Saving the Titanic:
Using CAR to Rescue a Sinking Process Improvement Program

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A Plea for Help

The situation:

- It’s Fall 2003
- An organization is moving toward SW-CMM (CMM for Software) Level 3
- Their process improvement (PI) consultant is yours truly

And I get a call…
That’s Customer Service?

My client

We’ve fallen hopelessly behind on our process improvement program. Can you help us develop a new schedule?

Ummm, no...

…at least, not unless we also address the reasons why we’re behind schedule.

Me (stunt double)
Stop the Insanity!

Developing a new schedule without addressing **root causes** of the slippage is not likely to prevent future slippages.

```
Build Plan
  ↓
Execute Plan
  ↓
Fall Behind
  ↓
Tired Yet?
  ♦
      Y
  ↙
  ↘
Fire Consultant, Try Again
```

“Insanity: doing the same thing over and over again and expecting different results.”

- Albert Einstein

**The Process Improvement Insanity Cycle**
Purpose

The purpose of Causal Analysis and Resolution (CAR) is to identify causes of defects and other problems and take action to prevent them from occurring in the future.

SG 1 Determine Causes of Defects
   SP 1.1 Select Defect Data for Analysis
   SP 1.2 Analyze Causes

SG 2 Address Causes of Defects
   SP 2.1 Implement the Action Proposals
   SP 2.2 Evaluate the Effect of Changes
   SP 2.3 Record Data

What the Book Says

CMMI Second Edition: Guidelines for Process Integration and Product Improvement; Chrissis, Konrad, Shrum
Determining What Went Wrong

I draft a “fishbone” diagram…

hop on a plane…

meet with my client…

…and we refine the diagram.

SP 1.2 Analyze Causes
Perform causal analysis of selected defects and other problems and propose actions to address them.
Drawing Our Fishbone

Also known as:
- Cause-and-effect diagram
- Ishikawa diagram
PI Effort Behind Schedule

Drawing Our Fishbone

1. Define the problem
2. Ask “Why?”
3. Repeat As Needed

Why?

- Insufficient planning
- Inexperienced PAT leadership
- Limited resources
- Insufficient buy-in to PI program
- Inefficient review cycles
- Inadequate monitoring

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Cause: **Insufficient Planning**

- Inexperienced PAT leadership
- Inadequate monitoring
- Limited resources
- Insufficient buy-in to PI program
- Inefficient review cycles
- Feeling that effort is “unplannable”

**Insufficient planning**

- Many efforts unestimated
- Unrealistic durations
- No resources on schedule
- Planning guidance unheeded
- Highly sequential schedule
Cause: Inexperienced PAT Leadership
Cause: **Inadequate Monitoring**

- Inadequate monitoring
- Limited slippage awareness
- Limited action item tracking
- No actions taken when schedule slips
- No schedule discussions at PAT level
- Inexperience
  - Limited resources
  - Insufficient buy-in to PI program
  - Inefficient review cycles
  - Reluctance to update plans
**Cause: Limited Resources**

- Small organization
- Proj. participation not planned/ budgeted
- Limited resources
- Not as important as “real” work
- Developers working OT on projects
- Inefficient review cycles
- Insufficient buy-in to PI program
- Insufficient planning
- Inexperienced PAT leadership
- Inadequate monitoring

**PI Effort Behind Schedule**
Cause: Inefficient Review Cycles

One individual trying to do too much

No distinction between forgotten & rejected inputs

Inefficient review cycles

Insufficient planning

Inexperienced PAT leadership

Inadequate monitoring

Limited resources

Insufficient buy-in to PI program

No documented PAT review process

PI Effort Behind Schedule
Cause: **Insufficient Buy-in to PI Program**

- Insufficient planning
- Inadequate monitoring
- Limited resources
- Inefficient review cycles
- Not addressing “What’s in it for me?”
- Limited management support
- Insufficient buy-in to PI program

**Little Software Lead buy-in**
Our actual diagram was a bit more complex. The one we present here has been sanitized and simplified.
We’ve Identified Causes… Now What?

We brainstorm solutions…

SP 1.2 Analyze Causes
Perform causal analysis of selected defects and other problems and propose actions to address them.

and run these by the appropriate people.
Insufficient Planning: Action

New schedule is being developed, and will:
- include **resource** assignments (names)
- better consider resource **constraints**
- be based on **labor hour** estimates
Inexperienced PAT Leadership: Action

Level of mentoring associated with PI program planning and monitoring will be increased.
Inadequate Monitoring: Action

Inadequate monitoring

Insufficient planning
- Many efforts unestimated
- Planning guidance unheeded

Inexperienced PAT leadership
- Limited action item tracking
- Little training
- Limited pool
- Limited awareness
- Many efforts unestimated
- No actions taken when schedule slips
- Inexperience

Insufficient resources
- Small org.
- Not as important as "real" work
- Developers working OT on projects
- Limited availability
- Not as important as "real" work

