

Dependable Systems Review

Coping with system complexity in the marine environment

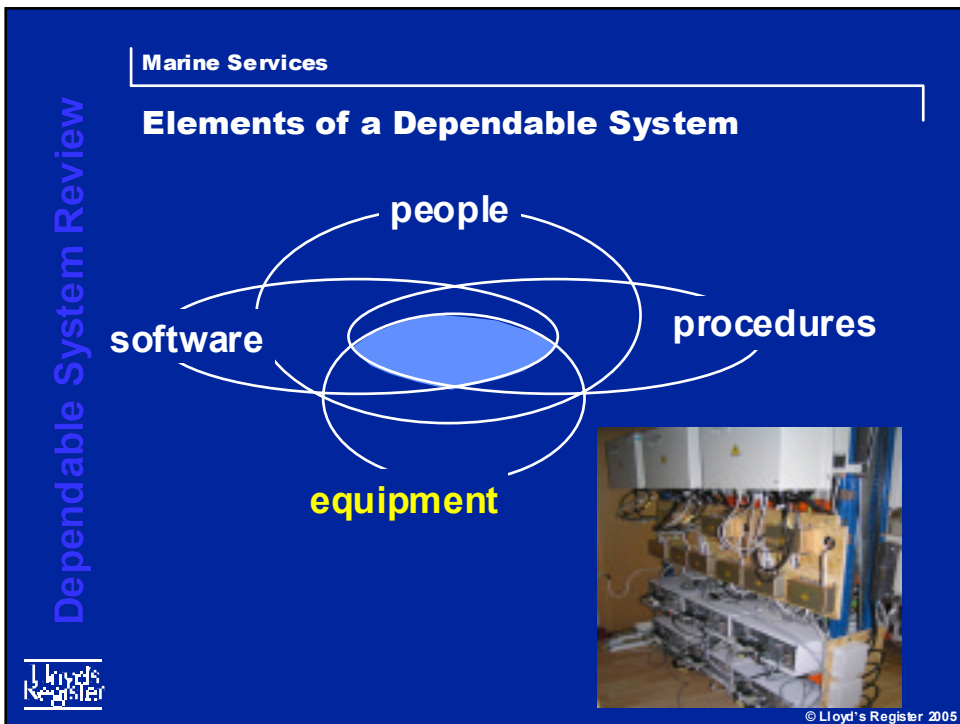
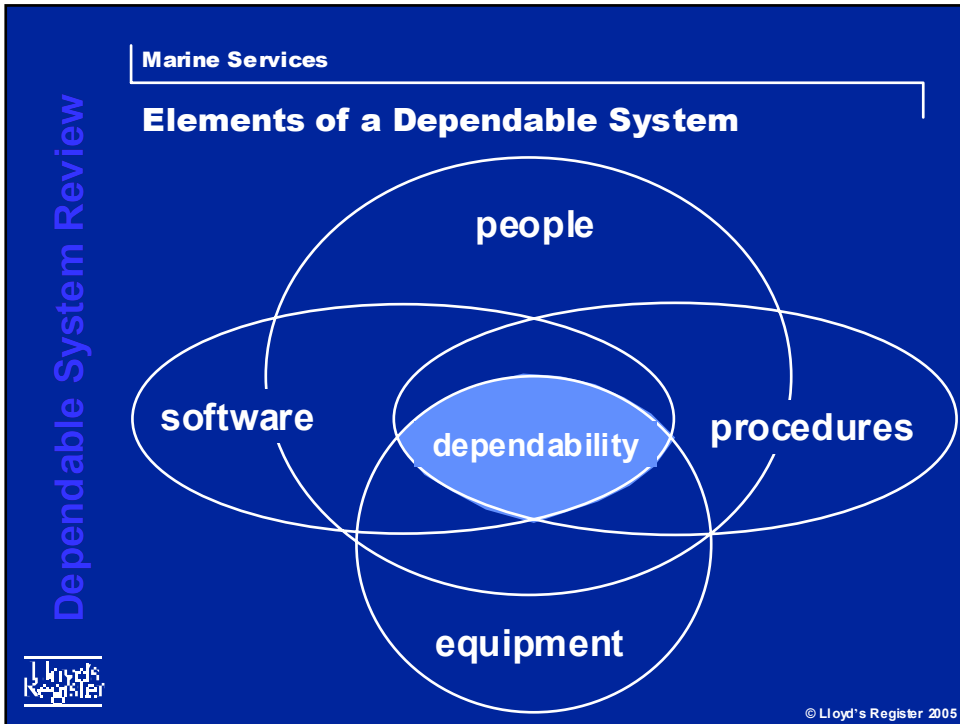
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Agenda

