

Living with Flight Dynamics : Proposals and Possible Pitfalls for Harmonising Flight Dynamics Systems with EGOS

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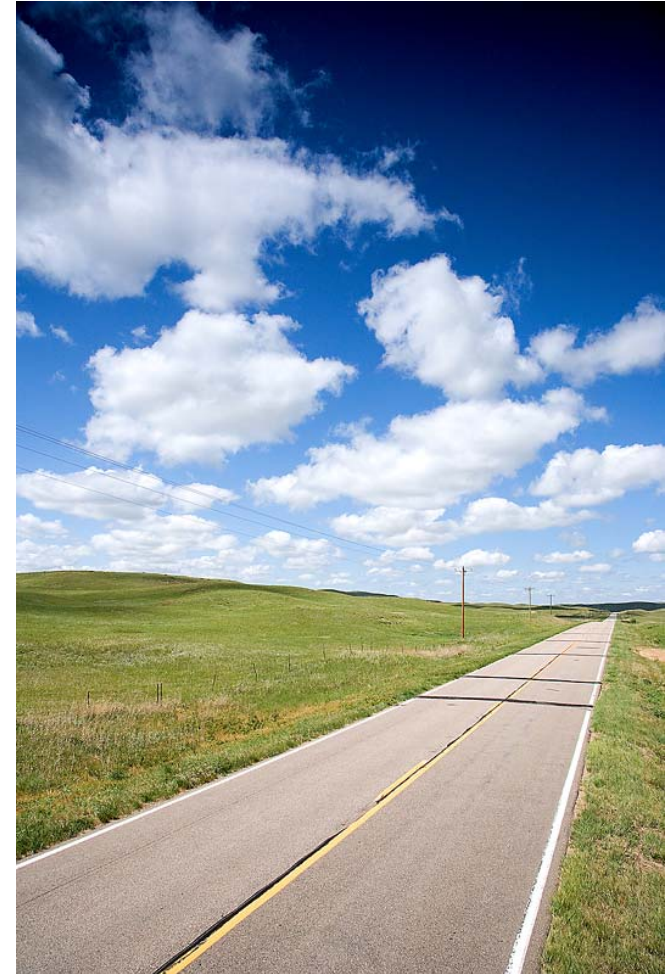
A case for harmonisation

- Minimise maintenance by maximising re-use.
- Increased productivity = more time to deal with evolving Flight Dynamics user requirements.



