

Biased Industry Perspective on Basic and
Applied Research.
*Experiences from a PhD on Magnetism in an
Engineering World.*

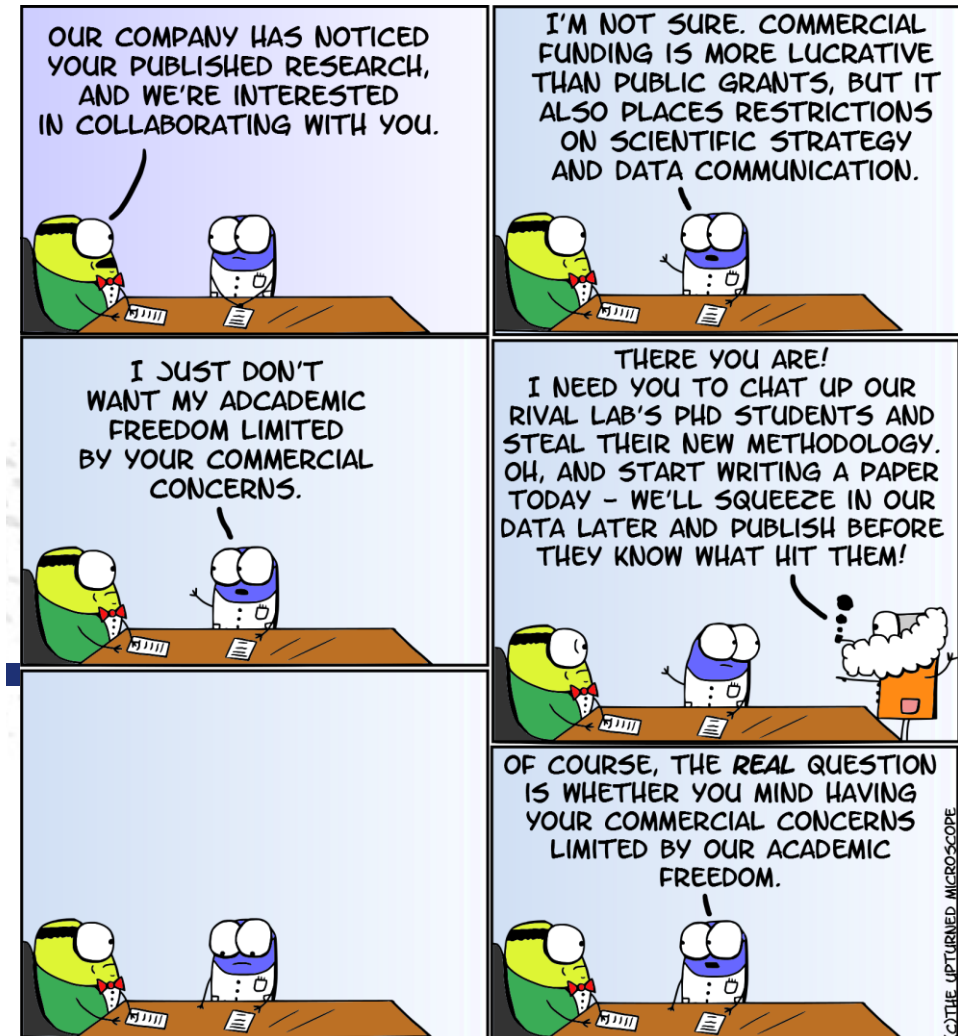
TEA-T-PR-180031, Issue A

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AIRBUS DEFENCE AND SPACE. 25/09/2018
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EXECUTIVE SUMMARY

PRESENT TALK is aimed at:

- Highlighting career paths BEYOND academic research institutions (*Universities, Research Centers...*),
- Providing a frame for actual needs on research from industrial companies (*Added-values...*)
- Offering a subjective view on engineering scope of projects and research (*cost & schedule implementable results or burst*)
- Helping decide yourself whether it is worth giving a try to applied research (*hopefully*)
- Fostering discussion on desirable relationship between research institutions and industrial companies.



CONTENTS

- Brief CV presentation.
- Doctoral Thesis finished. *PhD at the crossroads.*
- Decision-making. Airbus interests and personal situation. *Lucky non-void intersection.*

- **AIRBUS.** *Engineers at work: Make it Fly.*
- Research at the Industry. *Strategy-driven activities.*
- Daily work at the company. *Project after project.*
- Working for **AIRBUS.** *Career progression.*
- **Expert Role.** *Company response to safeguard technical knowledge.*
- **Well-being** aspects. *Personal development.*
- Some research results, mentoring, normative creation and lectures. *Applied Expertise.*

- **INITIAL Conclusions.** *What is missed ? What is gained ?*
- **FINAL Conclusions.** *Future is being built everyday and everywhere.*

BRIEF CV Presentation. *Problem Enunciation*

- *García Gómez, David. 47 years-old.*

- *Professional Experience:*

- *Actual Position: Expert in EMH Protection of Aircrafts* After Doctorate (AD)
- *AIRBUS. Defence and Space Division. (2001-onwards)*
- *UCM. Technical researcher on railway EMC characterization. (2000)*

- *Education:*

- *IESE Business School. “Airbus Military Development Program”. VIVERO* After Doctorate (AD)
- *Doctor in Materials Physics (UCM-Madrid 2000). Graduated in Fundamental Physics (UCM-Madrid 1994)*

- *Pre-doctoral research activities:*

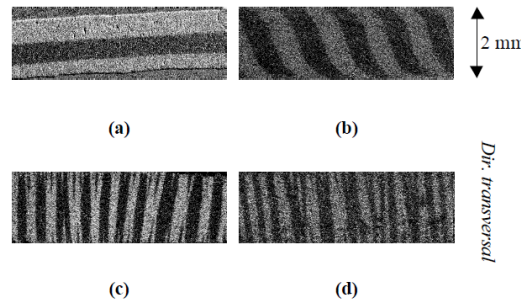
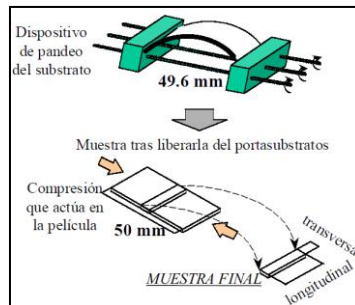
- *Doctoral Thesis. Extraordinary Award. “Magnetic Anisotropies in thin films and ferromagnetic/ferromagnetic multilayers grown by sputtering”. June 2000.*
- *1 patent approved. 32 refereed papers including: 3 Physical Review B, 3 Applied Physics Letters and 5 Journal of Applied Physics*
- *Elaboration of Procedure & Testing of Radiated EM Emissions of High-Speed Railway Madrid-Sevilla.*
- *Project: “Magnetic Integrated Circuits”. Funded by: EU (Esprit)*
- *Project: “Analysis of Magnetic perturbations generated by Madrid L7 Subway under Hospital Clínico de Madrid”. Mitigations of interferences based on personal proposal on minimizing magnetic loop in electrical power of subway line.*

Doctoral Thesis Finished. *PhD at the crossroads*

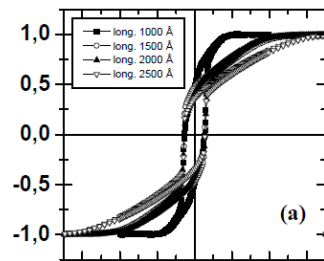
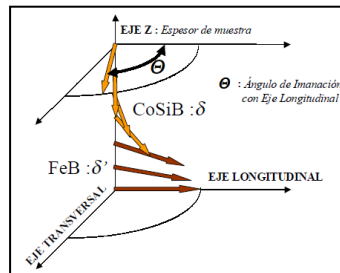
- Thesis dealt with:*

- Magnetic Anisotropies induced by thermal and/or stress treatments.*

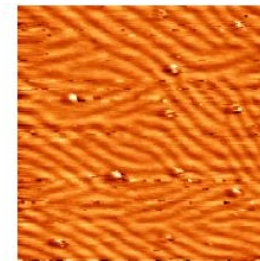
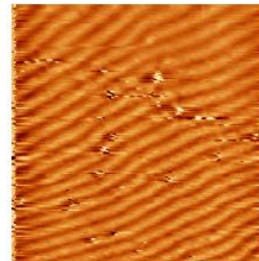
- ...In $\text{Co}_{76}\text{Fe}_4\text{B}_{20}$.*



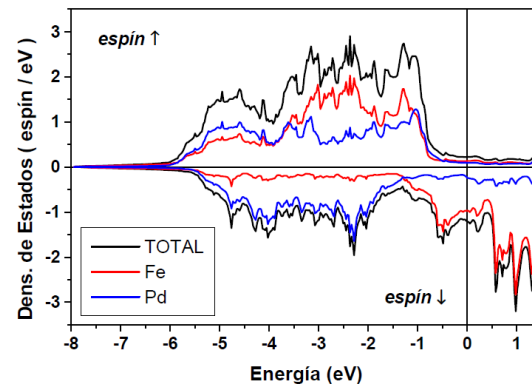
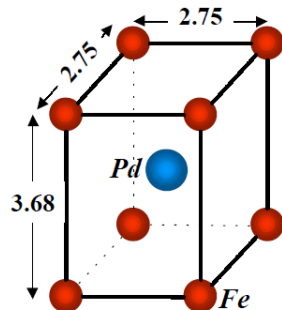
- ...In $\text{Co}_{75}\text{Si}_{15}\text{B}_{10}/\text{Fe}_{80}\text{B}_{20}$ multilayers. Weak-stripes. *M* component normal*



5.5 kA/m



- Calculated magneto-cristalline anisotropy in $\text{In Fe}_{50}\text{Pd}_{50}$ ordered alloy. Some Pd magnetic polarization*



ANISOTROPÍA MAGNETOCRISTALIN A (MJ/m ³)	Error (MJ/m ³)
1.10	0.16



Decision-Making. Airbus interests and personal situation. Lucky non-void intersection

- *Period spent on Doctorate has been the most joyful years on my professional life.*
- *People, interests, challenges, fun, travels... created an unique moment.*
- *But once Thesis was finished, uncertainty grew and a decision about future was required.*
- *At that moment a very pessimistic forecast on reaching academic research career was perceived.*
- *No clear post-doctoral positions were at stage.*
- *Personal feeling of being fed up with non-correlation of academic merits with actual attainment of academic positions,*
- *Only hope of jumping from one temporary contract to another in the near future.*
- *Henceforth, I decided to try on the industrial world.*
- *I found out that PhDs were not extremely interesting for Industry “per se”. Deep specialization narrows significantly the job market.*
- *IN FACT, I was contracted in AIRBUS just due to a line in my CV dealing with some EM Radiation Testing we performed in a HIGH SPEED TRAIN LINE at that moment (MADRID-SEVILLE).*

AIRBUS. *Engineers at work: Make it Fly*

- **AIRBUS.** Presentation and Key Figures.
- Largest European-based Aeronautics and Space Company.
- Manufacturing Aircrafts, Helicopters, Satellites, Launchers, Electronics, Security Solutions and Related Services for Civil and Military markets.
- Workforce: 130.000 employees. 130 different nationalities and over 20 languages spoken in the company.
- World presence: 180 Locations spread all over the globe. Final Assembly Lines in Europe, America and Asia.



