SOFTWARE:
CARE AND FEEDING

Marine Technology Society, Houston, TX

Presented by: Marine Cybernetics
May 24, 2012
SOFTWARE:

“TAKE CARE OF THIS..”
Agenda:

Software, It’s Here to Stay

Software Errors Explored

Regulatory & Class Contribution

HIL Testing Technology & Cases
Diagram of an Early, Electro-Mechanical Control System
Diagram of a Modern, Software Based Control System
Question: What do the following three events have in common?

FaceBook IPO, 2012
PetroBras P-34, 2005
Answer: Each control system had serious BUGS!
Early Bridge Control System (😊)
Modern Bridge Control System
Crane Control

Drill floor Control

Well Control

BOP Control

Emergency Shutdown

Dynamic Positioning

Ballast Control

Power management
So, what is the true cost of fixing a Software Error?
The Real Cost of Software Errors Undetected

Mumbai North High Platform, 2005
22 dead, 362 injured
Both the Bureau of Safety and Environmental Enforcement and the United States Coast Guard are increasing rule making and procedures.

And here’s why....
“While the rig employees were troubleshooting a network issue on the Driller’s Blowout Preventer (BOP) control panel of an ultra-deepwater semisubmersible drilling rig, an unplanned EDS occurred.”
On May 22, 2012,

The U.S. Department of the Interior’s Bureau of Safety and Environmental Enforcement will host a Technical Forum on Next-Generation Blowout Preventer (BOP) and Control Systems Technology, Management and Regulations.
December 29, 2011

“the Coast Guard published a notice of availability and request “request for comments regarding a draft policy letter on Dynamic Positioning (DP) Systems, Emergency Disconnect Systems, Blowout Preventers, and related training and emergency procedures” on a Mobile Offshore Drilling Unit.
ISQM => ISQM provides a process to manage software over the offshore unit’s life.

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<th>Concept</th>
<th>Rqmnts</th>
<th>Build</th>
<th>V V &amp; T</th>
<th>O &amp; M</th>
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- Concept Phase
- Requirement & Design Phase
- Construction Phase
- V V&T Phase
- O & M Phase
ISDS => Best practices to manage software intensive projects

Lifecycle of five phases:
- Concept (M0)
- Engineering (M1)
- Construction (M2)
- Acceptance (M3)
- Operation (M4)

Five responsibilities:
- Owner
- System Integrator
- Operator
- Supplier
- Independent Verifier
**ISDS => defect detection at early stages**

**Number of software defects (net per million lines of code)**

- **HIL case**
- **ISDS case**

Source: Capers Jones, Software Quality and Software Economics, Software Tech News, April 2010
DNV analysis
Control System Under Test

Supplied by OEM

Simulated, Virtual Rig

Supplied by Marine Cybernetics
Virtual Test Drive

CLICK HERE
Testing without Consequences!
(no risk of breaking break anything)
Actual Case Histories from HIL Testing

1: Dynamic Positioning – Azimuthing Thrusters

2: Power Management – Stuck Fuel Rack

3: Drilling – HMI “Double Click Error”
1: Dynamic Positioning – Azimuthing Thrusters
2: Power Management – Stuck Governor Fuel Rack
3: Drilling – HMI “Double Click Error”
Take Aways:

Software – Ubiquitous & Growing

Fixing - Sooner is Cheaper than Later

Oversight - is increasing

Solutions - Available
SOFTWARE:  
CARE AND FEEDING”

Special Thanks to:
- ABS
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- USCG