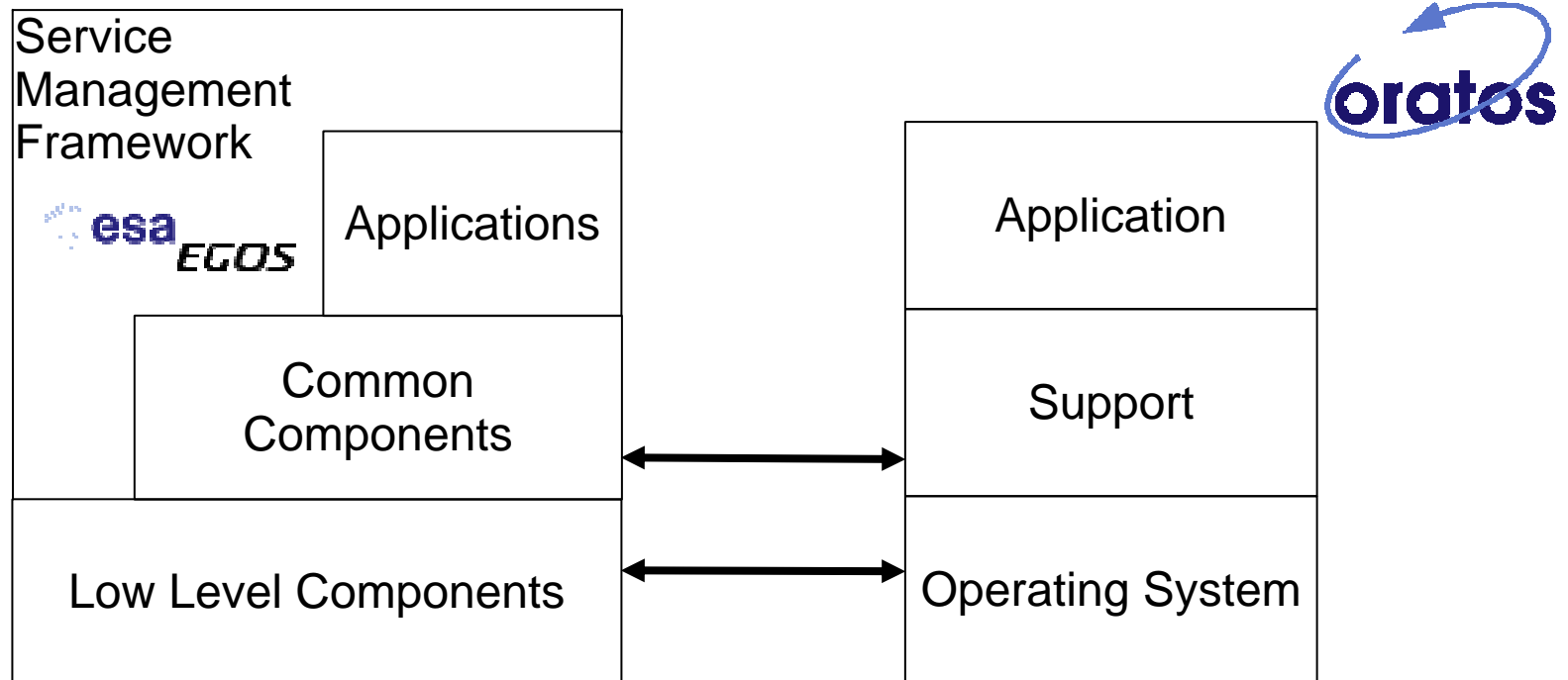
Agenda

- 4 proposals for harmonisation
 - Telemetry Monitoring Software
 - Low Level/Common Components
 - Open Source/COTS usage
 - Generic Software Requirements
- For each proposal
 - The case for harmonisation
 - The possible pitfalls



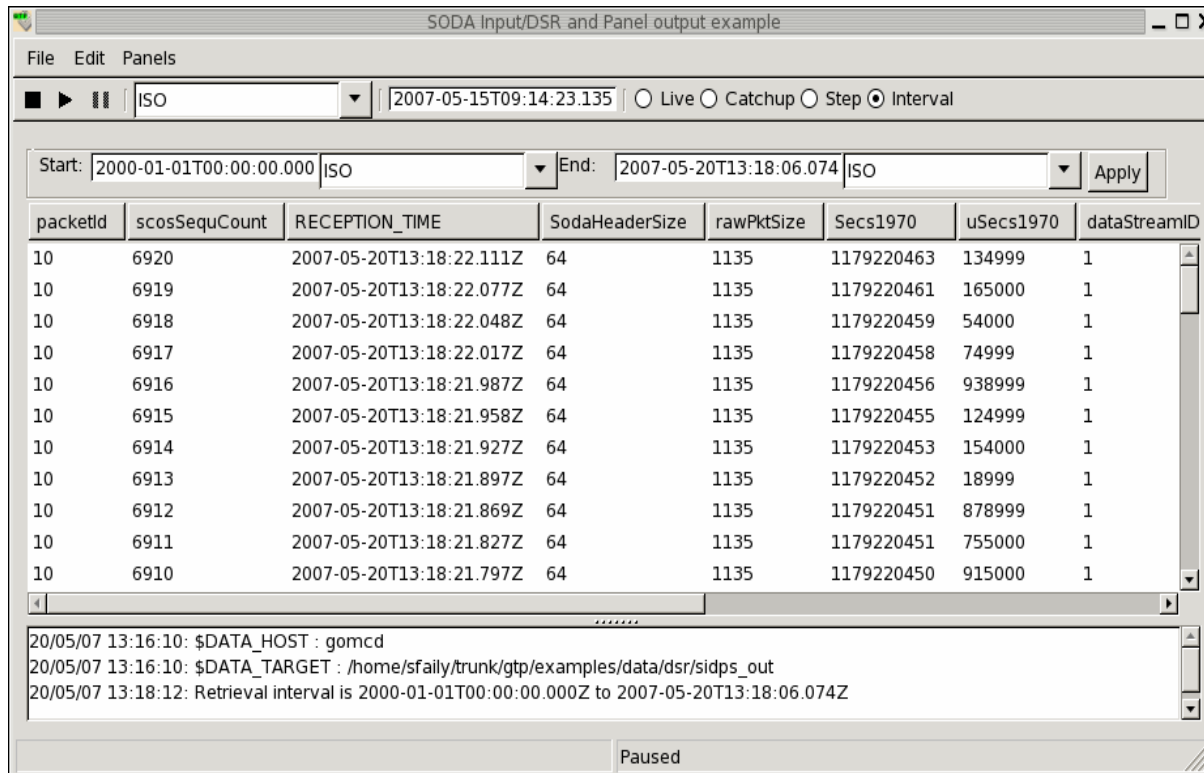
EGOS and ORATOS

- SCOS-2000/ORATOS commonality study indicated commonalities do exist.
- Both architectures have evolved since study, but commonalities should still hold.



Telemetry Software Harmonisation : Proposal

- Analogies between EGOS (Telemetry Monitoring Desktop) and ORATOS (Generic Telemetry Processor)



| packetId | scosSequCount | RECEPTION_TIME | SodaHeaderSize | rawPktSize | Secs1970 | uSecs1970 | dataStreamID |
|----------|---------------|--------------------------|----------------|------------|------------|-----------|--------------|
| 10 | 6920 | 2007-05-20T13:18:22.111Z | 64 | 1135 | 1179220463 | 134999 | 1 |
| 10 | 6919 | 2007-05-20T13:18:22.077Z | 64 | 1135 | 1179220461 | 165000 | 1 |
| 10 | 6918 | 2007-05-20T13:18:22.048Z | 64 | 1135 | 1179220459 | 54000 | 1 |
| 10 | 6917 | 2007-05-20T13:18:22.017Z | 64 | 1135 | 1179220458 | 74999 | 1 |
| 10 | 6916 | 2007-05-20T13:18:21.987Z | 64 | 1135 | 1179220456 | 938999 | 1 |
| 10 | 6915 | 2007-05-20T13:18:21.958Z | 64 | 1135 | 1179220455 | 124999 | 1 |
| 10 | 6914 | 2007-05-20T13:18:21.927Z | 64 | 1135 | 1179220453 | 154000 | 1 |
| 10 | 6913 | 2007-05-20T13:18:21.897Z | 64 | 1135 | 1179220452 | 18999 | 1 |
| 10 | 6912 | 2007-05-20T13:18:21.869Z | 64 | 1135 | 1179220451 | 878999 | 1 |
| 10 | 6911 | 2007-05-20T13:18:21.827Z | 64 | 1135 | 1179220451 | 755000 | 1 |
| 10 | 6910 | 2007-05-20T13:18:21.797Z | 64 | 1135 | 1179220450 | 915000 | 1 |