10,926
Aircraft delivered

to airlines worldwide as per end of December 2017



Around
12,000
Helicopters

operated by approximately 3,000 customers



2nd
Largest

space company in the world and top 10 defence company



€3bn
Self-financed R&D

in 2016: a major global innovator



25%
Reduction in CO2 emissions

by the A350 XWB



37,000
Patents

held by Airbus worldwide

Source: www.airbus.com

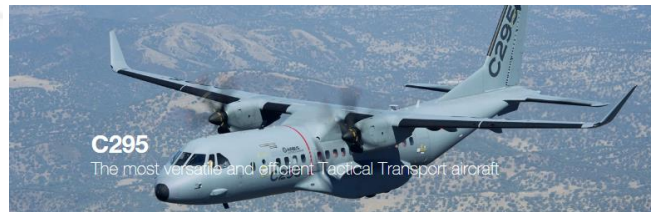
AIRBUS. *Engineers at work: Make it Fly*

- **Portfolio. Commercial Aircrafts**



- Plus corporate jets and freighter aircrafts

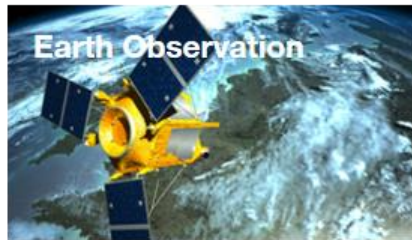
- **Portfolio. Defence**



- Plus secure communications, security solutions and intelligence systems.

AIRBUS. *Engineers at work: Make it Fly*

- Portfolio. Space



- Portfolio. Helicopters



- With a wide variety of solutions for civil and military markets.

AIRBUS. *Engineers at work: Make it Fly*

- Business Figures#1. Consolidated Revenues (and R&D expenditure)**

(in €m)	Year ended 31 December 2017	Year ended 31 December 2016	Year ended 31 December 2015
Airbus Commercial Aircraft	50,958	49,237	45,854
Airbus Helicopters	6,450	6,652	6,786
Airbus Defence and Space	10,804	11,854	13,080
Total Divisional revenues	68,212	67,743	65,720
Other / HQ / Consolidation	(1,445)	(1,162)	(1,270)
Total	66,767	66,581	64,450
Research and development expenses	(2,807)	(2,970)	(3,460)

- Business Figures#2. EBIT (and Taxes & Profit)**

(in €m)	Year ended 31 December 2017	Year ended 31 December 2016	Year ended 31 December 2015
Airbus Commercial Aircraft	3,428	1,543	2,287
Airbus Helicopters	337	308	427
Airbus Defence and Space	212	(93)	736
Total Divisional EBIT	3,977	1,758	3,450
Other / HQ / Consolidation	(556)	500 ⁽²⁾	612 ⁽¹⁾
Total	3,421	2,258	4,062
Interest result	(328)	(275)	
Other financial result	1,477	(692)	
Income taxes	(1,693)	(291)	
Profit for the period	2,877	1,000	

AIRBUS. *Engineers at work: Make it Fly*

• Workforce#1. Split by Divisions

Employees by Division	31 December 2017	31 December 2016	31 December 2015
Airbus Commercial Aircraft ✓	74,542	73,852	72,816
Airbus Helicopters ✓	20,161	22,507	22,520
Airbus Defence and Space ✓	32,171	34,397	38,206
Airbus former HQ ⁽¹⁾ ✓	2,568	3,026	3,032
Group Total ✓	129,442	133,782	136,574

(1) "Airbus former HQ" includes Headquarters, Shared Services and Innovation Works.

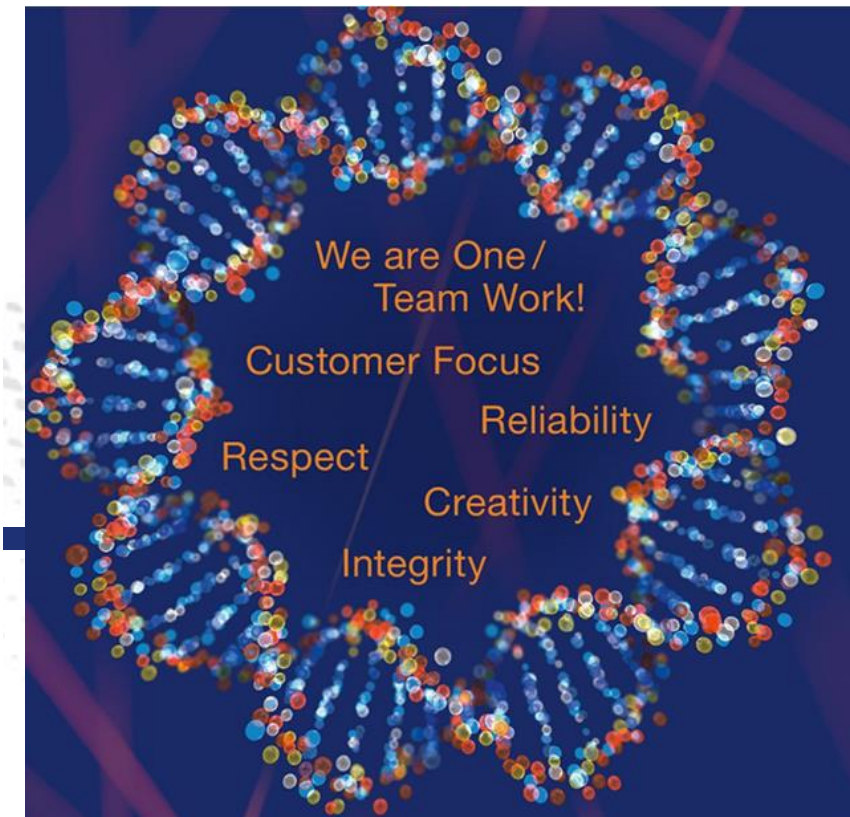
• Workforce#2. Geographical Distribution

Employees by geographic area	31 December 2017	31 December 2016	31 December 2015
France ✓	47,865	47,963	50,810
Germany ✓	44,214	46,713	47,796
Spain ✓	13,177	12,682	12,521
UK ✓	11,304	12,020	12,157
US ✓	2,707	2,829	2,821
Other Countries ✓	10,175	11,575	10,469
Group Total ✓	129,442	133,782	136,574

AIRBUS. *Engineers at work: Make it Fly*

The SIX AIRBUS Values:

- We feel, act and behave as one large family – **We are One** – and create an engaging and inclusive workplace that favours wellbeing, fun and trust to drive **team work**.
- We partner with our **customers** to deliver valuable and sustainable solutions together.
- Our **reliability** drives our competences and mindset to deliver on time, on cost and on quality.
- We treat each other and all stakeholders as we wish to be treated, with **respect**, embracing diversity.
- We are curious, courageous, passionate, open-minded and recognise **creativity** at all levels.
- We act with **integrity** and take appropriate consequences to eradicate unethical and non-compliant behaviours.



AIRBUS. Research at the Industry. Strategy-driven activities.

Main OBJECTIVES of industrial R&D activities:

- **Create** new Products and Services,
- **Enhance** Safety, Reliability, Quality...; **Reduce** Cost... ; **Increase** Profit...,
- **Forecast** future evolutions of market (*to be **at** the state-of-the-art of technology*),
- **Influence** future evolutions of market (*to be **the** state-of-the-art of technology*),
- **Keep** technical knowledge and capabilities,
- At the END: ***SURVIVE!***

Other OBJECTIVES are considered spurious :

- Compulsion to unveil secrets of the natural world,
- Curiosity,
- Altruistic Contribution to enlarge scientific knowledge,
- or increase number of publications,
- or get a permanent academic position,
- or attaining funding for grants and projects... **UNLESS they contribute to the first set.**

AIRBUS. *Research at the Industry. Strategy-driven activities.*

AIRBUS MOTTO FOR INNOVATION:

Shaping the future of aerospace

Innovation happens when great ideas, people, and challenges intersect. At Airbus, we make these intersections happen. The result: breakthrough innovations that positively impact the world, and ignite excitement and passion for aerospace.

