Interactive Guidance for Safety Critical Avionics

AET
AVIATION ENGINEERING TOOL

A partnership between

WIHM-Tech GmbH

cbp
cbprocess.de

BIBA

> visualizing certification contexts

> managing process complexity

> tracing project progress

> accelerating documentation issues

THE PROBLEM:

The following questions illustrate some challenges in designing and developing safety critical avionics.

What standards do I have to consider?

How can I become familiar with the relevant standards?

●─── Disoriented

Which processes do I need to follow?

How do I apply a standard appropriately?

●─── Confused

Which documents are mandatory for certification?

What do I do if there is more than one standard?

How do I ensure the quality of the documents?

How do I avoid preparing unnecessary documentation?

Do I have to issue documents formatted in a specific way?

Which tasks are assigned to me?

Which parts of the standards are relevant to me?

How can I ensure to keep my project on time?

Untrained ───●───

How do I avoid costly process errors?

Which documents do I have to create?

Uncertain ───●───

How can I easily produce the required documents?

What do I have to take into consideration if there is a new standard?

How do I know that there is a new standard?

THE SOLUTION:

The following screenshots show the AET during use.

INFO:

> Home screen of the AET which enables functional level selection.
> A functional level determines whether an aircraft function, system or equipment is going to be designed or developed.
> Requirements for a functional level arise from the next higher level.
> Navigation into a more detailed view occurs via smart-tags.