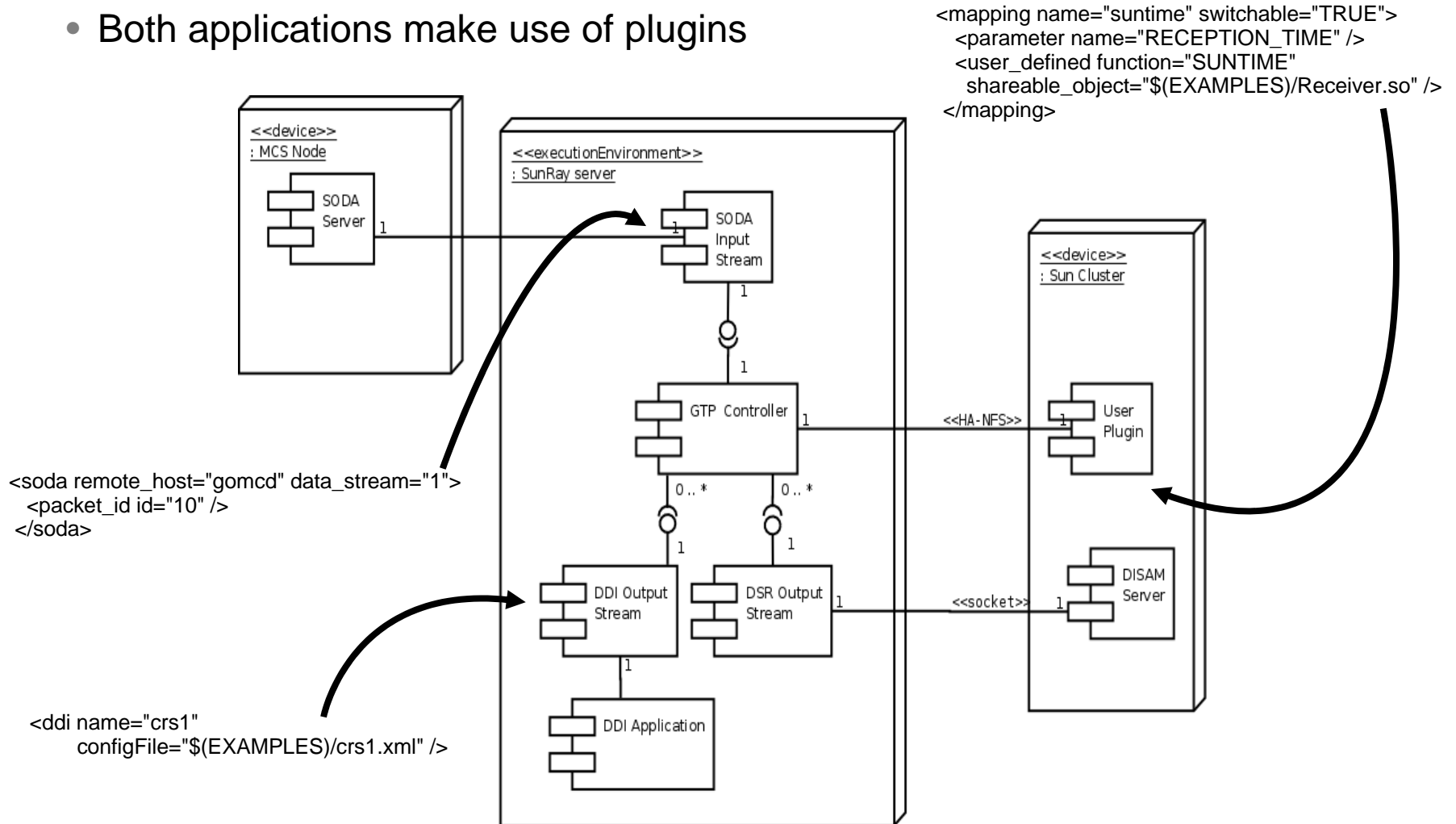
```

20/05/07 13:16:10: $DATA_HOST : gomcd
20/05/07 13:16:10: $DATA_TARGET : /home/sfaily/trunk/gtp/examples/data/dsr/sidps_out
20/05/07 13:18:12: Retrieval interval is 2000-01-01T00:00:00.000Z to 2007-05-20T13:18:06.074Z
    
```

