

XVIII Congreso de Confiabilidad

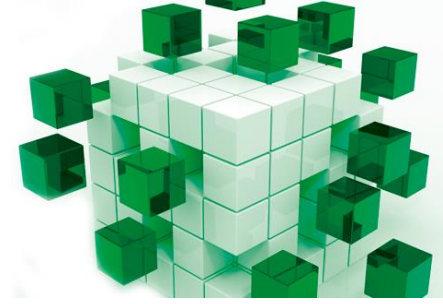
Madrid. 23 y 24 de noviembre de 2016



Organiza:



ASOCIACIÓN ESPAÑOLA PARA LA CALIDAD



APPLICATION OF MBSA FOR A FLIGHT CONTROL EMA

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**RAMS &
ILS Engineer**

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ILS Engineer**

**RAMS &
ILS Intern**



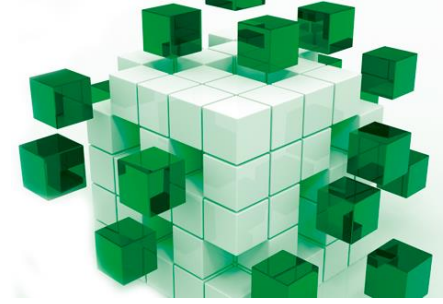
1. Introduction
2. MBSA
3. EMA for Aileron
4. Application of MBSA for EMA Flight Controls
5. Conclusion



1. Introduction

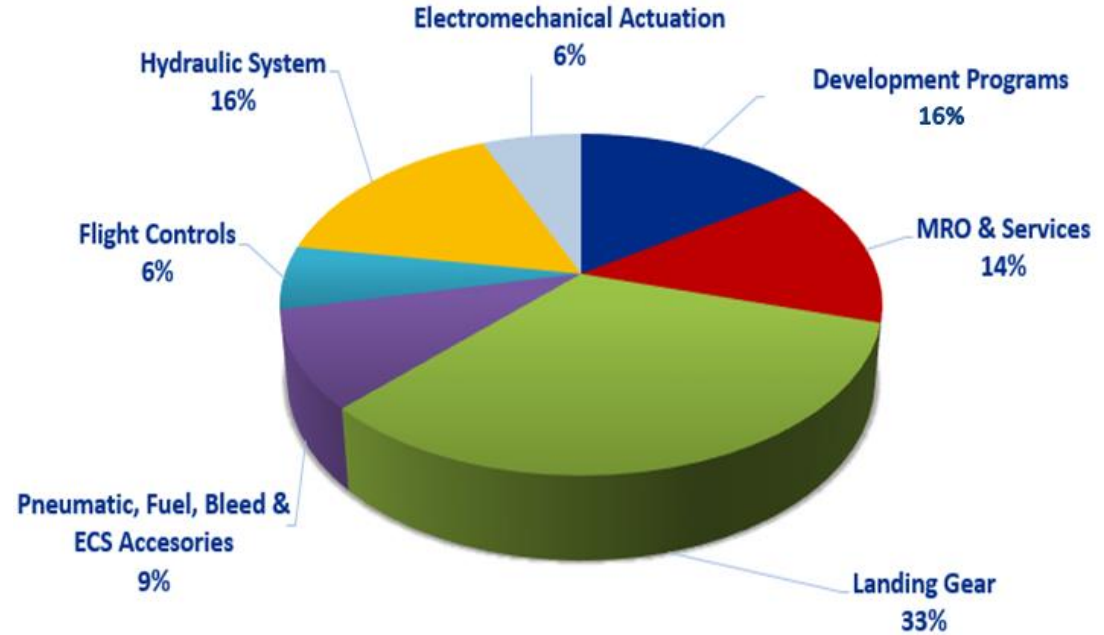
1. *Introduction*
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1. Introduction CESA Presentation

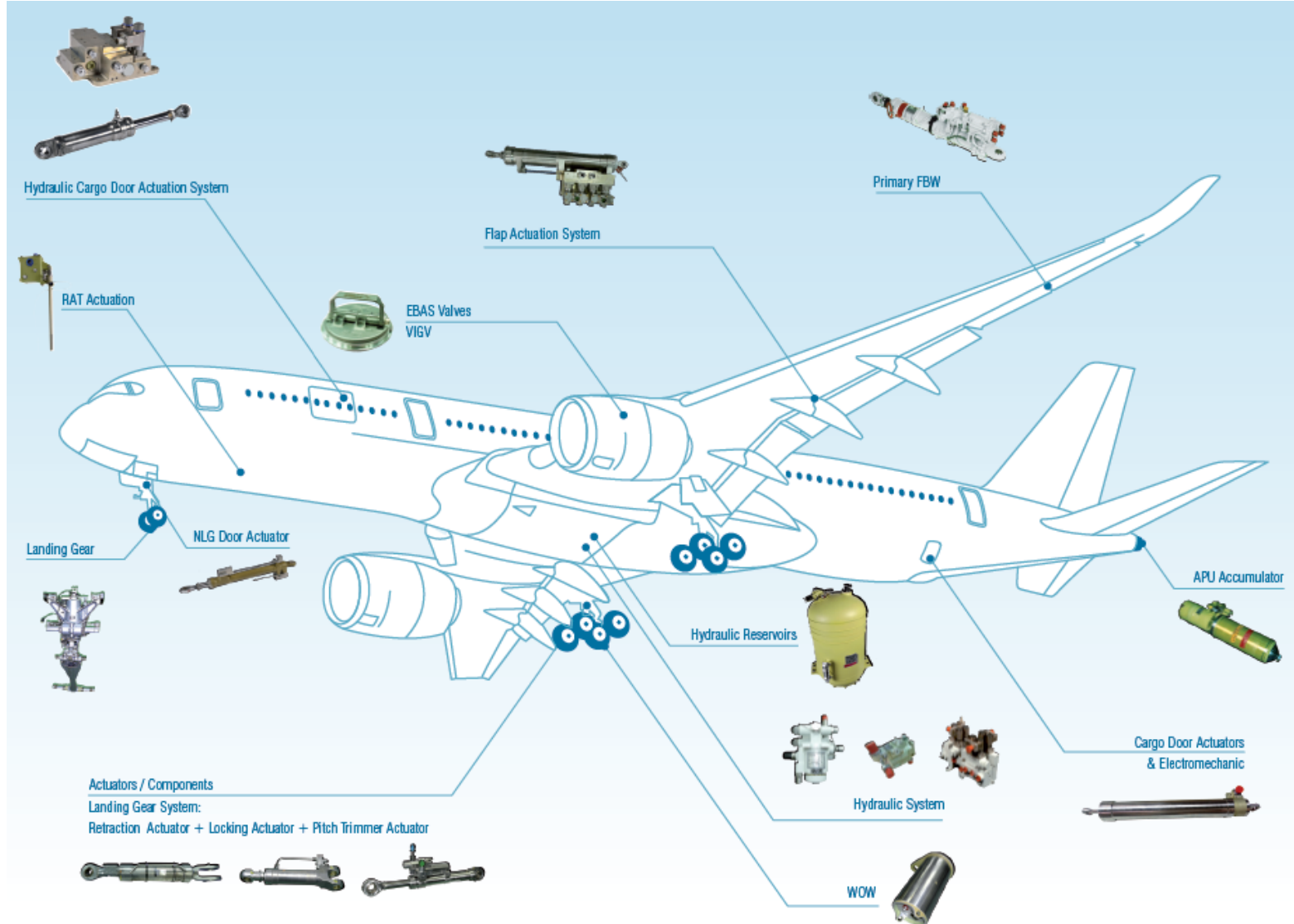
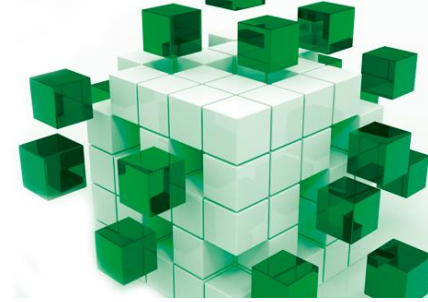


