



EASA
European Aviation Safety Agency

Software & Airborne Electronic Hardware Guidance Harmonisation with FAA



Guillaume Soudain
Software Senior Expert

Anne Sénéchal
Airborne Electronic Hardware
Senior Expert

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Presentation Guideline

- **EASA & FAA Harmonisation context & strategy**
- **Presentation of the resulting material**
 - Software guidance - **AMC 20-115D**
 - Airborne Electronic Hardware (AEH) guidance - **AMC 20-152A**
 - Open Problem Report management guidance - **AMC-OPR**
- **Benefits for certification projects & next steps**



EASA & FAA harmonisation - Context



- Supported by a joint ASD, AIA, and GAMA request, EASA and FAA started a joint harmonisation effort to:
 - Revisit the Software guidance
 - Increment AEH (Hardware) guidance
 - Create common OPR guidance with the goal of harmonizing their content as far as practicable.
- On EASA side this has been done under RMT.0643 (Regular update of AMC 20).



EASA & FAA harmonisation - Strategy

- **Working group with 3 major industry associations (ASD, GAMA and AIA)**
 - Drafting by EASA and FAA teams
 - Working sessions with industry to gather inputs/feedback/comments
 - Allowed to reach a good maturity before public consultation
 - Within a defined schedule.
- **Novel way of working for EASA and FAA : joint public comment phase**
 - Use of EASA CRT tool to gather common comments
 - EASA and FAA processed comments jointly to avoid misalignment until final publication.
- **Resulting in fully harmonised AMC and AC material**



