Maritime Navigation and Information Services

The MarNIS Architecture

Marit Natvig, SINTEF, Norway

marit.natvig@sintef.no

Content

- The architecture
  - ➢ Overall information
  - ➢ Content and establishment approach
- Definition of concepts by means of the architecture elements
  - ➢ Examples

- If time and interest I can also show some details (browse through the hierarchy of models, etc.)
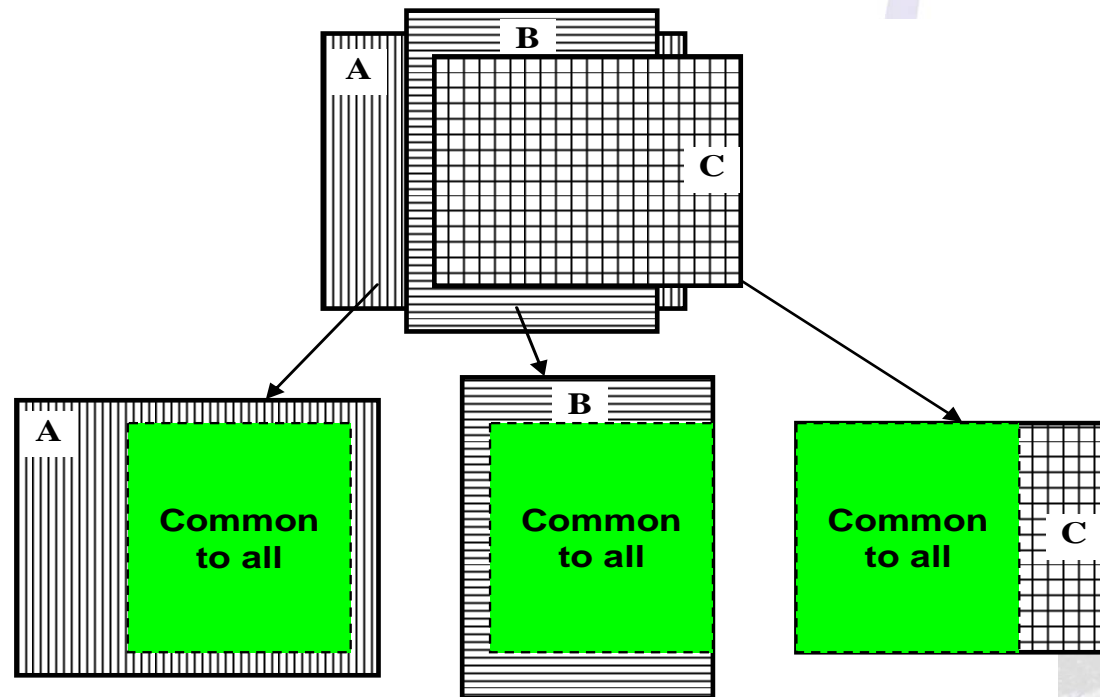
The MarNIS architecture

- A total picture of maritime traffic and transport to arrange for better solutions
  - ➢ The context in which the solutions shall operate
  - ➢ Relations and dependencies
- Independent of organisation and local/regional ways of doing things
- Formal definitions and specifications
  - ➢ Structured approach
  - ➢ Models
  - ➢ Consistency
- Support implementation of solutions

- Further discussions about solutions will be required, and such discussions may be supported by the architecture

- Shows the maritime sector as a part of the total transport sector
  - ➢ Arrange for co-modal transport
  - ➢ Achieve synergies

