

# Complex Aerospace Systems Supportability Design and Development

15th NATO LCM Conference 2019



## AeroLogLab ITA

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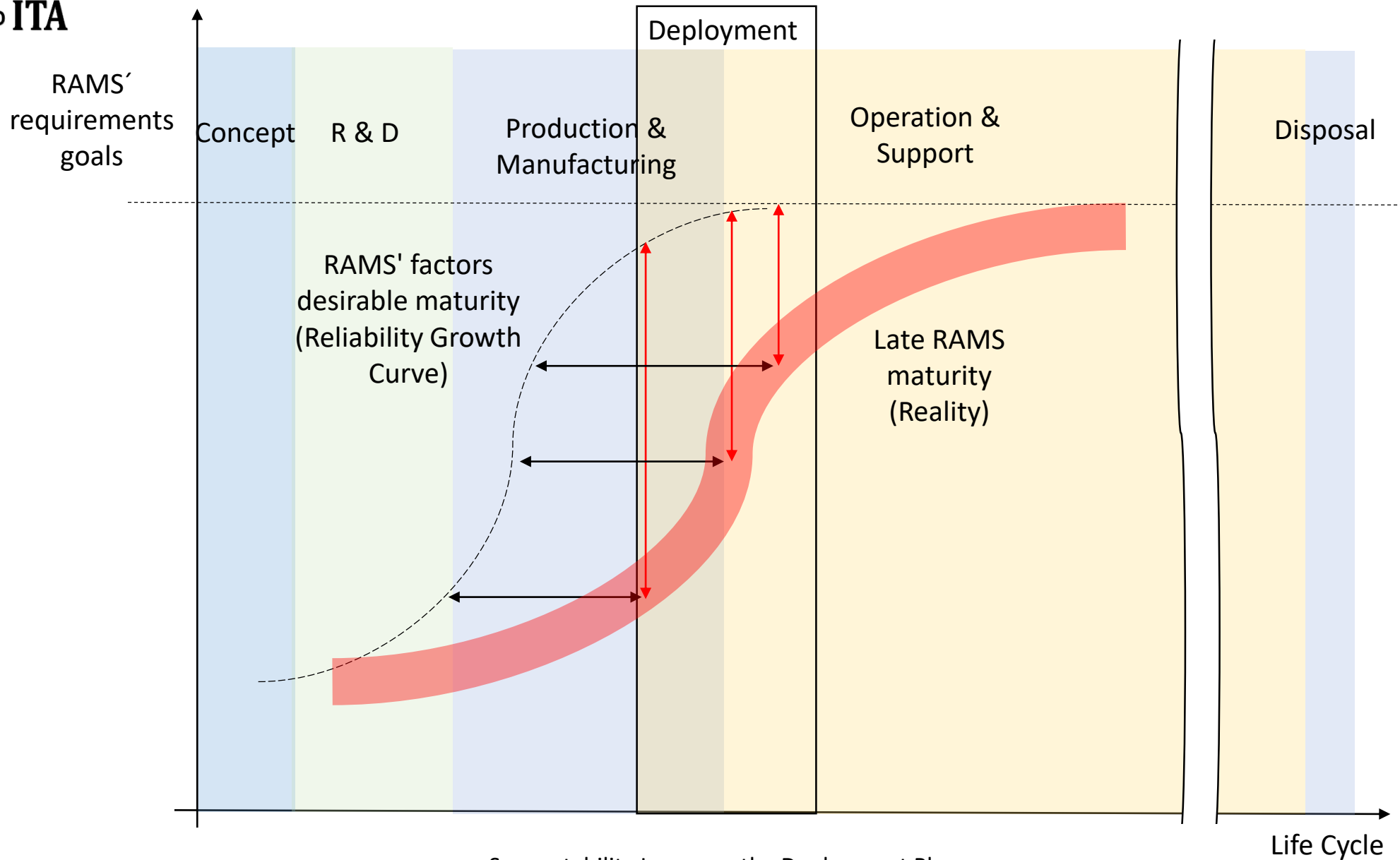
# Abstract

**This work reviews engineering and management aspects that involves and results in support for Complex Aerospace Systems. The study describes typical aircraft fleet support issues, whether commercial, executive or from the defense sector, but with natural possibilities for similar applications on other fleets of vehicles, rocket launchers and other complex systems.**

**Problems are identified in order to link their main causes and when it would be appropriate to deal with them so that they could be eliminated or, at least, minimized throughout the system's life cycle.**

**It is also discussed reasons why support design gaps occur, their temporality and their causes through content analysis involving Systems Engineering, the Integrated Logistic Support approach, the CDIO initiative, design for RAMS, eMaintenance and other related support approaches and methodologies.**

**Results provides a map of actions, both to guide education and to obtain skills in key areas for solving problems, as well as to drive research projects related to both the treatment of problems and innovation in terms of Complexes Aerospace Systems' support. A framework for research and development is proposed.**



		Life Cycle Phases				
ILS Elements		Preparation	Development	Production	In service	Disposal
	Maintenance	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues
	Supply	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues
	Manpower	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues
	Training	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues
	Support Equipment	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues
	Technical Data	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues
	Computer Resources	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues
	Facilities Infrastrucutre	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues
	PHS&T	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues
	Sustaining Engineering	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues
	Design Influence	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues
	Product Support Management	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues

## Problem:

- Absence of a collaborative and open platform for the all Life Cycle Phases;
- Absence of a dedicated, shared, integrated, comprehensive, transparent and total framework;
- Supportability of complex systems is still confusing, amateur, delayed, and non-coherent in great part of the aeronautical industry, agencies in charge of some fleets and academia;
- knowledge in the area is particularly low, little shared and spread, not compliant and almost ignored by academia (compared with aeronautical engineering);
- Some companies seems to be ok with that;
- The problem lacks a knowledge management approach in order to be developed and to become common organizational and academic culture, not just for developers but also for fleet operators and fleet maintainers.

## Objective:

Within the Triple-Helix concept, develop a collaborative, shared, transparent and open framework of tools for the development and management of all factors affecting the support of complex aerospace systems (for all phases of their respective life cycles).



AeroLogLab **ITA**

# AeroLogLabTOOL<sup>®</sup>

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First Name

Last Name



Last Name

Department / Office



Select your Department/Office

Username



Username

Password



Password

Confirm Password



Confirm Password

E-Mail



E-Mail Address

Contact No.



