

The Problem of Resonance  
in  
Technology Usage

OUTLINE

0. Introduction
1. Composite Case Study
2. Analysis of the Problem
3. Generalization of a Solution to the Problem
4. Conclusion

Hasan H. Sayani, Ph.D.

Cyril P. Svoboda, Ph.D.

Advanced Systems Technology Corporation

9111 Edmonston Road Suite 302

Greenbelt Maryland 20770

(301) 441-9036

## ABSTRACT

Developers of information systems are bombarded with publicity releases hawking a plethora of tools and techniques. Although vendors give the impression that their product will lead to developer to the "promised land", they rarely are able to deliver. The result is that information systems developers ride a roller-coaster: rising to a peak of expectation and hope, only to plummet down the track of reality, before beginning to climb up to yet another peak of hope. This paper will analyze this situation from the authors' perspective, formed by using various information system tools/techniques and by consulting with over ten Fortune 500 firms and six government agencies.

A case study will be presented which draws together the issues raised in three distinct cases. Obviously, the names of the organizations will be changed as will any other information that might lead to identification. This case study will show a typical progression from the selection of an analysis methodology (SA) to the adoption of an automated tool for specification and documentation (PSL/PSA) and the difficulty of fitting these into an existing life cycle development methodology.

The problem presented in the case study is similar to the problem of resonance: over a period of time, the morale of system developers reels through a journey over peaks of "hyped" expectations and down into valleys of depressing realizations. In addition, management is weighed down with the pressures of short-term goals and the burdens created by long ignored human factors, both of which entice management to press for "any" product rather than the "right" product. The technology to which both developers and management often turn in desperation is marked by desperate development and by the shallow experience of the developers. Lastly, the mentality of those employing development tools and/or techniques is

very often provincial, relegating various items to a rigidly determined set of categories or hardware-driven.

The general approach to a solution is taken from a procedure for problem-solving developed by Svoboda and Sayani (1980). In this procedure, the system developer is encouraged to take time first to examine the problem before attempting to solve it, defining its major dimensions and determining the evaluative criteria to be used in assessing any proposed solution. Then the problem-solver uses some visualization tactic suited to his/her cognitive style or suggested by an organization's methodology. These visualizations are then elaborated on by translating them into linguistic expressions, at various levels of formality or precision. What is expressed needs to be reflected, so that the composer can grasp the implications of what has been said from various points of view, with a differing focus or scope. Although what has been said seems, on reflection, to be what was intended, it needs next to be analyzed or evaluated against the earlier determined criteria, in light of any constraints, within the scope of resources available. Those specifications which do not "pass" the foregoing evaluation must be modified and this expression-reflection-evaluation-modification process must be repeated until the system has been completely specified and is ready for construction and implementation. Before the development team congratulates itself for a job "well-done", it should project which tool/technique ought next to be selected and employed and what has been learned from the whole process of system development that might give direction to the next effort.

If an organization does not employ such an approach in systems development, it will eventually begin to experience the rollercoaster ride mentioned earlier. If one does employ such an approach, the organization will be in a better position from which to assess the intrinsic quality of its tools/techniques and their

contribution to the successful development of information systems. Such an approach would offer the basis for guiding an organization in the introduction, facilitation and institutionalization of new tools/techniques for the development of future information systems.

**THE VIEWGRAPH MATERIALS**  
for the  
**H. SAYANI/C. SVOBODA PRESENTATION FOLLOW**

The Problem  
of  
Resonance  
in  
Technology Usage

Presented at Sixth Annual NASA  
Software Engineering Workshop  
December 2, 1981

Hasan H. Sayani, Ph.D.  
Cyril P. Svoboda, Ph.D.

Advanced Systems Technology Corporation  
9111 Edmonston Road Suite 302  
Greenbelt Maryland 20770  
(301) 441-9036

Copyright © 1981 by Advanced Systems Technology Corporation (ASTECC),  
Greenbelt, Maryland.