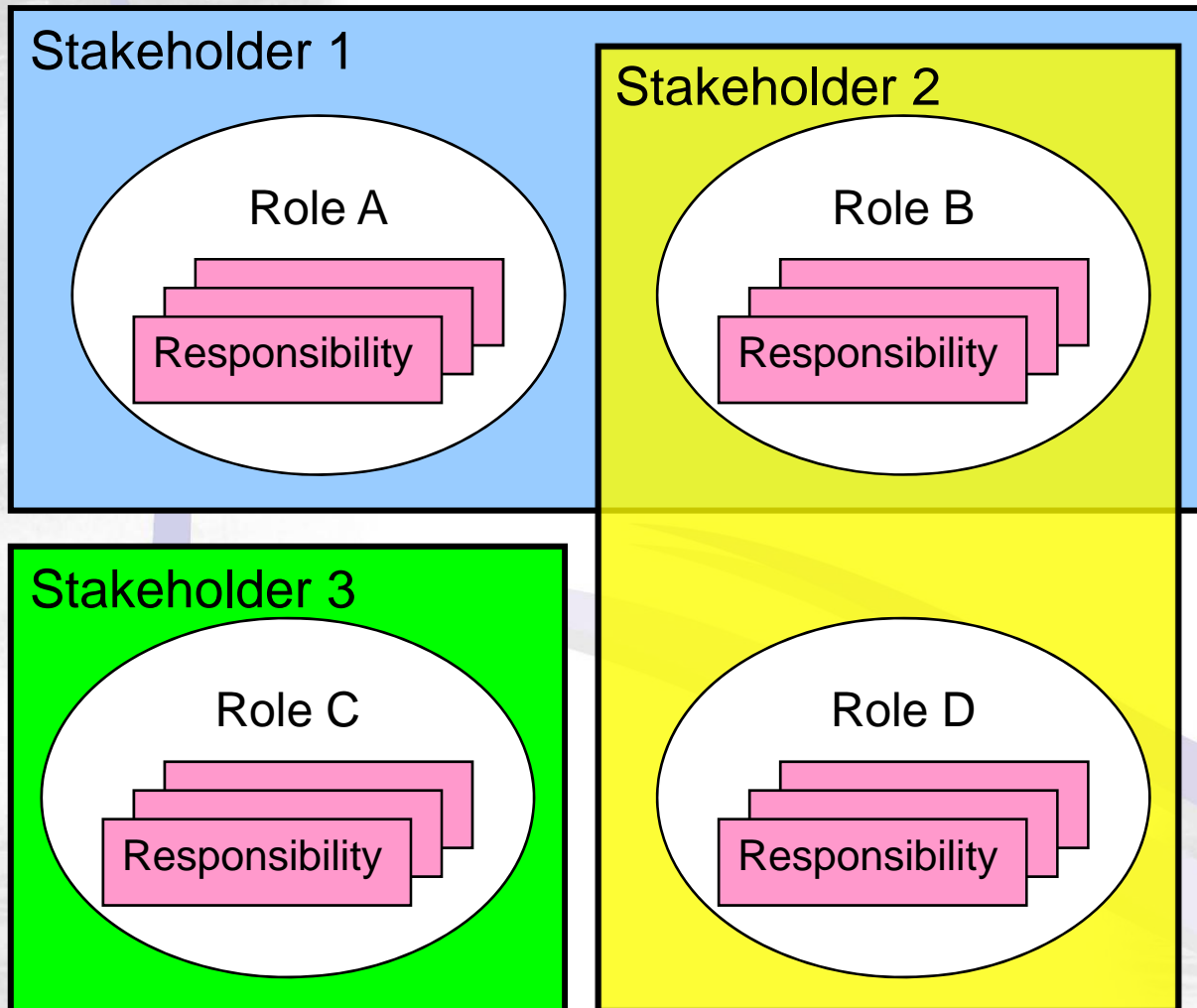# The architecture must be independent of local ways of doing things

- Different regions and organisations have different solutions
- Some core responsibilities will always be present
- Support local differences through focusing on these responsibilities

Responsibility centric architecture
A role represents unique sets of responsibilities