Limited action
- Little training
- No documented PAT review process
- No schedule discussions at level

Inefficient review cycles
- One individual trying to do too much
- No distinction between forgotten & rejected inputs
- Planning guidance unheeded
- Limited pool
- No actions taken when schedule slips
- Inexperience

Inadequate buy-in to PI program
- Limited action
- Inexperienced PAT leadership
- Limited pool
- Little training
- Planning guidance unheeded
- Limited awareness

"Schedule" will appear as first item on all future PAT meeting agendas

PI Effort Behind Schedule
Limited Resources: Action

PI Lead is requesting a budget increase, and has received a verbal commitment (11/19) of increased project participation.
Inefficient Review Cycles: Action

- Limited mgt support
- Inexperience
- No schedule discussions at PAT level
- Planning guidance unheeded
- No actions taken when schedule slips
- Limited slippage awareness
- Reluctance to update plans
- Small org. Developers working OT on projects
- Not as important as “real” work
- Inadequate monitoring
- Insufficient planning
- Insufficient resources
- Many efforts unestimated
- (Some) unrealistic durations
- No resources on schedule
- Highly sequential schedule
- Feeling that effort is “unplannable”
- Proj. participation not planned/budgeted
- Small org.
- One individual trying to do too much
- No documented PAT review process
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Consider formalizing key comments;
New schedule will include key review-related milestones

PI Effort Behind Schedule
Insufficient Buy-in to PI Program: Action

- Insufficient planning
  - (Some) unrealistic durations
  - No resources on schedule
  - Highly sequential schedule
  - Feeling that effort is "unplannable"
- Inexperienced PAT leadership
  - Many efforts unestimated
- Inadequate monitoring
  - Limited action item tracking
  - Limited slippage awareness
  - Limited action taken when schedule slips
  - Reluctance to update plans
- Insufficient resources
  - Insufficient buy-in to PI program
  - Inefficient review cycles

Post-POC lessons learned meeting has been scheduled for 11/25, and will tie into PI program

Developers working OT on projects

Limited resources
Fishbone Diagram with Selected Actions

We also had several additional actions. For simplicity, we’ve only chosen one per high-level “cause” in this presentation.

New schedule is being developed, and will:
- include resource assignments (names)
- better consider resource constraints
- be based on labor hour estimates

Level of mentoring associated with PI program planning and monitoring will be increased

“Schedule” will appear as first item on all future PAT meeting agendas

PI Effort Behind Schedule

Insufficient planning
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- No resources on schedule
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Inexperienced PAT leadership
- Limited pool
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Insufficient buy-in to PI program
- Limited mgmt support
- Not addressing “What’s in it for me?”

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Limited slippage awareness
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Inexperienced
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Insufficient buy-in to PI program
- Limited mgmt support
- Not addressing “What’s in it for me?”

Consider formulating key comments;
New schedule will include key review-related milestones

PI Lead is requesting a budget increase, and has received a verbal commitment (11/19) of increased project participation

Post-POC lessons learned meeting has been scheduled for 11/25, and will tie into PI program
Finally... Time for Action

SP 2.1 Implement the Action Proposals
Implement the selected action proposals that were developed in causal analysis.

SP 2.2 Evaluate the Effect of Changes
Evaluate the effect of changes on process performance.

Take action!
Resolve conflicts
Measure results
Measuring Our Results

The health of the PI program improved significantly. Several months later we were able to quantify the effect of the changes:
Measuring Our Results

The health of the PI program improved significantly. Several months later we were able to quantify the effect of the changes.

The organization was evaluated at **SW-CMM Level 3** in March 2004 via an independent Software Capability Evaluation (SCE).
Conclusions and Recommendations [1 of 2]

• Our application of CAR was imperfect and abbreviated, but extremely useful nonetheless.
  - *Walk before you run; don’t pursue perfection as a short-term goal*

• Several root causes were beyond our direct control, but we were still able to successfully exert influence to ensure many of these were addressed
  - *Don’t give up when you find many causes are beyond your control; apply WIFM (‘what’s in it for me?’) to gain support*

• We could have saved additional time by involving some key stakeholders sooner in the CAR process
  - *You’ll need buy-in from all key players eventually; do it sooner rather than later – it’s cheaper!*

• His organization’s process improvement problems were certainly not unique
  - *A cause-and-effect diagram can become a re-usable asset!***
Conclusions and Recommendations [2 of 2]

- Many of the causes were related to the process improvement program not truly being planned and managed like a project
  - Apply basic project management principles to your PI program (minimally, see PP and PMC)

- By using causal analysis and resolution techniques, we were almost certainly able to reduce the schedule and overall cost of the process improvement program. (Overall time from organization’s initial exposure to SW-CMM until successful Level 3 rating: 16 months.)
  - Applying a healthy dose of CAR to your significant process improvement –related problems
Questions?

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