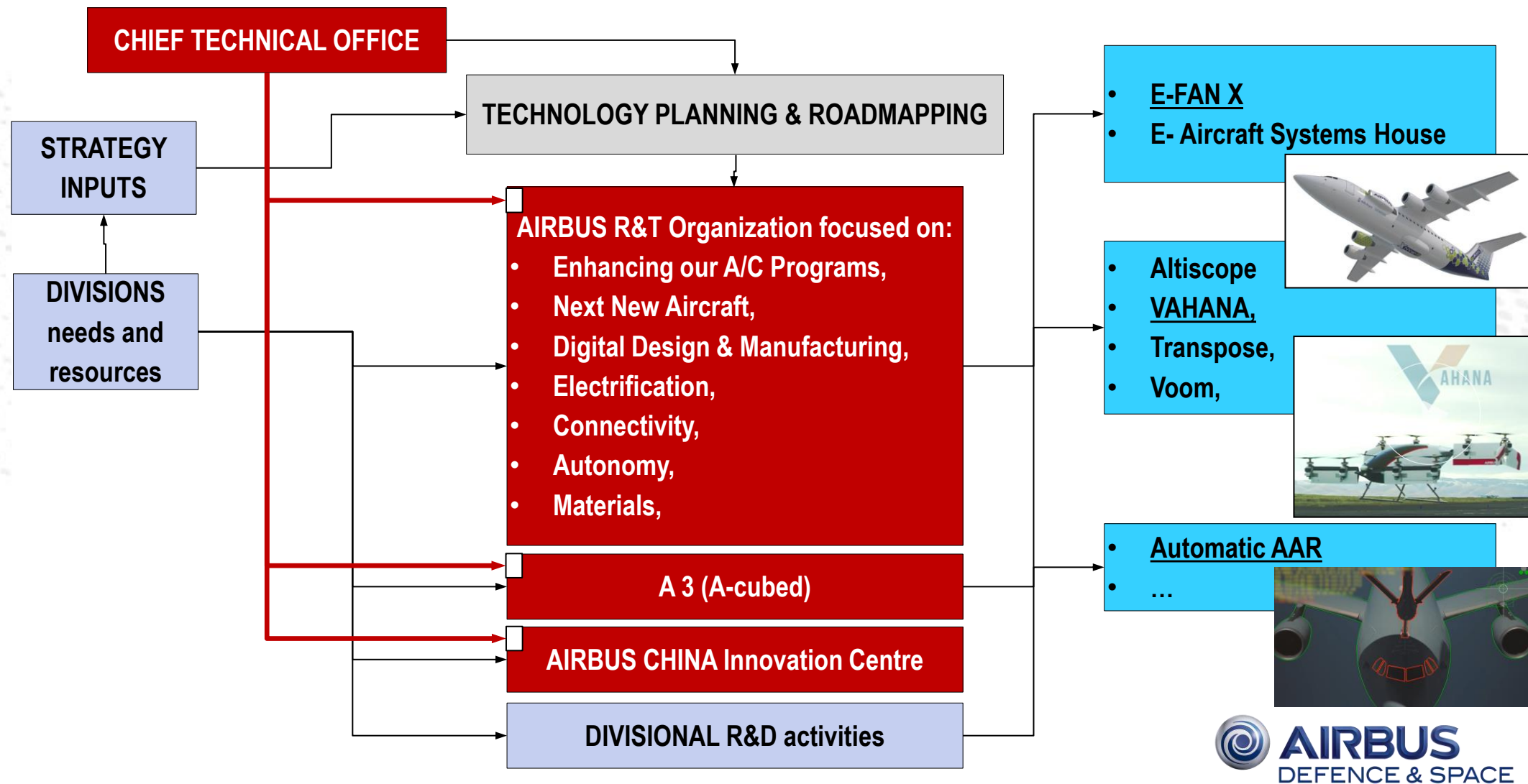
- **STRICT ALIGNMENT with STRATEGY of the Company,**
- **And with SOCIAL COMMITMENTS on sustainability initiatives (AIRBUS is signatory of UNGC)**



AIRBUS. *Research at the Industry. Strategy-driven activities.*

AIRBUS RELEVANT R&T, R&D Activities:

- Coordinated by Chief Technical Office through Planning & Road mapping frame,



AIRBUS. *Daily work at the company. Project after project. .*

[DGG] BACK to Personal Experience. :

- **DIVISION:** AIRBUS DEFENCE AND SPACE,
- **SITE:** GETAFE (MADRID, SPAIN),
- **POST:** SYSTEM ENGINEERING. TRANSVERSAL ACTIVITIES
- **PROFESSIONAL ROLE:** EXPERT on EM HAZARDS PROTECTION,
- **PRODUCTS:** Military Aircrafts, mainly A330 MRTT.
- **ACTIVITIES:** Provide adequate protection to Aircraft electrical/electronic installations and structure from Electromagnetic Environment in order to ensure airworthiness and capabilities during its life cycle.
- EM Environment stands for the natural and artificial EM Field levels into which aircraft is immersed during its operation. It encompasses High Intensity Radiated Fields generated out of the aircraft, Lightning, EM Pulses, Electrostatic discharges and EM field levels generated by surrounding electric/electronic systems.
- Airworthiness refers to the condition of safe flight.



AIRBUS. *Daily work at the company. Project after project. .*

[DGG] BACK to Personal Experience. :

- System Engineering work consists on building a PRODUCT that meets certain REQUIREMENTS.
- Our tasks consist on spreading/converting the TOP LEVEL Requirements given from customers (buyer, certification authority, quality, costing and planning organizations) into OTHERS oriented to define a design solution at the different levels of integration (equipment, structural element; system, assembly and final platform) and on demonstrating that the PRODUCT is able to meet all the REQUIREMENTS identified at each of the integration levels.
- Specific competences on protection from EM Environment deal with system engineering activities that ensure immunity to EM interference and prevent and control the EM field propagation by addressing phenomena such as generation, absorption, reflection, shielding, scattering, resonances, coupling of Electromagnetic Energy.
- LET me present some more technical information on the EM environment and on the Specific REQUIREMENTS that we need to address. *Engineering at work*

AIRBUS. Daily work at the company. Project after project. .

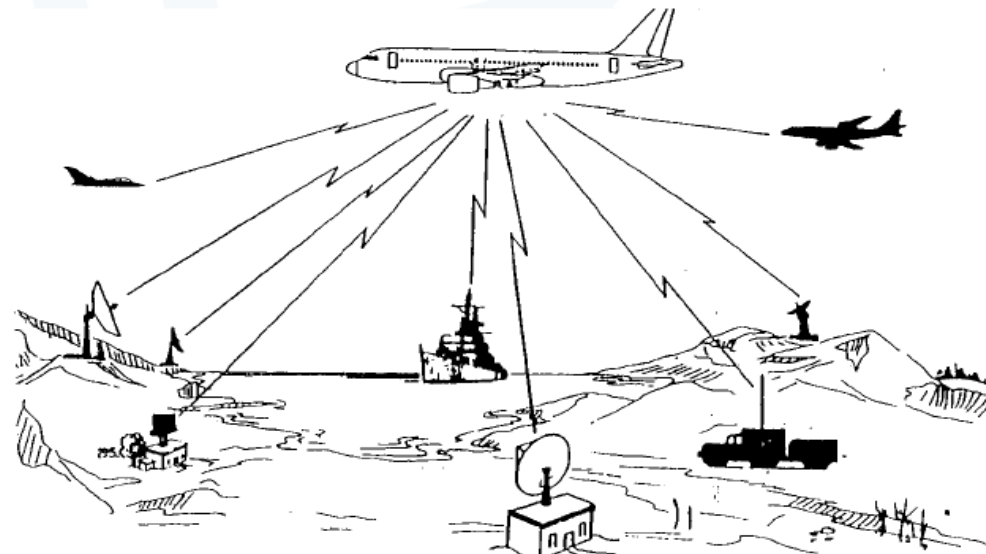
[DGG] BACK to Personal Experience. Requirements on High Intensity Radiated Fields (HIRF).

- A few words on HIRF phenomena and a/c (1/2)
- Man-made EM environments affecting aircraft.

FREQUENCY	SOURCE
100 kHz	LORAN
112 - 117 kHz	DECCA NAV
126 - 129 kHz	DECCA NAV
265 - 435 kHz	NON - DIRECTIONAL BEACONS
2 - 30 MHz	HF COMMS
75 MHz	ILS MARKER
108 - 112 MHz	ILS LOCALISER
108 - 118 MHz	VOR
118 - 136 MHz	VHF COMMS
328 - 336 MHz	ILS GLIDE PATH
225 - 400 MHz	UHF COMMS
460 - 470 MHz	UHF GROUND COMMS
590 - 598 MHz	50cm LOW/HIGH POWER RADAR
960 - 1215 MHz	DME IN PARTS OF BAND
1.03 and 1.09 GHz	SSR
1.215 - 1.365 GHz	23 cm PRIMARY RADAR
1.545 - 1.555 GHz	SATELLITE COMMS
1.574 - 1.576 GHz	GPS
1.646 - 1.656 GHz	SATELLITE COMMS
2.7 - 3.1 GHz	10cm PRIMARY RADAR
4.2 - 4.4 GHz	RADIO ALTIMETER
5.0 - 5.25 GHz	MLS
9.0 - 9.5 GHz	3cm PRIMARY RADAR
13.25 - 13.4 GHz	DOPPLER NAV
14.0 - 14.25 GHz	VSAT TX
14.4 - 15.7 GHz	RADIO NAV
15.45 - 15.55 GHz	SATELLITE COMMS
16.45 - 16.55 GHz	SATELLITE COMMS

Transmitter Groups

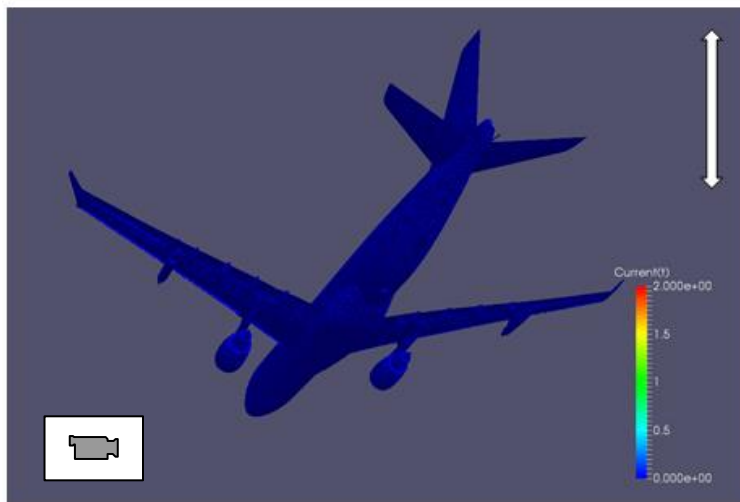
- ☐ AIRPORT LOCATED TRANSMITTERS
- ☐ NON-AIRPORT GROUND TRANSMITTERS
- ☐ SHIPBORNE TRANSMITTERS
- ☐ AIRBORNE TRANSMITTERS



AIRBUS. *Daily work at the company. Project after project. .*

[DGG] BACK to Personal Experience. Requirements on High Intensity Radiated Fields (HIRF).