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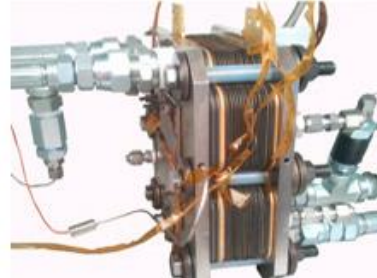
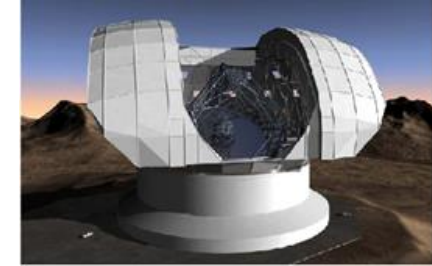
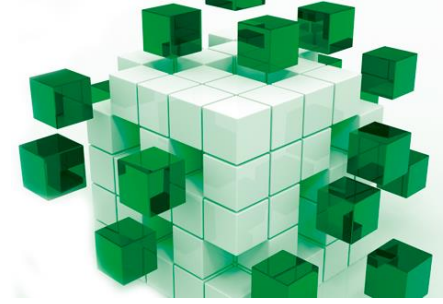


1. Introduction CESA Products



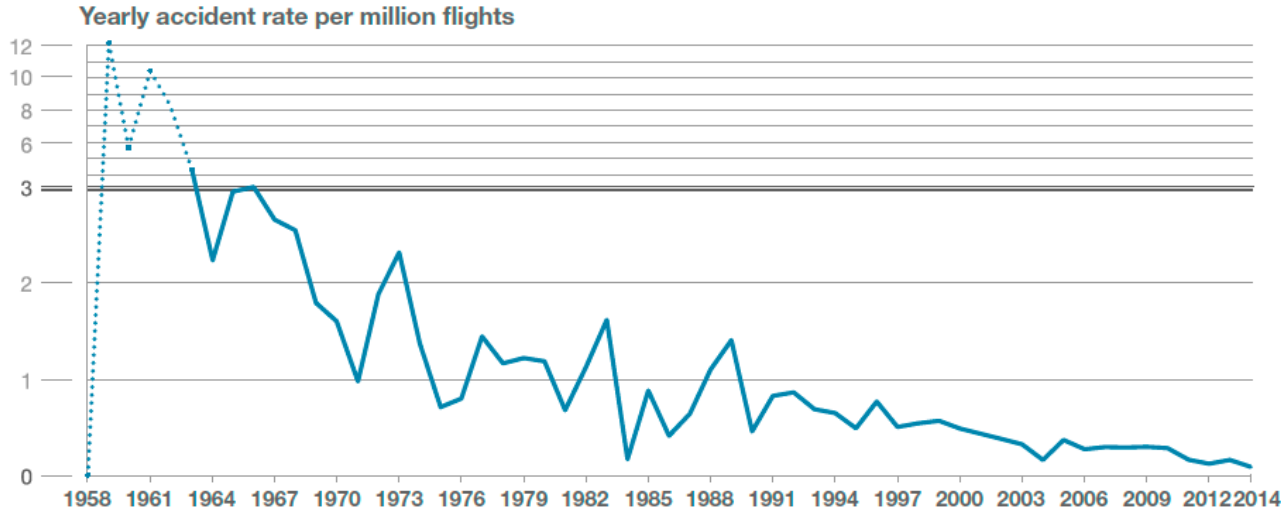
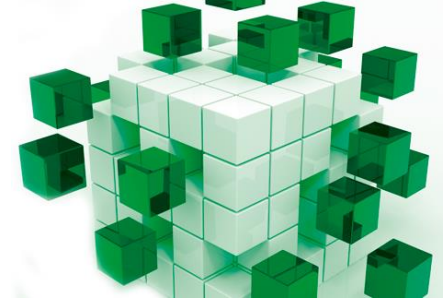
1. Introduction

