Standardization of a functional & interactive protocol

Working group AIRBUS/THALES/HONEYWELL

January 2022
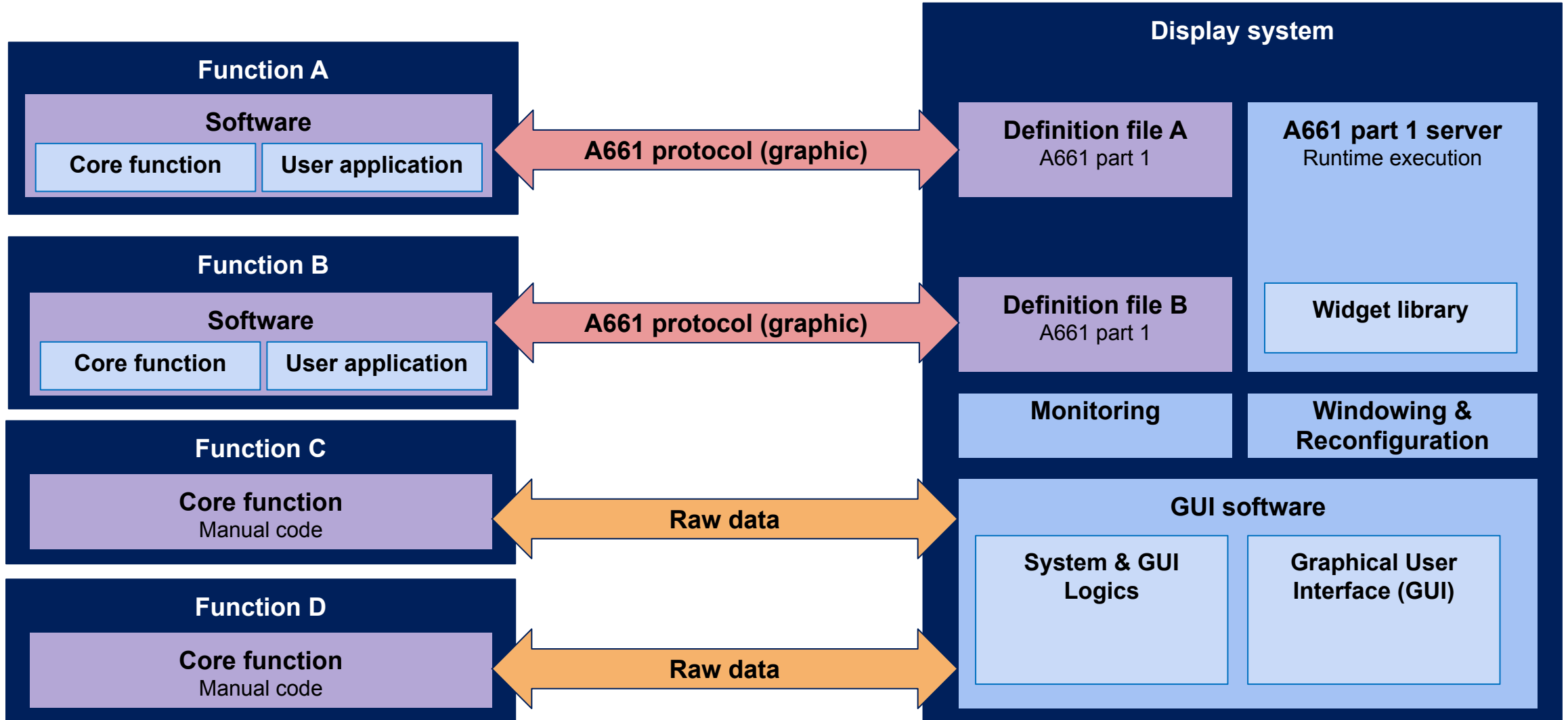
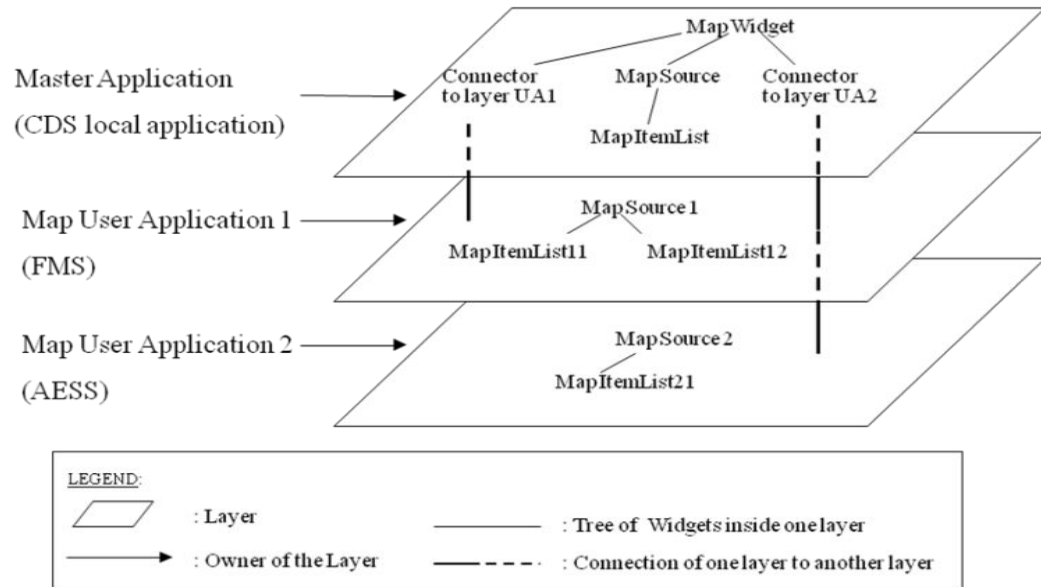# HMI architecture pattern : state of the art
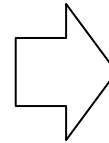
Function scope

