



Science & Technology Facilities Council

Rutherford Appleton Laboratory

On the Need to Develop and Better Use Operations Planning Expertise

P.A. Chaizy, P.M. Allan, T.G. Dimbylow,

<http://www.stfc.ac.uk/ralspace/default.aspx>



Introduction

- There is a need to improve the performance and productivity (P&P) of operations planning because for:
 - **Performance** (i.e. what can be achieved):
 - There is a need to push the borders of knowledge by increasing the scientific returns
 - **Productivity** (i.e. the cost effectiveness of what is being achieved):
 - Operations planning costs are not a negligible part of the total mission costs
 - Any saving on operations planning can help:
 - » Get new missions
 - » Extend existing missions (operations related costs are the only costs considered to extend a mission)



Purpose

- The purpose of this presentation is to show that Operations Planning Expertise (OPE):
 - Is required to improve the Performance and Productivity of Operations Planning Systems
 - Need to be developed and better used



Purpose

- Operations Planning Expertise (OPE):
 - Is the expertise held by people who:
 - Have both theoretical and practical experience in operations planning
 - Have experience across multiple mission types
 - Can be used, on request, by teams that design and implement operations planning systems:
 - Passively:
 - By providing practical advice (e.g. design patterns and/or “toolkits”)
 - Actively:
 - By participating in the design process



- The following mission features are interdependent and defined during the mission design phase:
 - Science objectives (i.e. a mission requirements issue)
 - Technology to be used and/or developed (i.e. a mission implementation issue)
 - Costs
 - Design



The Issue

- The optimisation of the Performance and Productivity of the mission needs a clear understanding of this interdependence
- Such clear understanding requires Operations Planning Expertise



- Operations Planning Expertise:
 - Can be complex
 - Is more specific than the one described in generic system engineering best practice (usually expressed as standards)
 - Needs to have a deep understanding of the specific issues associated with operations planning; i.e. it needs to:
 - Act as a knowledge repository:
 - Not to forget that the “wheel” exists
 - That is not tied to any particular types of mission
 - That is built upon past and current experiences



The Issue

- A key issue is the definition of the **quality** of the OPE:
 - Three types of quality have been defined
 - They are discussed in the next slides



- **Type I OPE**

- People who have:

- Designed, implemented and/or executed operations planning
- Have **not** spent a significant amount of time in the understanding and rationalisation of what they have been doing, more or less intuitively, in the past

- Such OPE:

- Does exist
- Is not the best available expertise; i.e.:
 - This expertise is likely to be limited
 - It is unlikely that the quality of their advice will be optimum (it is more likely to be prescriptive)



- **Type II OPE**

- People who have:

- Designed, implemented and/or executed operations planning
- Have spent a significant amount of time in the understanding and rationalisation of what they have been doing, more or less intuitively, in the past

- Such OPE:

- Does exist
- Is the best available expertise



- **Type II OPE**

- However, this expertise is:
 - Underdeveloped, because not funded
 - Underused, because not sufficiently structured, recognised and identified
 - Traditionally, this underuse leads to in-house bottom-up and often prescriptive ways of developing systems that
 - Limiting the cross fertilisation and exploitation of ideas that
 - Handicap the increase of Performance and Productivity
- i.e. The “wheel” is still reinvented too many times, when reinvented at all, and not in the best possible way or outcome.



- **Type III OPE**

- People who are spending time to rationalise and exploit OPE inside a body of expertise that is specifically and properly funded and whose prime objective is to design and use practical methodology whose:
 - Purpose is to assess and implement new missions
 - Content is:
 - Justified
 - Visible
 - Recognised internationally
 - Kept dynamic (e.g. to improve and to adjust to new technologies)



