Industry software maintenance standard

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On behalf of BIMCO and CIRM

e-Navigation Underway 2018

What are the challenges?

Software maintenance – example 2013

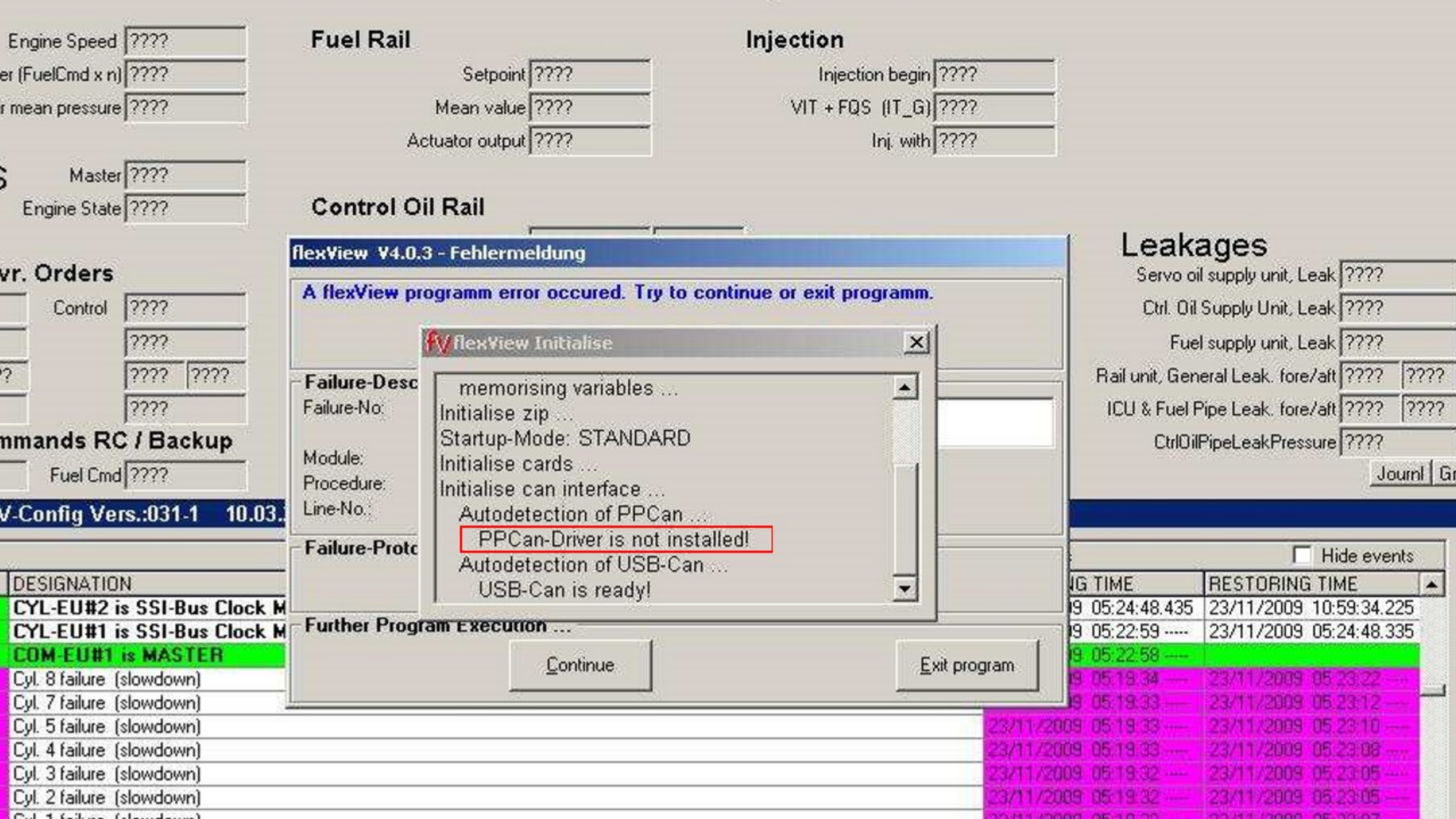
After black out due to repair cooling water valve 19/2, we have got at problem with (*name of main engine*).