- **Elements of a Dependable System**
- **Background to DSR**
- **Methodology**
- **Benefits**

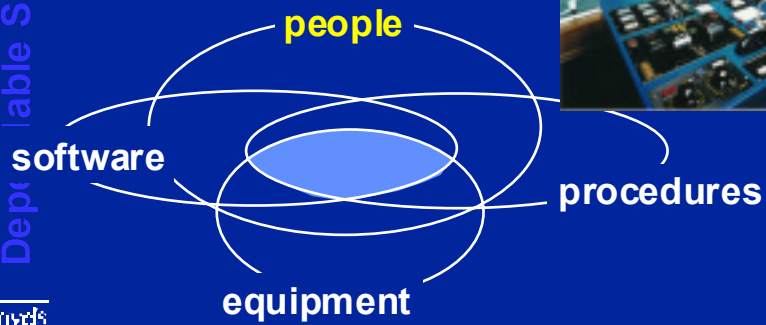
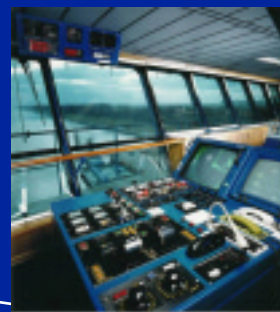


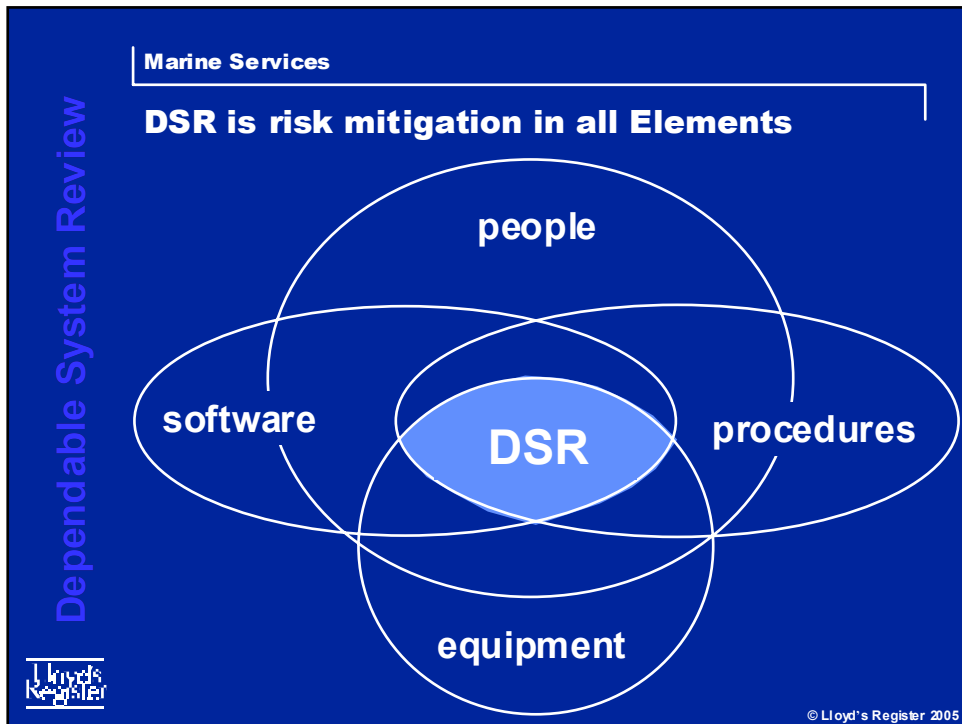


Components or Dependable System?