All rights reserved. No part of this material may be reproduced in any form  
or by any means, without permission in writing from ASTECC.

## CREDENTIALS

---

### Corporate Objectives

- R & D in IS development process
- analysis, design, code generation and life cycle management automation tools
- engineering and human factors background
- application of tools on projects

### Corporate Experience

- instruction and application of tools
  - 23 courses, seminars & workshops on PSL/PSA, methodologies, tools (ADL, ADS)
- consultation with organizations using tools (over 10 Fortune 500 & major Government Agencies) on all levels of organization
  - executive
  - management
  - operational
- evaluation of usage of tools

## PREVIEW OF PRESENTATION

---

### Composite Case Study

- examination of organization background in software development process
  - recognition of need for formal techniques
- response to problem
- result of piece-wise intro of tools

### Analysis of Situation

### Generalization Approach

### Conclusion



## COMPOSITE CASE STUDY

---

### Examination of Background in Software Development Process

- third generation of hardware
- obsolete/poorly documented existing systems
- high turnover/additions to systems people
- dissatisfied users viewing systems as:
  - inadequate and costly
  - in large backlog/overruns
  - unintegrated
- lure of effortless development via tools and techniques
  - "let's get on some bandwagon"

## RESPONSE TO PROBLEM

---

"Small is beautiful"

"Have Money - Will Buy Tools"

- one for each phase of development life cycle
- acquire tools
- train pilot group

## RESPONSE TO PROBLEM

---

### Apply the Solution

- result can range from
  - success to disaster

### Next Evolutionary Step

- pass on work from one phase to another, or
- have a second group use the same tool
- both of which are usually doomed to disaster

### Backlash

- build in-house
- force fit a tool by outspoken advocate
- regress

## ANALYSIS OF SITUATION

---

### Problem of Introduction

- reality rarely matches overall expectations
- never possible in isolation
  - distortion between existing and new techniques for each tool
- difficulty of integration across life cycle phases

## ANALYSIS OF SITUATION

---

### Management "Baggage"

- short term goals
- due-date versus quality
- ignoring human factors
  - career-path implications
  - E & T budget
  - management styles
    - authoritative
    - democratic
    - laissez-faire

## ANALYSIS OF SITUATION

---

### Technology Growing Pains

- first generation of tools/techniques
  - shallow experience
- vendor myopia and user passivity
- disparately developed
  - no overall plan of action
- changing ground rules
  - cost parameters (hardware/software ratios)
  - rapidly changing base technologies

DBMS

A-I

Graphics

## ANALYSIS OF SITUATION

---

### Field Immaturity

- failure to recognize commonalities
  - e.g., different types of systems
    - engineering vs commercial
  
- financial and legal community's effect
  - capitalization
  - protection (e.g., copyright/trade secrets)
  - inability to keep up with rate of change
  
- Governmental approach
  - doesn't foster coordinated effort

## GENERALIZATION APPROACH

---

### (Problem-Solving)

#### Problem Recognition

- postpone solution before understanding
- dimensions of problem
- developing criteria of judging solution

#### Visualization

- cognitive style
- methodology
- merely a basis for further work.
- not universal

#### Expression

- graphics
- linguistic
  - levels of formality

#### Reflection

- other than mere echo of expression
- other focus, scope, dimension



## GENERALIZATION APPROACH

---

(Problem-Solving)

### Analysis/Evaluation

- comparing against criteria
- evaluate against constraints
- realization of resources available

### Modification/Iteration

- sensitivity analysis
- impact projection

### Solution

- determination } of product
- and }
- presentation }

### Iteration

- where should next tool fit?
- what have we learned from experience?

## CONCLUSION

---

- User organization: "get your house in order"
- Articulate needs of tools/techniques
- Set quality standards
- Evaluate existing tools/techniques
- Walk through whole development cycle scenario
- Introduce in a studied fashion
  - deliverables
  - career paths
  - feedback
  - support usage
  - training
- Study the process as well as the problem