CESA Research & Development

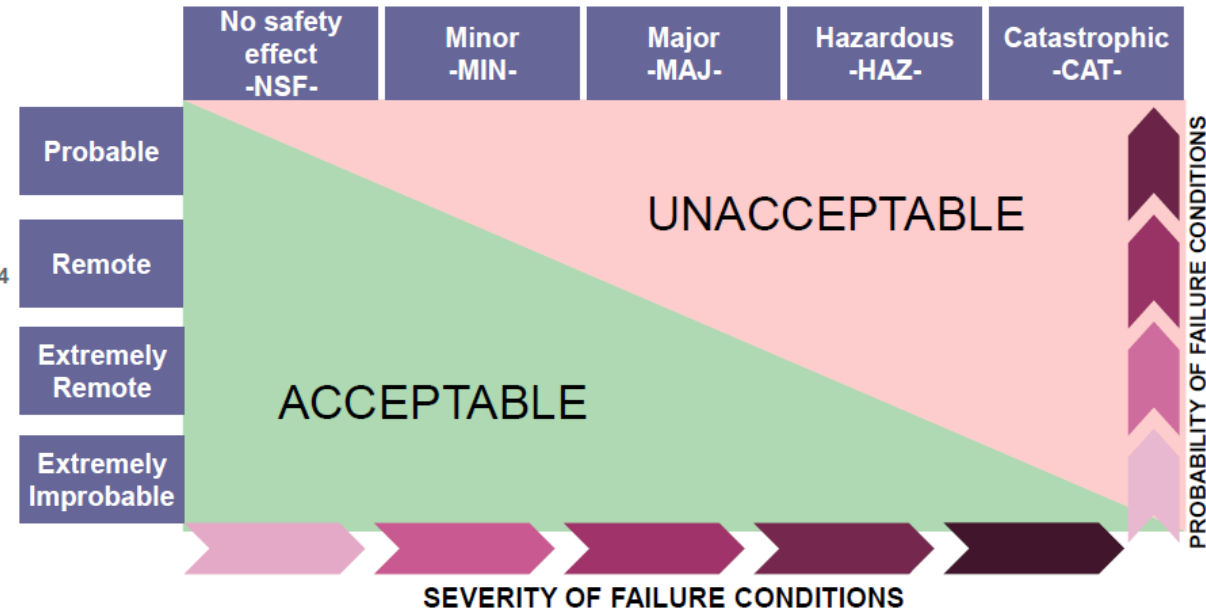


1. Introduction

System Safety Assessment

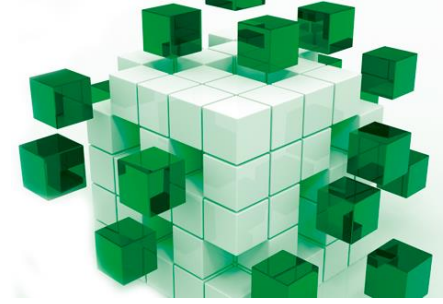


Source: Airbus – Commercial Aviation Accidents 1958-2014 – A Statistical Analysis

