Some generic global goals

Extracts from the SIP (NAV 59-6)

- **S3: improved reliability, resilience and integrity of bridge equipment and navigation information** (remark: part of it real time)
- **S2: means for standardized and automated reporting**
- **S4: integration and presentation of available information ...**
- **....IMO taking the lead in setting the performance standards appropriate for e-navigation ... These standards should be based on user needs and should encourage technology neutrality and interoperability**
- **An infrastructure providing authorized seamless information transfer**

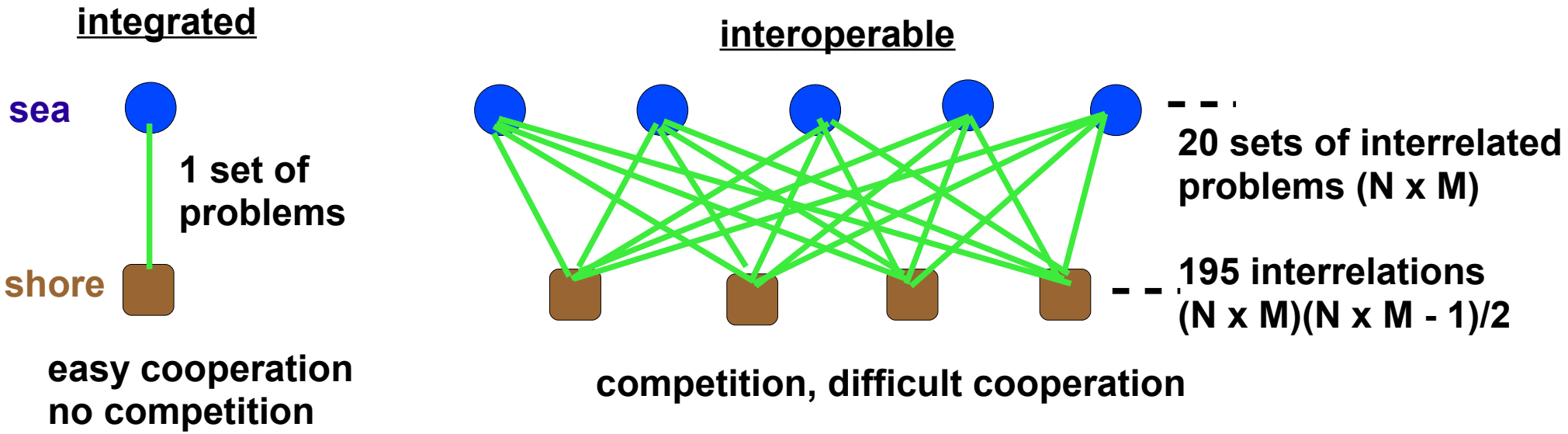
simpler and safer for mariners

more complex for engineers

development riskier for all stakeholders

Complexity aspects (application level)

- **All definitions are ambiguous in some way, except formal logic (far beyond our reach)**
- **interoperable # integrated**



- **real time makes everything more complex (dynamic semantics ...)**
- **on board systems have to be integrated =>system still more complex**
- **more lines of code => more bugs for a given quality level**

Interoperability aspects

“The other striking feature is that, despite considerable research efforts into interoperability dating back to the early 1980s, this remains a poorly understood area and currently solutions simply do not meet the needs of the complex distributed systems of today, particularly in terms of the levels of heterogeneity and dynamism..."

From Interoperability in Complex Distributed Systems - Gordon S. Blair, Massimo Paolucci, Paul Grace, Nikolaos Georgantas **- 2011 in relation with the european “CONNECT” project**

There is currently no recognized method to produce complete and non-redundant specifications for interoperability.

Prudent approach :

- **make it as simple as possible ; simple things first**
- **increase complexity progressively while controlling increases**
- **increase quality accordingly, starting from a minimum (TBD)**

Our tools

Our main tools are recommendations, guidelines and standards ; for interoperable parts, they must contain :

- **strict rules making some kinds of details unnecessary for some services ; e.g. : limiting some data exchange to broadcasting modes;**
- **for other services or sub-services, all necessary details, down to part of the detailed design and of its management;**

  The S100 registry is part of this detailed design, but probably not adapted to all necessary details.

- **quality requirements, especially for software, incl. validation**
- **a “risk register” for the identification and mitigation of risks plus associated planning and follow-on**

Method : risk register with a separate register for each risk

Identification of risk

Description

Rationale

Likelihood

Potential impact

Mitigation measures

List with entity in charge (owner)

Description

Schedule

Progress indicator.

annual review - presentation of progress at each e-NAV

Tentative risk portfolio

- Complexity
- Quality deficiencies or excesses in the engineering process : Reliability, Availability, Maintainability, Security, including cyber-security, Validation/approval process.....
- Communications adequacy common parts/functions with GMDSS
- Need for particularly detailed specifications for interoperability
- Insufficient planning and configuration management of recommendations, guidelines and standards ; should lead to phasing (defining stages, at least the first one)
- Insufficient teamwork
- ...

Phasing

"Although the adoption will be gradual, a number of preliminary agreements are required and certain minimum conditions need to be met. These are:

- **buy-in to the SWIM principles from the stakeholders;**
- **an initial SWIM governance and management structure, including a legal framework;**
- **an initial set of defined SWIM profiles;**
- **availability of initial infrastructure and a first set of deployed services compliant with ...”**

From the SWIM Concept of Operations - Eurocontrol - 10th june 2013

Tentative tasking for WGs

Risks	Risk owner
Complexity	WG 1 : complexity dashboard WG 4 : definition of the first version
Quality deficiencies or excesses in the engineering process	WG 1 in general WG 5 : PNT
Communications adequacy	WG 3
Insufficient planning and configuration management of regulations and standards Phasing (defining stages, at least the first one)	WG 2 : overall WG 4 : phasing of services
Need for particularly detailed specifications for interoperability	WG 4