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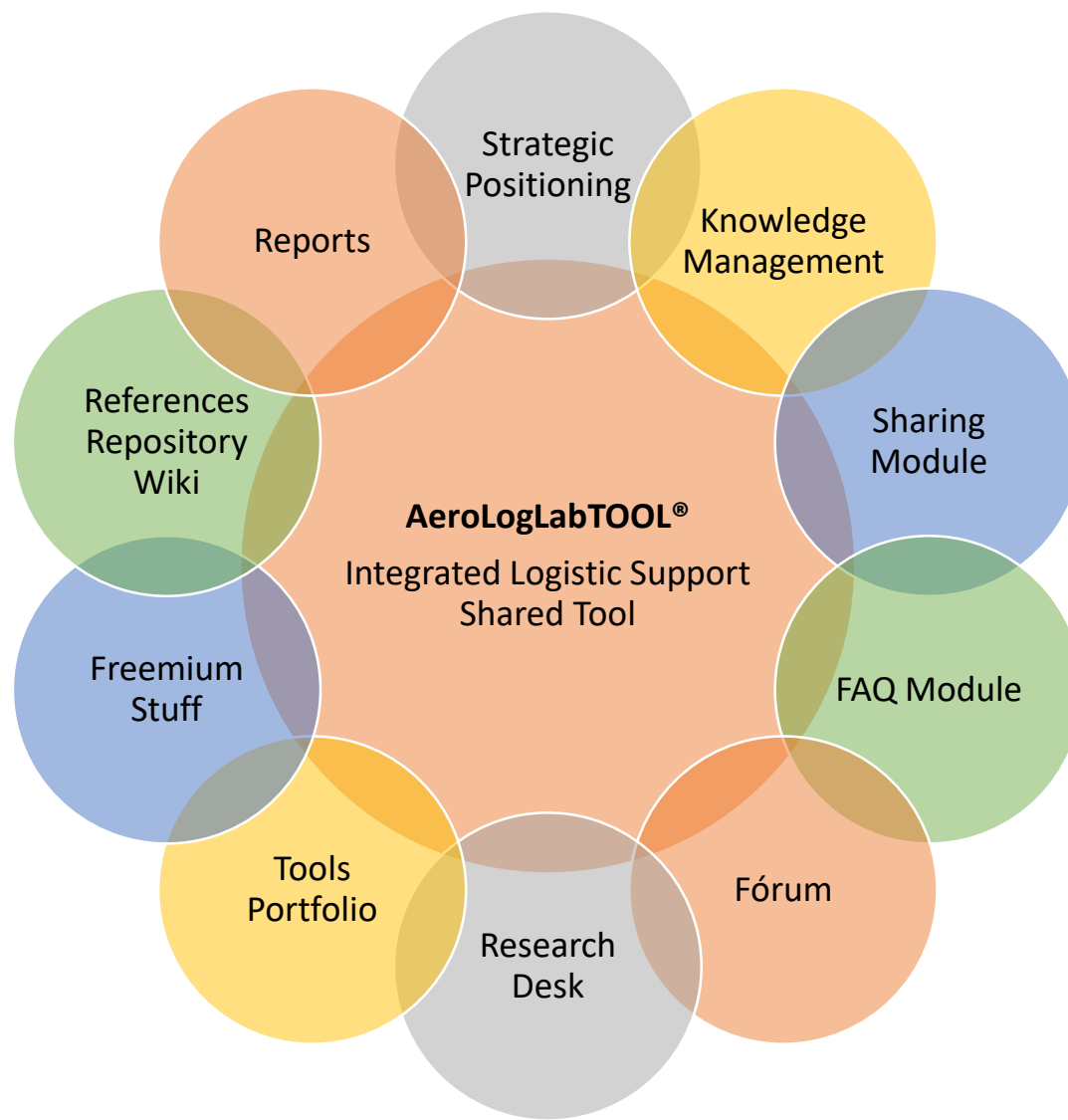


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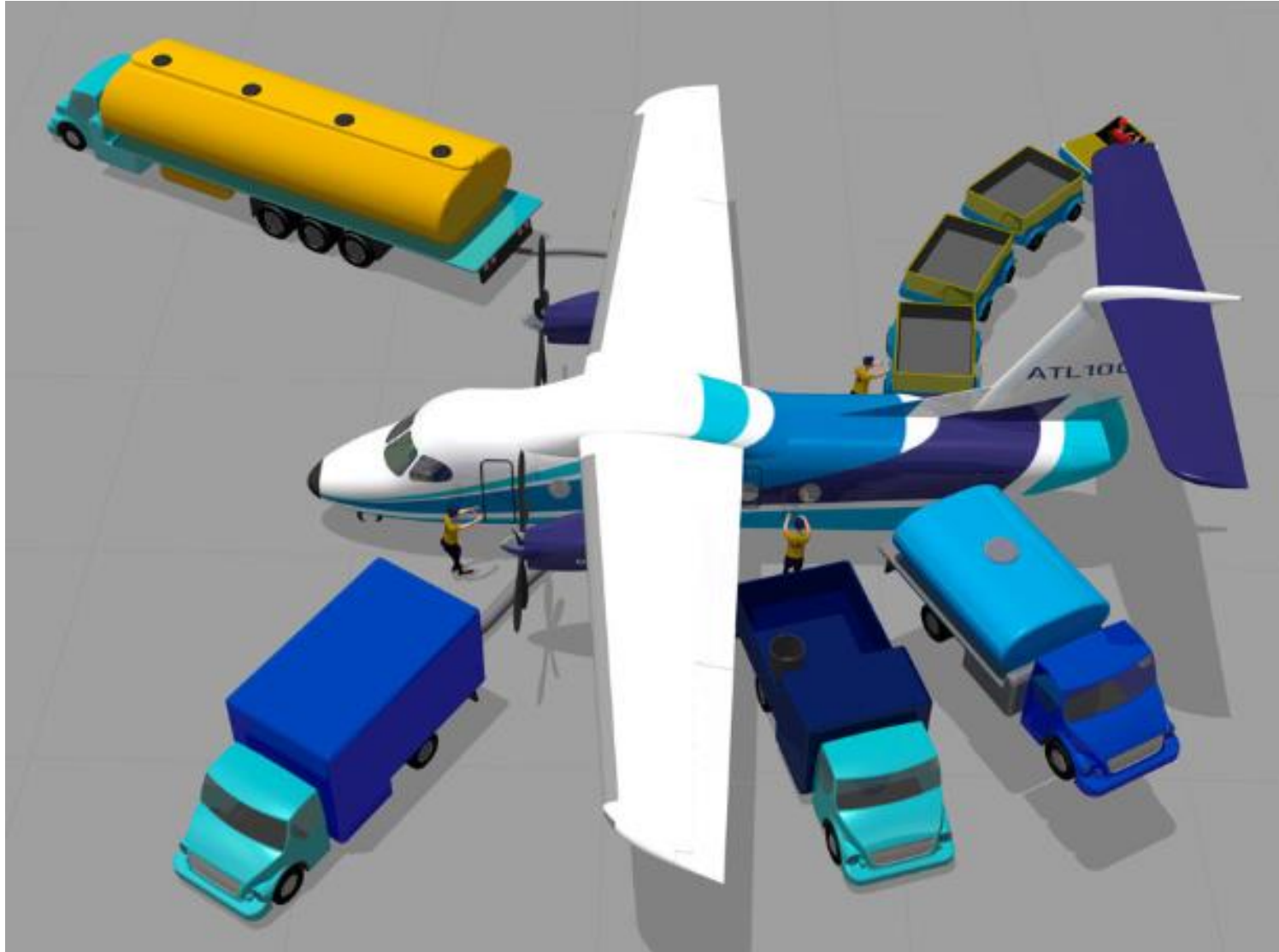
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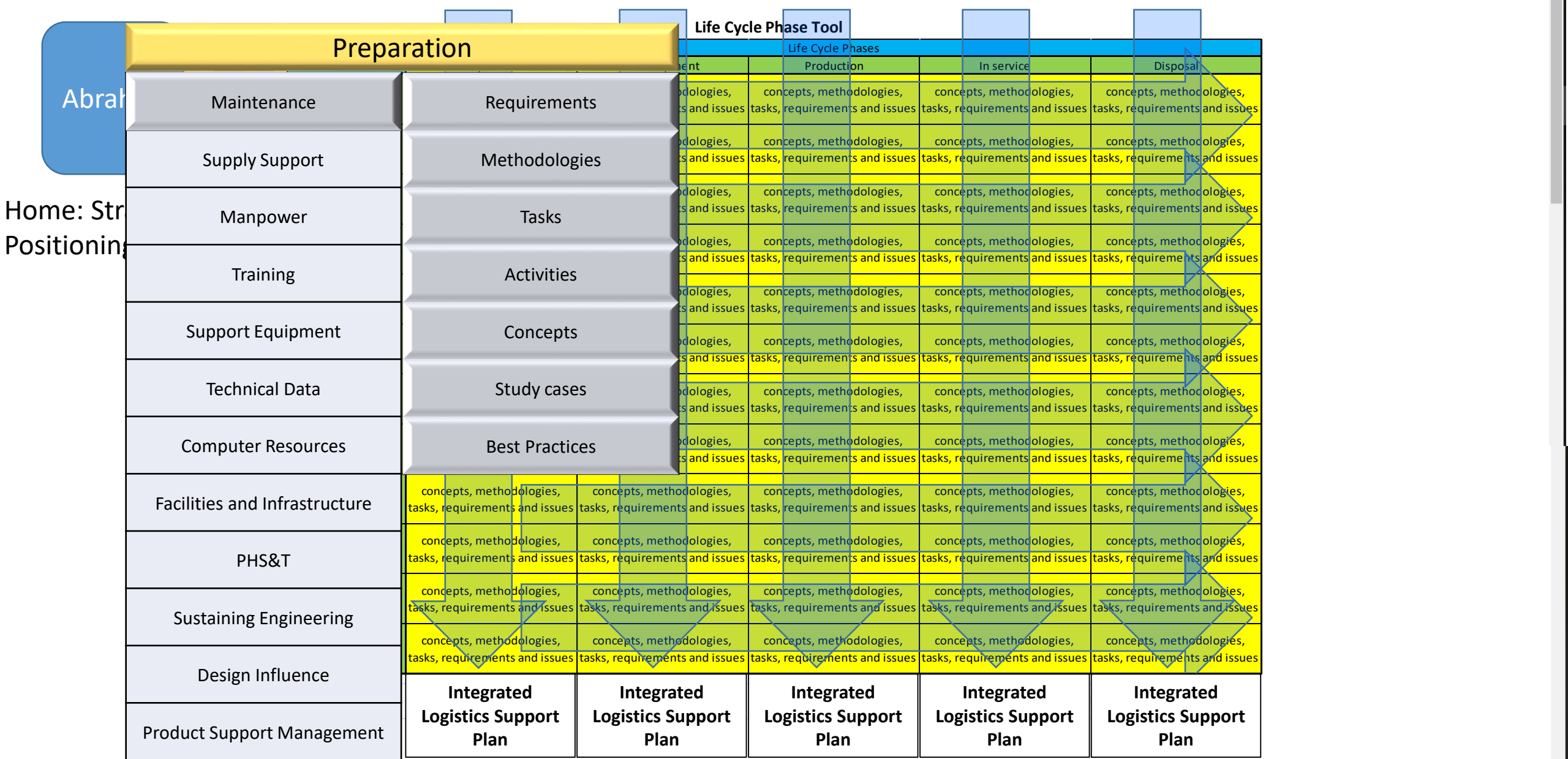
Home: Strategic Positioning