Paused

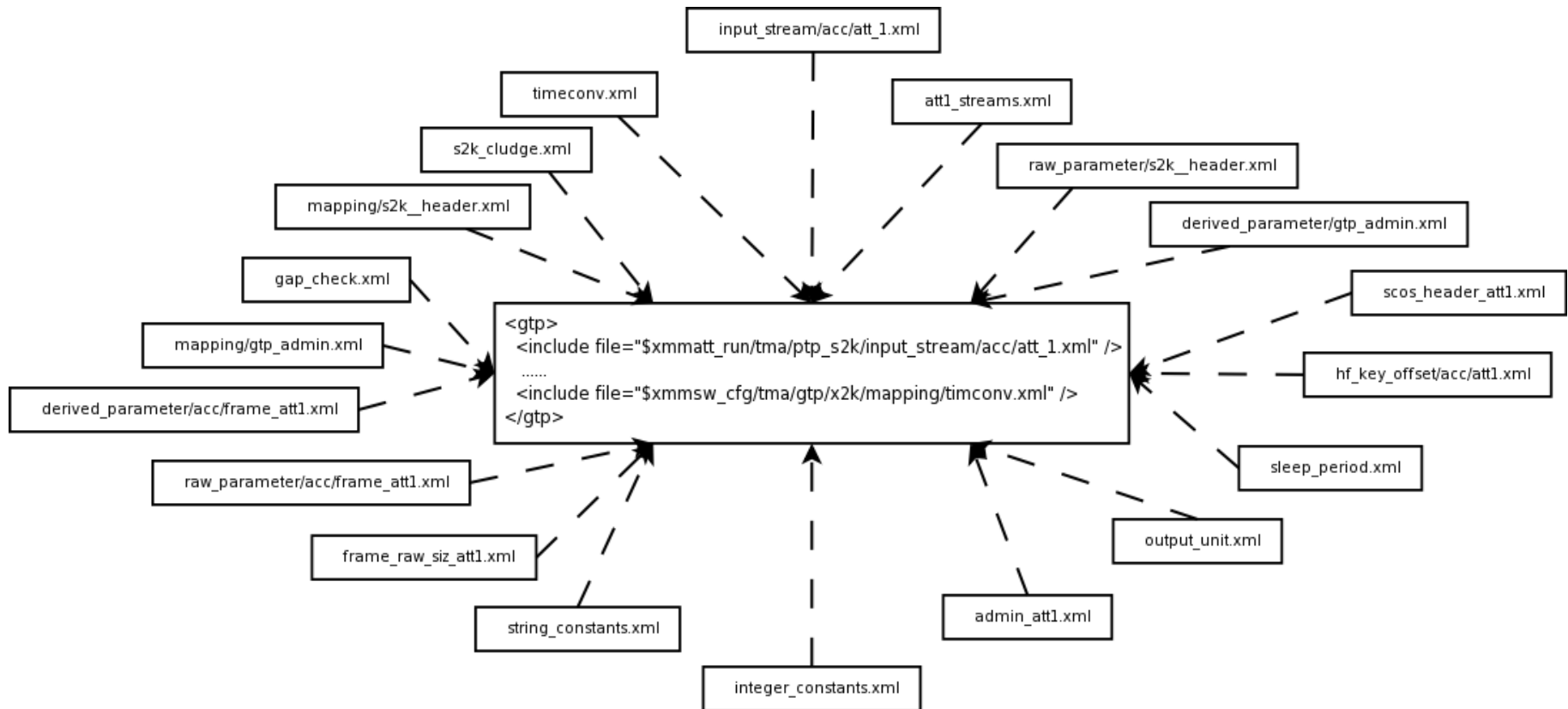
Telemetry Software Harmonisation : Proposal

- Both applications make use of plugins



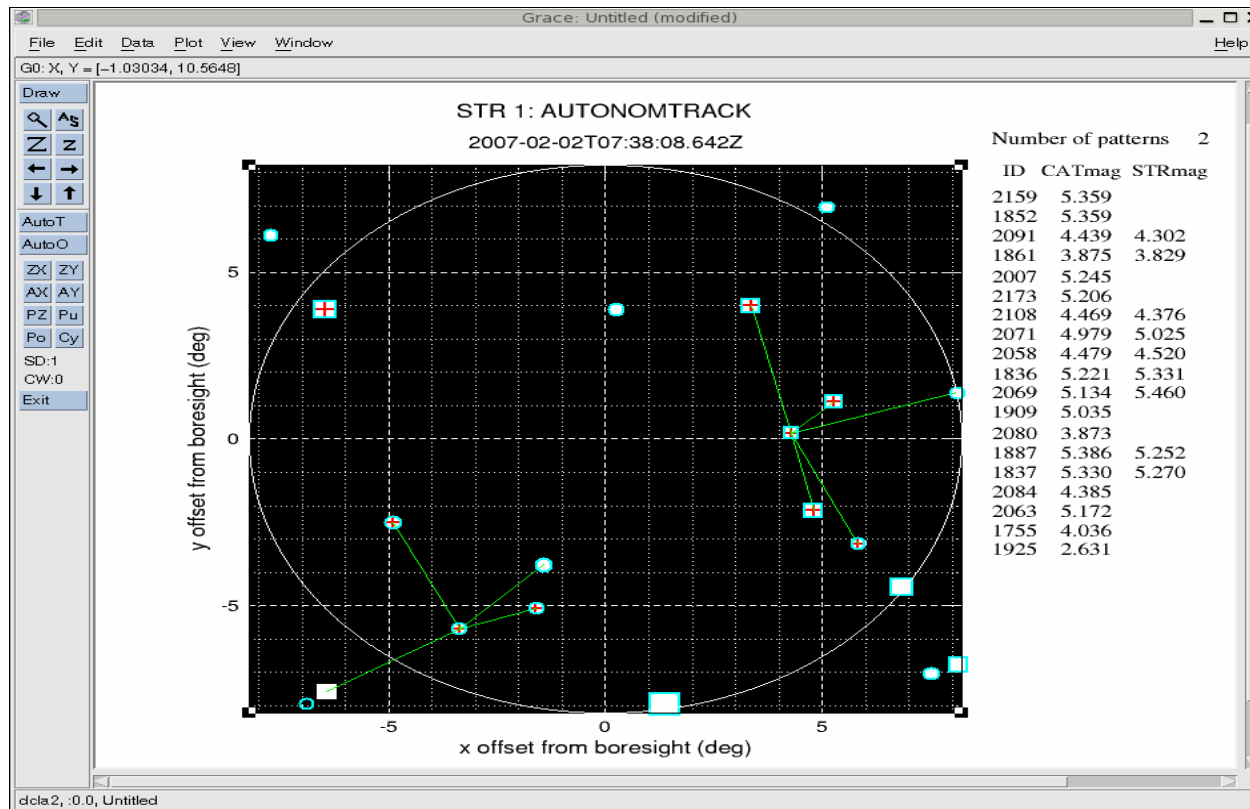
Telemetry Software Harmonisation : Proposal