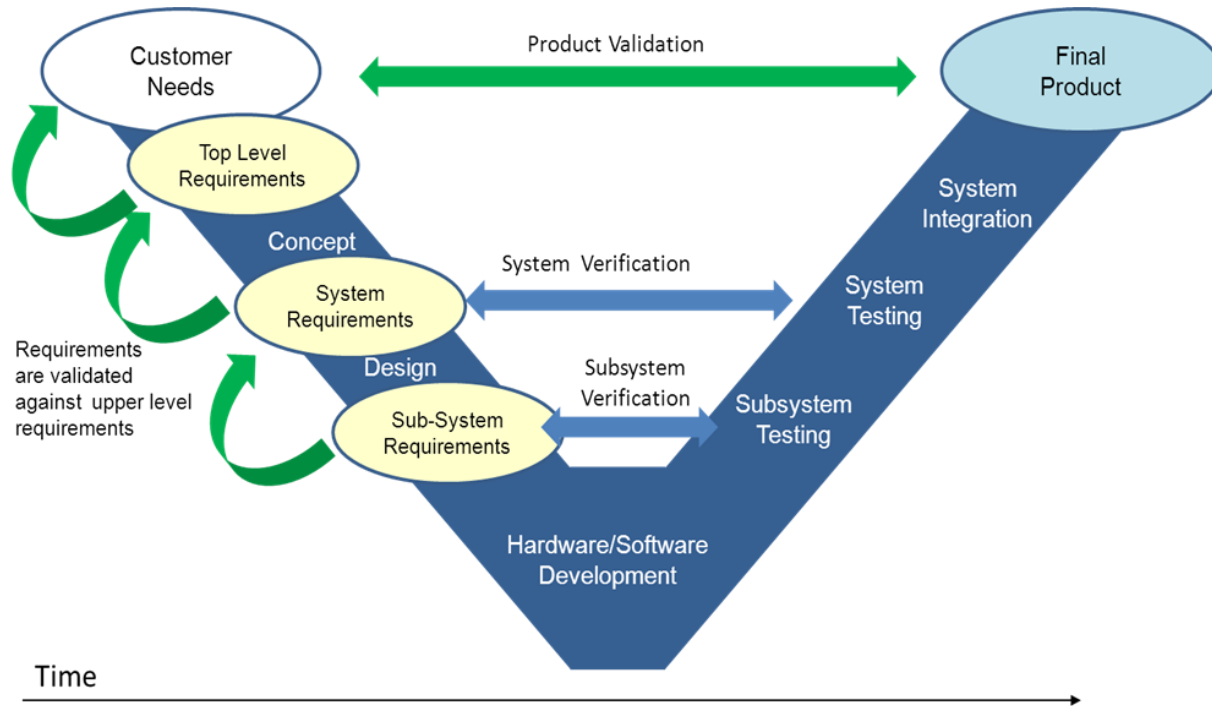


Source: Safety Assessment MASI

1. Introduction System Safety Assessment

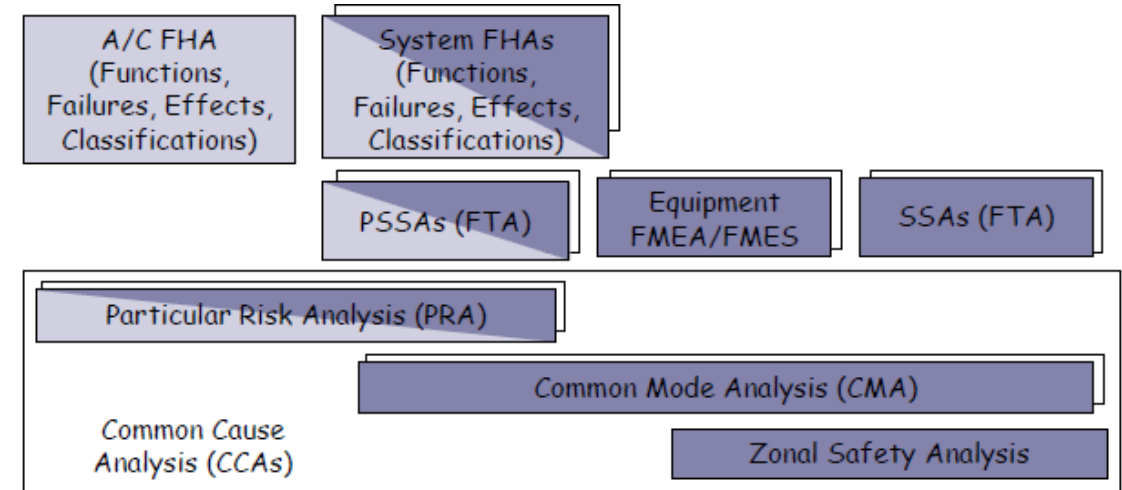


• SAE-ARP-4754

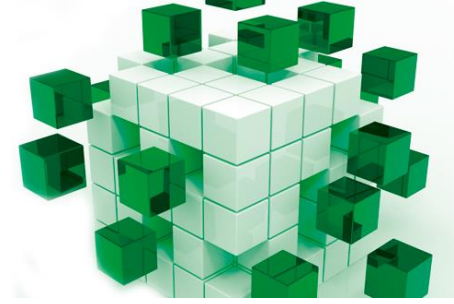


Source: www. sarel-consult.de

• SAE-ARP-4761



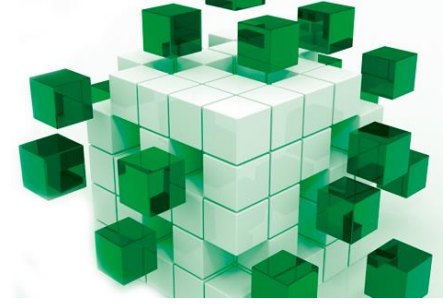
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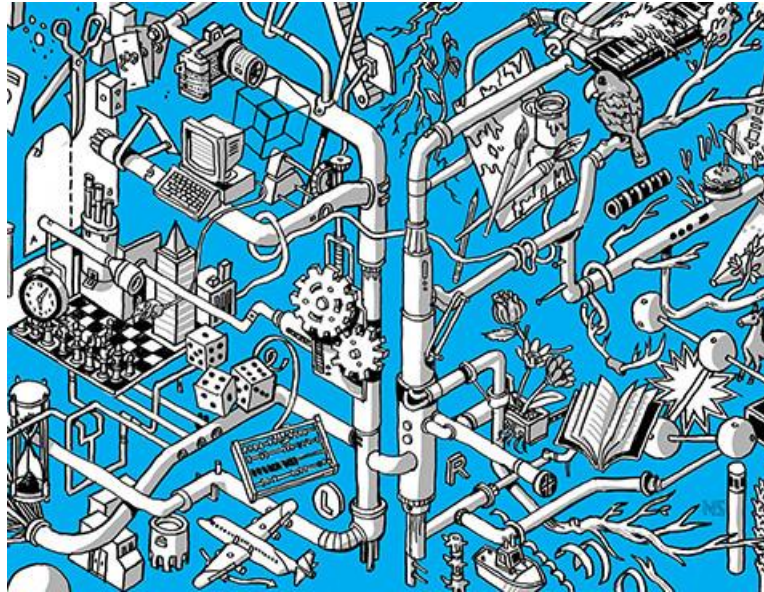
2. MBSA

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2. MBSA Why?



Classical Safety
Methods

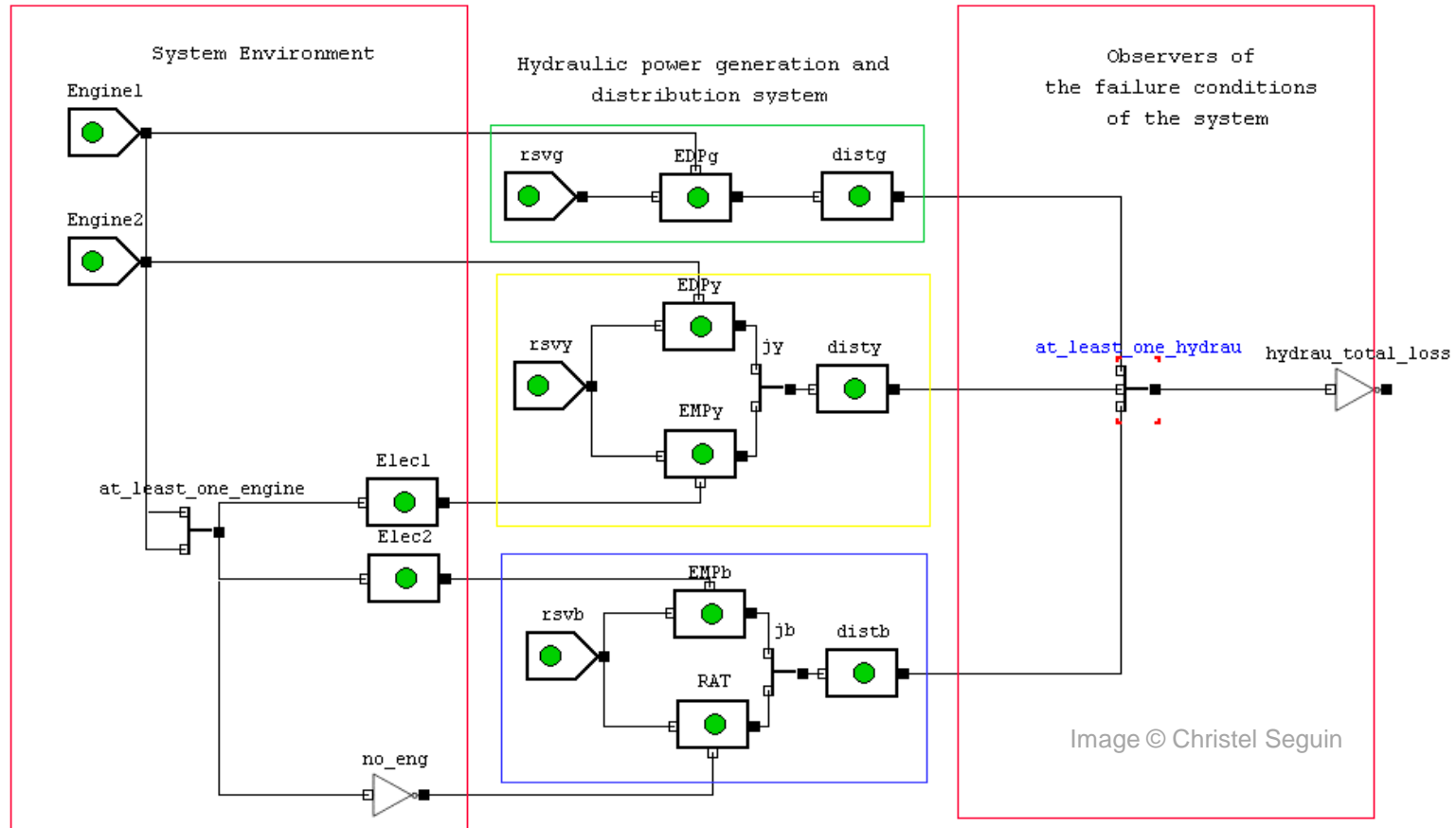
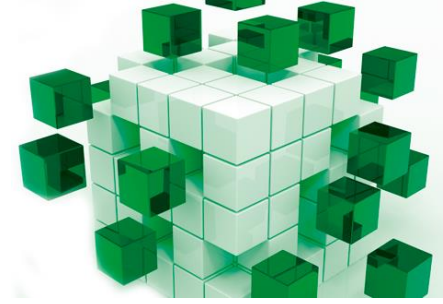