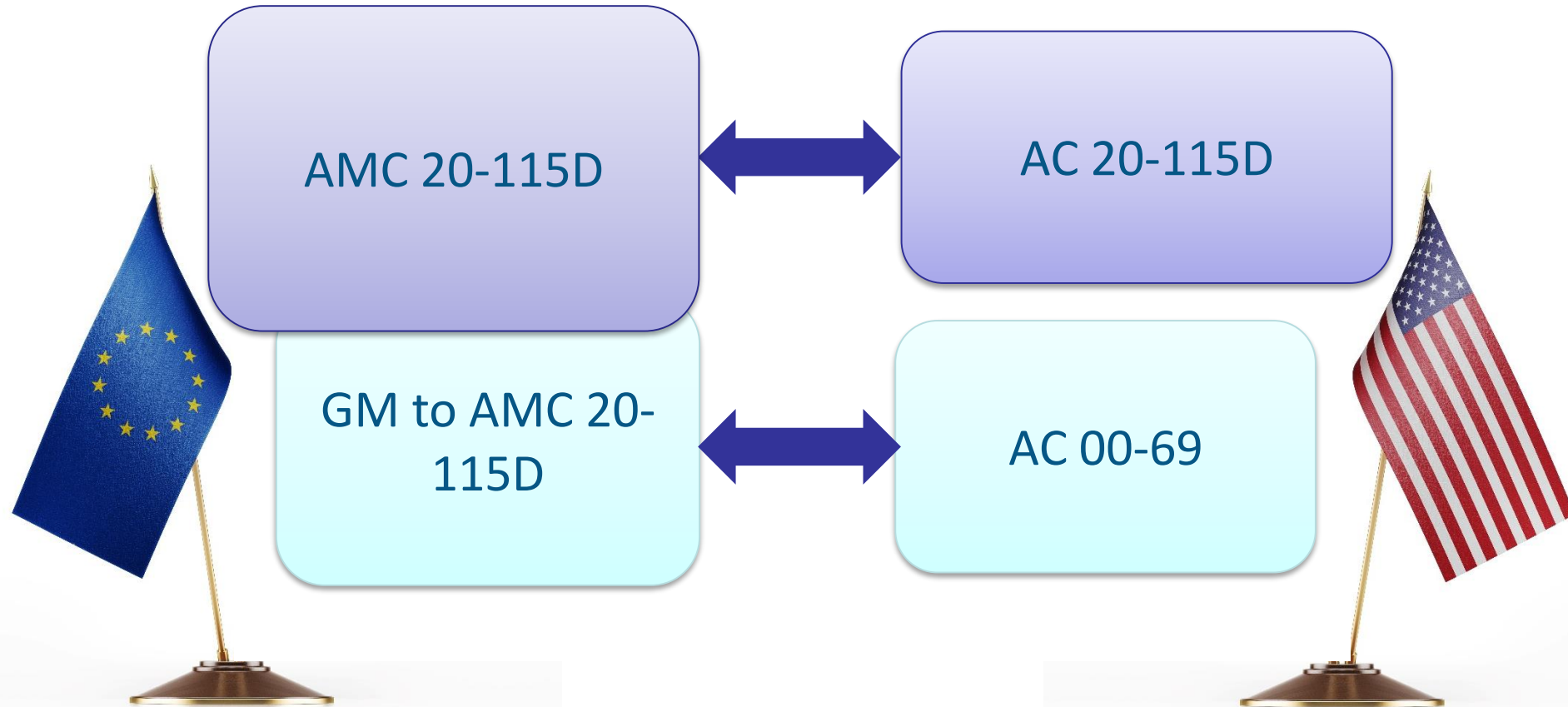


Software AMC 20-115D - Challenges

- Identical software standards ED-12C/DO-178C however...
- Differences between AC and AMC 20-115C triggered need for further harmonisation:
 - Different approach for using existing ED-12B/DO-178B processes
 - Different conditions when modifying/reusing previously approved Software
 - Differences in guidance for TSO and ETSO
 - Lack of guidance regarding tool qualification in AMC 20-115C.
- An additional challenge was the attempt to include all the necessary guidance in a “one-stop shop” AMC
 - In order to avoid raising CRIs on any known topics.



Software AMC 20-115D - Resulting Material





Software AMC 20-115D - Highlights

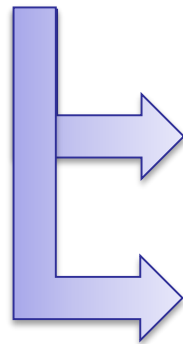
► Technical content of AMC 20-115D and AC 20-115D fully harmonised

Section 5 defines when existing ED-12B/DO-178B processes can be used for new development

Section 8 contains guidance for FLS* and UMS* as it applies to software developers

Section 9 harmonises conditions for developing legacy software using existing processes

Section 10 harmonises guidance on tool qualification



Allows use of ED-12C/DO-178C PDI* guidance with existing ED-12B/DO-178B processes

Allows use of MBD*, OOT*, or FM* for legacy development, provided processes were evaluated and found to be acceptable by EASA

(*) see slide 19



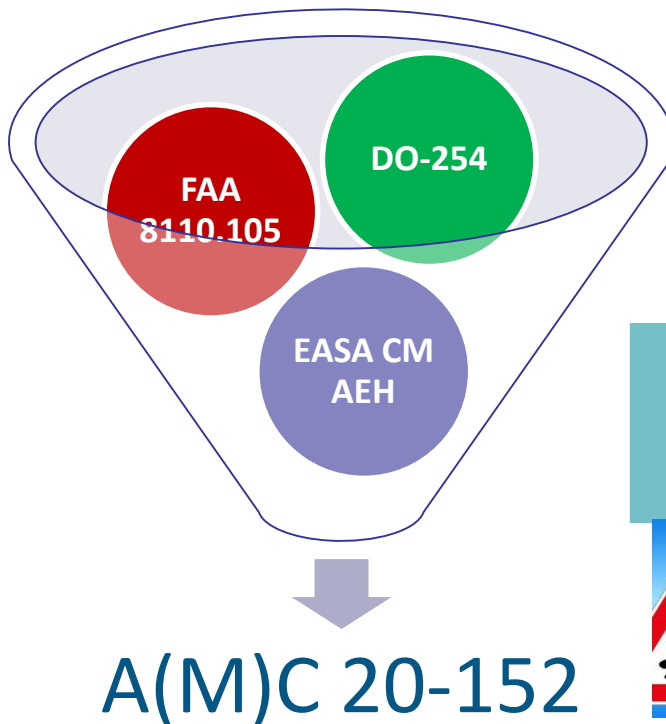
AEH AMC 20-152A - Context and Scope

➤ Context

- ED-80/DO-254 (year 2000) : good fundamentals but new challenges of hardware development assurance was supplemented by

- EASA Cert Memo, perceived as prescriptive

- FAA order 8110.105, intended for FAA personnel and not covering some topics as use of COTS device



➔ **FAA & EASA A(M)C 20-152A, a joint effort**





AEH AMC 20-152A - Chosen approach



➤ Streamlined guidance – Objectives oriented wording

- Focus on WHAT to achieve
- Allow industry flexibility on the HOW
- SMART Objectives :
Specific/Measurable/Achievable/Realistic/Tangible