- GTP Mission specific configuration can be non-trivial.



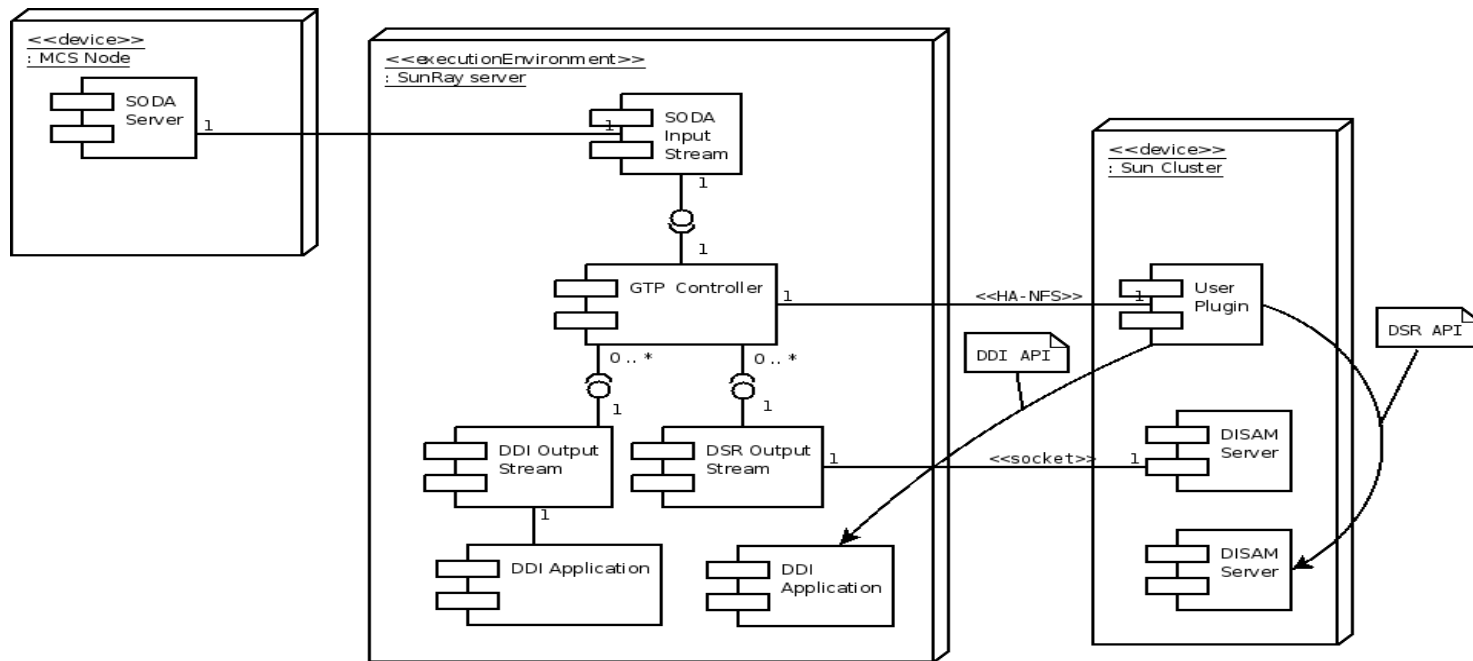
Telemetry Software Harmonisation : Proposal

- GTP Parameter visualisation uses “best-of-breed” open source.