Complex Systems

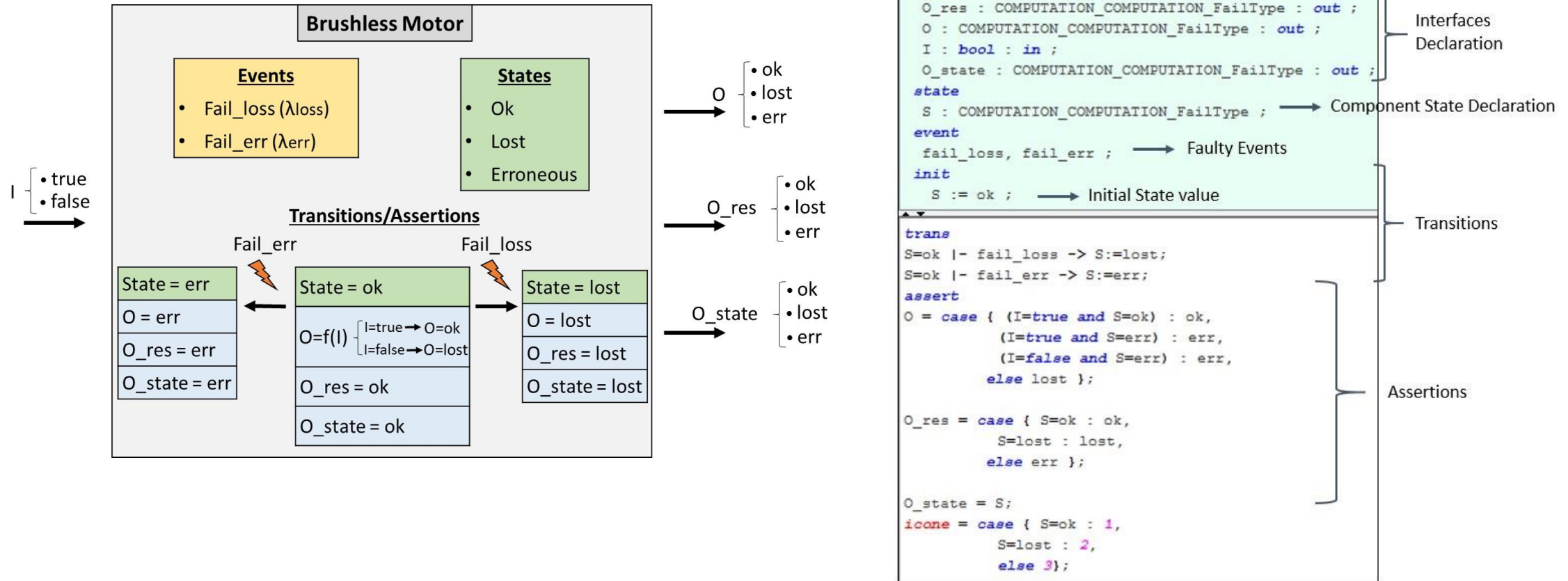
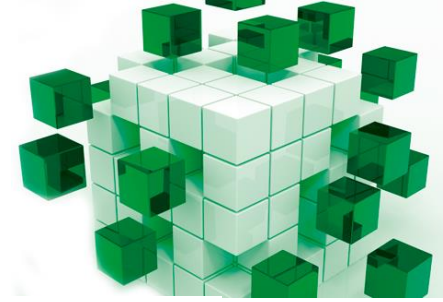


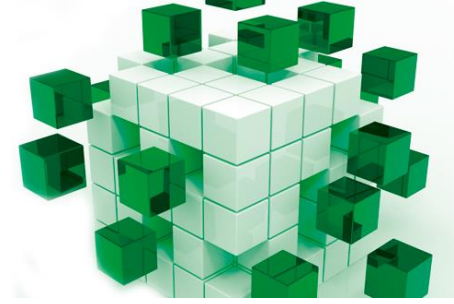
Model Based
Safety Analysis

2. MBSA What is?



2. MBSA Elements

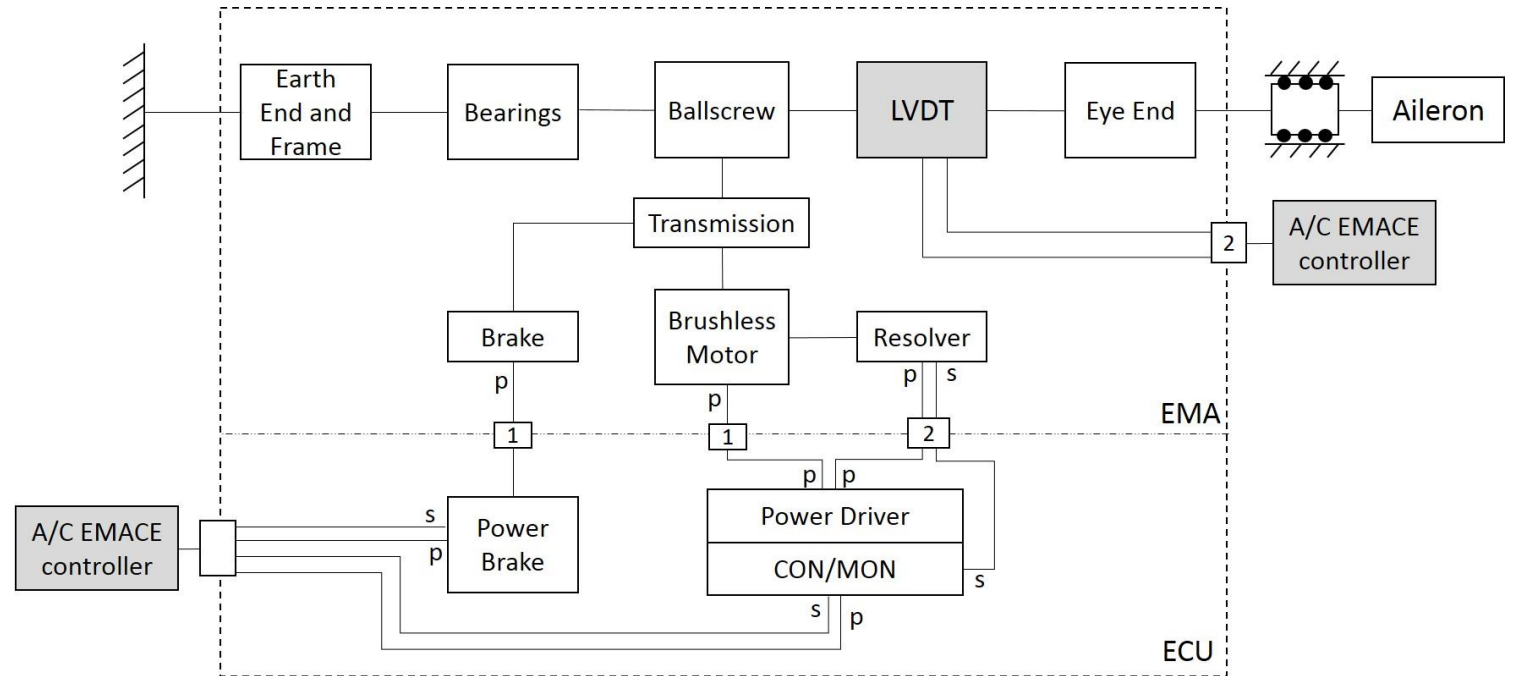
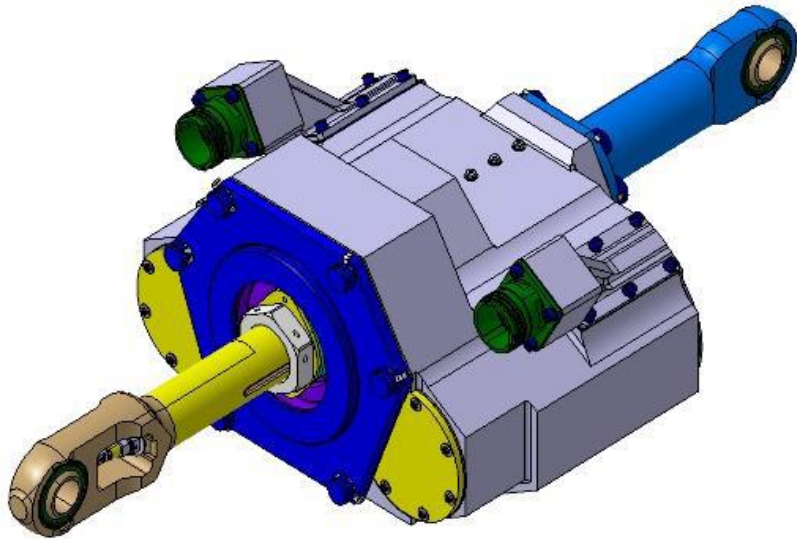
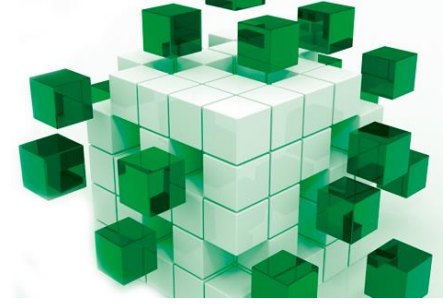