Display scope

Function A

Software

Core function | User application

A661 protocol (graphic)

Function B

Software

Core function | User application

A661 protocol (graphic)

Function C

Core function
Manual code

Raw data

Function D

Core function
Manual code

Raw data

Display system

Definition file A
A661 part 1

A661 part 1 server
Runtime execution

Definition file B
A661 part 1

Widget library

Monitoring

Windowing & Reconfiguration

GUI software

System & GUI Logics

Graphical User Interface (GUI)

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# HMI architecture pattern : limitations


ARINC 661 layers

Single view

Main assumption : future HMI cannot be managed with multiple ARINC 661 layers and remote User Applications as tin the current architecture pattern

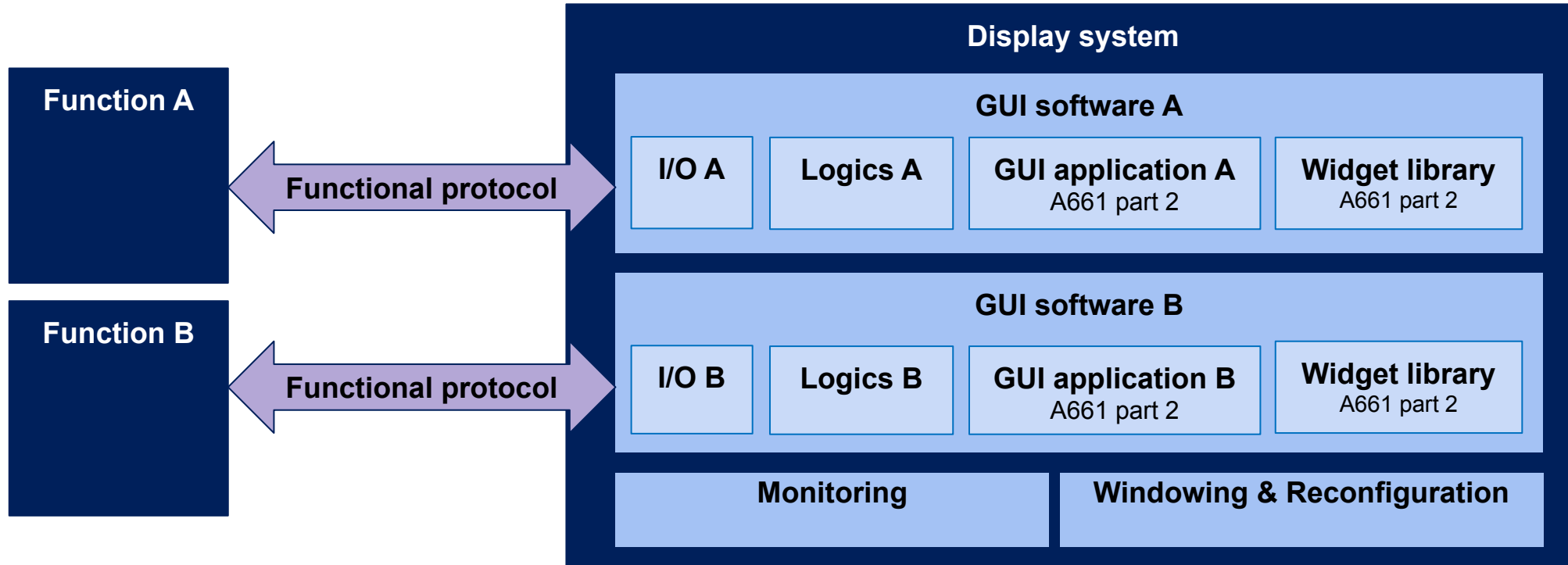# Expected benefits for a functional & interactive protocol

- **Increase decoupling between HMI and Functions**
  - Use common function with different cockpit concept
  - Allow independent evolution of HMI and functions
  - Limit bandwidth between HMI and functions (useful for ground assistance)
- **Reduce system costs (RC/NRC) and development time**
  - Re-use standard interfaces
  - Ensure interoperability between suppliers
  - Enable product policy
- **Provide secured interfaces with « Open world applications »**
  - Semantic checking for data security
- **Rationalize number of protocols in the aircraft**
- **Foster datacentric approach of communication**