1. Functional Levels
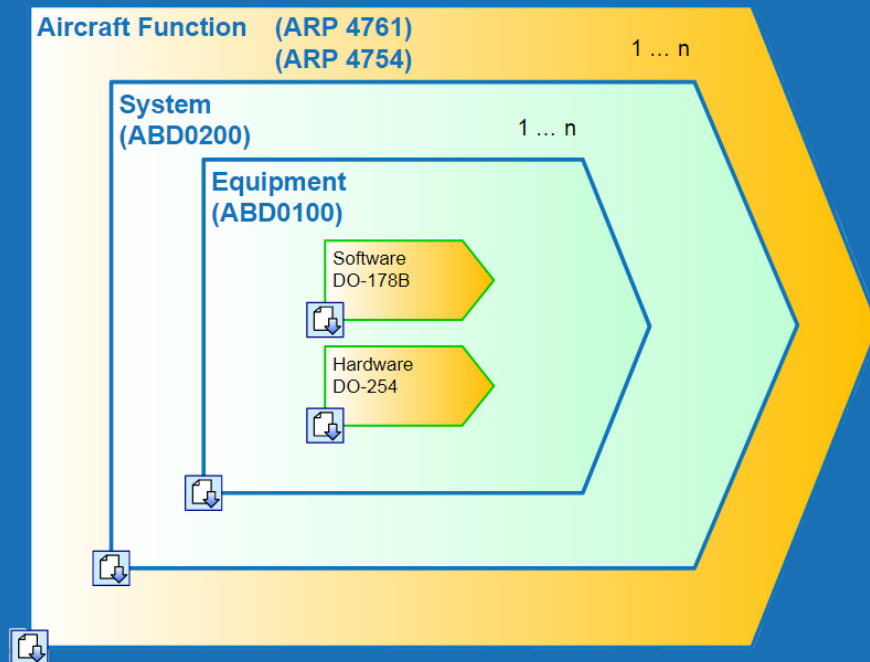
INTERNATIONAL STANDARDS AND SPECIFIC DIRECTIVES:

> ARP 4761 (Aerospace Recommended Practice): Guidelines for conducting an industry accepted safety assessment.
> ARP 4754 (Aerospace Recommendended Practice): Certification aspects of highly-integrated or complex systems installed on aircraft.
> ABD0200 (Airbus Directive): Special effort needed in the early phases of the system design process to produce products for use in Airbus aircraft.
> ABD0100 (Airbus Directive): General design requirements to be fulfilled by the suppliers of equipment for use in Airbus aircraft.
> DO-178B/C (Design Organisation): Aspects of airworthiness certification that pertain to the production of software for airborne systems and equipment used on aircraft or engines.
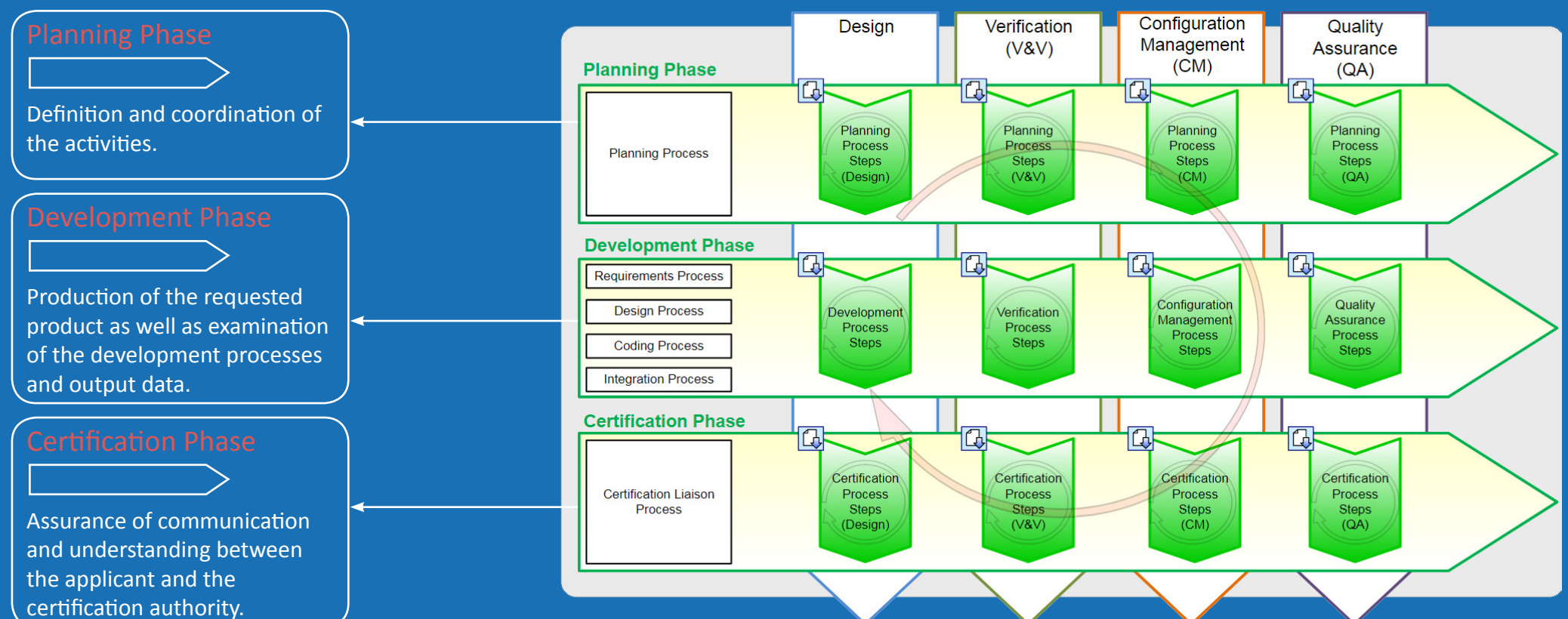> DO-254 (Design Organisation): Design assurance guidance for airborne electronic hardware.

INFO:

> A life cycle processes survey (roles and phases) which depends on the functional level selection.
> During the individual phases all processes are performed concurrently. The integral processes (V&V, CM and QA) depend on the development process (Design).
> Processes run iteratively depending on the transition criteria specified during the planning phase.

> The life cycle processes involve four roles: Design, Verification (V&V), Configuration Management (CM) and Quality Assurance (QA).
> The roles differ in their objectives, activities and documents.
> The life cycle processes of the roles V&V, CM and QA are called integral processes. Their purpose is to ensure the correctness (V&V), control (CM) and confidence (QA) of the Design processes and their outputs.

2. Life Cycle Processes

Planning Phase

Definition and coordination of the activities.

Development Phase

Production of the requested product as well as examination of the development processes and output data.

Certification Phase

Assurance of communication and understanding between the applicant and the certification authority.