Elements of a Dependable System





- Marine Services
- Background**
- Dependable System Review
- **Safety Lifecycle – IEC Functional safety of programmable electronic systems**
 - **System Lifecycle - next step from ISO 9001 for 21st C**
 - **Human Error - IMO resolution 850 and MSC Circ 1091 introduction of new technology**
 - **Europe – EU Funded project with LR as strategic leader (ATOMOS)**
 - **Market Survey – Industry becoming more aware of IT problems and system issues**
 - **Principles for PES development and operation**
- Lloyd's Register
- © Lloyd's Register 2005

Objective of ISO 17894 and DSR

The system shall be demonstrably suitable for the user and the given task in a particular context of use.

It shall deliver correct, timely, sufficient and unambiguous services to its users and other systems.

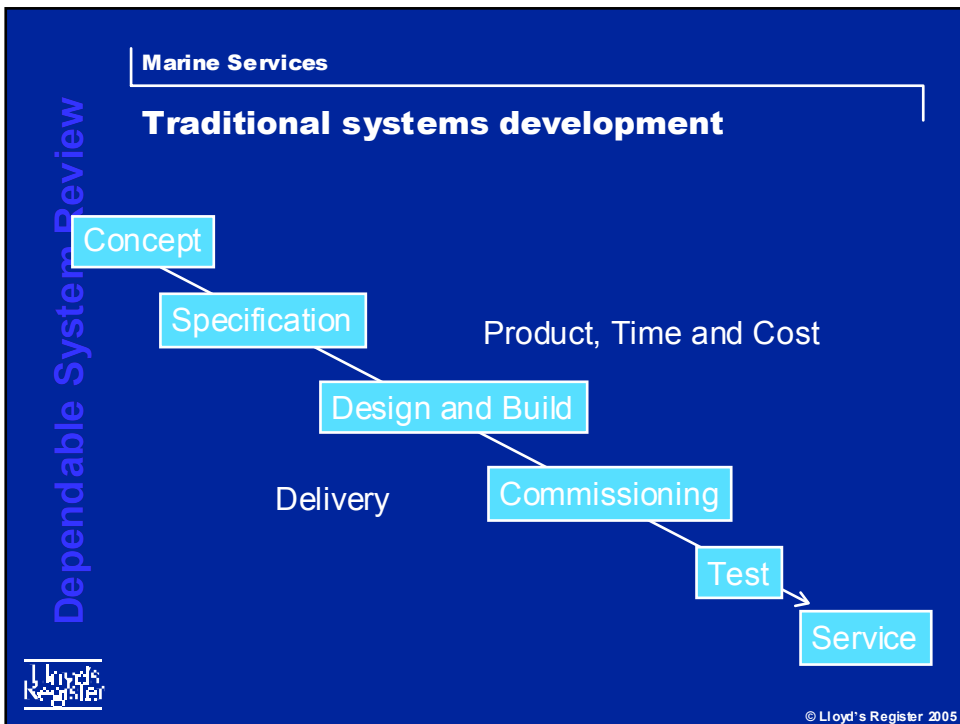
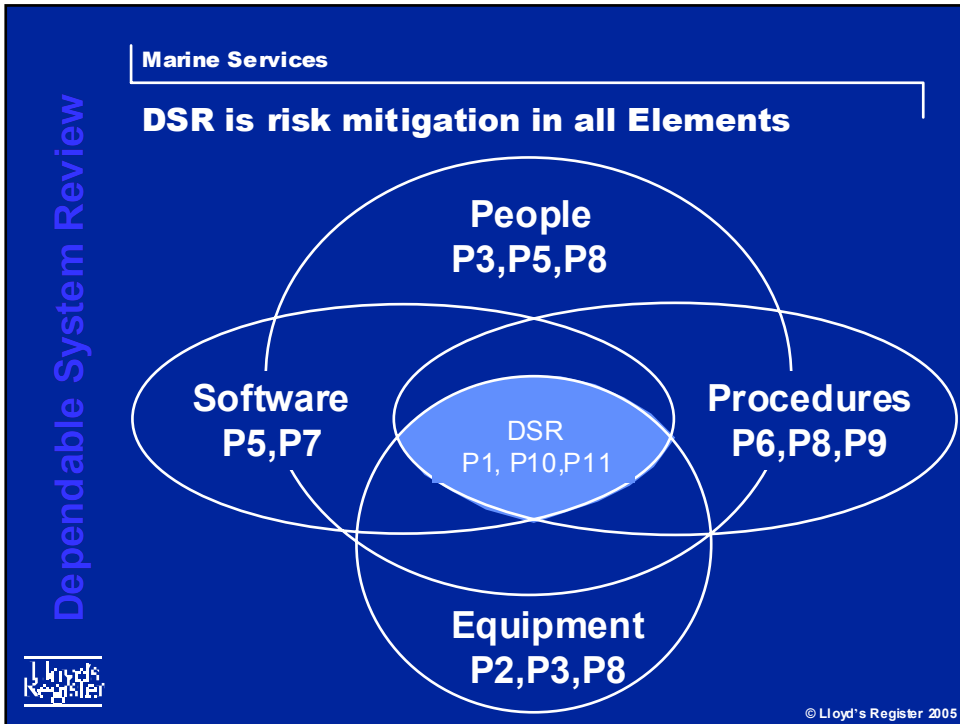
The components of the system shall perform correctly throughout the system's lifecycle.