- A few words on HIRF phenomena and a/c (2/2)
- HIRF certification environment depends on the operational scenario the a/c will be immersed during its life-cycle.
- These external EM Fields inject un-desired energy into the a/c electrical/electronic systems by induction resulting in transitory currents and voltages in a/c surfaces and circuitry.



AIRBUS. Daily work at the company. Project after project. .

[DGG] BACK to Personal Experience. Requirements on Lightning Impact.

- A few words on Lightning phenomena and a/c (1/3)
- About 90% of lightning discharges to a/c are thought to be initiated by a/c.
- Video on lightning Impact on a/c.

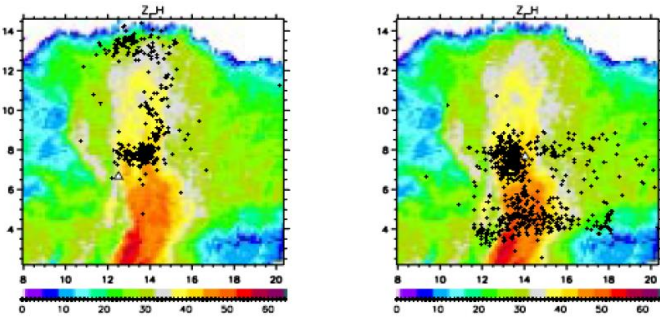
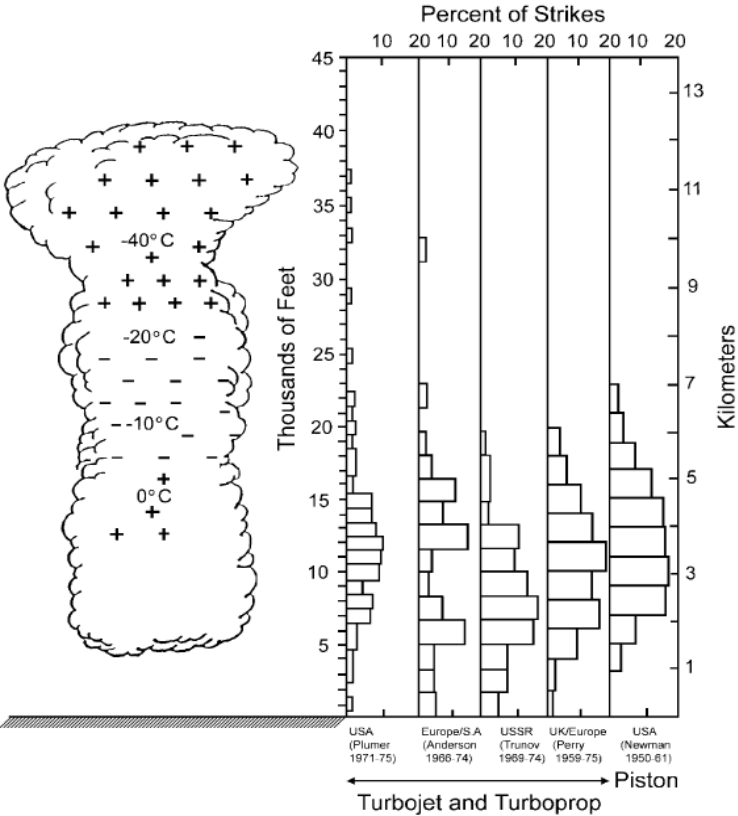


Figure 1. VHF radiation sources for an intracloud discharge (left) and a cloud-to-ground discharge (right), overlaid on a vertical radar scan through the discharges for a storm on August 2, 1999. Distances are in km above mean sea level and away from the radar, respectively. The intracloud discharge occurred at

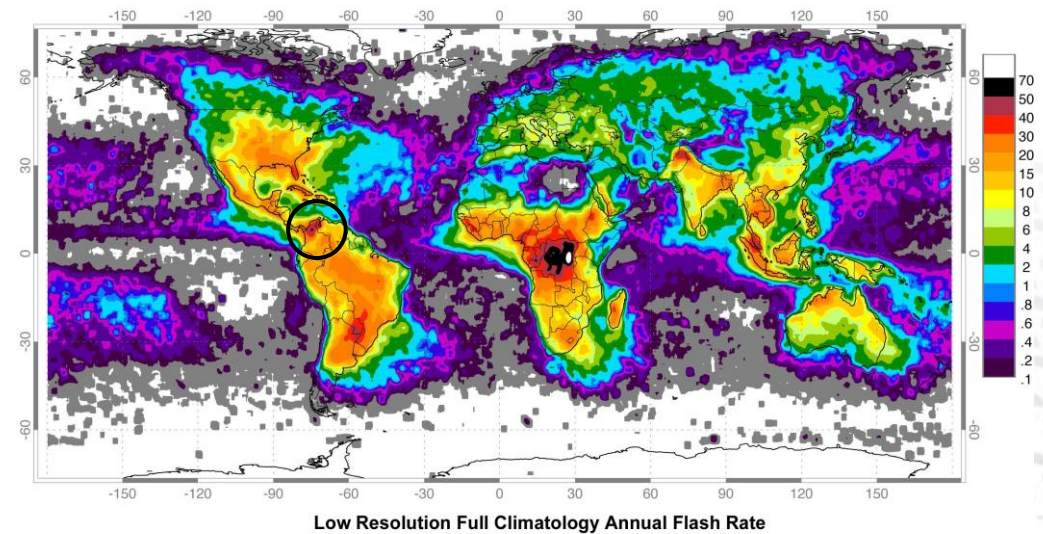
Table 1
Incidence of lightning strikes to commercial aircraft

Aircraft type	Newman (1950–1961)		Perry (1959–1974)		All data combined		
	Strikes	Flight hours	Strikes	Flight hours	Strikes	Hours	No. hours per strike
Piston	808	2,000,000	—	—	808	2,000,000	2,475
Turboprop	109	415,000	280	876,000	389	1,291,000	3,320
Pure jet	41	427,000	480	1,314,000	521	1,741,000	3 340
All	958	2,842,000	760	2,190,000	1,718	5,032,000	2,930

AIRBUS. *Daily work at the company. Project after project. .*

[DGG] BACK to Personal Experience. Requirements on Lightning Impact.

- A few words on Lightning phenomena and a/c (2/3)
- Commercial a/c hit by lightning each 3000 flight hours (about once a year)



Global distribution of lightning April 1995-February 2003 from the combined observations of the NASA OTD (4/95-3/00) and LIS (1/98-2/03) instruments.

AIRBUS. Daily work at the company. Project after project. .

[DGG] BACK to Personal Experience. Requirements on Lightning Impact.

- A few words on Lightning phenomena and a/c (3/3)
- Stepped leader / First Return Stroke / Dart leader / Subsequent Strokes.
- Example of Lightning dynamics.
- a/c initiated lightning

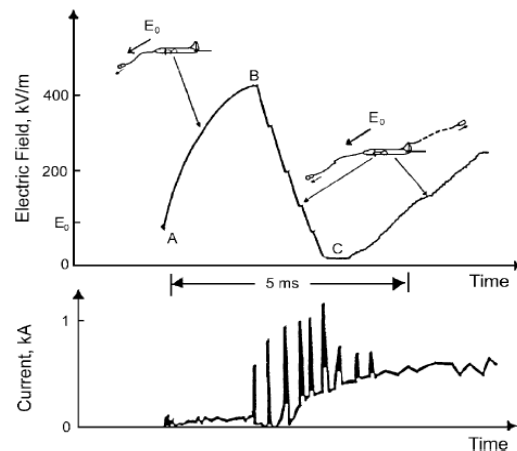
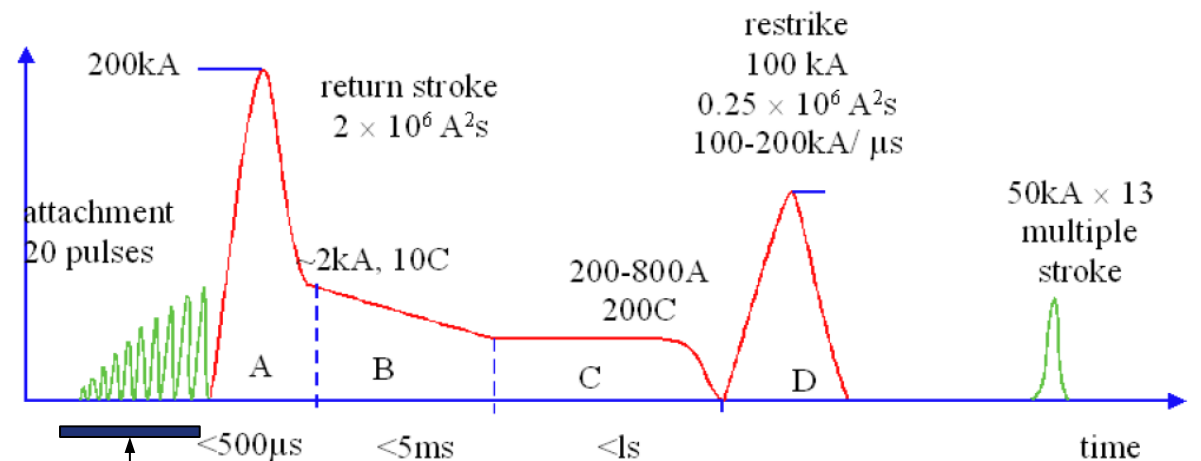


Fig. 5. Typical electric field intensity, current, and schematic representation of leader development during the initial phase of a typical aircraft-initiated lightning. E_0 is the ambient electric field at lightning initiation. Adapted from [27].