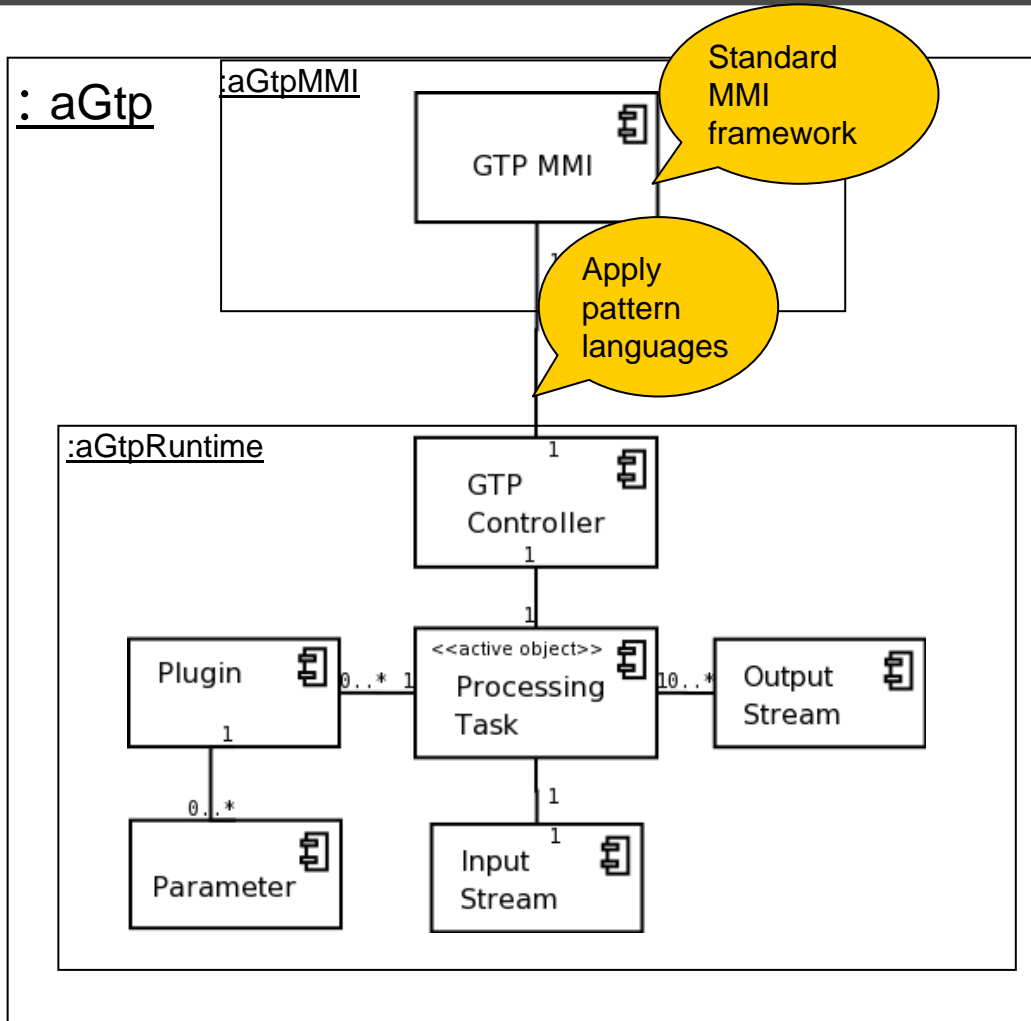
Telemetry Software Harmonisation : Possible Pitfalls

- Supporting End-User Development (EUD) is important!



- EUD experiences lead to new ORATOS requirements.

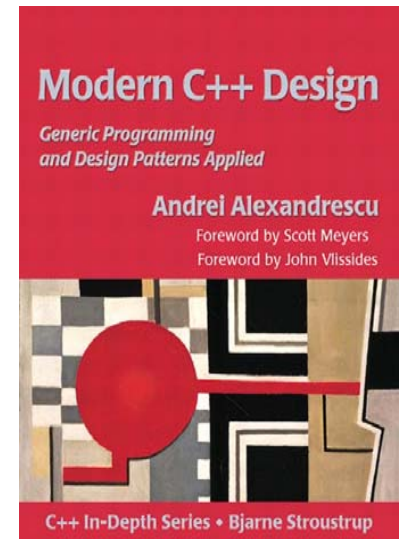
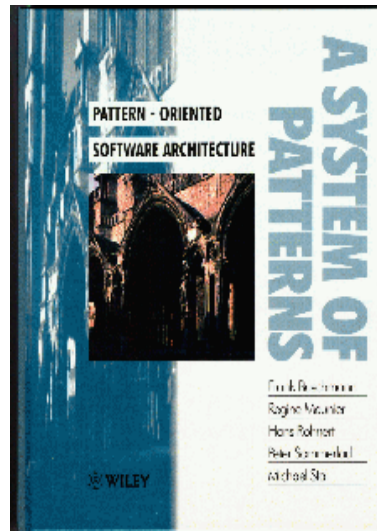
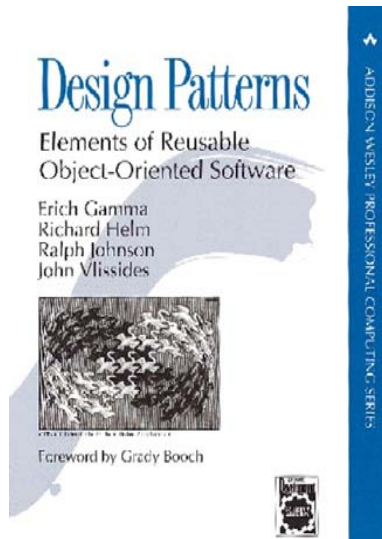
Telemetry Software Harmonisation : Possible Pitfalls



- What is the QoS impact of selections?
- What is the maintainability impact of selection given extra artificial complexity?
- Does it meet our operational requirements?
- Misunderstanding implicit assumptions can lead to unsustainable architectural mismatch.
- ..which may be unnecessary.