ILS Tool

		Life Cycle Phase Tool						
ILS Elements	Life Cycle Phases							
		Preparation	Development	Production	In service	Disposal		
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	Product Support Management	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues	concepts, methodologies, tasks, requirements and issues		
	Integrated Logistics Support Plan	Integrated Logistics Support Plan	Integrated Logistics Support Plan	Integrated Logistics Support Plan	Integrated Logistics Support Plan			











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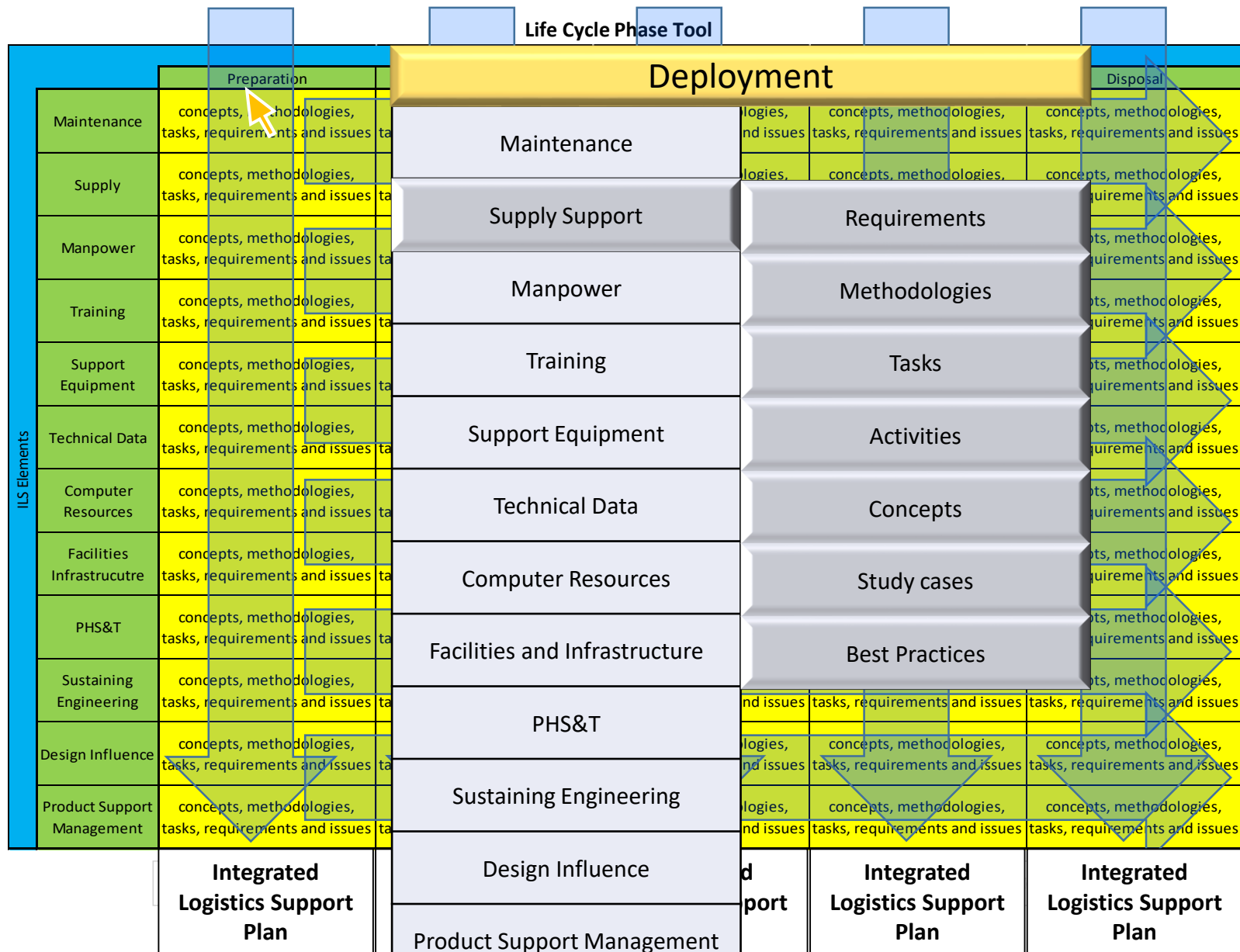
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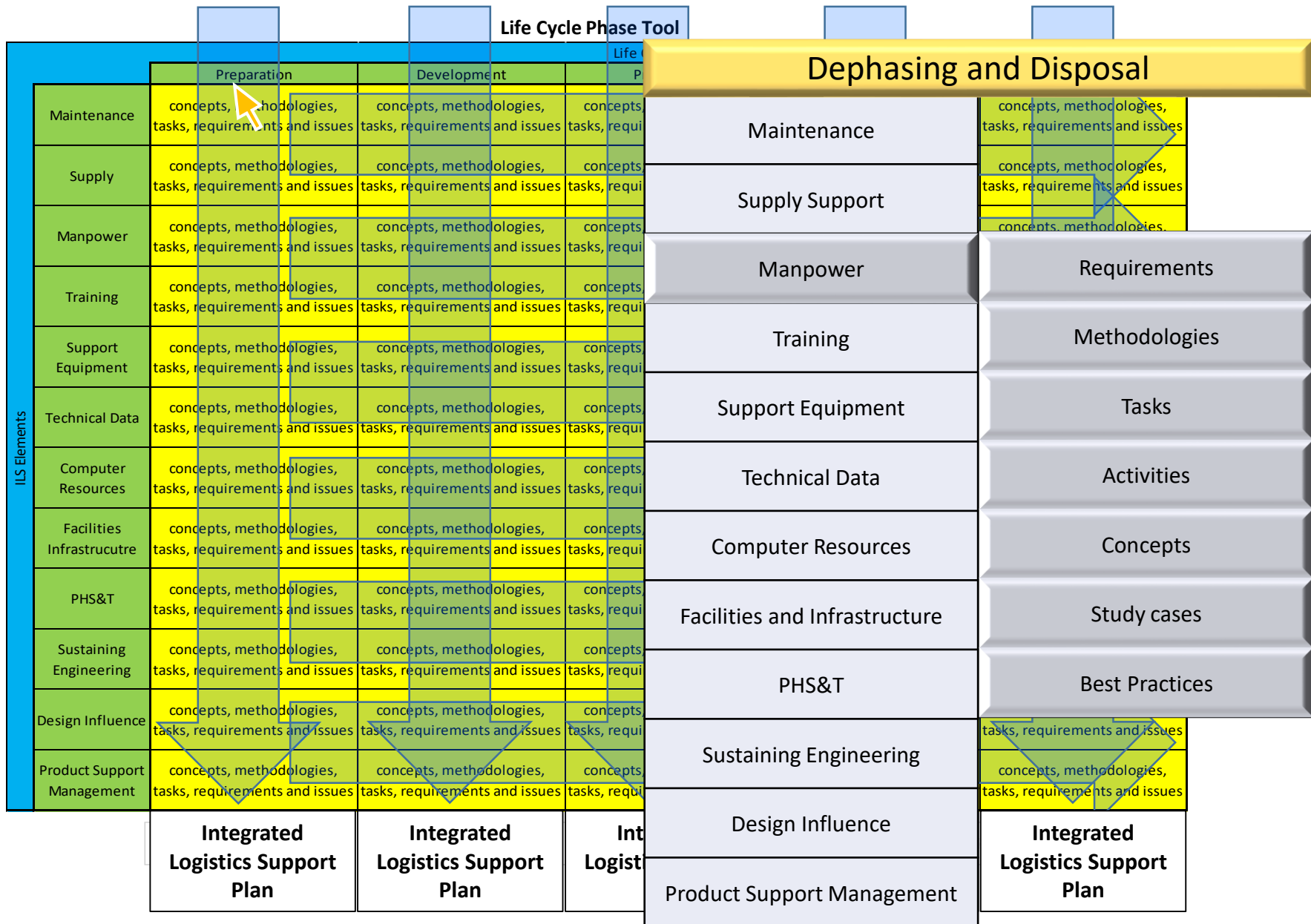
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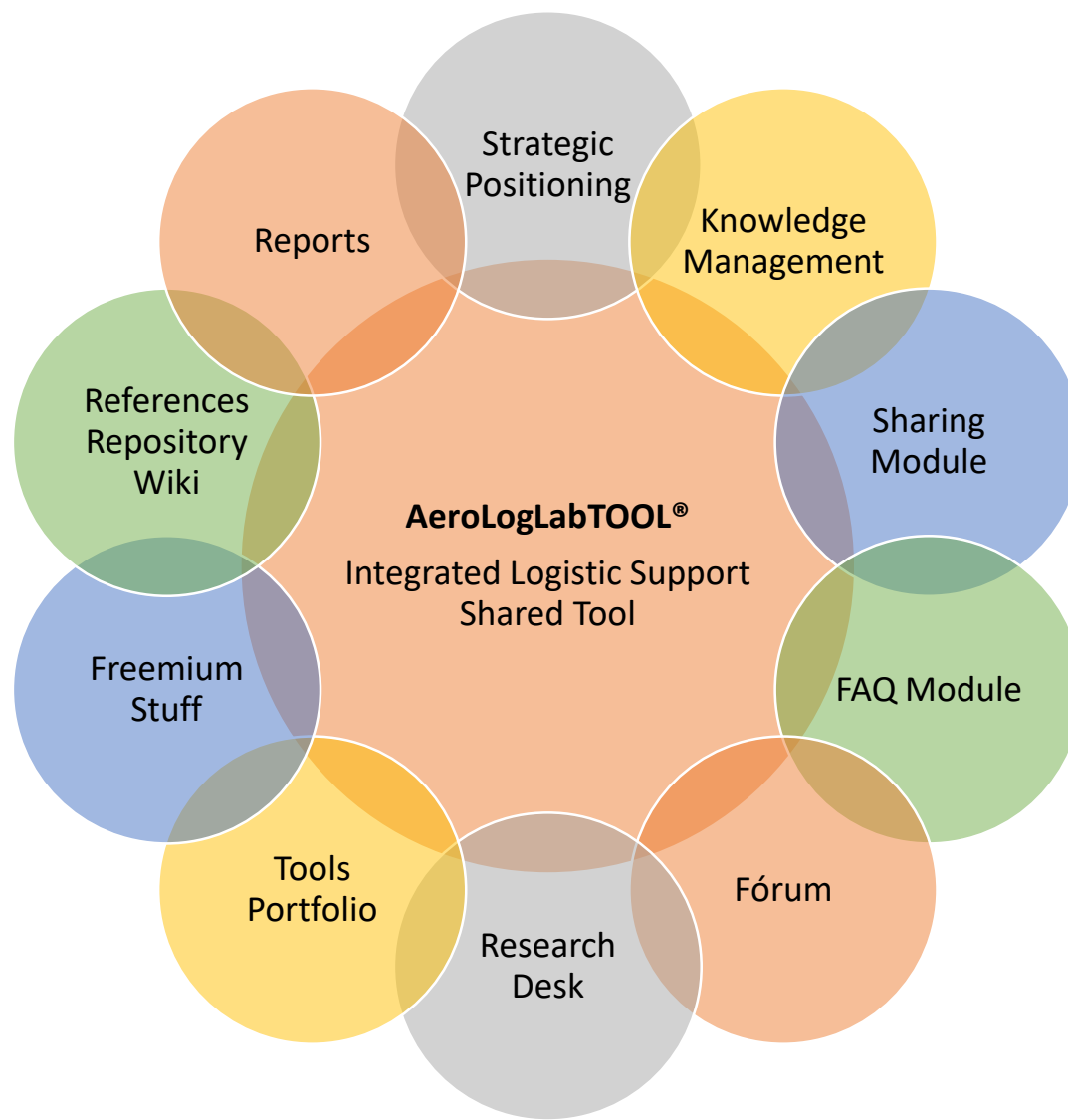
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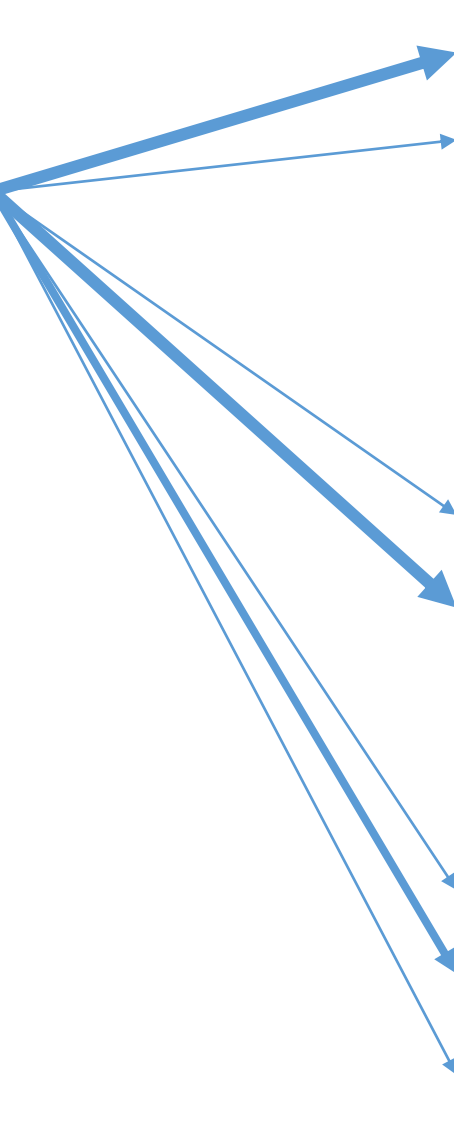
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Home: Knowledge Management