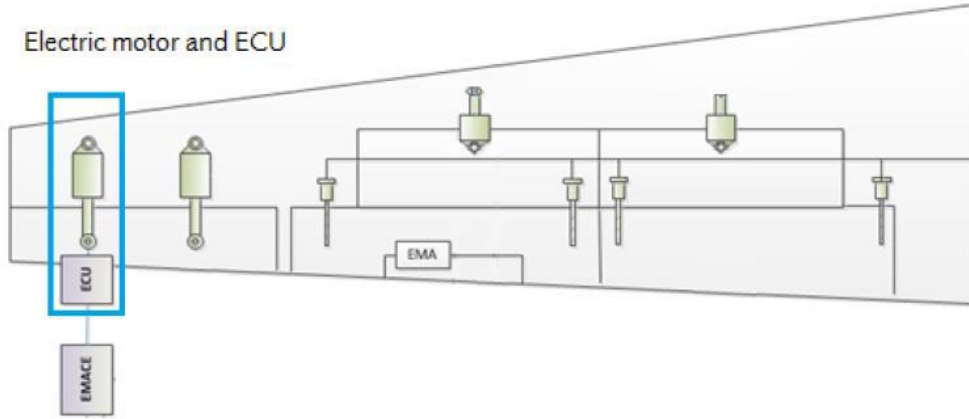
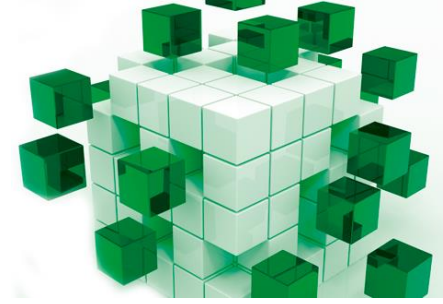
3. EMA for Aileron

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3. EMA for Aileron Functional Description

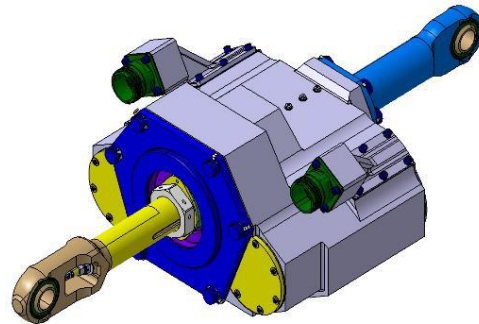


3. EMA for Aileron Failure Conditions



Aileron Runaway

Aileron Jamming



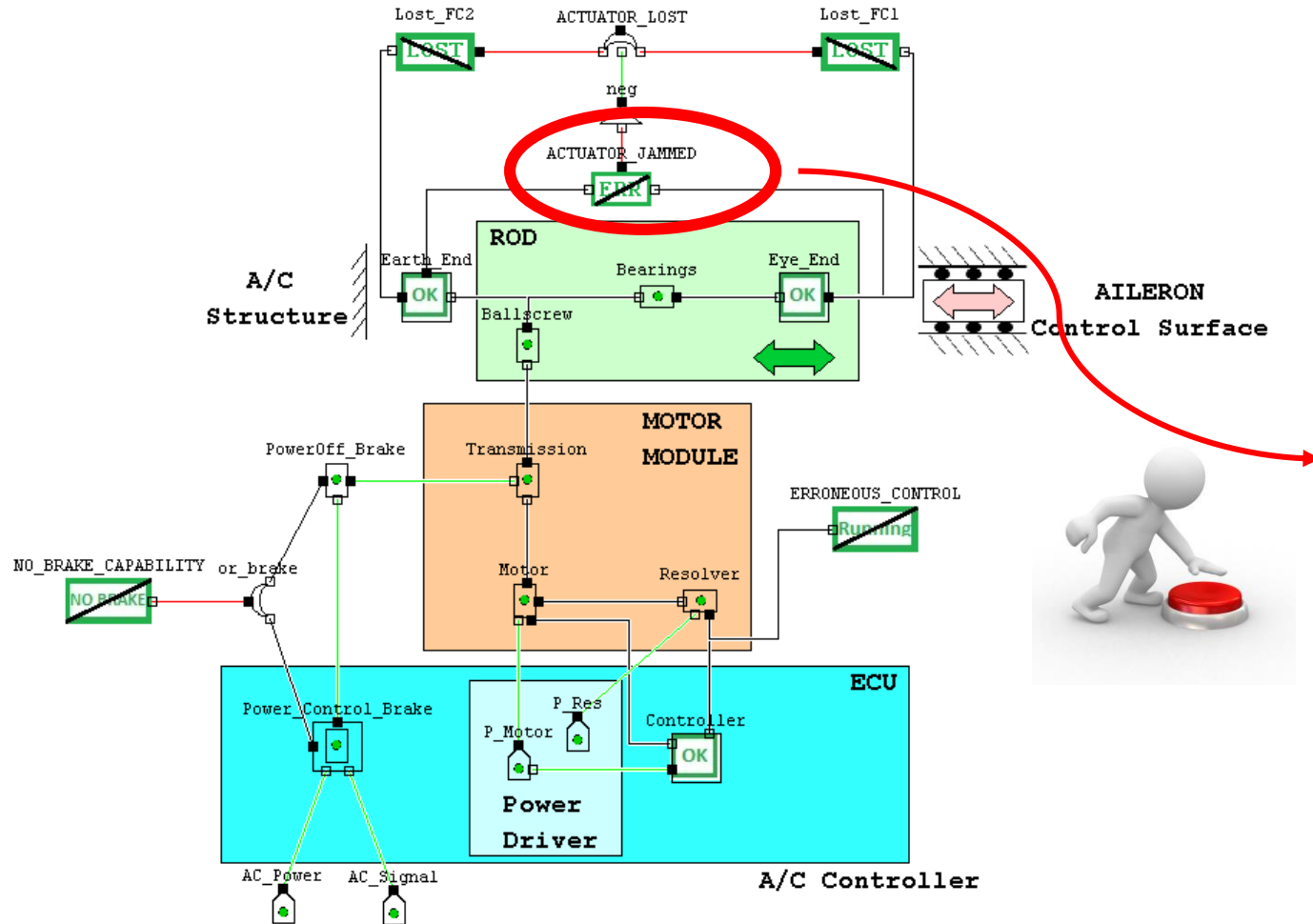
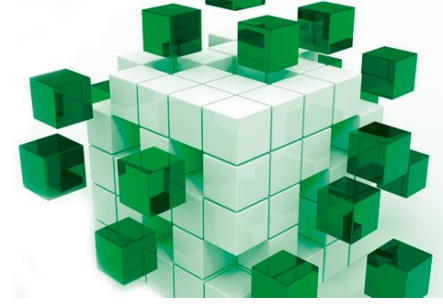
EMA Jamming