Roles

Stakeholder 1

Stakeholder 2

Role A

Responsibility

Role B

Responsibility

Stakeholder 3

Role C
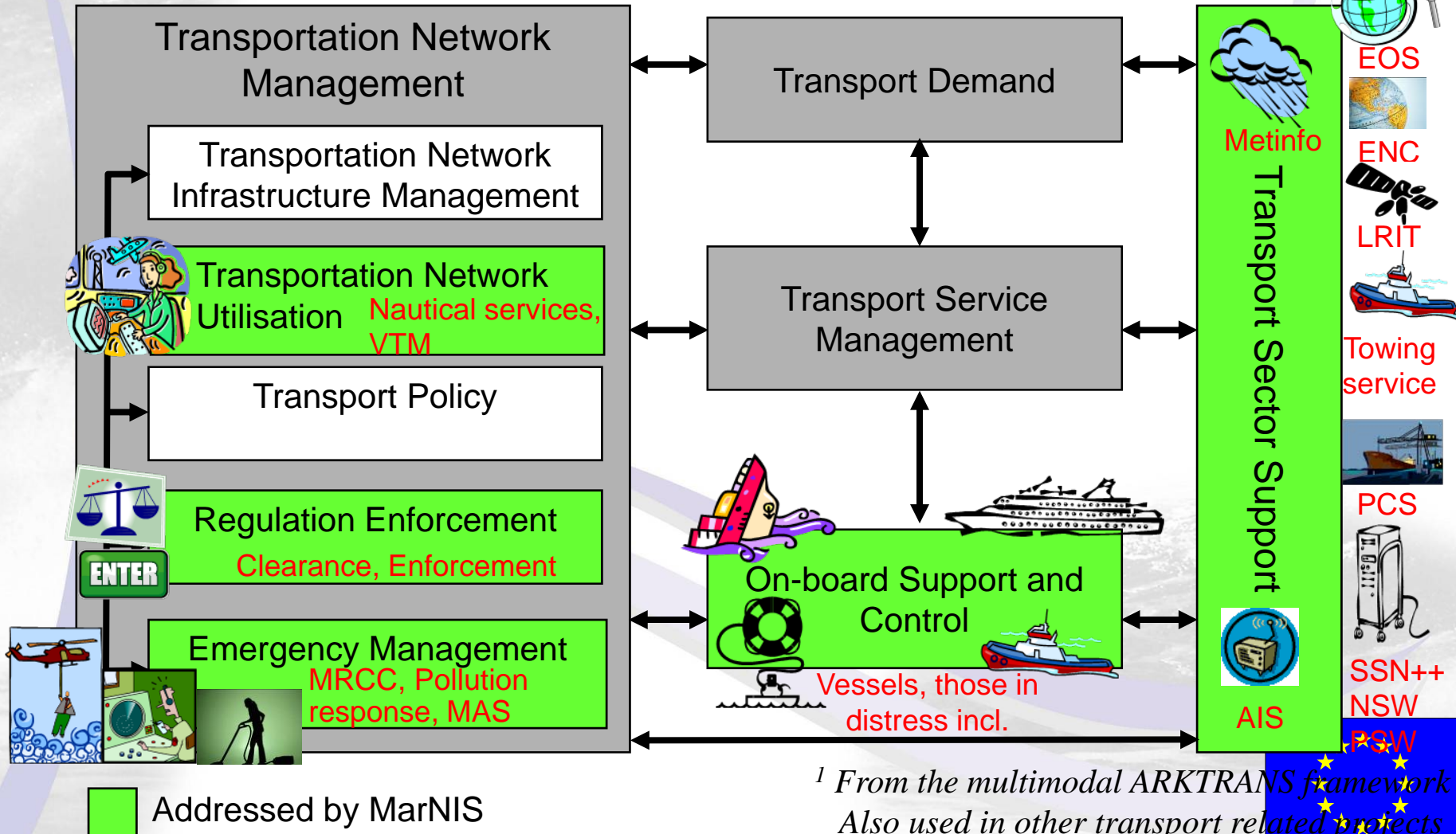
Responsibility

Role D

Responsibility

- The architecture uses roles instead of stakeholders
- Represent unique sets of responsibilities
- Independent of organisation and local or regional ways of doing things
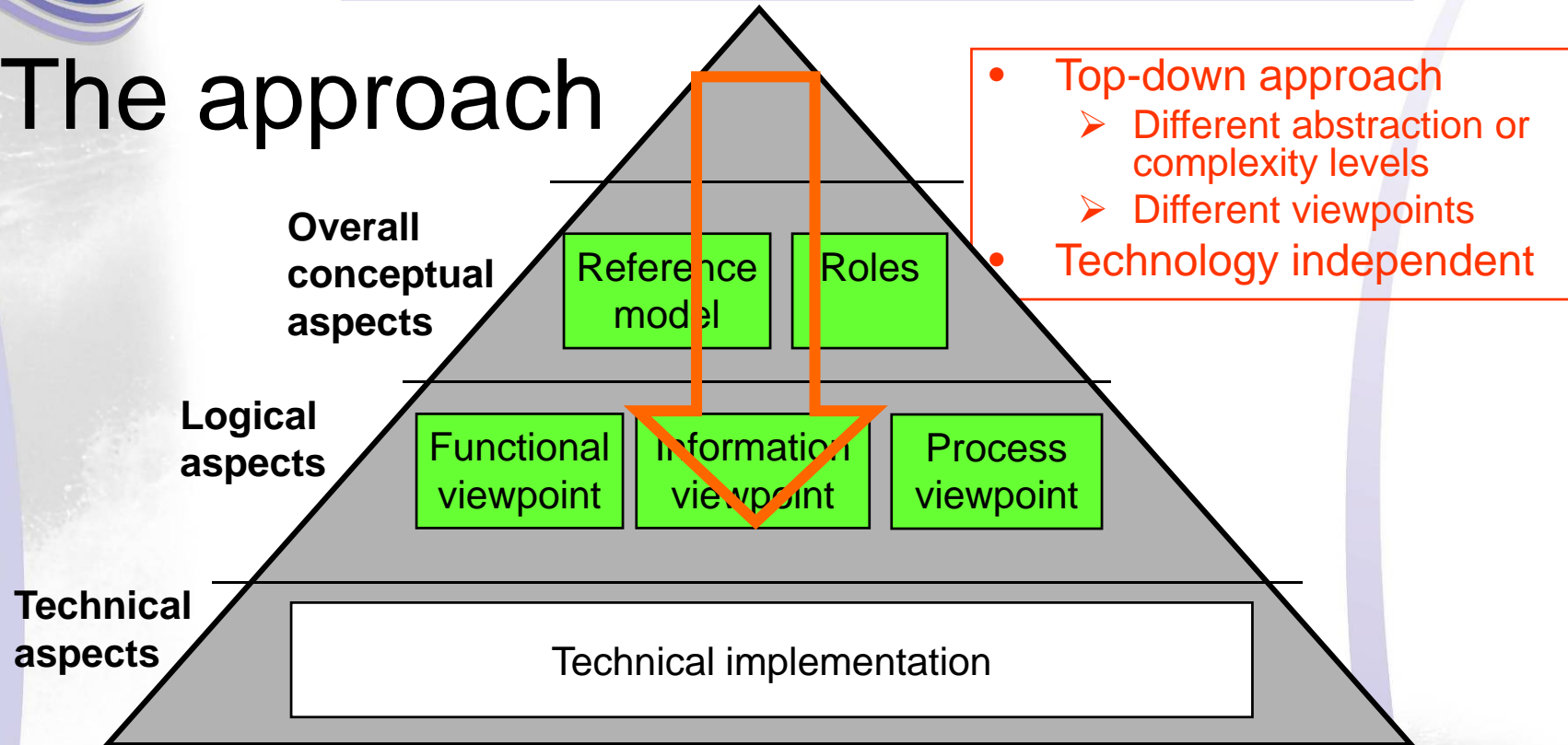- Support Pan-European solutions

Reference Model[1]

Facilitates synergies between projects, activities and transport modes.
Shows how MarNIS fits into a wider context (e.g. co-modal transport chains)

Transportation Network Management

- Transportation Network Infrastructure Management
- Transportation Network Utilisation — *Nautical services, VTM*
- Transport Policy
- Regulation Enforcement — *Clearance, Enforcement*
- Emergency Management — *MRCC, Pollution response, MAS*

Transport Demand

Transport Service Management

On-board Support and Control

Vessels, those in distress incl.

Transport Sector Support

- Metinfo
- AIS

EOS
ENC
LRIT
Towing service
PCS
SSN++
NSW
PSW

▇ Addressed by MarNIS

[1] *From the multimodal ARKTRANS framework*
Also used in other transport related projects