Low-Level / Common Components Harmonisation : Proposal

- Similarity between low-level and common component use and design principles.



- Components developed for Flight Dynamics may be re-usable in other Algorithmic/Scientific applications.

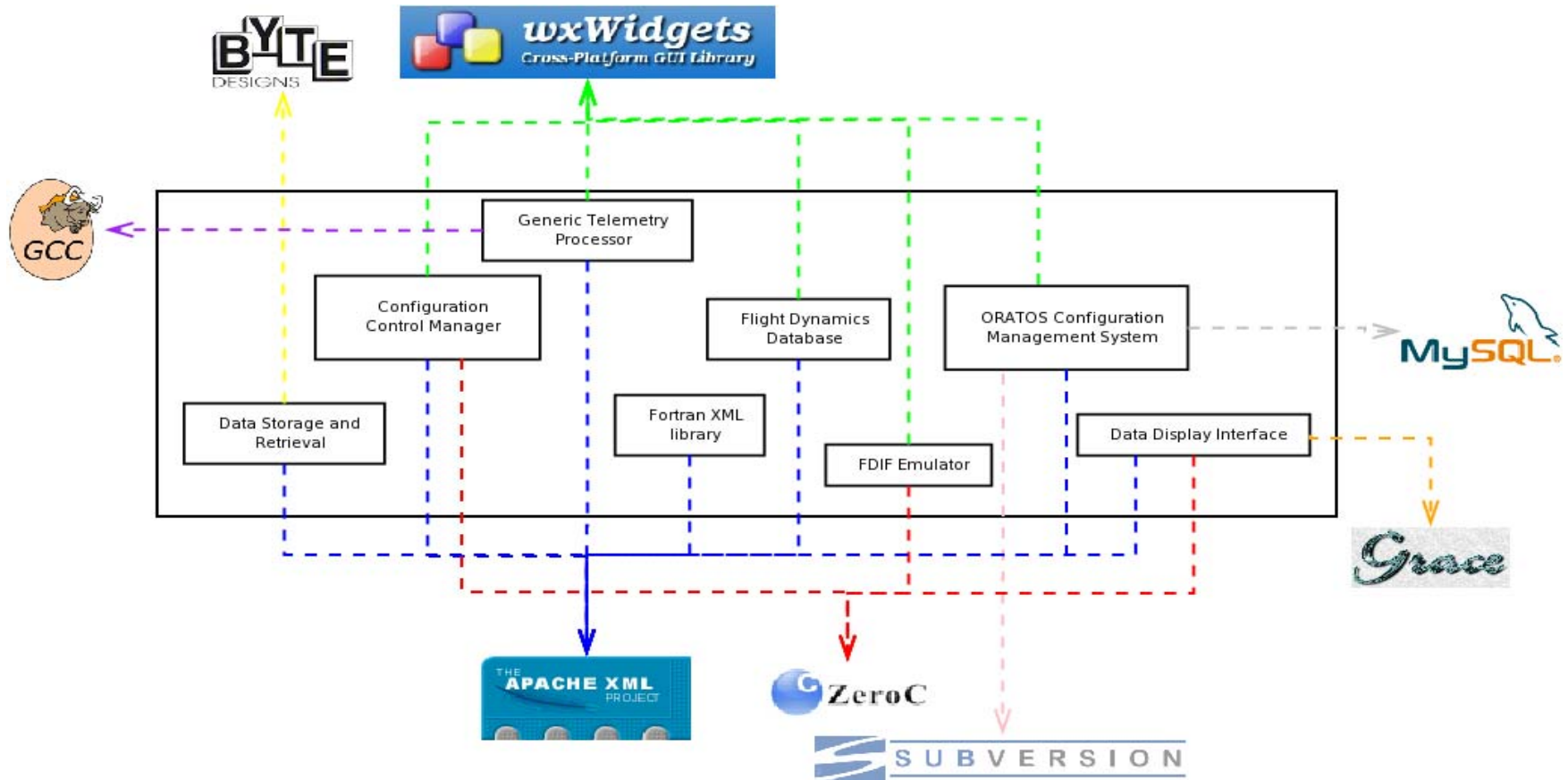
Low-Level / Common Components Harmonisation : Possible Pitfalls

- ORATOS component re-use traditionally driven by tacit knowledge.
- Agreed interfaces need to be negotiated.
- What are the supportability requirements?