➤ AMC 20-152 joint working group with EASA/FAA/industry

- 15 participants
- 1 year
- Intense discussionsbut constructive





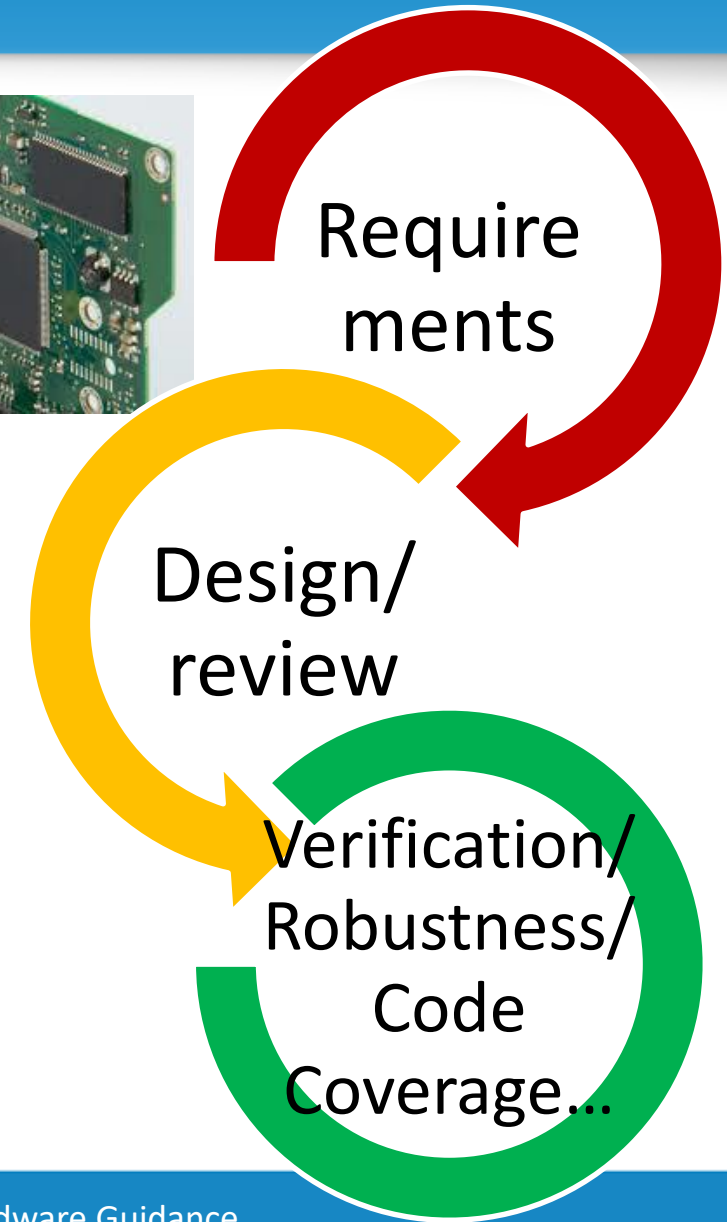
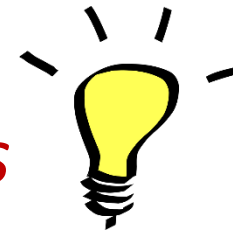
AEH AMC 20-152A - Highlights

- Development of custom devices
FPGA/PLD/ASIC
=developed by applicant/suppliers



- Recognize ED-80/DO-254
- Supplement ED-80 gaps with key objectives
focusing on programmable AEH + ASIC
- Simple \neq Complex