Maritime Navigatio

The approach

Overall conceptual aspects

Reference model

Roles

Logical aspects

Functional viewpoint

Information viewpoint

Process viewpoint

Technical aspects

Technical implementation

- Top-down approach
  - Different abstraction or complexity levels
  - Different viewpoints
- Technology independent
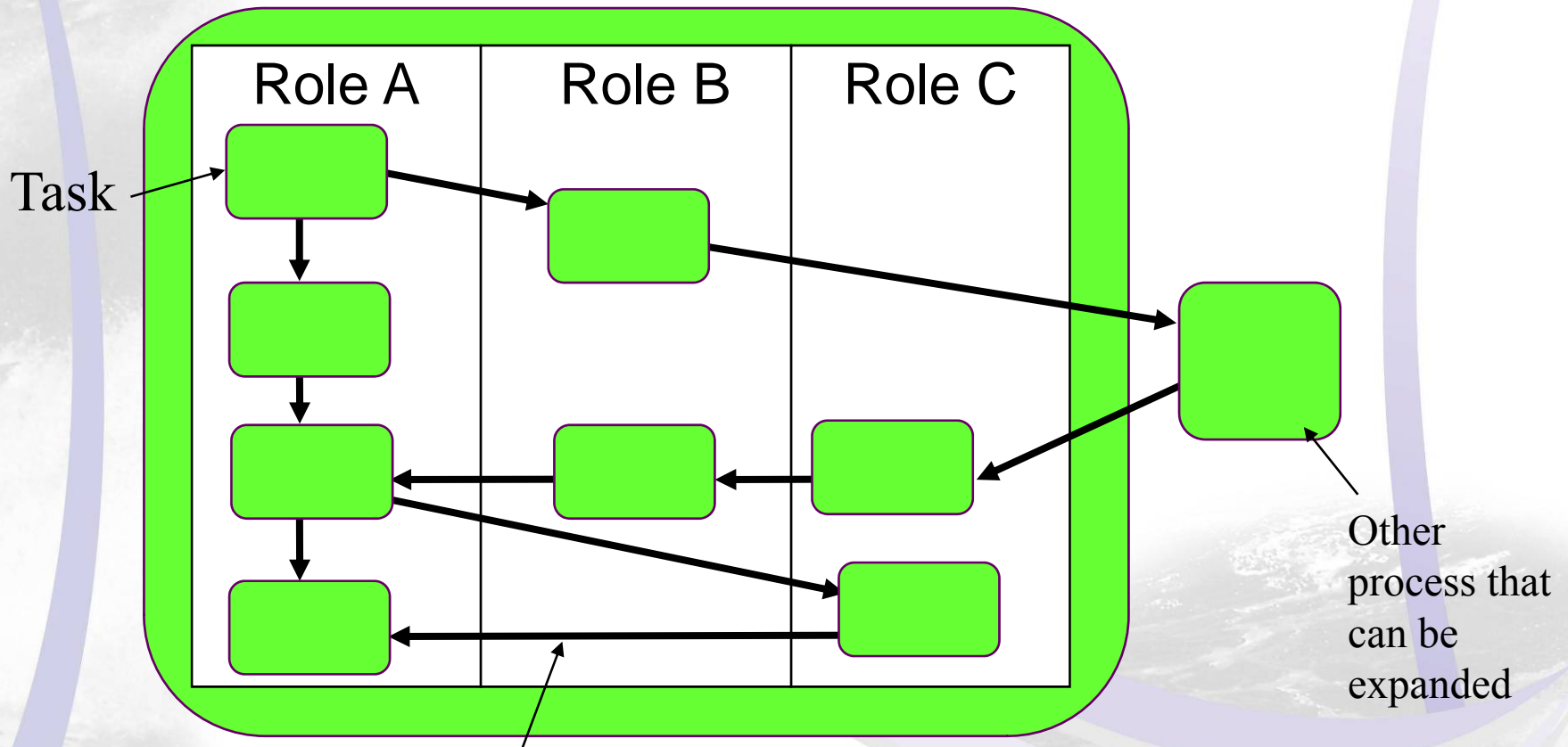
- For each responsibility domain of the Reference Model
  - Roles with responsibilities (one role belongs to just one domain)
- For each Role
  - Tasks that contributes to the fulfilment of the responsibilities
- Processes define how to fulfil responsibilities
  - How tasks are interact/collaborate (information exchange)
- Information elements

Processes

Defined by means of activity diagrams in swim lanes

Role A | Role B | Role C

Task

Other process that can be expanded

Information exchange between tasks and roles

Maritime Navigation and Information Services

Information elements for information exchange with authorities (1:2)

Port Entry/Departure Notifications (PEN/PDN)

Port Entry/Departure Profiles (PEP/PDP)

Cargo o/v
- + CrewEffectItem
- + DGInfo
- + DutiableCrewEffects
- + GeneralDescriptionOfCargo
- + GerenralDescriptionOfDG
- + NumberOfPersonsOnBoard
- + Stores
- + StoresItem

Clearance Status
- + ClearanceStatus
- + ClearanceStatusType

Class and Certificates
- + ISMCertificate
- + ISSCertificateStatus
- + SaftetyManagmentCertificate
- + Certificate
- + CertificateCodeType
- + ClassAndCertificates
- + DeclarationOfHealthInfo
- + FlagRegistration
- + GasFreeCertificate
- + RegistrationCertificate
- + ShipClass

Crew Data
- + CrewOverview
- + CrewData
- + CrewMemberData
- + OnBoardDutyCodeType
- + OnBoardDutyCodeType_EPC2
- + OnBoardDutyType
- + ShortCrewMemberData

Core Data
- + ReportPosition
- + ReportPositionFix
- + ReportTime
- + Amount
- + CargoLocation
- + CertificateStatusType
- + ContainerLocation
- + ContectInfo
- + CoordinateType
- + CountryCode
- + FeederLocation
- + GenderType
- + IdDocumentType
- + Location
- + NameType
- + OtherLocation
- + Party
- + PersonIdDocumentType
- + Port
- + QuantityType
- + QuantityUnitType
- + ROROlocation
- + TankerLocation
- + ebXML Core Components