- Knowledge Search and Creation
- Knowledge Localization and Support
- Knowledge Organization
- Knowledge Extraction
- Knowledge Sharing and Distribution
- Knowledge Management

- E-Maintenance Tools:
- RAMS Tools:
- Life Cycle Cost Tools:
- Smart Operations Tools:
- Supply Support Tools:
- Fleet Readiness Assurance Tools:
- Acquisition Logistics Tools:

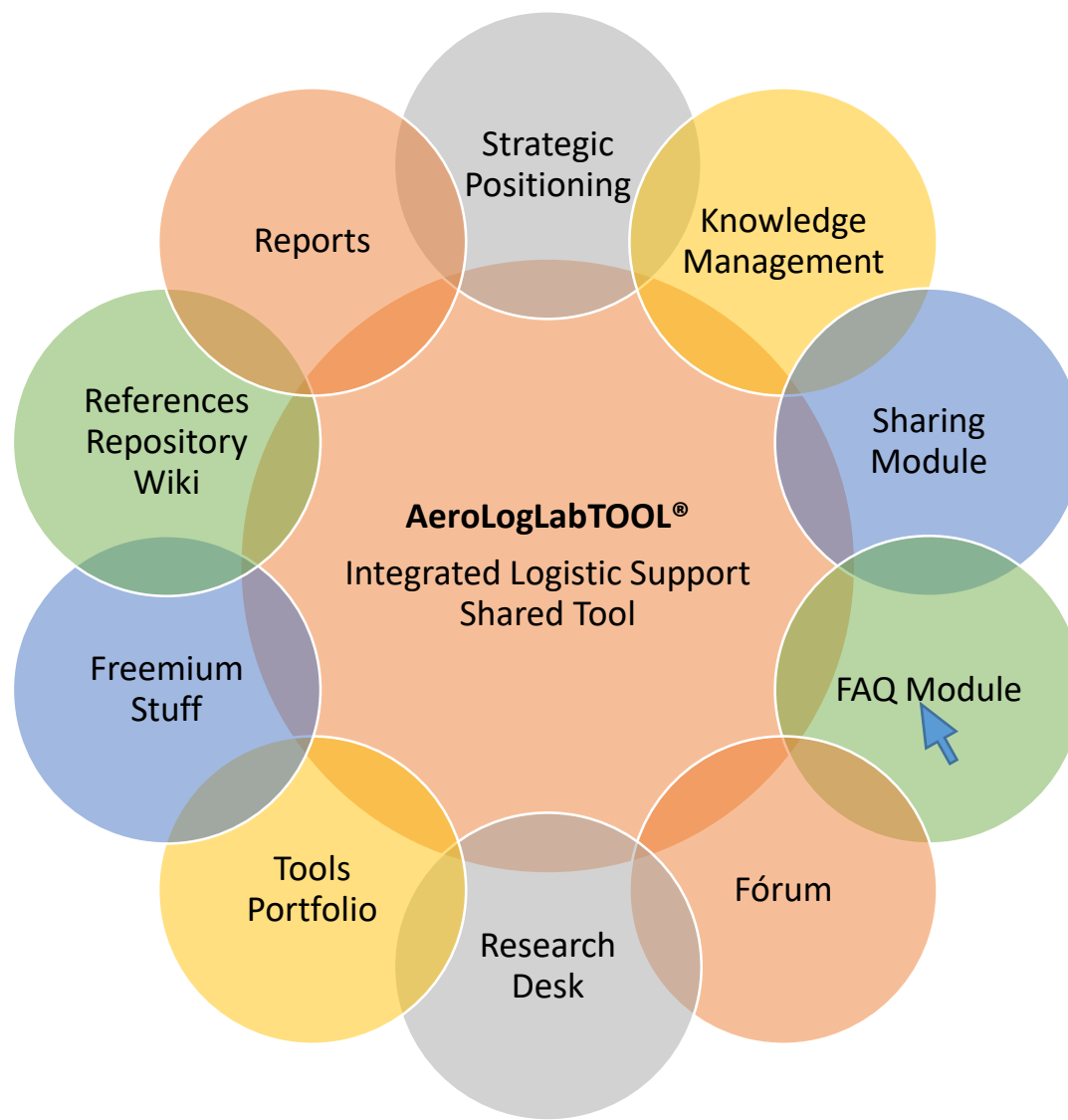
- Maintenance
- Supply Support
- Manpower
- Training
- Support Equipment
- Technical Data
- Computer Resources
- Facilities and Infrastructure
- PHS&T
- Sustaining Engineering
- Design Influence
- Product Support Management





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Home: FAQs

## AeroLogLabTOOL quick links

To help you navigate our frequently asked questions page you can click on the links below to quickly get to the answer you need.

- [What is AeroLogLabTOOL?](#)
- [What are the main advantages of AeroLogLabTOOL?](#)
- [How expensive is to use AeroLogLabTOOL?](#)
- [How is the expected environment for AeroLogLabTOOL?](#)
- [Is it possible to run AeroLogLabTOOL off-line?](#)
- [What are the requirements to run AeroLogLabTOOL?](#)
- [Is there a mobile version of AeroLogLabTOOL?](#)
- [Is AeroLogLabTOOL suitable for just Defense, or also for Commercial Systems?](#)
- [What is the difference between AeroLogLabTOOL and DAU's IPS roadmap?](#)
- [How does the Premium Stuff works?](#)
- [How can I contribute to the AeroLogLabTOOL?](#)
- [Is it possible to donate resources to the AeroLogLabTOOL?](#)

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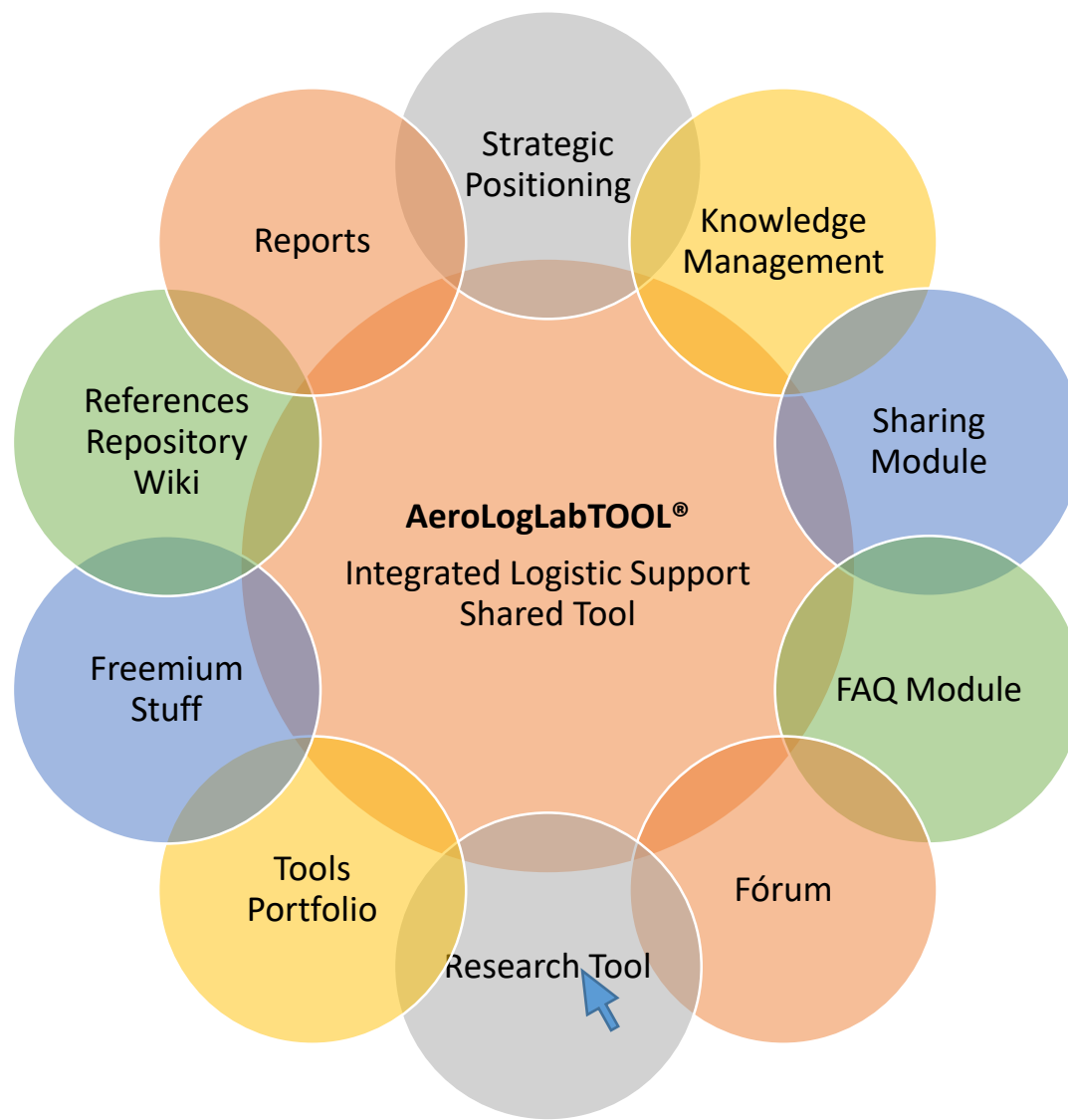
AeroLogLabTOOL is a collaborative tool designed to develop the entire set of activities/tools/analyses/developments involved on the supportability of complex aerospace systems.