Upset Testing. Multiple burst

Damage Testing.
Single Stroke

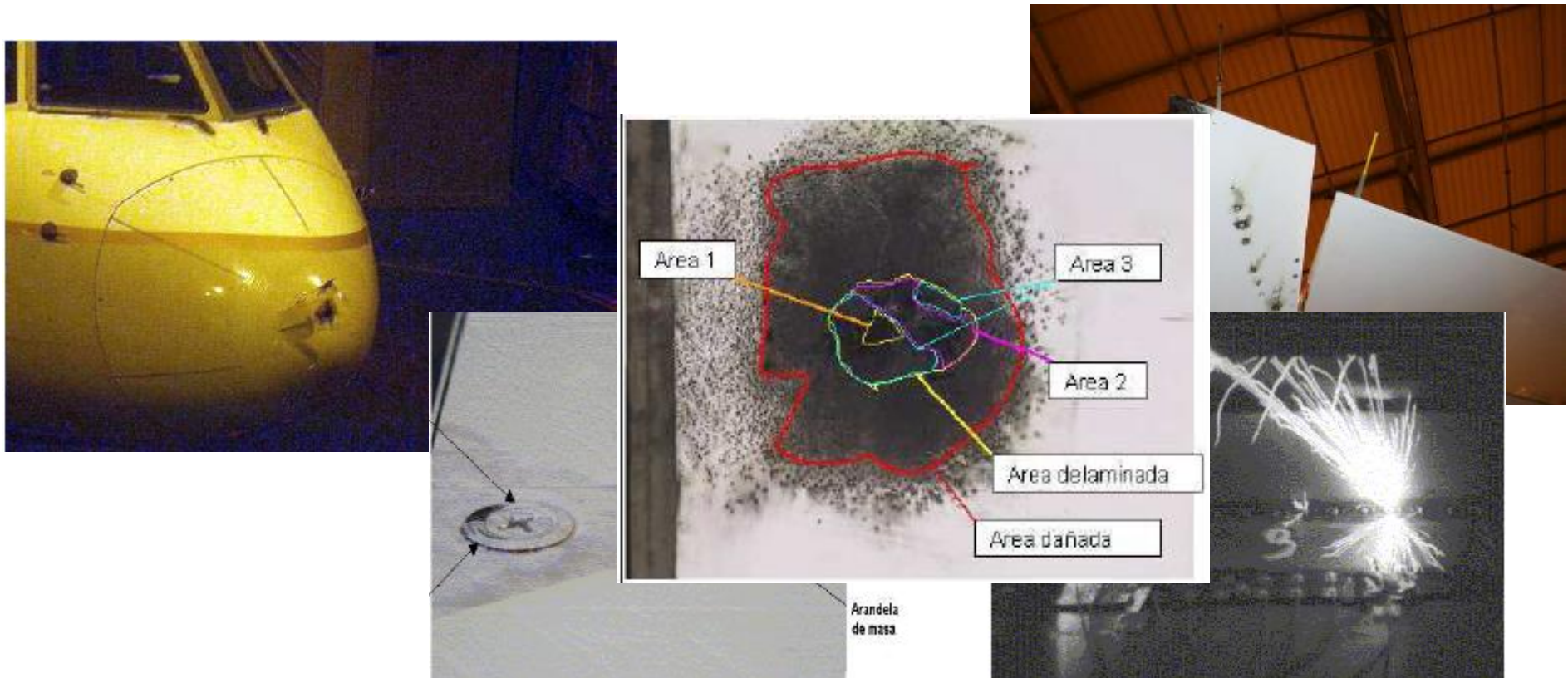
N/R for Indirect
Effects.

Upset Testing.
Multiple Stroke

AIRBUS. *Daily work at the company. Project after project. .*

[DGG] BACK to Personal Experience. Requirements on Lightning Impact.

- A few words on Direct and Indirect Effects.
- Direct Effects stand for all the effects created by the flow of the lightning current through the airframe (hot spots, magnetic forces, damage in materials, ignition hazards).



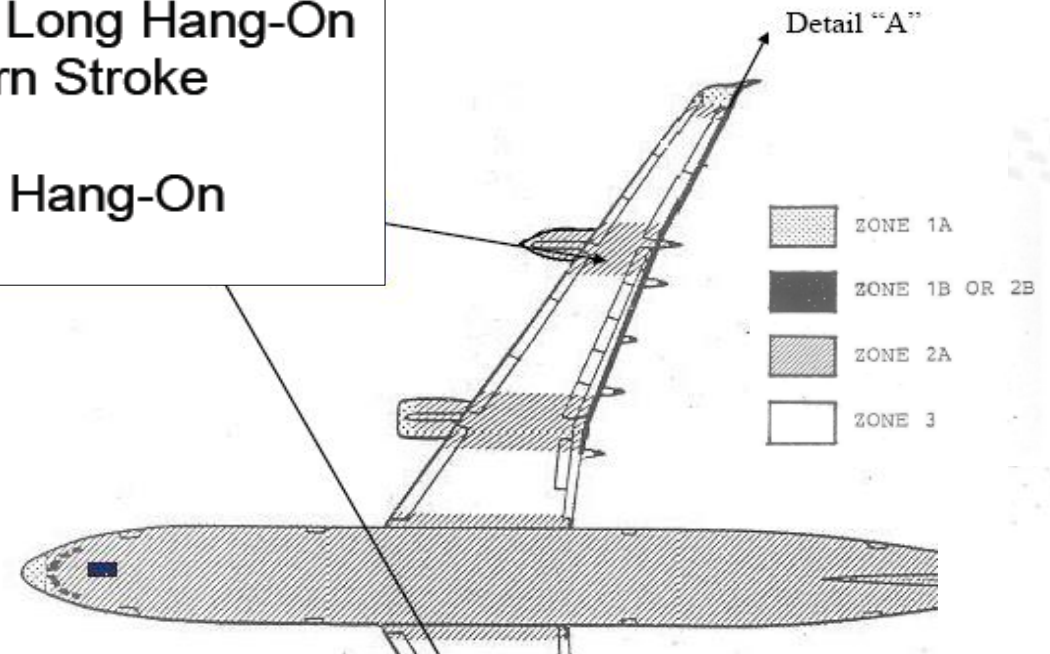
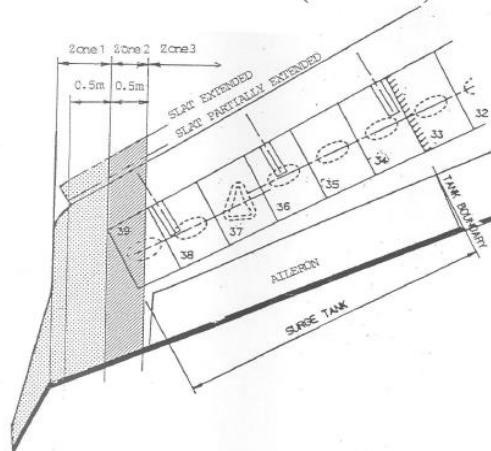
AIRBUS. *Daily work at the company. Project after project. .*

[DGG] BACK to Personal Experience. Requirements on Lightning Impact.

- A few words on Direct and Indirect Effects.
- Airframe is ZONED iaw ARP5414.
- Zoning establishes how each area of the airframe interacts with Lightning.

Zone 1A: First Return Stroke Zone
Zone 1B: First Return Stroke Zone with Long Hang-On
Zone 1C: Transition Zone for First Return Stroke
Zone 2A: Swept Stroke Zone
Zone 2B: Swept Stroke Zone with Long Hang-On
Zone 3: Current Conduction Zone

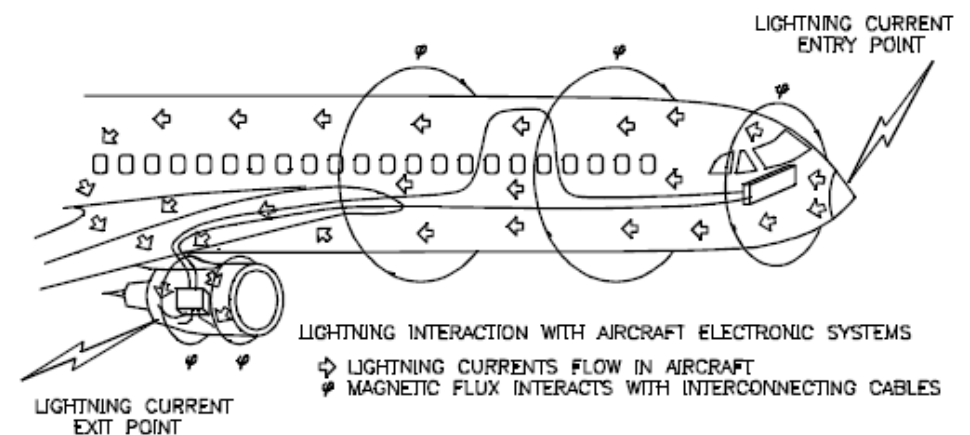
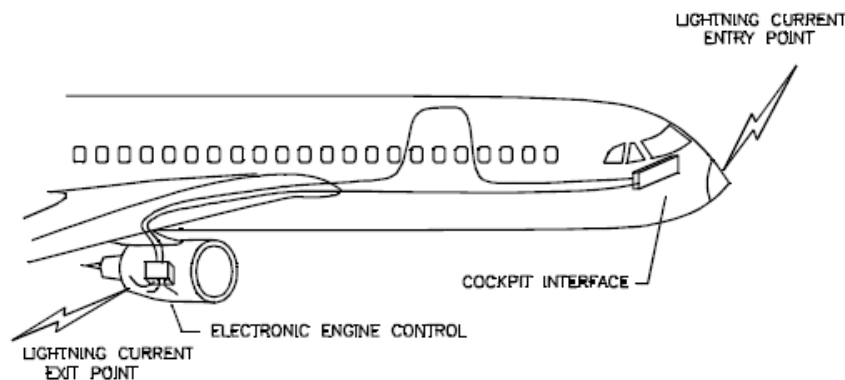
WING TIP LIGHTNING STRIKE ZONES (SLATS OUT)



AIRBUS. *Daily work at the company. Project after project. .*

[DGG] BACK to Personal Experience. Requirements on Lightning Impact.