➔ *Objectives for clarifications*

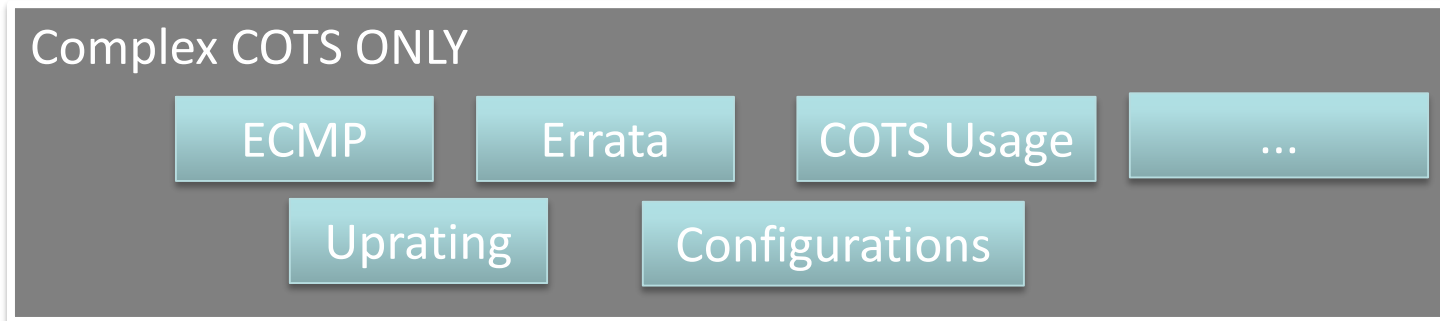




AEH AMC 20-152A - Highlights

➤ Use of COTS devices

- COTS devices = Commercial-Off-The-Shelf device fully developed by semi-conductor industry
- Focusing on usage aspects ...
- Topics of interest : only Complex COTS!



➔ *Guidance is now « objectives oriented »*

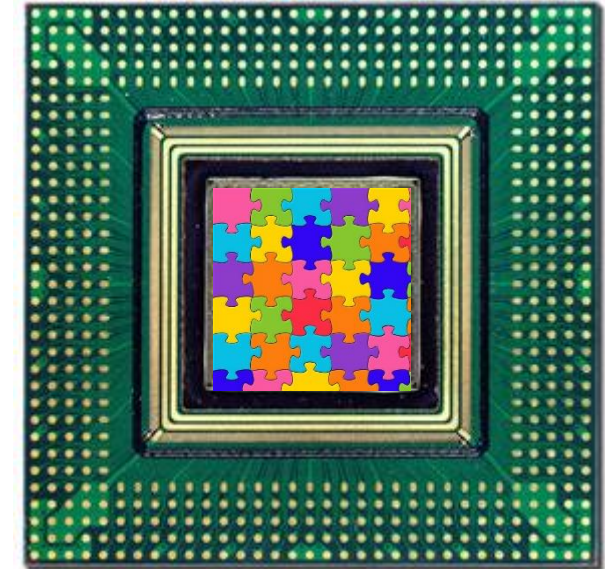


AEH AMC 20-152A - Highlights

...between COTS device and custom device

➤ Use of COTS Intellectual Property (COTS IP) in custom devices

- Commercial IP : piece of hardware are not developed according to ED-80/DO-254
- To be implemented inside custom device, design/implementation still to be completed



➔ *COTS IP objectives = Novel guidance !*



AMC 20-OPR - Background

- So far guidance for Open Problem Reports was not harmonised...
- AMC 20-OPR will provide guidance addressing simultaneously three domains: **System, Software and AEH**
 - Reference material include ARP4754A/ED-79A, DO-178C/ED-12C and DO-254/ED-80
 - Goal to create a stand-alone document, not implying the use of a given standard
- **Supporting inputs**
 - DO-248C/ED-94C DP#9
 - Lessons-learned from certification projects
 - GAMA report 15-63: « *Industry Recommendations on the management of Open Problem Reports* », October 14, 2015



AMC 20-OPR - Highlights

➤ Definition:

Open Problem Report (OPR) - A problem report that remains open at the time of approval.

➤ AMC 20-OPR planned contents in a nutshell:

Section 5 : PR management guidance

Minimal guidance fostering good practices in PR management



Section 6 : OPR management guidance

Minimum classification
scheme for OPRs

Assessment of OPRs

Disposition for
unmitigated 'Safety' OPRs

OPR reporting



EASA & FAA harmonisation - Benefits for projects

➤ Effects on current guidance

- AMC 20-115D replaces previous AMC-20-115C for projects with application date after 24.10.2017
- Existing Software/Hardware Certification Memo is/will be cancelled but remain available on the EASA website to further support existing projects

➤ Reduction in number of EASA Software and AEH CRIs

- No Software & AEH CRIs will be needed on top of AMC 20-115D/20-152A/OPR
- Only technological CRI at present time is the Multi-Core Processor (MCP)

➤ Benefits for validation projects

- AMC and AC materials are fully harmonised
 - Will reduce differences between Certification and Validation Authorities guidance
- However some differences expected at the installation level of (E)TSO equipment
 - AMCs will be applicable to ETSO projects from CS-ETSO → identical applicable guidance
 - ACs will be applicable to only new released FAA TSO



Outlook : next harmonisation steps

➤ Harmonisation of guidance material almost achieved

- AMC 20-115D has been published on 24th October 2017
- AMC 20-152A and AMC-OPR final drafts have been finalized
 - **Will be published together very soon**
 - For public consultation beginning of 2018
 - Final publication around mid 2018.