AeroLogLabTOOL was created due to the absence of a collaborative and open platform that deals with logistics in the design, development, manufacture, deployment, operation and support, modernization and disposal of complex aerospace systems, in a shared, integrated, comprehensive, transparent and total way. This is a problem because, in most cases, complex aerospace systems' supportability still occurs in a confusing, delayed, amateurish and non-consistent manner in a large part of the aircraft industry, in the fleet management companies of these systems and in the academy. The knowledge is significantly low, almost not shared, not compliant and almost ignored by the academy (in most engineering institutes).

Industry, with rare exceptions, prefers to misrepresent the issue and not brag about the grave consequences unless it is too late. The problem lacks a shared knowledge management framework so that it can evolve and become an organizational and academic culture for both developers and operators and fleet maintainers of complex aerospace systems.

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Research Tool

## Areas of Interest:

<ul style="list-style-type: none"><li>• Acquisition Logistics</li><li>• CMMS</li><li>• Contracting</li><li>• E Maintenance</li></ul>
<ul style="list-style-type: none"><li>• AIRBUS</li><li>• BOEING</li><li>• DESAER</li></ul>
<ul style="list-style-type: none"><li>• Concept</li><li>• R&amp;D</li><li>• Manufacturing</li></ul>
<ul style="list-style-type: none"><li>• Operation and Support</li><li>• Disposal</li></ul>

## Operators:

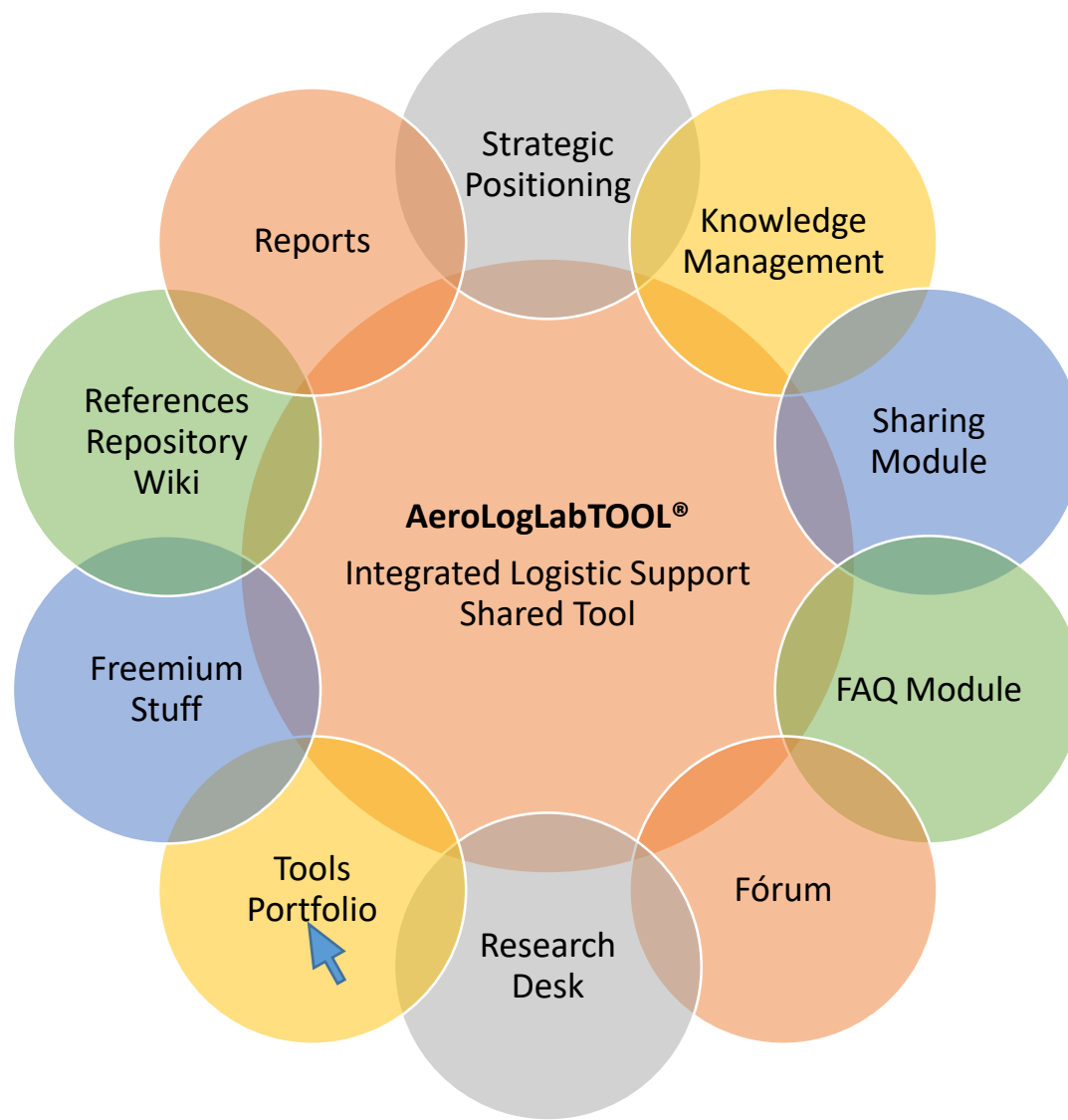
## List of Institutes:

<ul style="list-style-type: none"><li>• AeroLogLab-ITA</li><li>• AFIT</li><li>• DAU</li><li>• LTU</li></ul>
<ul style="list-style-type: none"><li>• ABRAHÃO, F.T.M. ITA</li><li>• ROSCA, Suzano USPSC</li><li>• JOE</li></ul>
<ul style="list-style-type: none"><li>• Maintenance</li><li>• Supply Support</li><li>• Manpower</li><li>• Training</li><li>• Technical Data</li><li>• Computer Resources</li><li>• Facilities and Infrastructure</li><li>• Support Equipment</li><li>• PHS&amp;T</li><li>• Design Interface</li><li>• Sustaining Engineering</li><li>• Product Support Management</li></ul>

Matching Tool

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Areas of Interest:

E-Maintenance Tools:

RAMS Tools:

Contracting Tools:

Human FactorsTools:

Smart Operations Tools:

Supply Support Tools:

Fleet Readiness Assurance Tools:

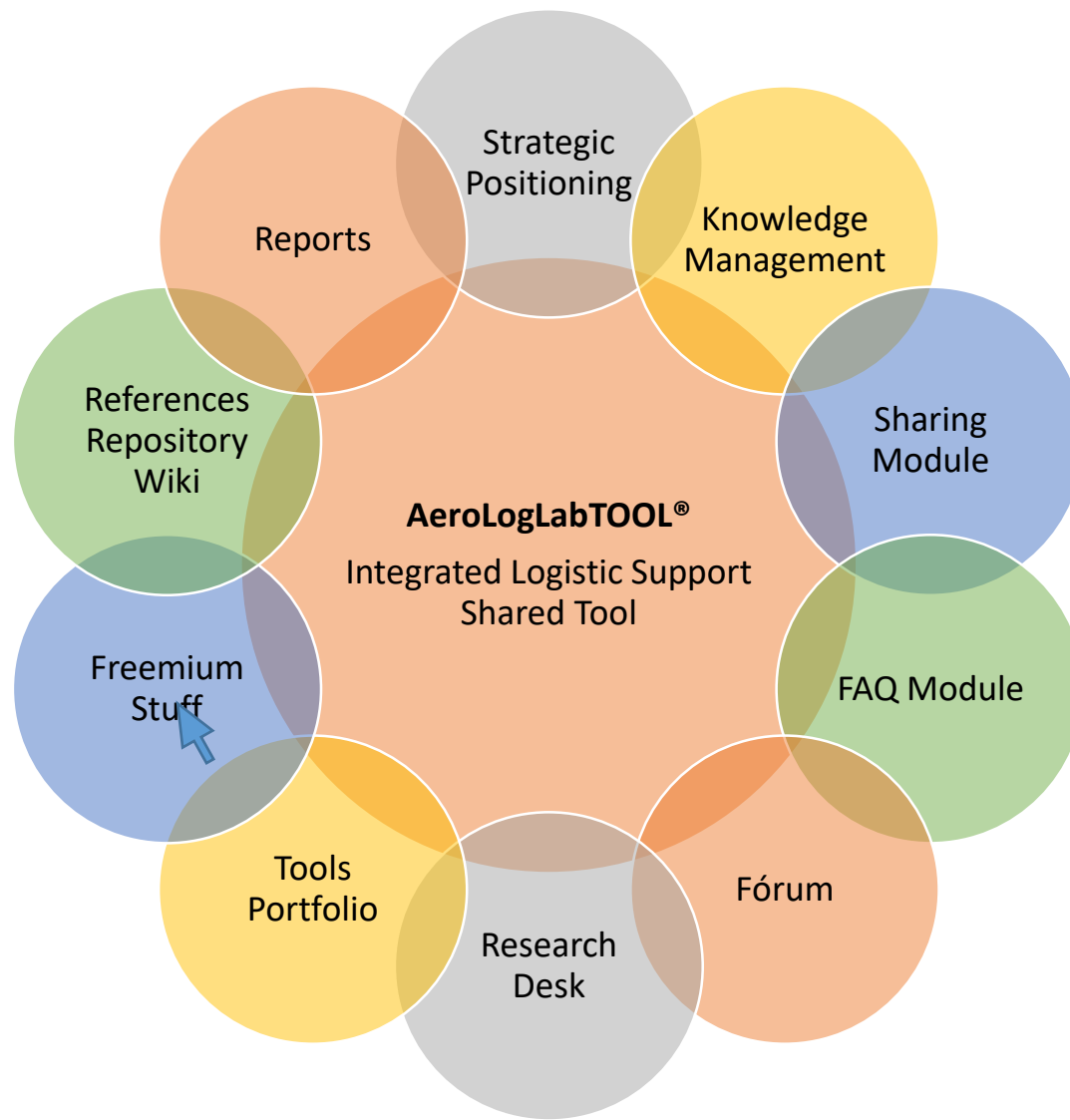
Acquisition Logistics Tools:

Configuration Management Tools:

Home: Tools

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Home:







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Premium Stuff

Areas of Interest:

E-Maintenance Tools:

RAMS Tools:

Contracting Tools:

Xxxx Tools:

Smart Operations Tools:

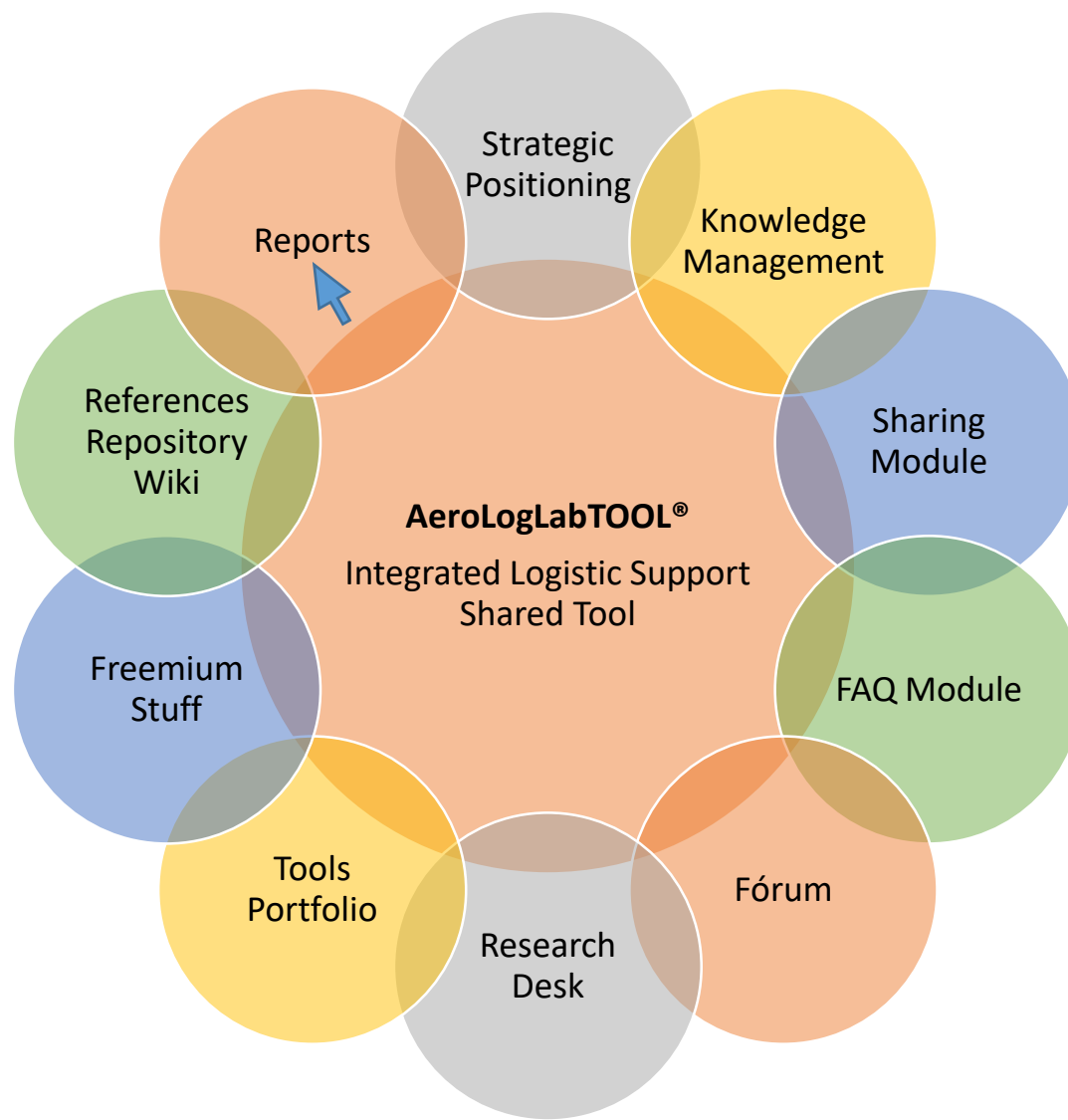
Supply Support Tools:

Fleet Readiness Assurance Tools:

Acquisition Logistics Tools:

Special Cases:

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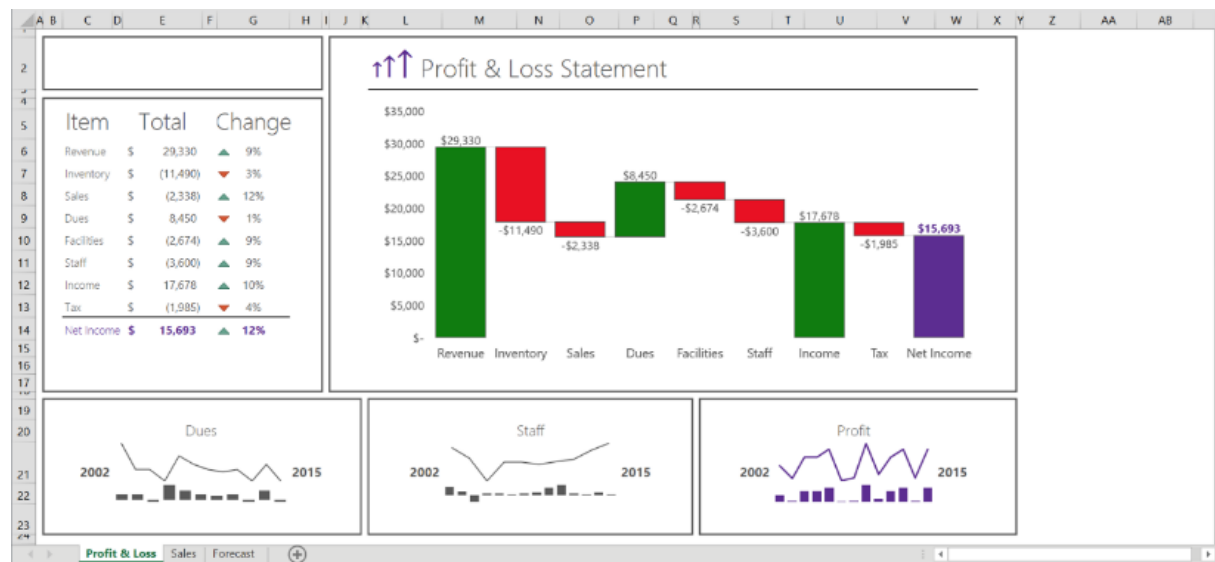
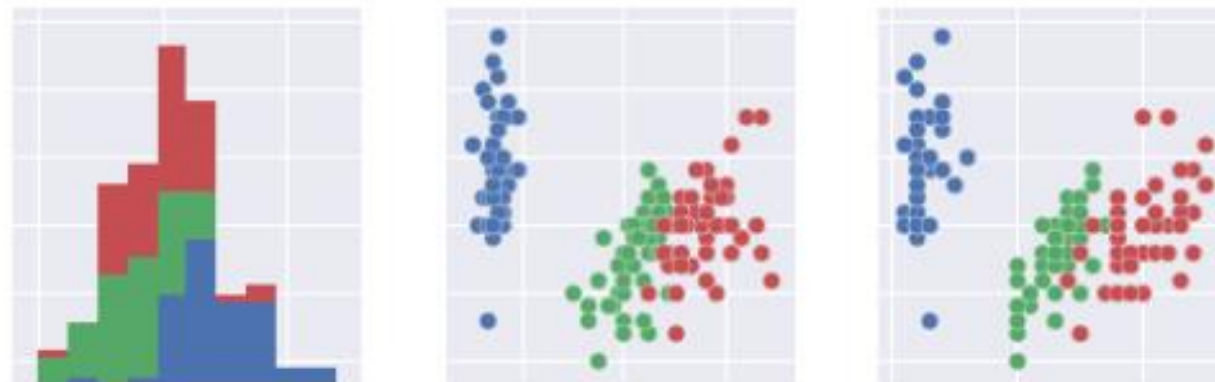
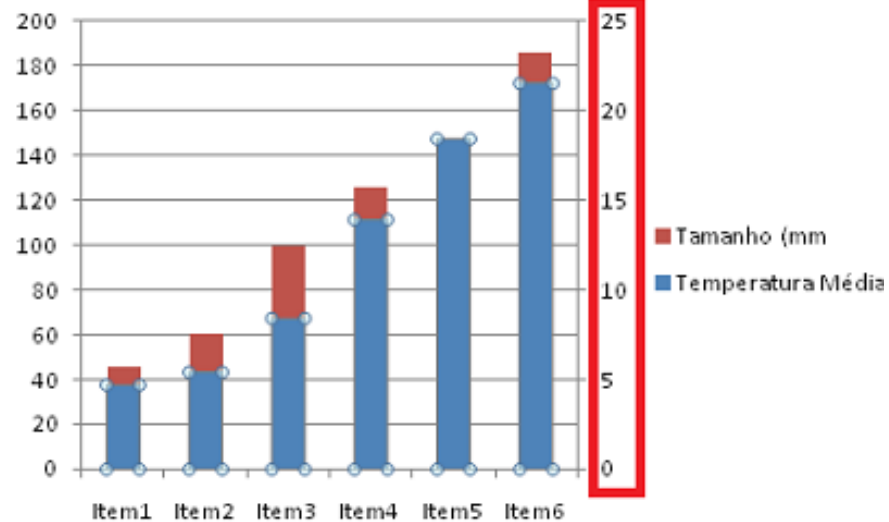
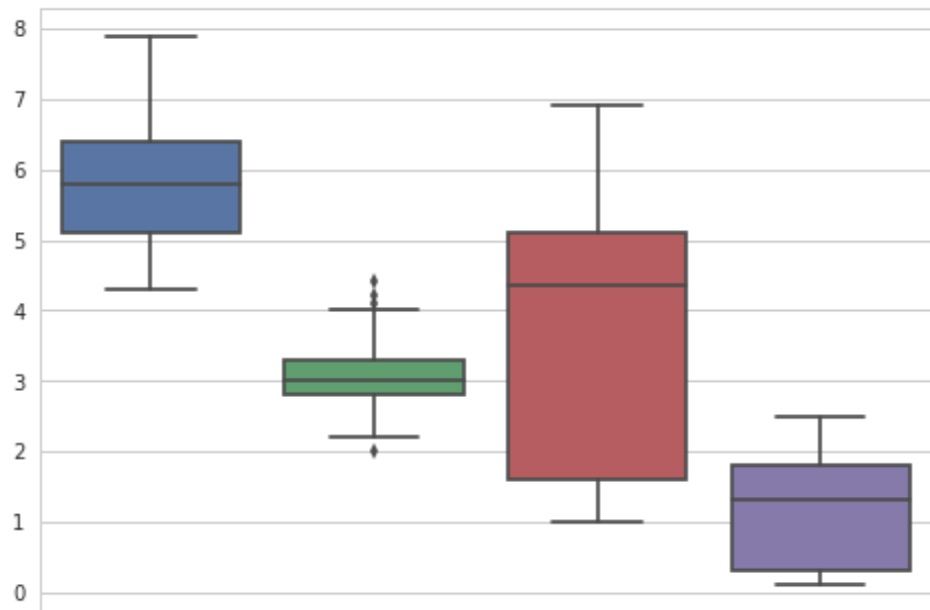
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## Conclusion

- Instead of just educating maintainers to become developers, which may not achieve the desired effect, we are aligned with the CDIO's perspective, focused primarily on the Training and Education of developers to become (think, understand, act , develop) better support designers.
- This should lead to Manpower being able to innovate, develop, integrate and manage logistics engineering for complex aerospace systems, not only just for product development and manufacturing lifecycle phases, but for the entire life cycle up to its exit from operation .
- Our product is the Manpower capable of innovation, researching and learning with its partners and offering solid and academic research on Logistics Engineering and Maintenance in a complete triple helix environment.