Usable Verification for Usable Systems

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SPUR  (Patterson, CACM 2005)
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- Increasing reliability (telephone)
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User involvement and complete reqs & specs are the two most important factors for success (Standish Group Chaos report, 1995)
What’s Wrong Now?
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- Insufficient focus on acceptability and usability (building the right system)
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- Insufficient focus on acceptability and usability (building the right system)
- Without which a system doesn’t serve its purpose!
Speedway to Success

HIGHLY MAINTAINABLE

ON BUDGET

ON TIME

2167 A COMPLIANCE

REDUCED RISK

CUSTOMER ACCEPTS IT!
The Actual Development Process
The Specification

Gridlock

Monday, November 15, 2010
Specification Gridlock
Section 2.7.6: Security  (~ page 10)

“If the system sends a signal hot then send a message to the operator.”

Section 9.3.4: Temperatures  (~ page 150)

“If the system sends a signal hot and $T>60^0$, then send a message to the operator.”

Summary of critical aspects  (~ page 650)

“When the temperature is maximum, the system should display a message on the screen unless no operator is on the site except when $T<60^0$.”
What's Wrong (cont)
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- Insufficient focus on determining that spec indeed covers user’s intent.
What’s Wrong (cont)

- Specification capture led by development doesn’t necessarily lead to acceptable systems.
- Insufficient focus on determining that spec indeed covers user’s intent.
- Insufficient focus on whether system is usable.
Examples

This application has access to the following:

⚠️ Your location
    coarse (network-based) location, fine (GPS) location

⚠️ Network communication
    full Internet access

⚠️ Your personal information
    read contact data

⚠️ Storage
    modify/delete SD card contents

⚠️ Hardware controls
    change your audio settings, take pictures

⚠️ System tools
    modify global system settings, prevent phone from sleeping, read system log

OK  Cancel
I purchased a new version of an antivirus program from
and was told by them that I first would have to delete the old
version first, which I did. Then I paid $39.95 for the new version
of "________" which was a good product. I tried then after
opening the software to load it and could not, because it required
parts of the old version to be present.

## Disadvantages

- Contain adware toolbar
- Freezes occasionally.
- Cannot make copies of other dvds.
Why Does this Happen? (conjectures)

- Users not involved in prototyping and implementation
- Lack of verification for usability
- Impact of architectural decisions and environmental situations are not taken into account
- Users’ needs are not sufficiently considered
Can we Remedy this?

- Extreme Programming (too extreme?)
- Rapid prototyping + program transformation (performance?)
- Waterfall (usability?)
- Have user participate in every stage of development
- Develop “mock up” scenarios
Perhaps, we can’t (EWD627)

The term "software reliability" does not occur in my active vocabulary... it is in my opinion not a very fruitful notion. I call a tool "reliable" when it is safe to use by virtue of the fact that, when used, it acts as intended... it covers two completely different questions: the formalised question whether a program is correct, i.e. whether it meets its specifications, and the unformalised question whether a tool meeting those specifications is in such-and-such unformalised and ill-understood environment a pleasant tool to use. Correctness is a scientific issue, pleasantness is a non-scientific one, and it's therefore confusing to try to deal with both of them in a single sweep. And that is why the term "software reliability" has been banned from my active vocabulary.... As far as the non-scientific issue is concerned, there is little reason to assume that the scientist is much better equipped to contribute than others. As furthermore no scientific fruits are to be expected from dealing with fundamentally non-scientific issues, the scientist is justified in experiencing dealing with the non-scientific issue not only as a neglect of duty, but even as a waste of time.
For Users

- Make software **usable, predictable, and reliable**
- Make software easier to use
- Bridge gap between formal specs and users’ needs
- Verification is only good if it addresses users’ needs
- (Make security/privacy part of specs)
For IT Developers

- Bridge gap between programmers and FM community
- Develop reusable, scalable, replaceable, easily updatable software
- Develop better tools for cost estimation
And... Acceptability

- Specification needs be captured and maintained
- Avoid having implementation become its own specification
- Dependence on undocumented features
- Which user may be unaware of
Acceptability
(Specification vs Implementation)

 Guarantee access by implementation only through documented interface

 Continuous (and automatic) update of specification

 Specification is a living (currently, undocumented) organism should maintained as such
Usable systems require interaction between IT-developers and social needs

Usable Verification is only useful if applied toward attaining Usable Systems

To guarantee usability, the user must be involved in all stages of development

We (may) need tools to specify and measure usability