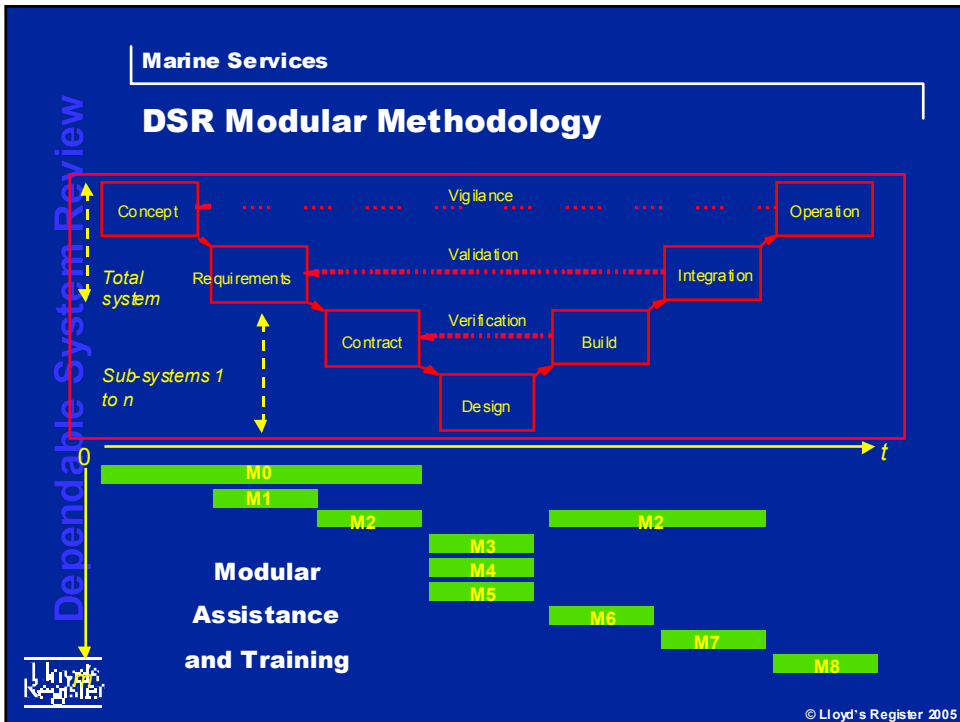
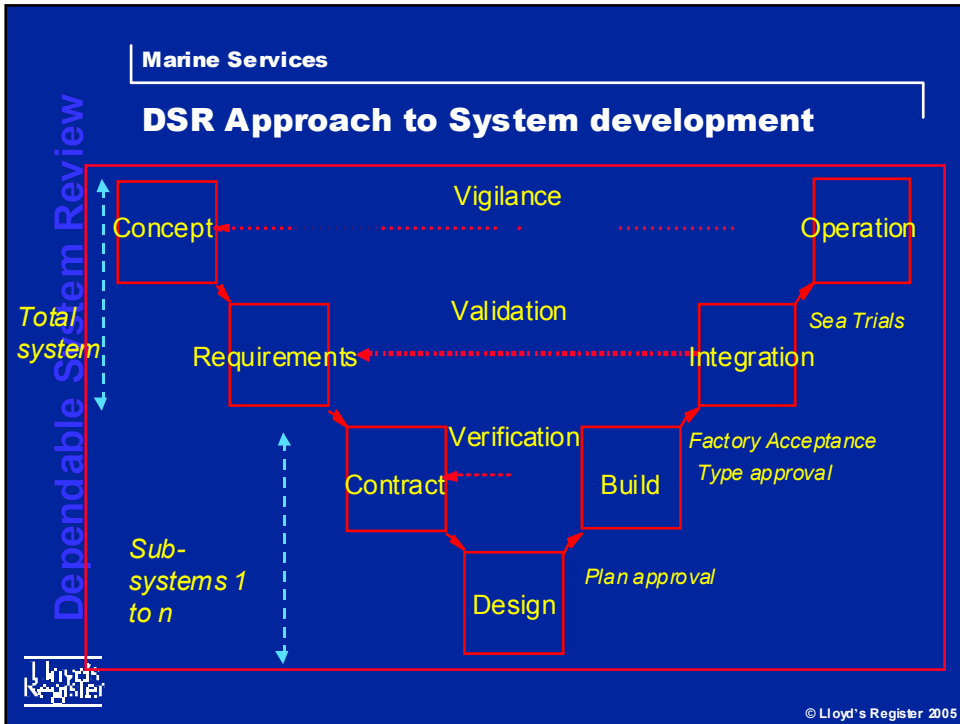