Dangerous Cargo Data
- + EmergencyDescription
- + DGSafetyDataSheet
- + PackingGroupType
- + PollutionCodeType
- + UNClassType
- + UNNumberType

General Cargo Data
- + ContainsDangerousGoods
- + BulkCargoHandling
- + CargoData
- + CargoItem
- + CargoItemOrigin
- + CargoStatisticsData
- + CargoType
- + GoodsType
- + LocationCodeType
- + NonCargoType
- + OnBoardLocationType
- + SpecialCargoDetails
- + TransportUnitInfo

Passenger Data
- + AssistanceRequests
- + ExtendedPassengerMemberData
- + PassengerData
- + SimplifiedPassengerMemberData

Security
- + CurrentShipSecurityLevel
- + ISPSAble
- + ISSCInformation
- + OtherSecurityInformation
- + SecurityInfoShipToShip
- + SecurityLevelInPort
- + SecurityLevelsInPreviousPorts
- + ShipToShipActivity

class Data Elements

Services
- + Bunkers
- + GeneralServiceRequest
- + Pilots
- + Service
- + Tug

Ship Contacts
- + AgentContactInPort
- + Charterer
- + Company
- + CompanySecurityOfficer
- + InmarsatCallNumber
- + NameOfMaster
- + PaymentsContacts
- + ShipContacts
- + ShipOwner

Ship ID
- + CallSign
- + FlagState
- + Id
- + IMONumber
- + MMSINumber
- + ShipID
- + ShipName
- + ShipRegistration

Ship Particulars
- + INFShipClass
- + ShipType
- + AccommodationLadderLocation
- + AdditionalDetailsForShipHandling
- + Beam
- + CargoAreaLength
- + CargoGearDescription
- + DeadWeight
- + DepartureDraught
- + DoubleBottom
- + DoubleBottomType
- + GrossTonnage
- + IceClass
- + IceClassId
- + IceClassType
- + IceClassTypeBaltic
- + IceClassTypeIACS
- + INFShipClassType
- + LengthOverall
- + MooringLinesDescription
- + NetTonnage
- + OperationalConditionOfEquipment
- + ShipParticulars
- + ShipTypeType
- + SummerDraught

Vessel Operation Data
- + IncidentOrAccidentDischarge
- + IncidentOrAccidentServerity
- + AirDraught
- + ArrivalDraught
- + DistanceShipSideToHatch
- + DistanceWaterLineToFirstHatch
- + FuelType
- + IncidentOrAccidentDischargeType
- + IncidentOrAccidentSeverityType
- + IncidentOrAccidentType
- + LastExpandedPSCInspectionDate
- + PlannedOperations
- + PurposeOfCallType
- + RemainingOnBoardBunkers
- + TankCondition
- + TankConditionInformation
- + TankStatusType

Voyage Data
- + ATA
- + ATD
- + ATP
- + CurrentPort
- + ETA
- + ETD
- + ETP
- + PositionType
- + PreviousVoyageNumber
- + VoyageNumber
- + ArrivalBerth
- + Berth
- + CommercialVoyageIdentification
- + ConsecutivePortCallList
- + DepartureBerth
- + LastPortOfCall
- + NextPortCall
- + PeriodOfStay
- + PortOfArrival
- + PortOfDeparture
- + PortOfDestination
- + PortOfOrigin
- + Position
- + PreviousPortCallList
- + TimeEstOrAct
- + VoyageData
- + VoyageType