It keeps coming up with failure:
Failure no 3633 (Cant Load DLL: MSJTER35.DLL Module frm Card Failure
Procedure: add failure
Line 50750

Choices are to press continue or exit program.
If pressing continue the error comes back after some seconds/minutes.

We have tried to restart a couple of times and same error comes back.

Now the pc is blocked and we can not operate from pc in ECR.
But the engine is running ok.


Engine Speed ????
er (FuelCmd x n) ????
r mean pressure ????
Master ????
Engine State ????
vr. Orders
Control ????
????
????
????
????
mmands RC / Backup
Fuel Cmd ????
V-Config Vers.:031-1 10.03.
Fuel Rail
Setpoint ????
Mean value ????
Actuator output ????
Injection
Injection begin ????
VIT + FQS (IT_G) ????
Inj. with ????
Control Oil Rail
Leakages
Servo oil supply unit, Leak ????
Ctrl. Oil Supply Unit, Leak ????
Fuel supply unit, Leak ????
Rail unit, General Leak. fore/aft ???? ????
ICU & Fuel Pipe Leak. fore/aft ???? ????
CtrlOilPipeLeakPressure ????
Journl
flexView V4.0.3 - Fehlermeldung
A flexView programm error occured. Try to continue or exit programm.
Failure-Desc
Failure-No:
Module:
Procedure:
Line-No.:
Failure-Proto
Further Program Execution ...
Continue
Exit program
flexView Initialise
memorising variables ...
Initialise zip ...
Startup-Mode: STANDARD
Initialise cards ...
Initialise can interface ...
Autodetection of PPCan ...
PPCan-Driver is not installed!
Autodetection of USB-Can ...
USB-Can is ready!
Hide events
DESIGNATION
NG TIME
RESTORING TIME
CYL-EU#2 is SSI-Bus Clock M
CYL-EU#1 is SSI-Bus Clock M
COM-EU#1 is MASTER
Cyl. 8 failure (slowdown)
Cyl. 7 failure (slowdown)
Cyl. 5 failure (slowdown)
Cyl. 4 failure (slowdown)
Cyl. 3 failure (slowdown)
Cyl. 2 failure (slowdown)
9 05:24:48.435
23/11/2009 10:59:34.225
9 05:22:59 -----
23/11/2009 05:24:48.335
9 05:22:58 -----
9 05:19:34 -----
23/11/2009 05:23:22 -----
9 05:19:33 -----
23/11/2009 05:23:12 -----
23/11/2009 05:19:33 -----
23/11/2009 05:23:10 -----
23/11/2009 05:19:33 -----
23/11/2009 05:23:08 -----
23/11/2009 05:19:32 -----
23/11/2009 05:23:05 -----
23/11/2009 05:19:32 -----
23/11/2009 05:23:05 -----

Software system after a black out

- Better software quality that are tested to ensure that such things does not happen
  - We need to prevent and avoid that a maintenance event creates problems due to integration of software

Another example

- Antenna problem – a service provider from another company than the original manufacturer comes on board
- The technician has problems, he cannot update the existing software, so he decides to install a new version of the software
- The problem is that the original manufacturer does not support the version that is being installed

power steady greem
terminal teady red
antenna steady red

CONDITION FOUND + ACTIONS TAKEN

On arrival try to connect to BDU with the TMA tool without success, did factory reset and now is possible to access the BDU also LEDs were back to normal. SW ver. founded 1.19 tried to do sw update without success. Still no communication. Connect a new BDU same result. Proceed to replace the ATM and now system is back to normal, performed a software update now SW ver. 1.21. Master test the system.

Equipment is back to normal, in good working order.

Replaced the Antenna Tracking Module.

EQUIPMENT SERIAL NO.	HARDWARE VERSION	SOFTWARE VERSION		SOFTWARE VERSION	
10449100	FBB 500	1.19	[Found]	1.21	[Updated]

FINAL CONDITION OF EQUIPMENT	FOLLOW UP NEEDED ?
System is back to normal	NO

SPARE PARTS / MATERIALS / SERVICE CODES

QTY	PART DESCRIPTION	PART NUMBER	S/N NEW PART	S/N DEFECTIVE PART	T.B.RAn?
1	ANTENNA TRACKING MODULE	THS-62- 128256AT	P5800033050112	22002125025	YES

The following day

- Good day,
- Please find service report attached - FBB has been checked and found OK.