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Thank you for your attention!

Do not hesitate to raise questions in slido!

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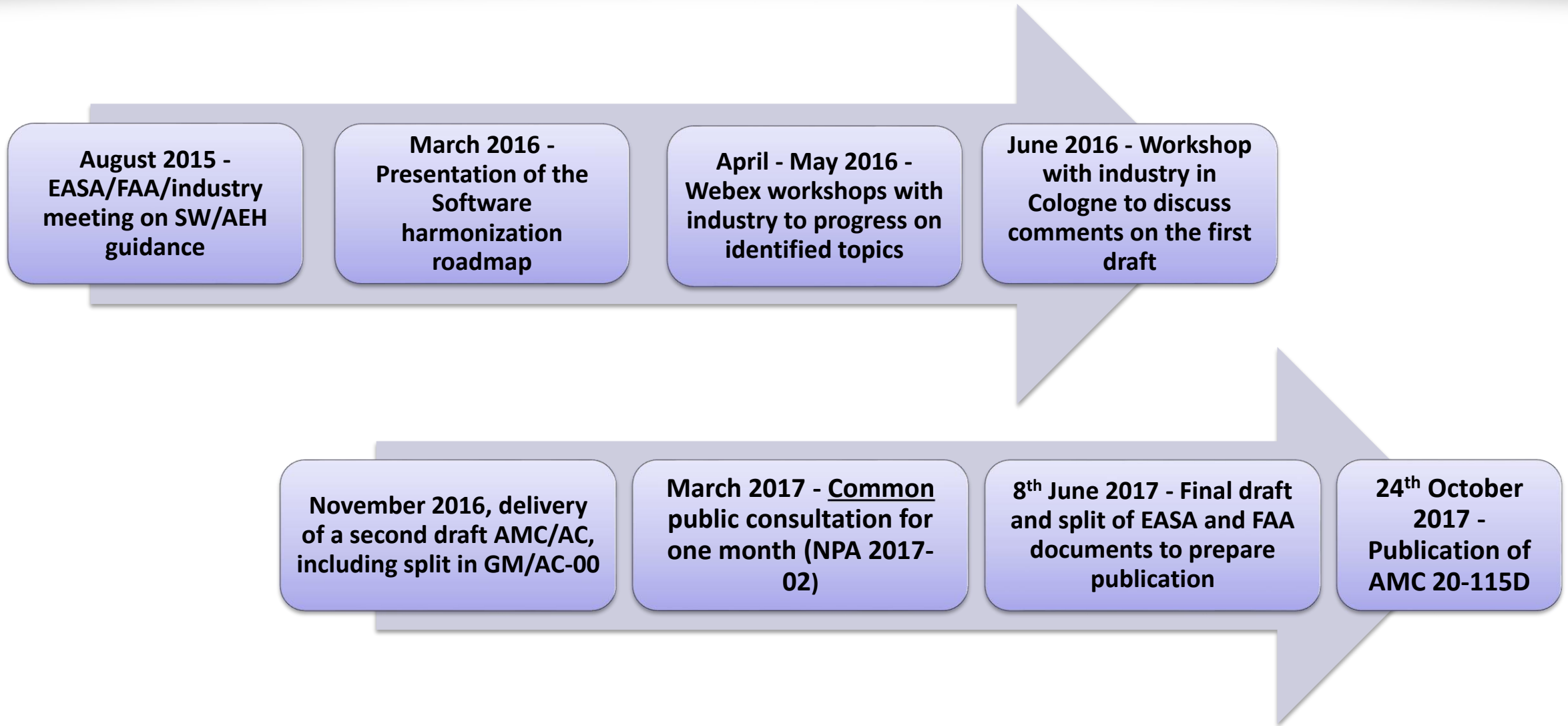
Some Software Abbreviations...

- FLS: Field Loadable Software
- FM: Formal Methods
- MBD: Model-Based Development
- OOT: Object Oriented Techniques
- UMS: User Modifiable Software





Software AMC 20-115D - Timeline





AMC 20-OPR - Timeline