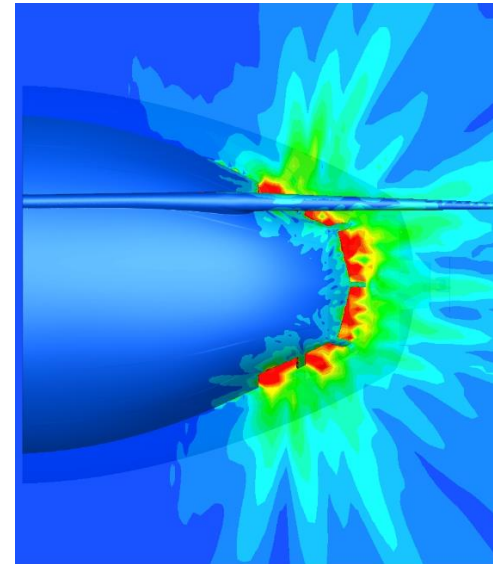
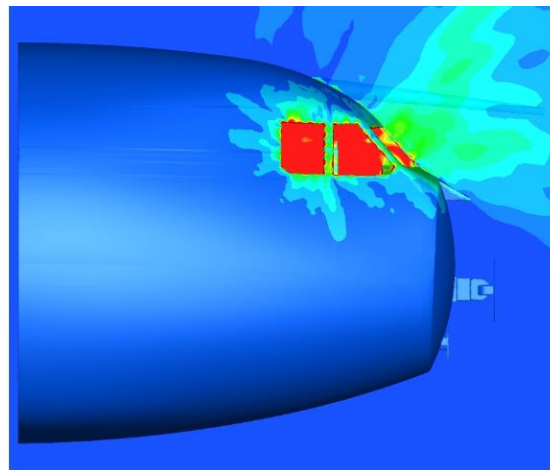
- A few words on Direct and Indirect Effects.
- Indirect Effects stand for all the effects created by the inductive coupling of lightning energy on the bundles of the electrical installation and the subsequent effects on the electrical equipment connected to these bundles.
- Whenever a Lightning impacts an aircraft, current flows through external skin of a/c generating electromotive forces on electrical wiring.
- Energy is coupled on every airborne electrical wire. Transients appear at every single pin of any connector within all pieces of electrical/electronic equipment wired through electrical bundles.



AIRBUS. *Daily work at the company. Project after project. .*

[DGG] BACK to Personal Experience. Requirements on evaluation of PEDs

- PEDs stand for Portable Electronic Device (mobile phones, tablets, laptops...) carried onboard.
- PEDs, as any electronic devices, emit electromagnetic energy, either intentionally (useful signals for voice or data transmission) or unintentionally (spurious unwanted signals). In order to grant operational approval of PEDs and T-PED technologies for use onboard aircraft, the safe use of the PEDs or T-PEDs must be demonstrated. With safe use is meant, “that cannot adversely affect the performance of the aeroplane’s systems and equipment”.



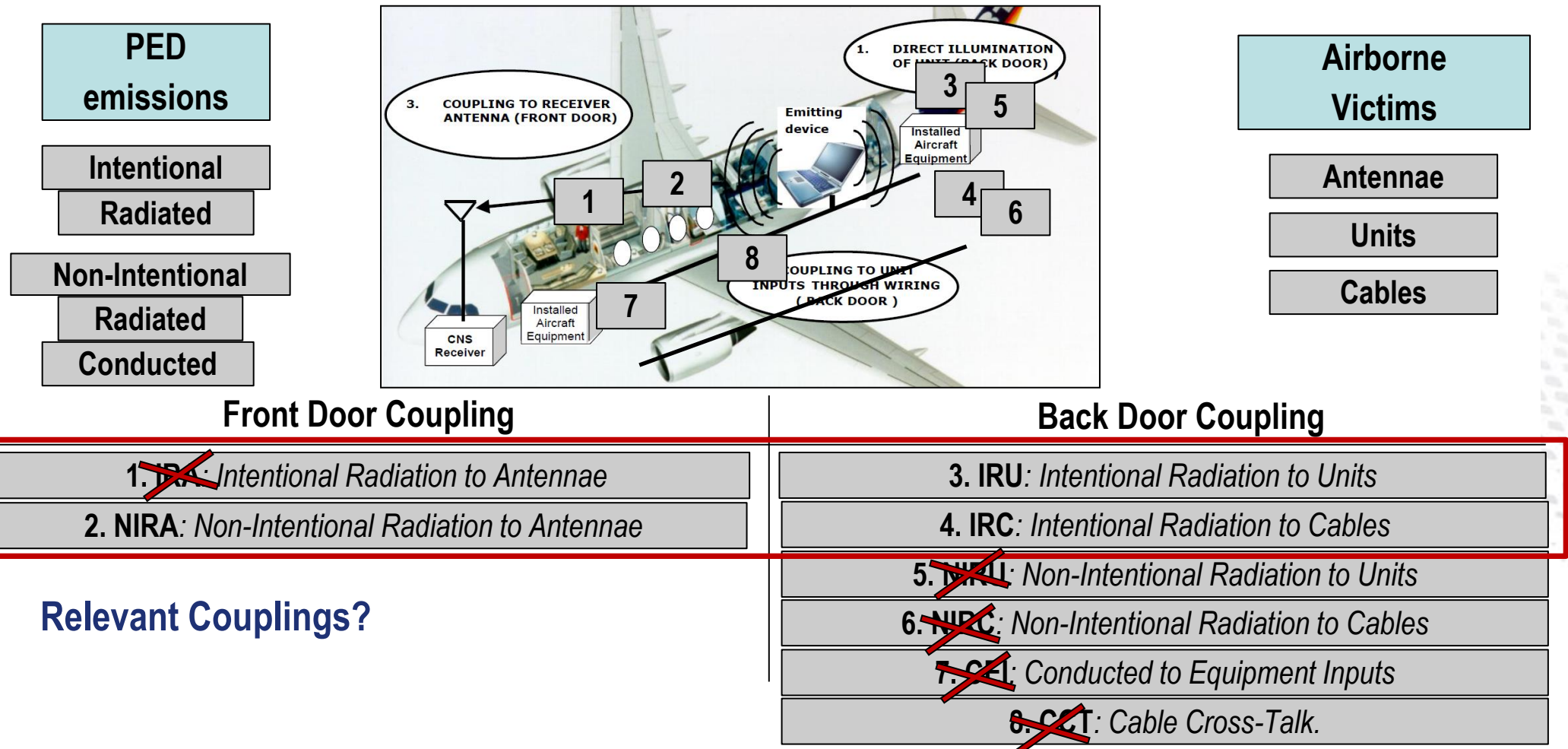
- What might be happening during safety briefings to passengers in commercial flights?



AIRBUS. Daily work at the company. Project after project. .

[DGG] BACK to Personal Experience. Requirements on evaluation of PEDs

- Scheme of EM interactions of PEDs with airborne systems



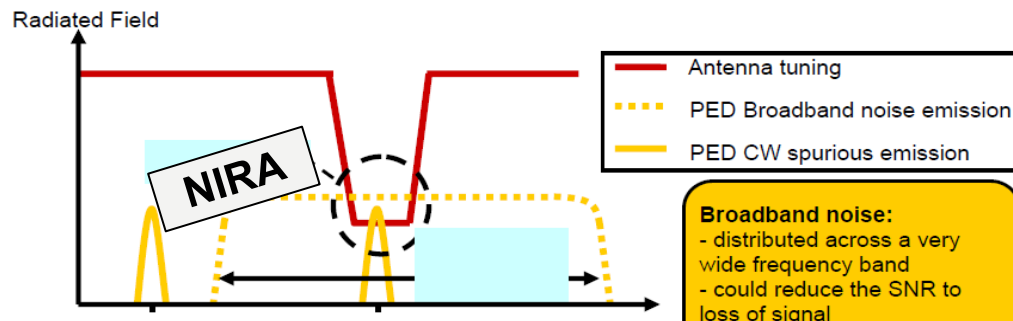
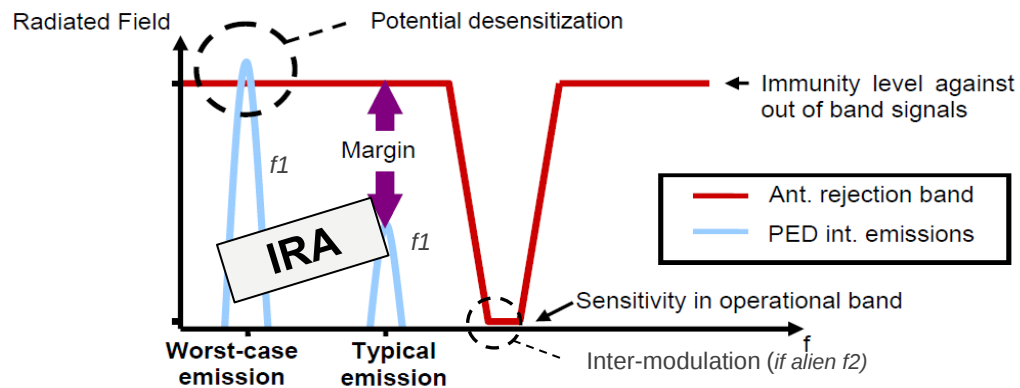
- Relevant Couplings?

AIRBUS. Daily work at the company. Project after project. .

[DGG] BACK to Personal Experience. Requirements on evaluation of PEDs

- Scheme of EM interactions of PEDs with airborne systems

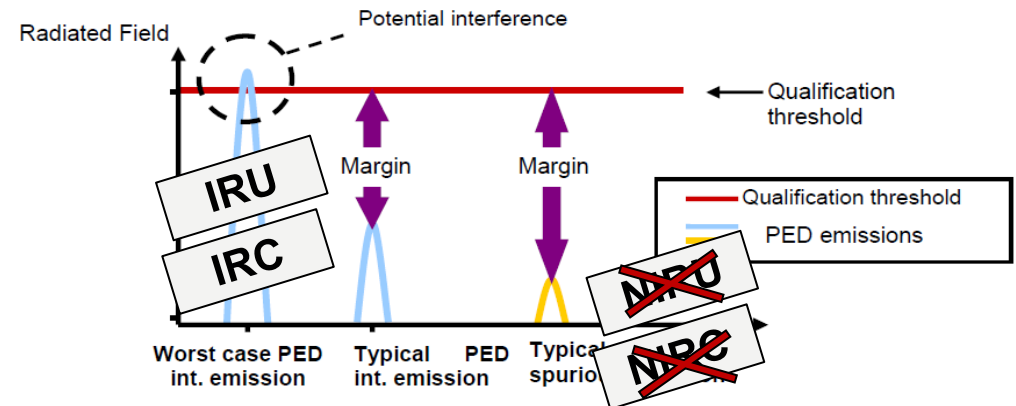
Front Door Coupling



Continuous Signals (CS):
 - not uniformly distributed across frequency band.
 - harmful interference is dependant on the number of carrier signals, bandwidth of the avionics receiver, emission level and path loss of the receiver antenna.

