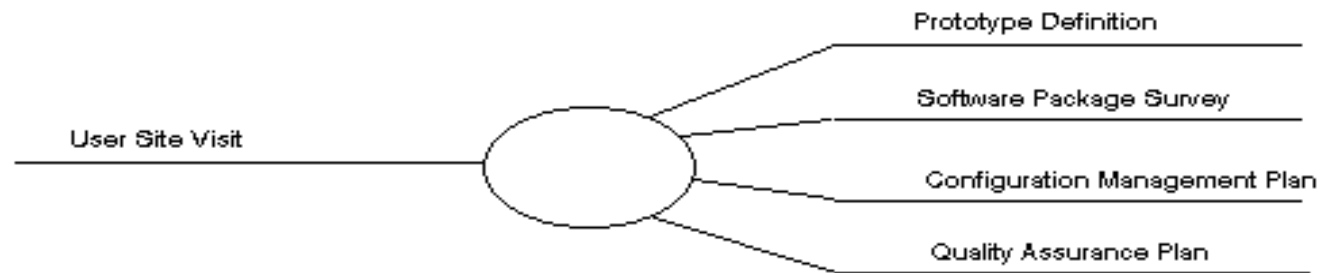
-  areas of plans with large number of uncertainties

-  areas of plans with large allocations of effort/elapsed time and little description

-  estimated by ‘remainder’

 -  detailed hardware costs therefore remainder must be software

Example Chart



When events are possibly uncertain make them a precondition of as little as possible in plans

Resource Problems

✂ Network Computed by Tool?

- Time Scheduled

- ✂ Every activity starts ASAP
- ✂ Resource level demands fluctuate widely with unrealistic peaks
- ✂ Parallel working excessive
- ✂ Danger of task interactions

- Resource Limited Scheduling

- ✂ Float used as lead, fewer resources used, lower peaks, maintain times
- ✂ Paths become near critical, little float, more hazardous

Risk Reporting

Report to

-  Senior Management

-  Customer

Initially use ‘Top 10’ reporting

-  Batch if more than 10

Know what they are and what you are doing about it

A Risk Report

- ✍ All major hazards and associated risks
- ✍ In addition to standard risk information
 - ✍ Length of time active
 - ✍ New items
 - ✍ Slow moving items
 - ✍ Successes

Example Risk Report

Rank	Prev Rank	On List	Item	Consq	Progress
1	4	2	Replace- ment for team leader	Lack of expertise, delay in code production, less reliable in operation	Chosen replacement made unavailable by other project
2	6	2			
3	2	5			
4	3	6			
5	5	3			