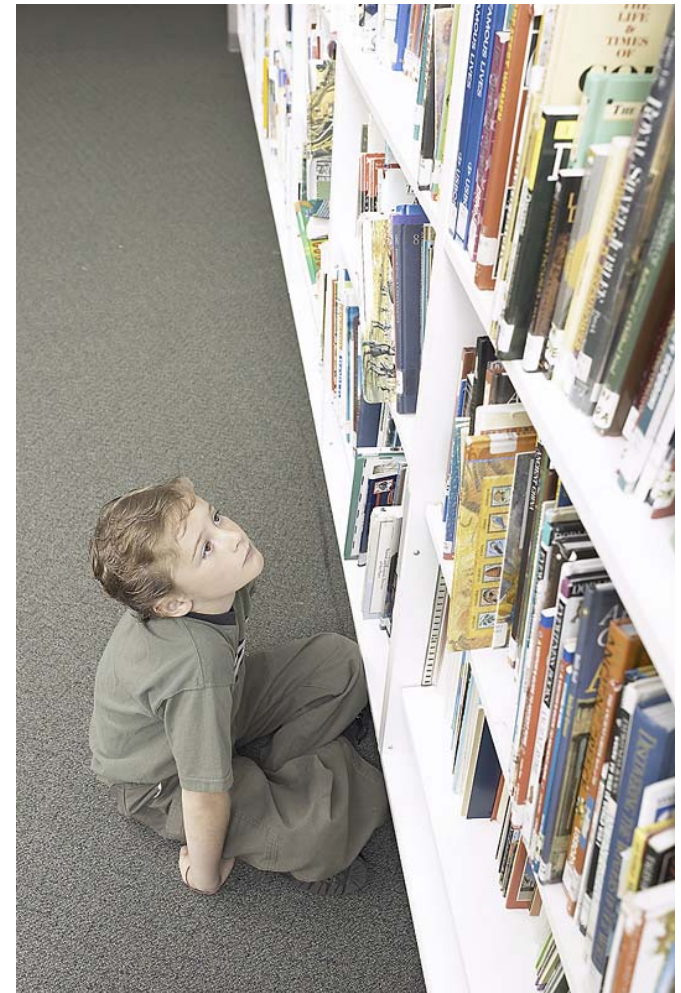
Open Source / COTS usage Harmonisation : Proposal

- ORATOS relies on Open-Source.



Open Source / COTS usage Harmonisation : Proposal

- Re-use of lessons learned replacing closed with open-source.
- Harmonisation of products and versions eases idiomatic software re-use.



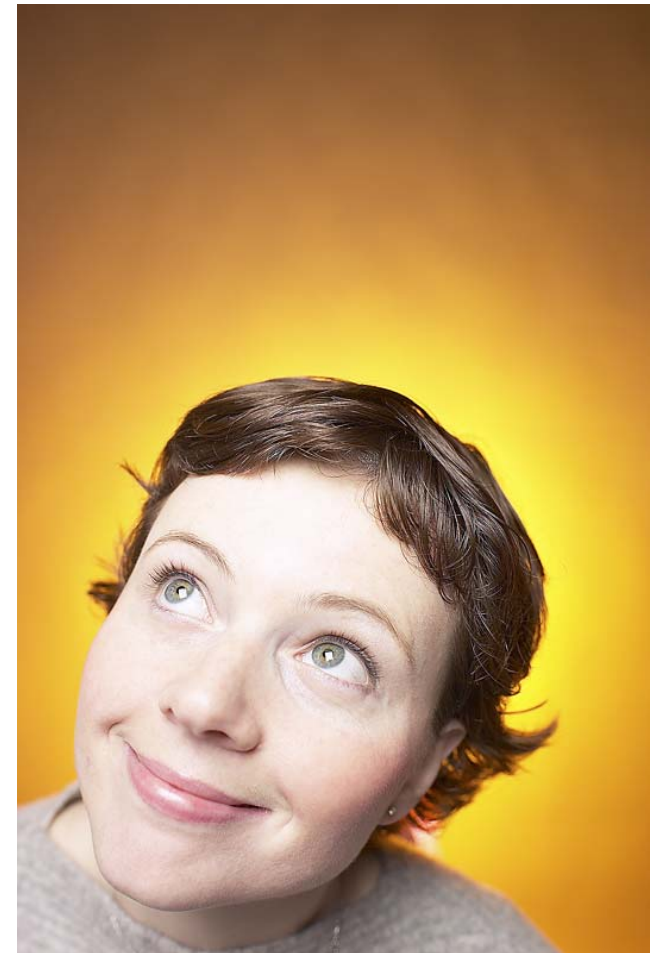
Open Source / COTS usage Harmonisation : Possible Pitfalls

- Vendor supported “stable” versions not always stable when integrated with Flight Dynamics software.
- Flight Dynamics Open-Source selection based on experience developing and maintaining it as part of the Flight Dynamics infrastructure.
 - Subversion more robust than CVS when updating the repository structure.
 - ICE easier to use and components easier to maintain than CORBA (ACE/TAO).



Generic Software Requirements Harmonisation : Proposal

- Many EGOS Generic Software Requirements already implicitly met, e.g. Cluster awareness requirements.
- Harmonising means setting common standards for 3rd parties to develop components used in Flight Dynamics Systems.



Generic Software Requirements Harmonisation : Possible Pitfalls

- Current design and implementation constraints heavily biased towards C++ and Java.
- Mandating use of explicit CASE tools stifles the initiative of those who wish to use complementary tools and methods.

MappingInit0

Mapping'
mappingName? : String
routineName? : String
library? : SharedLibrary

routineName? ∈ dom library?.routines
name' = mappingName?
routineObject' = library?.routines routineName?

$MappingInit \hat{=} MappingInit0 \vee RoutineNotPresent$

RoutineNotPresent

routineName? : String
library? : SharedLibrary

routineName? ∉ dom library?.routines

Summary

- A foundation for harmonisation exists.
- All pitfalls can be overcome by requirements negotiation.
- Flight Dynamics users as stake-holders of EGOS should be the basis of subsequent requirements negotiation.



Thank you for listening!

- Any questions ?