Broadband noise:
 - distributed across a very wide frequency band
 - could reduce the SNR to loss of signal

Back Door Coupling



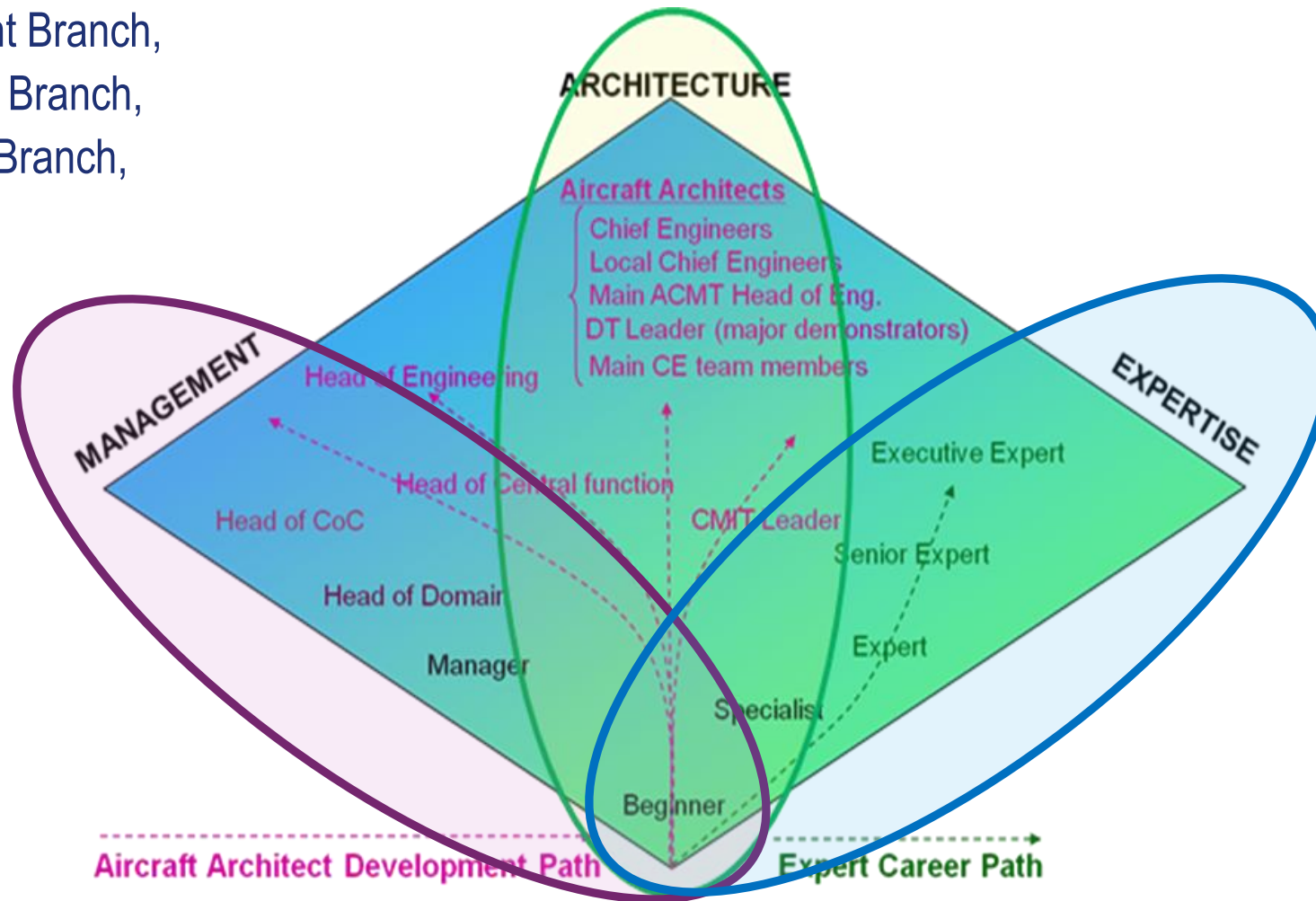
Typical RF emission levels of T-PEDs

Intentional	Non-Intentional
~ 10V/m @ 1m	~ 0.1V/m @ 1m

AIRBUS. Working for AIRBUS. Career progression.

Different Options for Engineering Career Development

- Management Branch,
- Architecture Branch,
- And Expert Branch,



AIRBUS. Expert Role. Company response to safeguard technical knowledge.

EXPERT Role definition.



- The eXpert is a person who has outstanding knowledge and skills in a field of competence which is important for the company. eXperts are recognised by users and sources of core knowledge. He/she must be able and willing to accept a specific role and function within the company, to which certain accountabilities are attached, which are, essentially to:
 - **Grow** his/her **expertise**, e.g. by closely following latest developments in his/her field,
 - **Propose orientation** for technical decisions in programmes, R&D and strategic technical areas,
 - **Provide advice** to management on technological and design solutions with associated risk as well as on process improvements,
 - Actively **cooperate with other domain specialists**, lead and participate in investigation task forces and issue diagnosis,
 - **Disseminate his/her knowledge throughout the company** and actively participate in an internal "knowledge network"; he/she plays a role in external benchmarking,
 - Support **problem solving transversally** (e.g. anomaly investigation),
 - **Deliver expertise** on key programmes either during early phases (critical trade-offs) or critical reviews,
 - **Represent Airbus**, collect and capture data in external forums dedicated to his/her expertise.

AIRBUS. Expert Role. Company response to safeguard technical knowledge.

EXPERT Rights :

- Access to available and necessary information for area of expertise. Investigation Right. (Participation to Conferences, working groups)
- Support from operational manager to allow fulfillment of expert missions. Right to be listened & contribute on technical issues.
- Represent Airbus externally by expressing ideas/positions (*following rules of communication*)
- Take initiatives in knowledge dissemination by organizing ad hoc events. (i.e., EMC Huddle)
- Similar compensation and benefits schemes as those of management of equivalent grading,
- Access to dedicated Expert Development Programmes within Airbus formation courses.

eXperts



AIRBUS. Expert Role. Company response to safeguard technical knowledge.

EXPERT Duties :



- Resource for the Group. Application of its key technical competences (knowledge and skills) to Airbus Products and Processes,
- Provide advice on technical matters. Communication capabilities and technical leadership to position Airbus at the cutting edge of its technical domain.
- Participate to, guide and define research, development and innovation within the group. Protection of Airbus intellectual property. Promotion of standards/regulations. Multidisciplinary and creative thinking for problem solving.
- Represent Airbus in external Forums/committees/technical societies/conferences.
- Assist in providing direction and assessment in challenging situations.
- Share knowledge and experience through seminars, classes, conferences and lectures.
- Mentor.
- Create value for the customer. Participate in product definition, safety, manufacturing, operations, testing, quality.

AIRBUS. Well-being aspects. Personal development.

Company needs a committed organization:

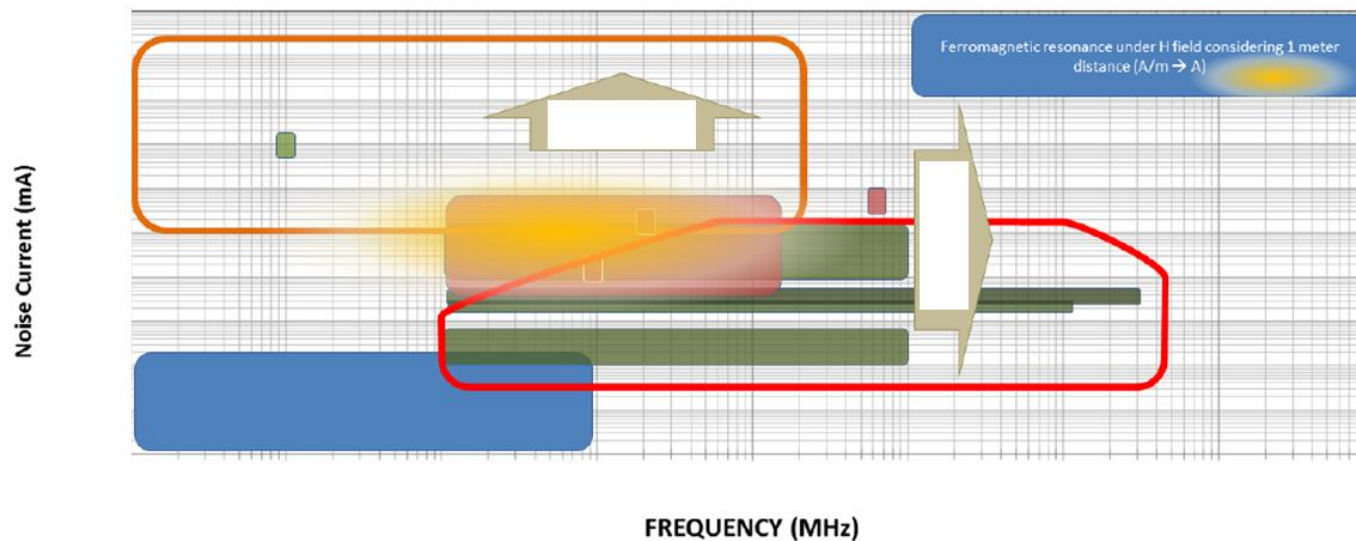
- Complexity of engineering projects requires contributions from a very wide range of organizations, each of them constituted by an even wider range of people; each of them gifted with unique personalities, backgrounds, characters, dreams and concerns.
- And collaboration is a **MUST** for a successful development of any project.
- However conflicts usually arise within human organizations.
- Henceforth although Personal Aptitudes (competences) are basic, Personal **ATTITUDES** towards collaboration are **MANDATORY**.
- Company awareness on these topics lead to formation offer on **SOFT SKILLS**.
- **SOFT SKILLS** stand for the personal resources needed to:
 - communicate to any other person in effective, constructive and positive ways.
 - Behave assertively in relation to your individual needs and to the business needs.