Waste
- + Waste
- + WasteDeliveryIndicator
- + WasteInformation
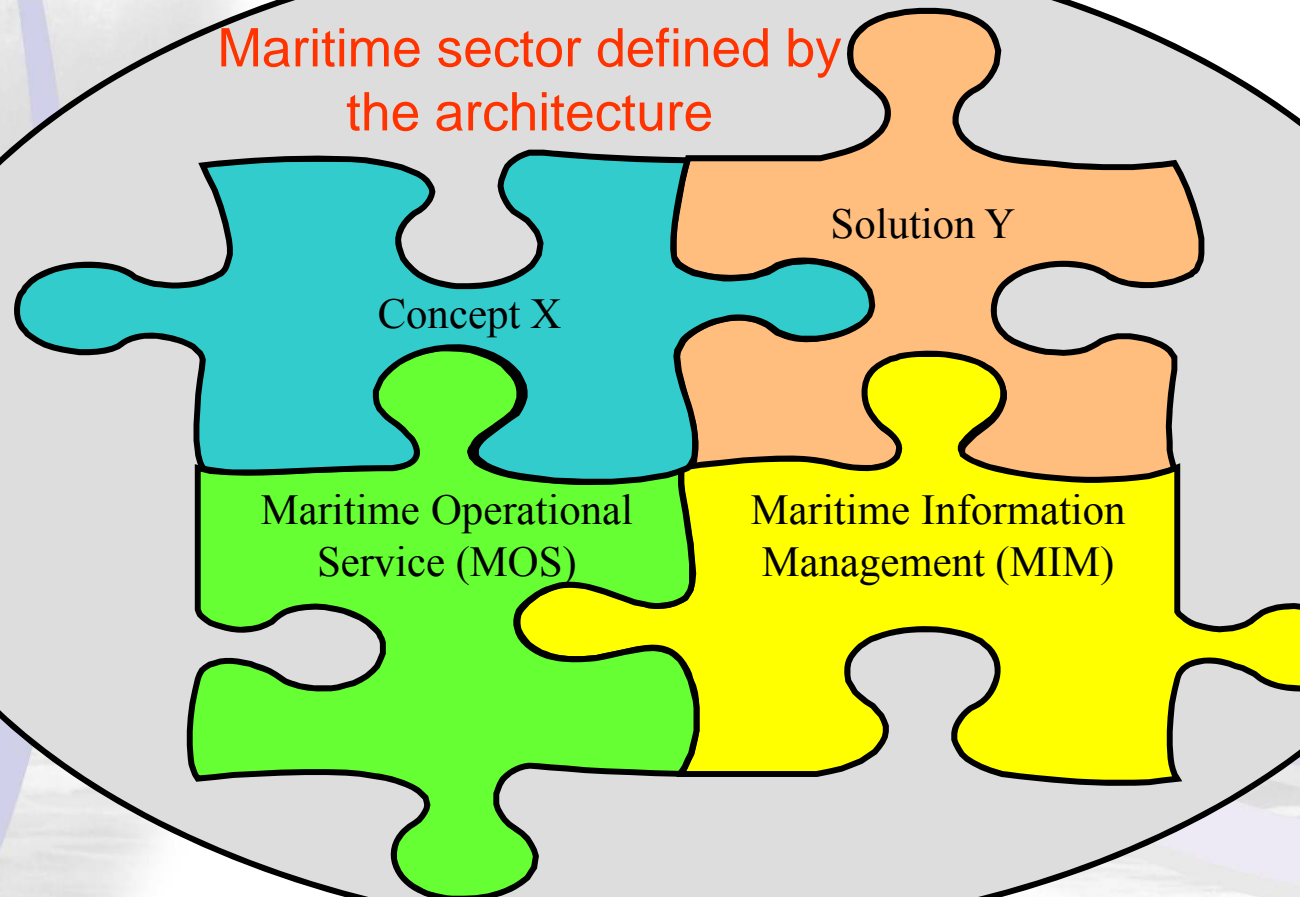- + WasteList
- + WasteType

Information elements for information exchange with authorities (2:2)

Further discussed and refined in the ISO TC 8 standardisation committee (ISO 28005 on Electronic Port Clearance)