THE SOLUTION:

The following screenshots show the AET during use.

INFO:

> The Process- and Activity-Workflow diagrams depend on the selected life cycle process.

> They are divided into blocks of columns which are composed according to their semantics.

> The two right-hand blocks of columns always refer the block of columns to their left. Relationships between the blocks of columns are represented by the position and colour of the elements.

> Most elements provide additional information in tooltips.

3. Process-Workflow
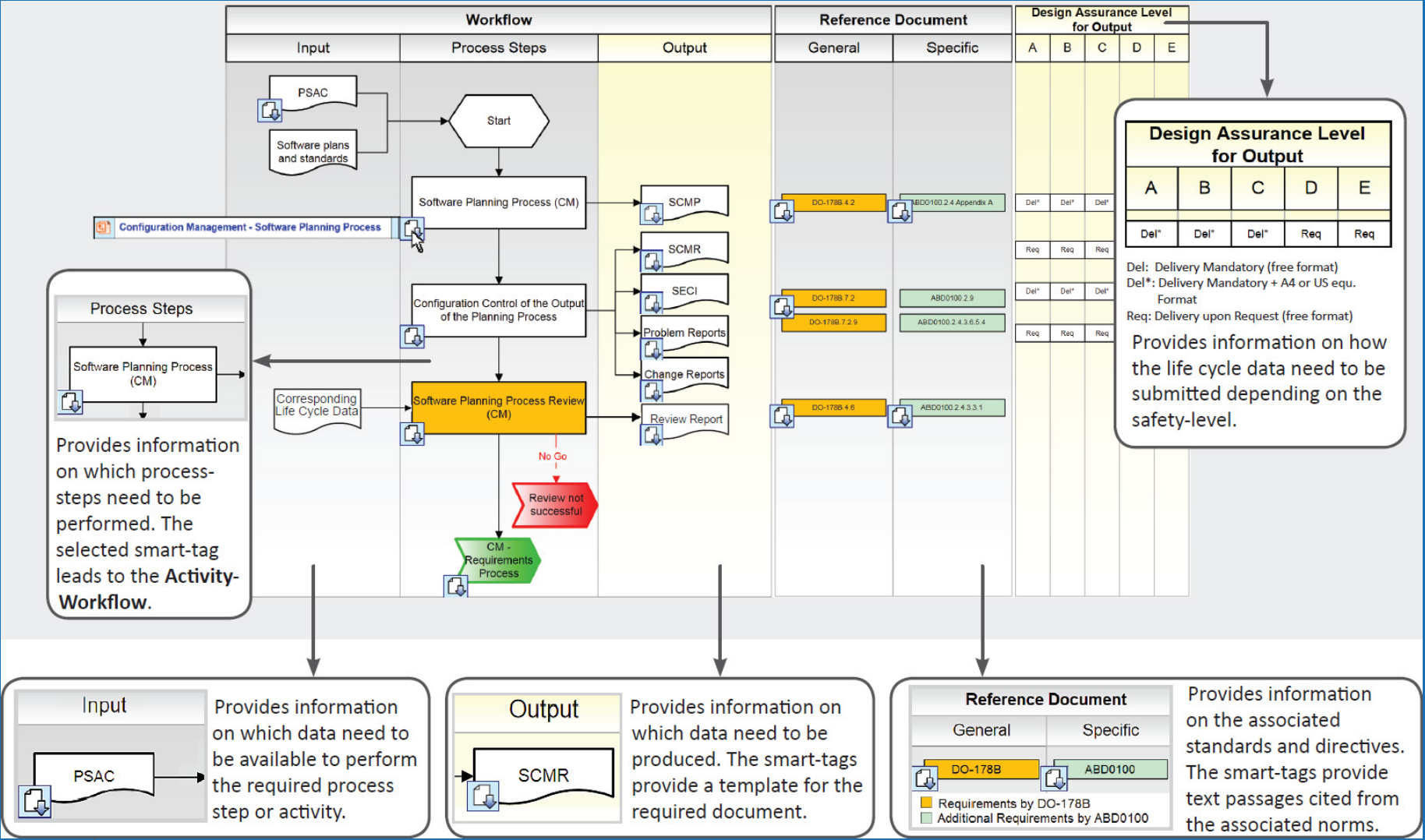
4. Activity-Workflow
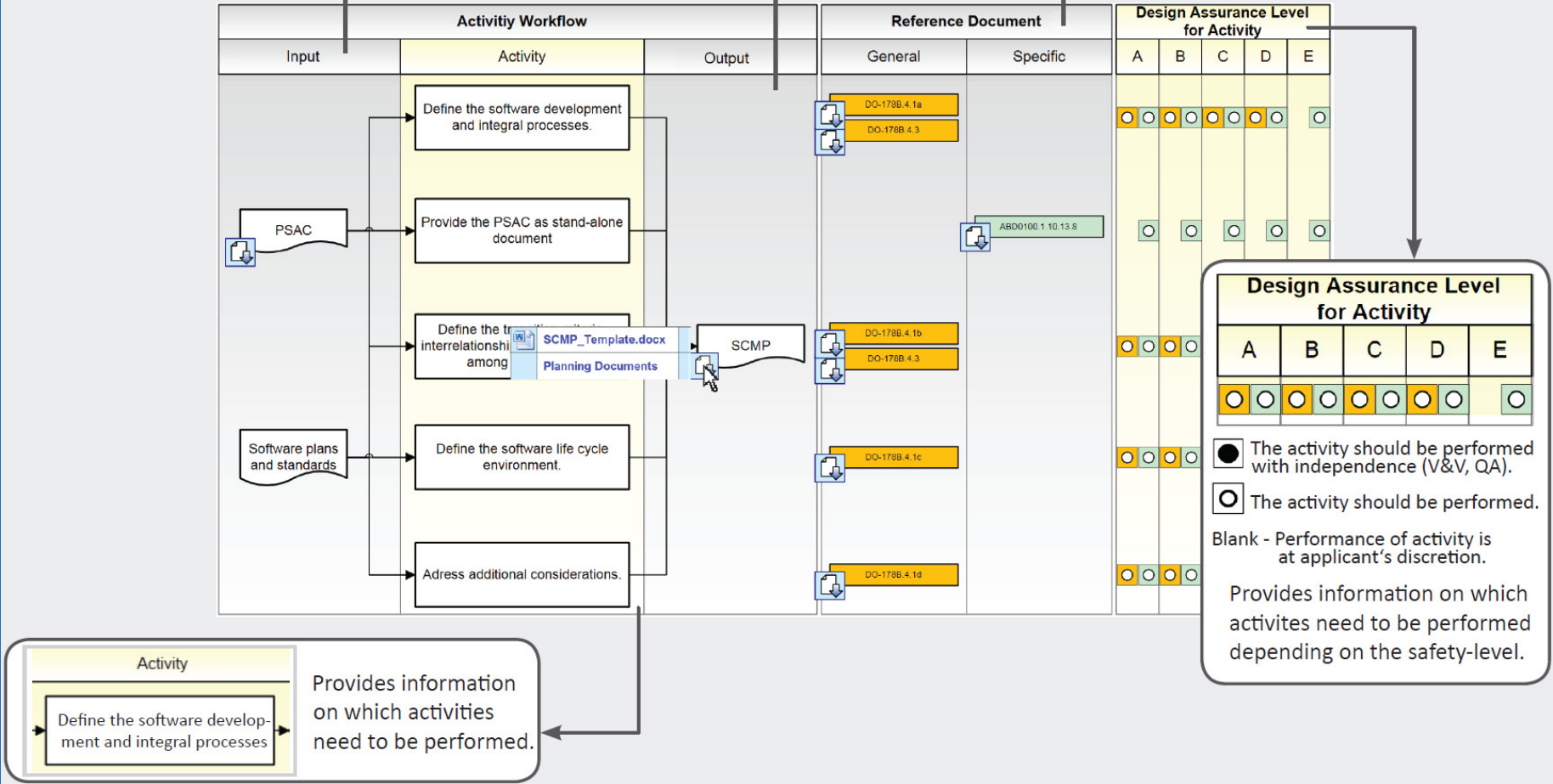
ADVANTAGES:

The AET...