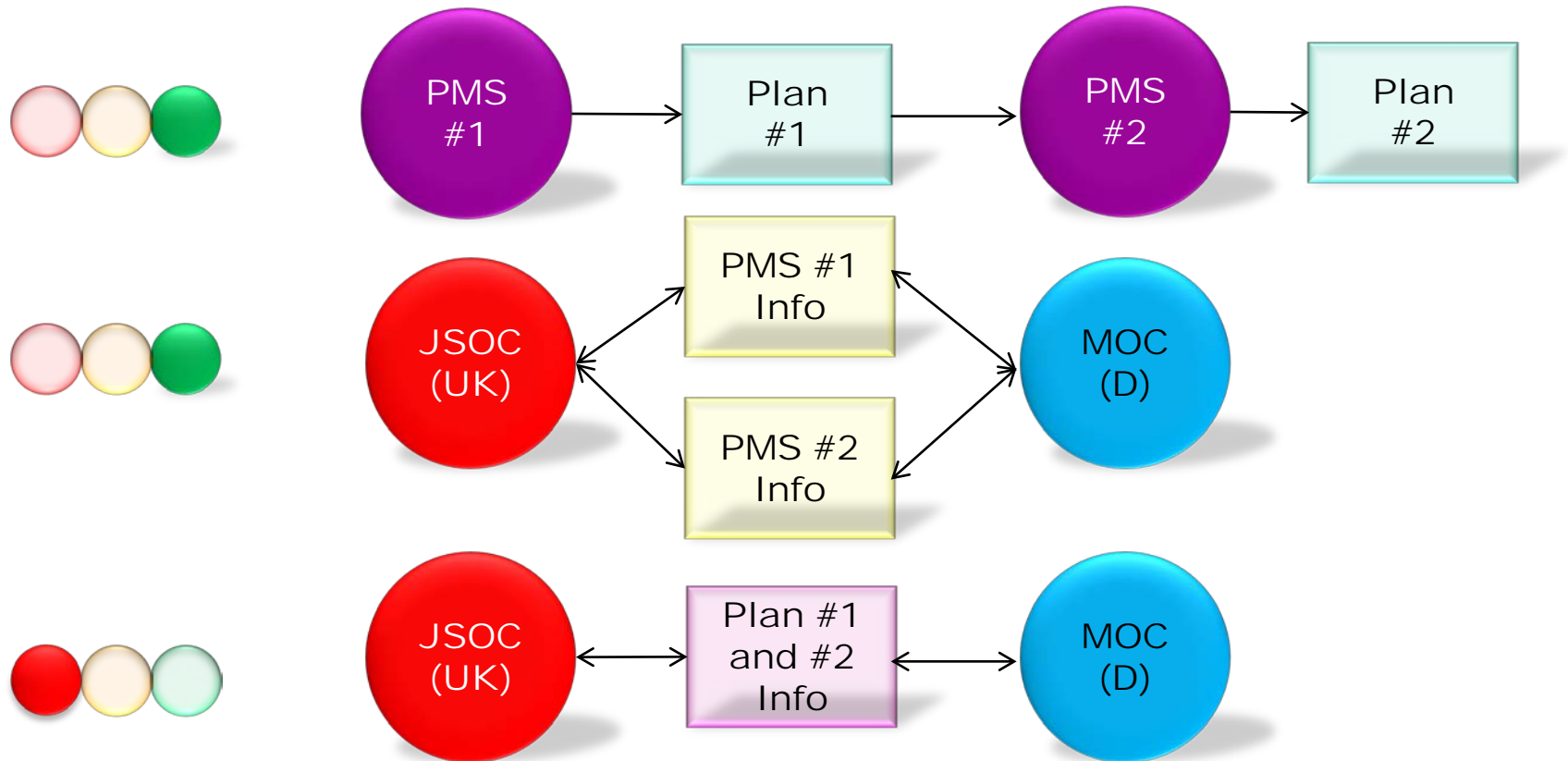
- **Type III OPE**

- Such body of expertise is the only way of:
 - Efficiently identifying operations planning issues and their solutions
 - Keeping track of the latter in order to apply them to new missions
- Similar bodies of expertise already exist for data processing; e.g.:
 - International Planetary Data Alliance (IPDA):
<http://planetarydata.org/>
 - the Space Physics Archive Search and Extract (SPASE):
<http://www.spase-group.org/>
 - Planetary Data System (PDS):
<http://pds.jpl.nasa.gov/index.html>



Example: Cluster

Problem: Interfaces have been defined at the level of institutions, not of functions => Unnecessary planning steps (PMS = Plan Management system)





Conclusion

- It is difficult to imagine how the Performance and Productivity of Operations Planning Systems can be efficiently improved without a Type III OPE.
- Therefore, we strongly believe that public and/or private space organisations should put resources, individually and/or collaboratively in order to perform, at least, a feasibility study of Type III OPE.



Question

- Do you support the idea that resources should be allocated by private and/or public space organisations in order to, at least, perform a feasibility study of Type III OPE?
 - **No**: why not?
 - **May be**: what do we need to do to make up our mind, i.e. to decide “yes” or “no”?
 - **Yes**: what do we do next?