MCDU

MFD interactive page

Future HMI

Decoupling

Functional interface

FMS

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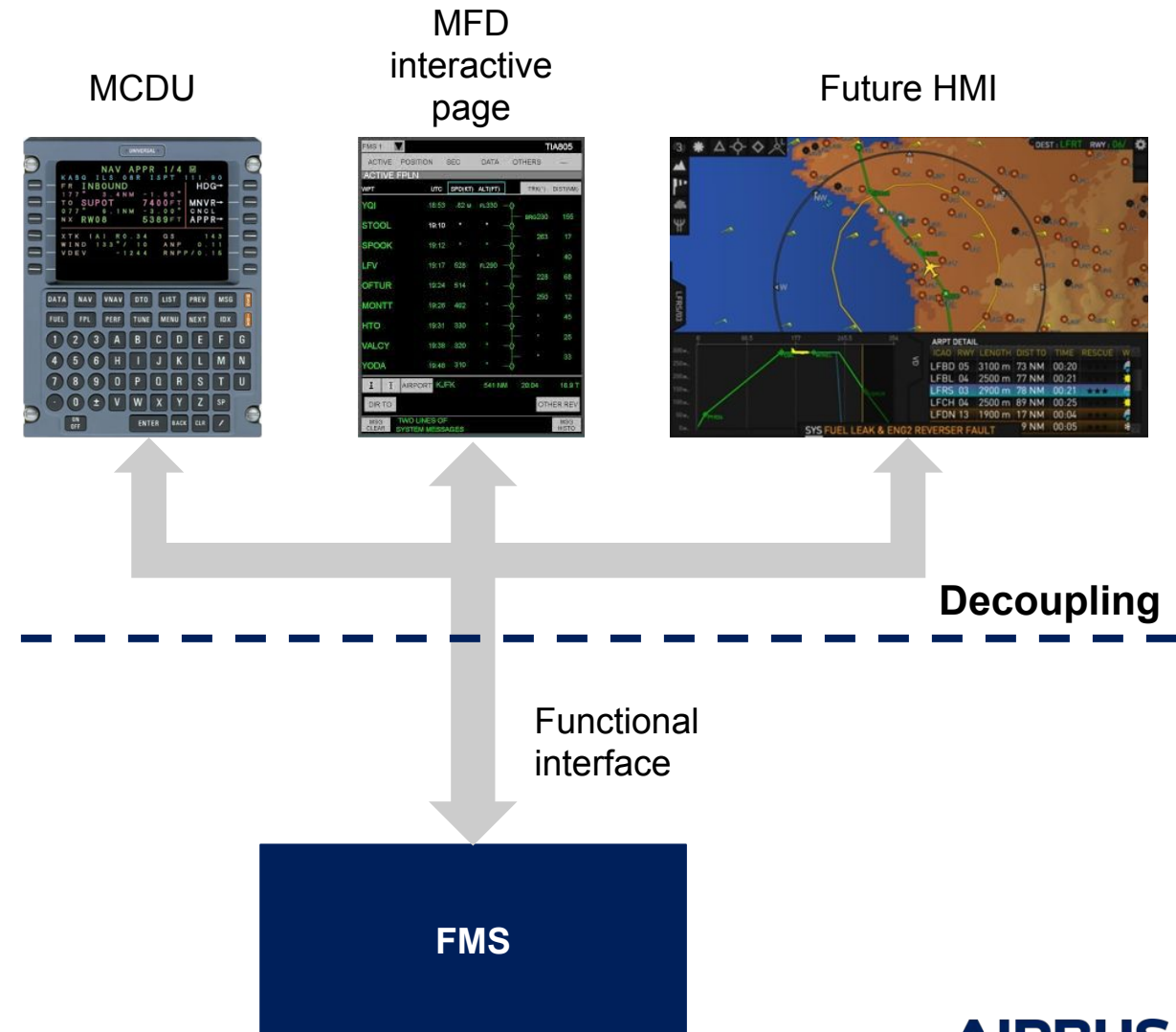