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> offers additional, custom-fit information for designing and developing safety critical avionics.

> tells the user what he has to do at every process-step.

> enables autonomous familiarization with avionics certification.

> hides all irrelevant information from the user.

> provides best practices.

> visualizes complex processes, simplifies correlations and helps the user to stay orientated.

> guides the user precisely through the life cycle processes via step-by-step instructions.

> ensures that all assigned tasks can be executed in time.

> deals with both international standards as well as specific directives.

> prescribes which documents have to be produced in which sequence and at which moment.

> distinguishes between mandatory and optional documents.

> supports the preparation of documents via tailored templates.

> improves documentation quality.

> knows which format certification documents must have.

> helps prevent too much documentation.

> is constantly updated.

> makes alterations to the standards transparent.

> reduces time and costs of certifying avionics.

Guided

Skilled

Focused

Assured
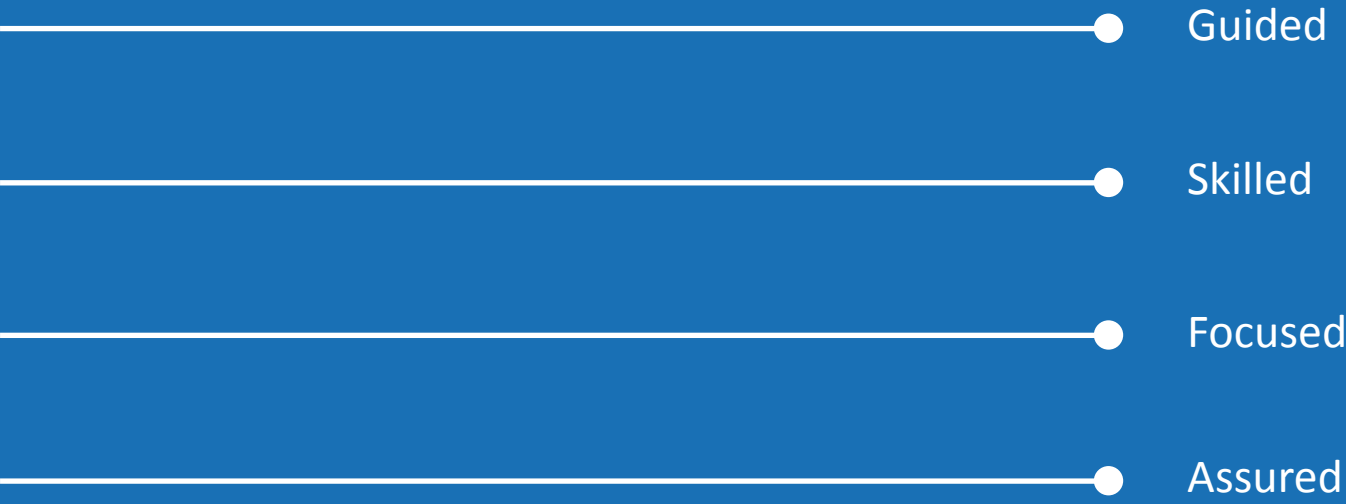
THE AET:

The Aviation Engineering Tool guides users through the planning, development and certification phase of avionics engineering. In these phases, users have to follow a number of prescribed lifecycle processes in order to follow standards of avionics design and development and comply with airworthiness requirements. The AET gives an overview of all these processes in consideration of international standards like DO-178B and DO-254 as well as specific directives such as ABD 100 and ABD 200. It makes them convenient via step-by-step instructions. It provides additional information and custom-fit assistance for every process step and activity. The AET manages multiple roles – Design, Verification (V&V), Configuration Management (CM), Quality Assurance (QA) – and solves both general and role-specific user questions.

The AET includes
> objectives for lifecycle processes,
> descriptions of process steps and activities for achieving those objectives,
> mechanisms for progress monitoring as well as
> templates for the preparation of the required lifecycle documents.

The AET is likewise suitable for OEMs and SMEs. The AET is designed as a complement to existing engineering solutions and can easily be adapted to individual customer needs.

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