Relevant standards and other tools

- **ISO 17894 - Principles for PES development and operation**
- **ISO/IEC 15288 - System Lifecycle processes**
- **IEC 61508 - Functional safety of PES**
- **ISO 13407 - Human-centred design processes**
- **ISO 9000:2000 - Quality Management (ISO/IEC 900003 for software)**
- **Existing Marine regulations, Rules and equipment standards**
- **(HAZOP - early identification of operational hazards**
- **EEMUA alarm management guidance)**







Benefits offered by DSR framework

- **Improved service performance**
- **System confidence**
- **Reduced maintenance**
- **Enhanced safety**
- **Enhanced asset value**
- **through-life cost reduction**

(through early analysis and progressive monitoring of complex system risks)



DSR from Lloyds Register

- **Unique – no one else is offering the service**
- **Expertise - We developed the standards on which the service is based**
- **Risk based - tailored to client's specific project risks**
- **Through life support (risk tracking)**



Conclusions

- promote a systems-oriented view of development
- take account of system operation and maintenance
- allow developers to innovate - suitable assessment of innovative designs
- DSR - a set of dependability requirements that owners can request for all systems
- DSR as the first step for RISK AWARE clients



Frequently Asked Questions

Q: Can the principles of DSR be applied to systems other than Software intensive systems?

A: Yes, however, DSR is based on the International Standard ISO 17894 General principles for the development and use of programmable electronic systems in marine applications. Suitable standards should be identified for other systems

Q: Is DSR Class dependent?

A: DSR can be applied to non-LR vessel, it is independent of Class.

Q: Can DSR be offered to shipyards?

A: Yes, the risks will differ to that of a ship-owner. A reduction in modifications during build and miss-interpretations of the specification should offer considerable savings to the yard.

Q: Can DSR be applied to retrofits?

A: DSR is well suited to retrofit applications, the initial research was carried out on such a system and proved to be very successful in reducing costs and mitigating risks.

Q: How much does DSR cost?

A: DSR is not expensive compared to the potential cost savings which can be achieved throughout the life of the vessel, estimated savings can be \$Millions (see previous slides).



Marine Services

Building better business

Dependable System Review



Total Systems Engineering



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