Solution A : functional protocol and ARINC 661 part 1 & 2

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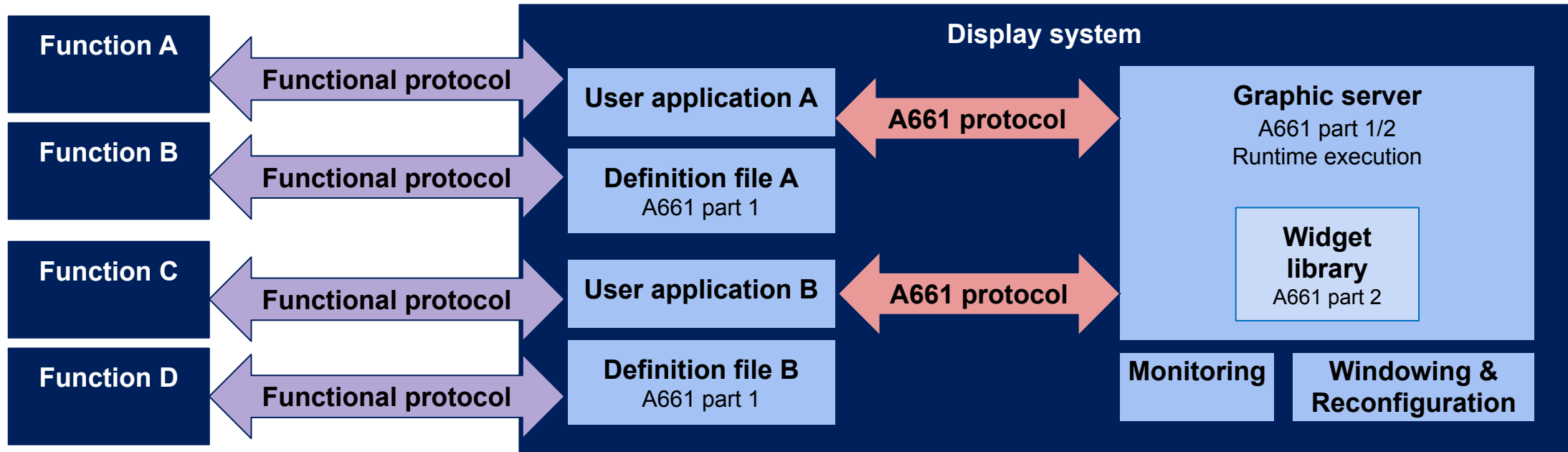
Solution B : functional protocol and ARINC 661 part 2 only