Good day Captain,

Noted your below email with thanks.

Please note,
Software has been upgraded to a version not accepted by XX.
We believe instruction for downgrade might be available on board which was forwarded by XX During EVC migration.
Can you please check if staff on board can do the downgrade to version 1.19?
Only version accepted by XX is 1.19

Challenges continued

Nobody told the technician to replace software version. This is not aligned with the policies of the manufacturer

The software in the antenna tracking module (ATM) led to failure of other software, making it impossible to connect / communicate at service level

Need for better co-operation between service provider, master, owner and manufacturer

There is a need to be able to return to the previous software version so the ship can operate safely if the maintenance goes wrong

What is the solution?

Were a d

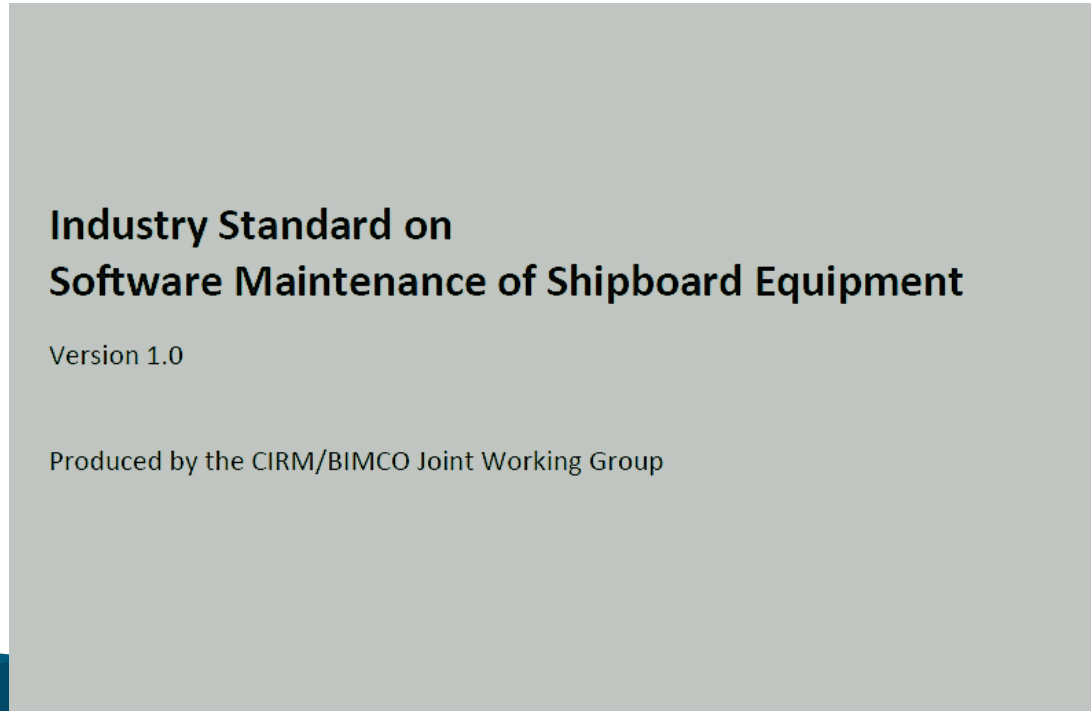
- Ship's s gration, and
  autom t on board
- e-Navig digm shift
- Many " her than hard
  ware re