Concepts defined by means of the architecture

Maritime sector defined by the architecture

Solution Y

Concept X

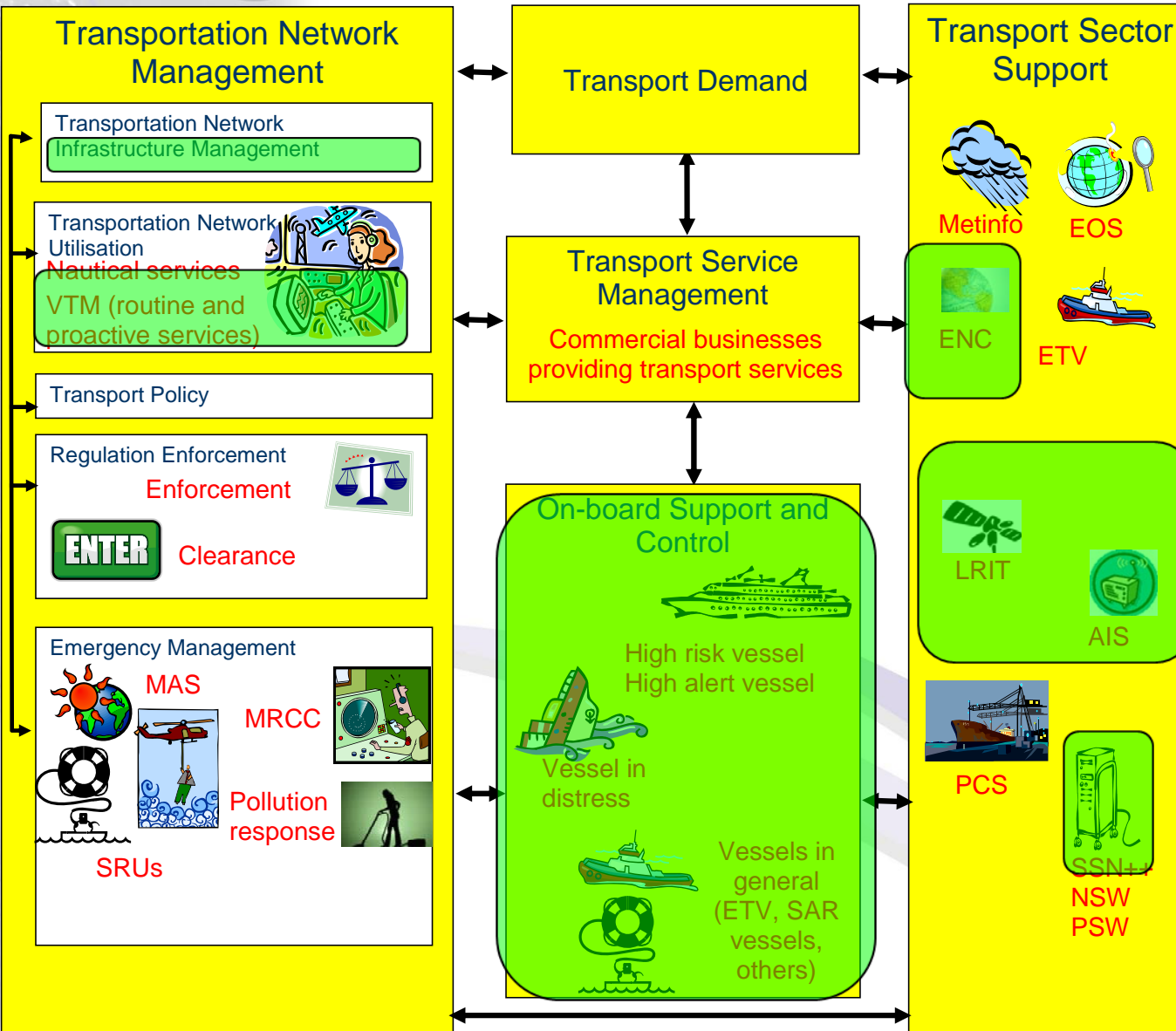Maritime Operational Service (MOS)

Maritime Information Management (MIM)

- The concepts fit with other concepts and solution
- They are a part of a total picture
- They are well defined

The MOS (Maritime Operational Service) concept

- Define the roles involved for each relevant area
- Define the tasks involved for each role
- Define the related processes (with interactions)

MARNIS
Maritime Navigation and Information Services

Transportation Network Management

Transportation Network
Infrastructure Management

Transportation Network Utilisation
Nautical services
VTM (routine and proactive services)

Transport Policy

Regulation Enforcement
Enforcement
ENTER Clearance

Emergency Management
MAS
MRCC
Pollution response
SRUs

Transport Demand

Transport Service Management
Commercial businesses providing transport services

On-board Support and Control
High risk vessel
High alert vessel
Vessel in distress
Vessels in general (ETV, SAR vessels, others)

Transport Sector Support
Metinfo   EOS
ENC   ETV
LRIT
AIS
PCS
SSN++
NSW
PSW

The architecture can support the definition of eNavigation

- Will arrange for consistency and clarity
- Wills support discussions and decisions
- (Should be defined in a functional and logical way - Not by referring to technologies or hardware)

Just an example
Probably not correct

Conclusion

- The MarNIS architecture puts the MarNIS solutions into a context
- Provides formal definitions and specifications that
  - Are independent of organisation and local or regional ways of doing things
  - Support accurate definitions and common understanding
  - Support implementation of interoperable solutions in different countries and regions
- The architecture can be used as a tool for discussions and specifications when new concepts and solutions are to be defined