AIRBUS. Some research results, mentoring, normative creation and lectures. Applied Expertise.

[DGG] Back to Personal Experience.

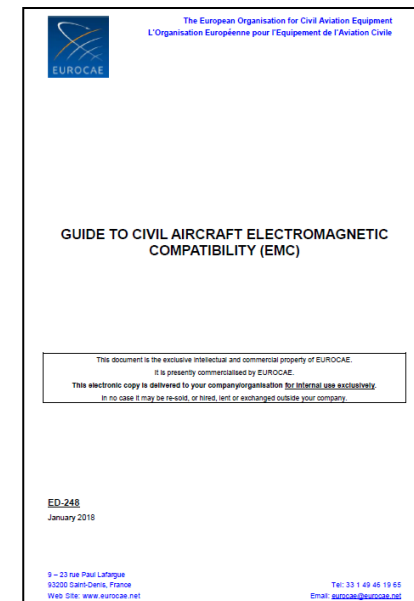
- Since incorporation to AIRBUS research did not end, but it changed notably.
- Totally applied research, grounded to the product. More modest. Not oriented to publication.
- Development of calculations for Lightning Indirect Effects Certification, HF emissions, HERP, Transfer Impedance of bundles, AAR ESD, EMP, HIRF,...
- Optimization of testing techniques for AAR ESD, EMC,...
- Project with CSIC – ICMC Research Centre on Ferromagnetic Shielding Materials (2013-16)



AIRBUS. Some research results, mentoring, normative creation and lectures. Applied Expertise.

[DGG] Back to Personal Experience.

- Since incorporation to AIRBUS research did not end, but it changed notably:
- ...and some publications:
 - “Finite-difference Time-Domain Method applied to Lightning simulation and aircraft certification process”, IEEE Trans on EMC. ISBN :978-1-4577-1709-3, 2011
 - “On the Design of Aircraft Electrical Structure Networks”, IEEE Trans on EMC, Vol, 58, No2, April 2016
- Participation in Internal R&T forums:
 - Research and Technology Group on EMC and Lightning Protection
 - EMC Expert Huddle.
- Participation in elaboration of Aeronautical Guidance Material.
 - EUROCAE ED-248. Guide to Civil Aircraft Electromagnetic Compatibility (EMC).
- Coordinator & Lecturer on Post-Degree Master @Univ.C3M Madrid.
 - Aircraft Electromagnetic Compatibility, Sessions on Master on Aircraft Systems Integration.
- Mentoring
 - Supervisor of 5 Final Master Projects of internal post-degree grantees.



INITIAL Conclusions. *What is missed ? What is gained ?*

- ***WHAT IS MISSED from ACADEMIC EXPERIENCE ?***

- *Thrill of discovery,*
- *Freedom to define own investigation topics (kind of),*
- *To work at very challenging tasks,*
- *To feel being at the edge of something,*
- *To be able to explain behaviors,*
- *To make conjectures and confirm or refute them,*
- *To question everything,*
- *To be learning at every moment,*

- ***WHAT IS ABSOLUTELY NOT MISSED?***

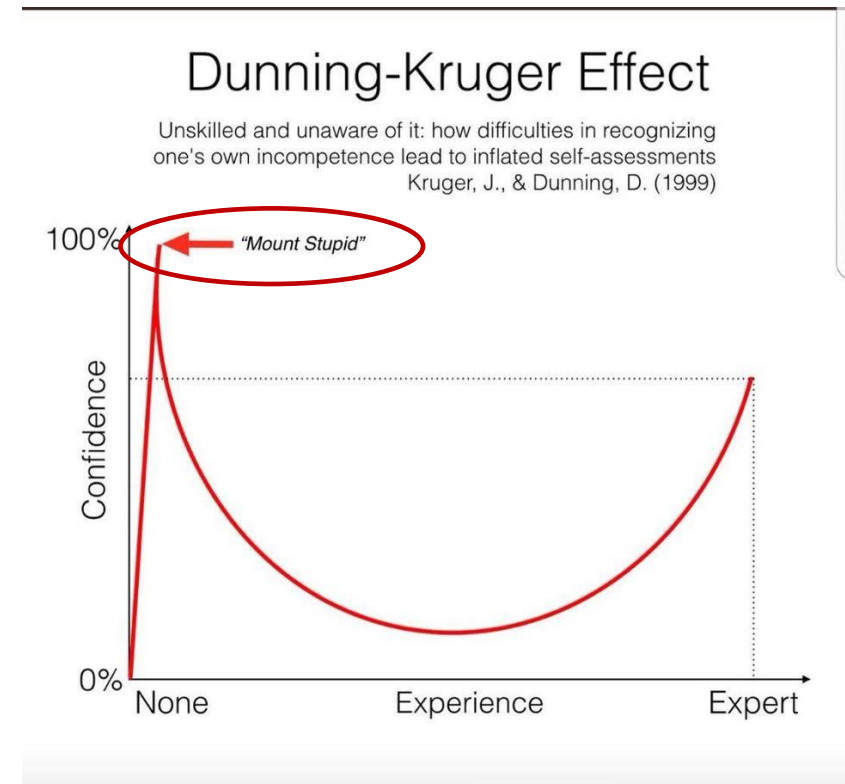
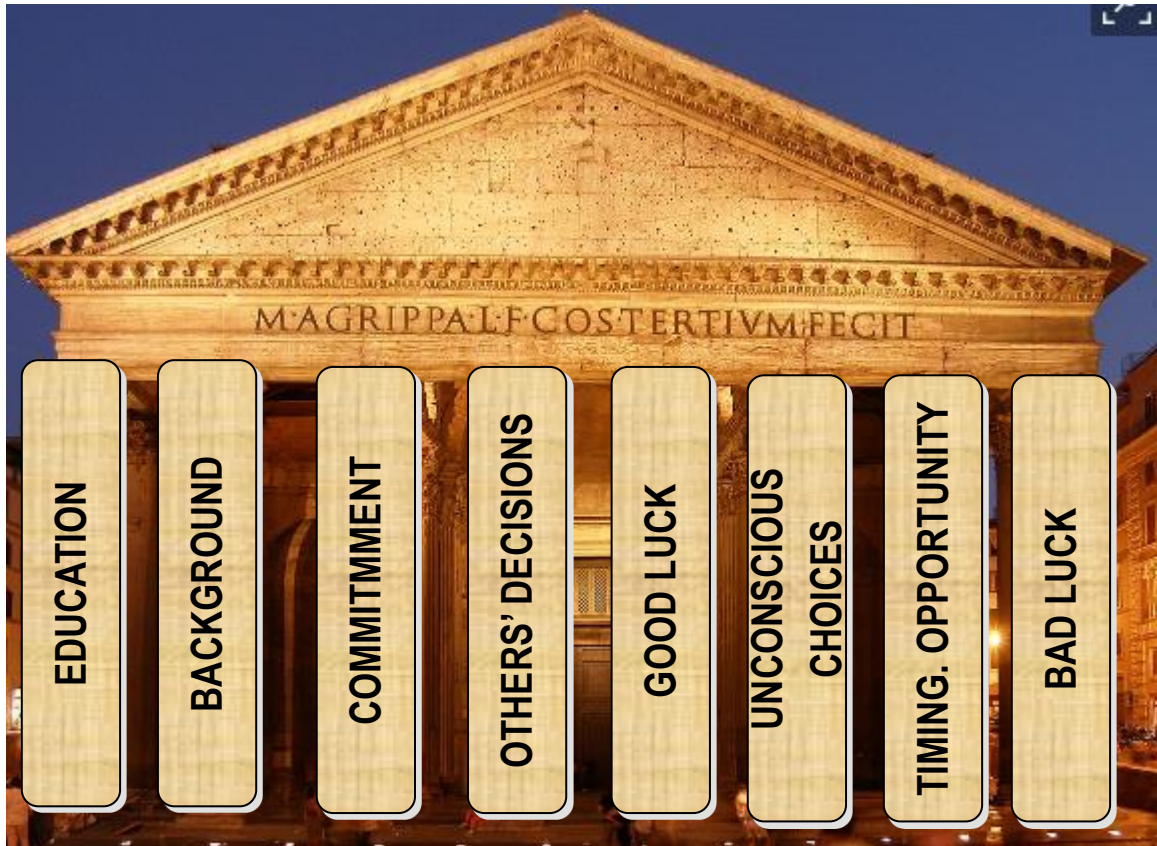
- Insecurity. Long chain of grants / post-docs / temporary contracts,
- Paternalism, arbitrary managerial decisions,
- Favoritism. Unfair treatments with no consequences,
- Childish relationships: To become heartless enemy of concurrent group A just because you work at group B,

INITIAL Conclusions. *What is missed ? What is gained ?*

- **WHAT IS GAINED after abandonment of ACADEMIC EXPERIENCE?**
- *To work in Collaborative Environments (MANDATORY),*
- *To participate in the creation of complex systems,*
- *Financial Security,*
- *Labor Rights,*
- *Accountability of personal behaviors,*
- *Progress in career based on results,*
- *Care for personal well-being (kind of),*
- **WHAT IS PENALISED?**
- *“Stress-friendly” environment: running on and on to meet milestones, goals, on endless cycles...*
- *More prosaic objectives, (but, who cares?)*

FINAL Conclusions. *Future is being built everyday and everywhere.*

At the end, PROFESSIONAL CAREER is built on some pillars,



Which are not under your control,...

therefore I could only recommend you to find your "Mount Stupid" and start descending it ASAP.

THAT's ALL

**MANY THANKS,
ANY QUESTIONS ?**