Calls for a standard on software maintenance

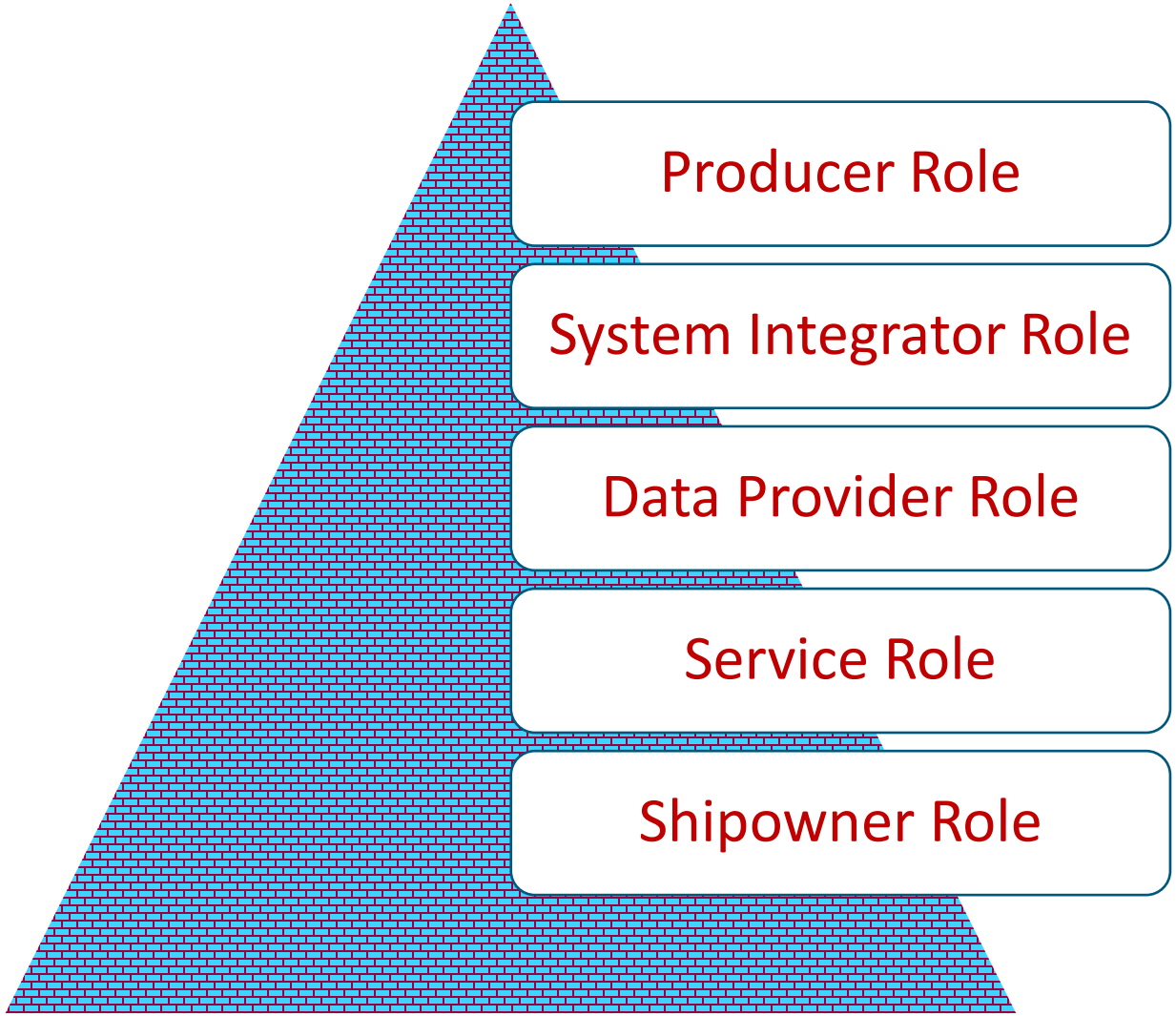
Success

- BIMCO approached CIRM in 2013
- CIRM/BIMCO Joint Working Group (JWG) established 2014
- A pilot project tested the draft standard in 2017

- Version 1.0 published January 2018



Many stakeholders in different roles



Increasing awareness/visibility of situation on board

Electronic Service Report

- Completed by service role at the conclusion of SW maintenance
- Standard specifies minimum content

Onboard software log

- Shipboard repository of electronic service reports
- Implemented and maintained by shipowner role

Availability of software updates

- Producer role provides information about available SW and updates

Awareness of software versions

- Equipment must display on demand the current SW version

Ensuring effective planning of SW maintenance

Checklist for communicating a software problem

- Communicated by the shipowner role to other roles

Producer role

- If update to be performed by crew, provide detailed instructions

Service role

- Plan and describe work expected to be undertaken
- Agree time, place and maintenance requirements with shipowner

Shipowner role

- Prepare plan in advance of SW maintenance

System integrator role

- New updates must be assessed to determine impacts on software installed on connected equipment