4. Application of MBSA for EMA Flight Controls

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4. MBSA for EMA Failure Conditions



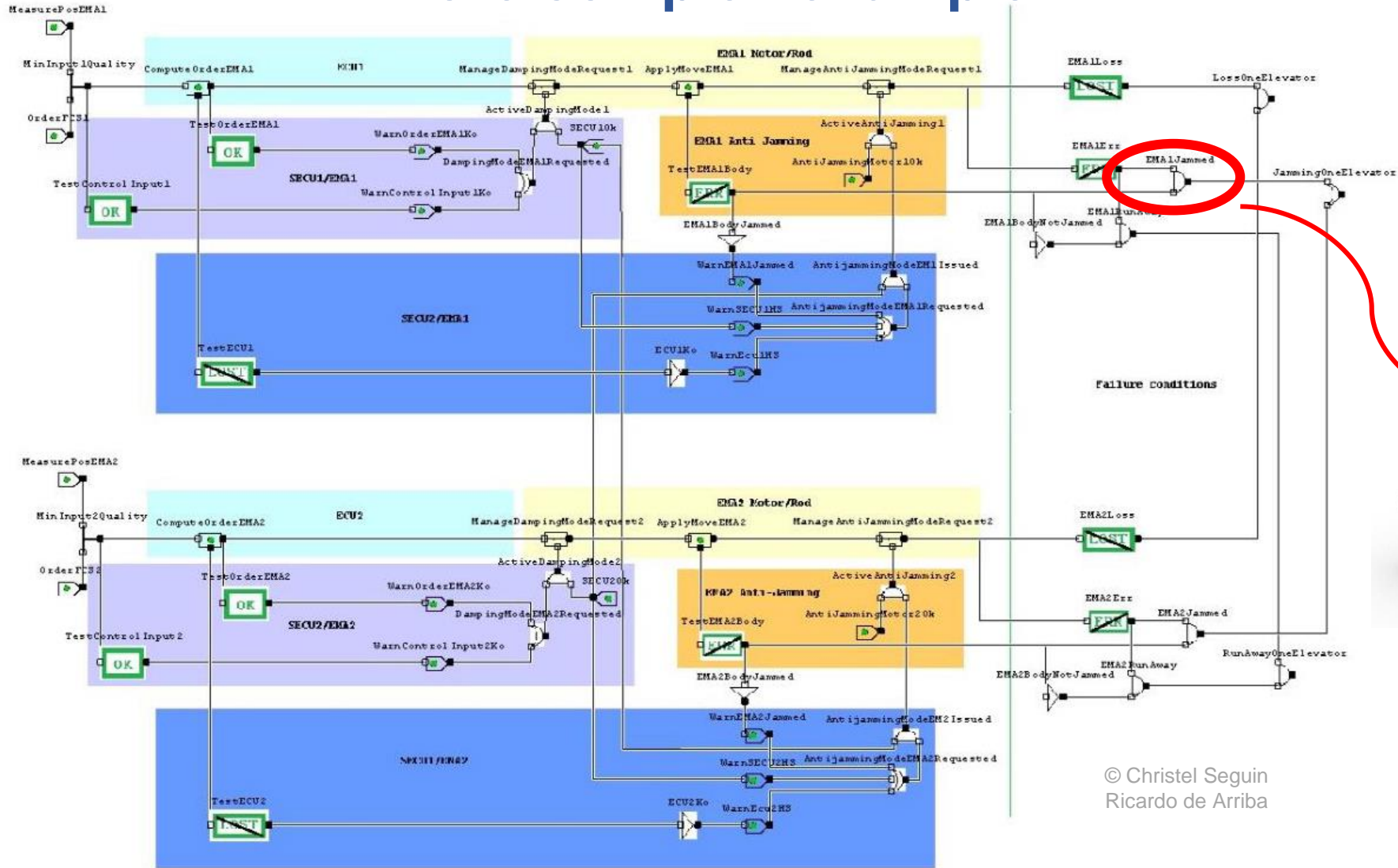
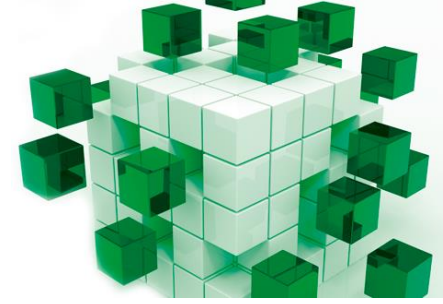
Actuator
jamming



- Ballscrew seized
- Bearings seized
- Motor rotor blocked
- Power control brake fail loss
- Power control brake fail erroneous
- Gearing seized