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Standard breakdown

Could be standardized by existing ARINC working groups

Function data model
Definition of messages, commands and data dictionnary for a given function

Interface Model FMS	Interface Model FWS	Interface Model Displays	Interface Model Wxr Radar	Interface Model Comms
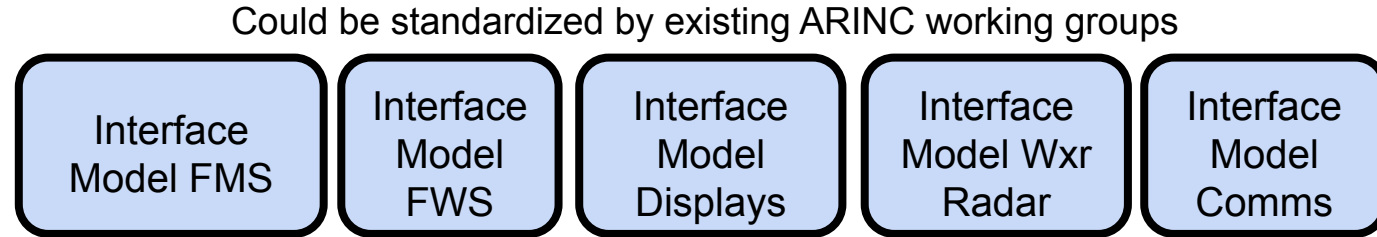
Core standardization working group

Exchange patterns
Communication patterns, connection process, protocol message formatting

Publish
For permanent periodical publications to several clients

Subscribe
For temporary subscription to publication

Request/Reply
To retrieve data or activate a function

Serialization solution

Interface Definition language
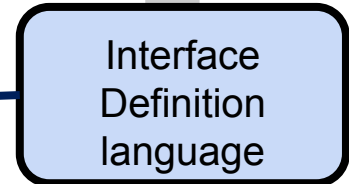
Packing
Packing and Unpacking management, packet transactions, securisation (CRC, acknowledge, retry) at packet level)

Profiled TFTP for AFDX
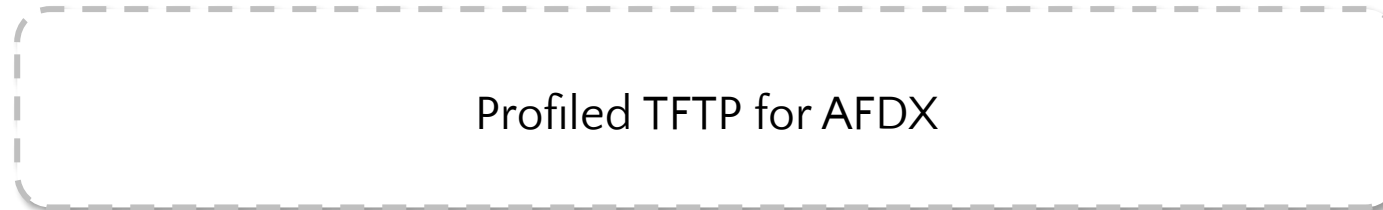
Transport
Network management (routing), transport level, error handling at Transport level

e.g. AFDX, UDP, TCP, RAM, ...

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