Ensuring competencies of service personnel

Software maintenance competency requirements

- required competencies for different levels of SW maintenance

Producer role

- Must specify maintenance requirements in maintenance manuals

Service role

- Must have auditable QA system covering competence management
- Must meet producer’s maintenance requirements
- Train-the-trainer model as a minimum; for certain types of equipment technicians may require additional testing/certification by the producer

Improving cyber security

Producer role

- Equipment must provide protection against unauthorized access (e.g. IEC 60945)

Service role

- Maintenance operations must not lead to malware infection
- Requirements on use of removable storage devices and malware checks
- Restrictions on connection to “controlled networks”

Shipowner role

- Procedures must be in place to protect equipment against malicious or unintentional security threats

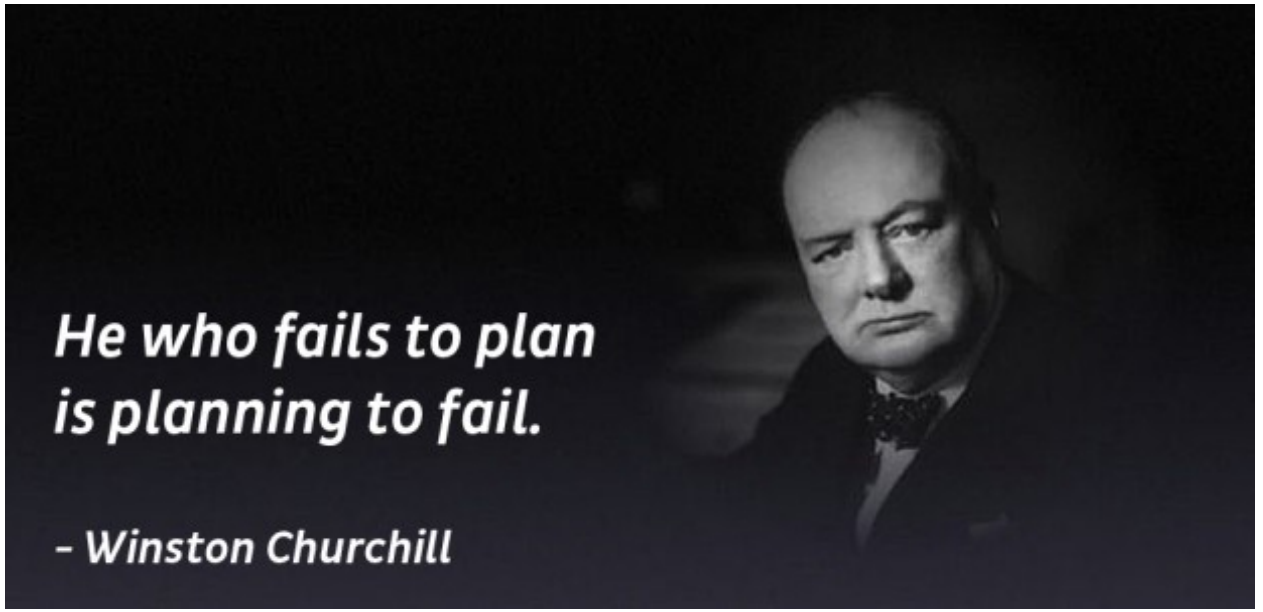
SW maintenance a controlled process

Event Initiation
- Preventative maintenance
- Corrective maintenance
- Regulatory compliance
- Improvement of performance

Planning
- Who, what, when and where
- Onboard software log

Execution
- Execution and control
- Cyber security

After service
- Service report and onboard software log
- Evaluation and feedback



Improving production of software

- Support procedures for on-the-spot diagnostic report after maintenance Software
- Role-back to previous safe state in case of errors during update
- Means to check that interfaces and functionality are operating as expected

What is next?

- All stakeholders are encouraged to implement and use the standard:
  - manufacturers; software houses; IT subcontractors; data suppliers; service providers; servicing companies; technicians; shipowners; masters and crews
- Possibly to be added to BIMCO ship repair standard contacts
- Evolve into an ISO standard

Thank you!

Contact BIMCO at

www.bimco.org

and CIRM at www.CIRM .org