4. MBSA for EMA

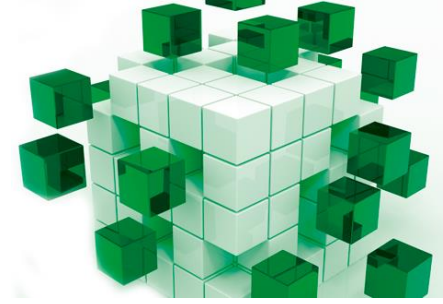
More complex example



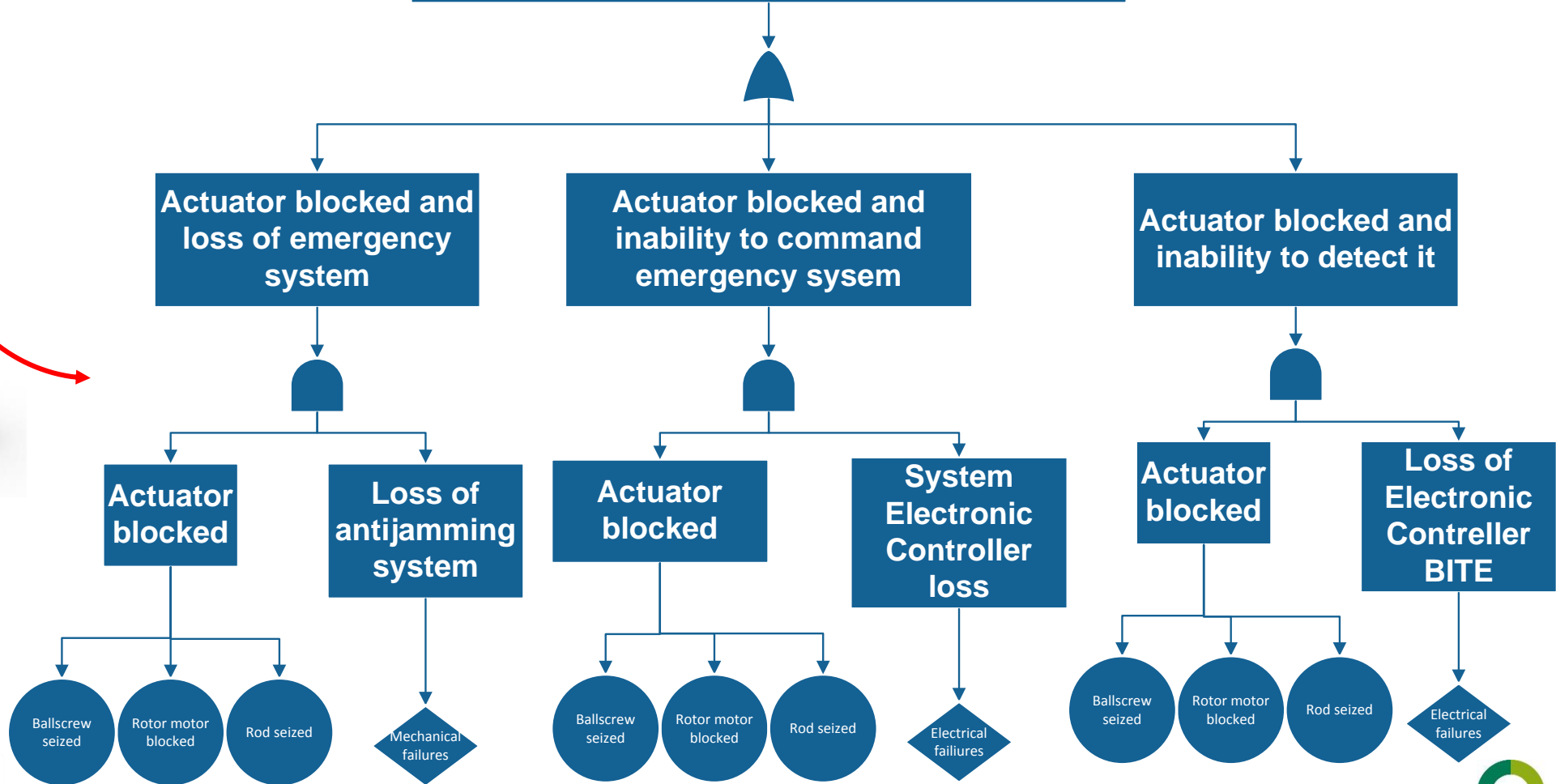
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Ricardo de Arriba

4. MBSA for EMA

More complex example



Jamming of Actuator n°1

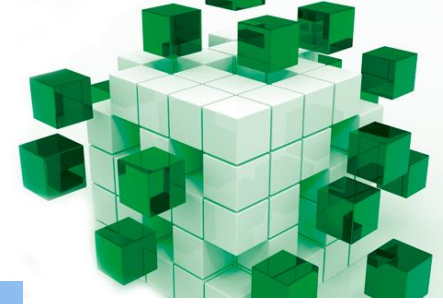




5. Conclusion

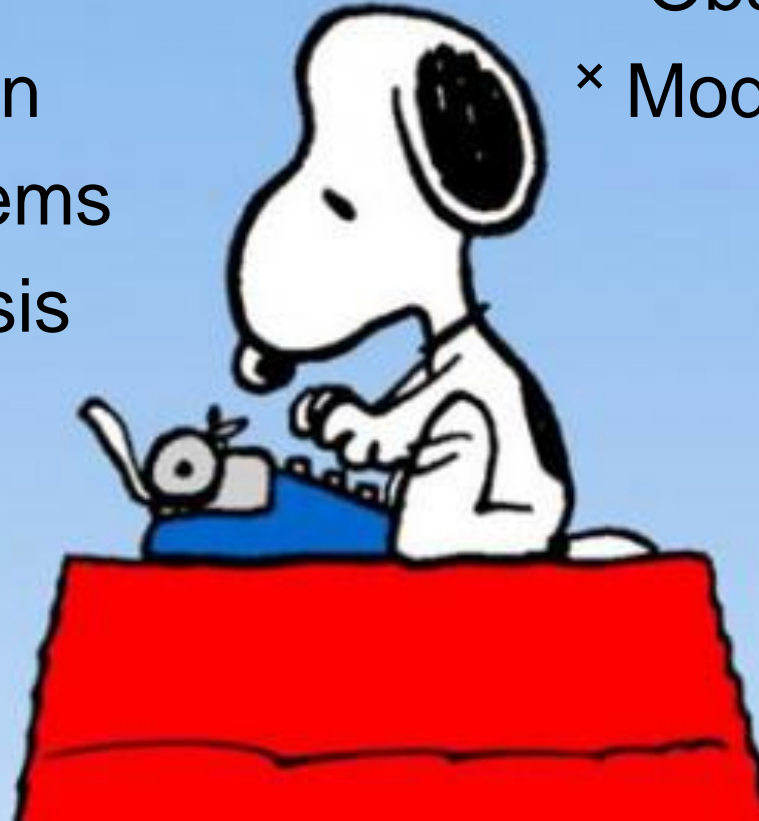
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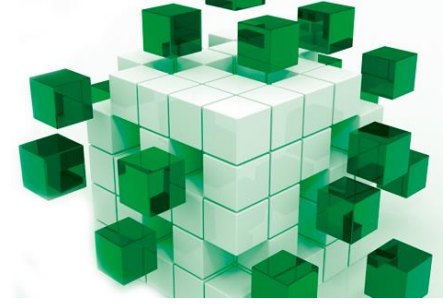
- ✓ Model shared
- ✓ Communication
- ✓ Complex systems
- ✓ Multiple analysis

- × Observers
- × Model verification



Source: www.clasesdrdu.wordpress.com

Acknowledgements



Thank you!

