


## Writing by design, Part 1

### CMPE 349 Spring 2016 E.F.C. LaBerge

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Week 1 1-1



## Rothwell & Cloud

- Technical writing is not fundamentally distinct from the rest of the engineering process...
- ...and therefore, by LL#3 is a **design problem**

<b>Customer</b> <b>Engineering Standards</b> <b>Project cost</b> <b>Product efficiency</b> <b>Product effectiveness</b> <b>Customer feedback</b>	<b>Audience</b> <b>Writing conventions</b> <b>Author time &amp; effort</b> <b>Doc brevity &amp; conciseness</b> <b>Document clarity</b> <b>Critique</b>
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Week 1 1-2



## First rule of technical writing: Know your purpose

- Capture knowledge and rationale (documentation)
- Propose solution (proposal)
- Provide rationale or persuasion
- Provide status
- Inquiry
- Provide a process or instructions

## Second rule of technical writing: Know your audience

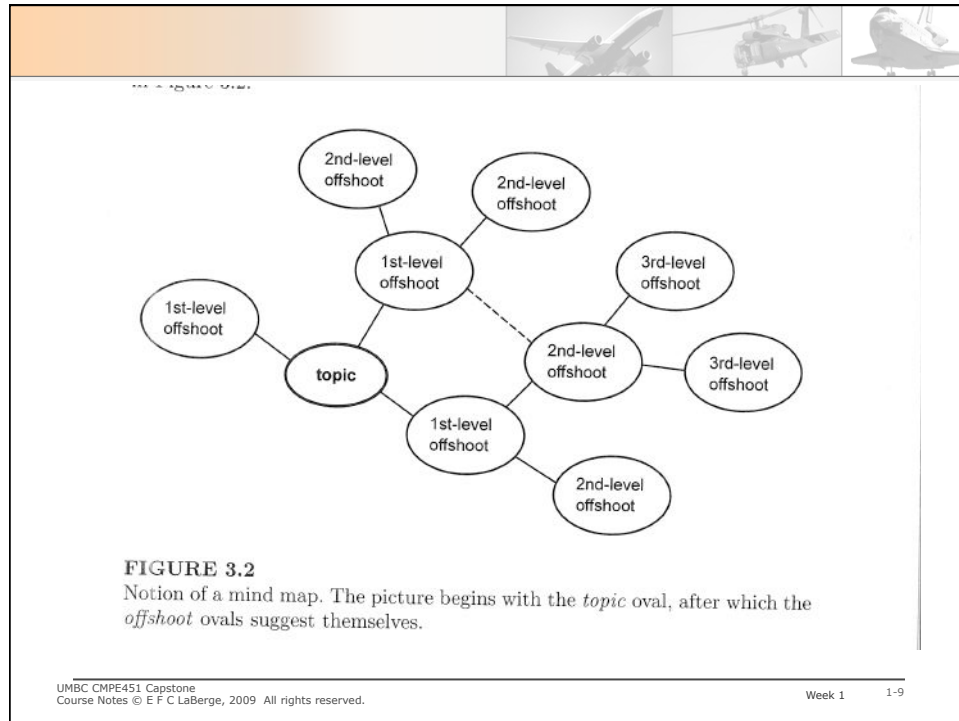
- Each type of document has a different audience...
- ...and each audience has a different concern
- You can't choose the right content if you don't think about your audience
  - Status reports: management or customer
  - Informal tech notes or memos: yourself(!) or close team
  - Working papers: experienced practitioners
  - Formal technical papers for conferences & journals: experienced practitioners & theorists
  - Requirements Documents: user community or customer, some of who may not be experts
  - Statements of Work: management & customer
  - Proposals: customer – both engineering & mgmt.

## Third Rule of Technical Writing: Clarity Counts!

- Engineers have to write in a manner that makes complicated things simple(r) to understand
- Organization
- Graphics
- Logic
- Language
- Math

## Organization

- Outline (often used for final organization)
  - I, A, 2, b, iii
  - 1, 1.1, 1.2.1, 1.2.3.4
- Mind Map
  - Figure 3.2, 3.3 in Rothwell & Cloud
- Core Dump
  - Write it all down and “capture it”
  - Extensively edit
- The important thing is that the *deliverable* is not a core dump!



## Graphics

- These are our artifacts and the others we will discuss
- A mind map is generally for organization and not delivery...
- ...but the SE artifacts should be for inclusion.
- A picture (or well-constructed table) is worth 1000 words
- Including Graphics
  - Figure number
  - Figure title
  - Citation in text
  - Optional Caption

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Week 1 1-10

## Figure example

### Receiver Antenna Pattern

WP439 accounts for the steered Aero I or Aero H beams by an "effective above the horizontal, and can be expected to result in a streamer antenna gain.

Figure 1 illustrates the representative ground plane the gain is less than

Figure 1 illustrates the tridium AIRS representative ground plane. At angles more the gain is less than the -10 dBi assumed in

<sup>1</sup> In the terms defined in WP-438, E=500 nmi, F=50 nmi.  
Page: 2  
EFCL0156B Updated North Atlantic Model saved 5/2/2000

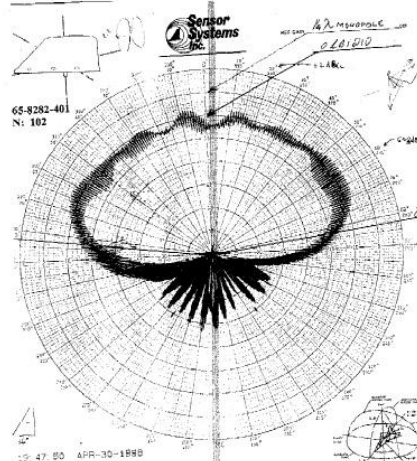


Figure 1: AIRSAT 1 Blade Antenna Pattern over Representative Ground Plane

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Week 1 1-11

## Status reports

- Generally short (1-2 pgs)
- Use Word or equivalent, not email
  - Eases storage & retrieval
- General Outline
  - Intro – what job? What period? What purpose?
  - Progress from last time
    - What did we say we would do & what did we actually do?
    - Were there mitigating situations? Problems? Successes?
  - Plan for next interval
    - What will we get done?
  - Issues that need audience input

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Week 1 1-12

- **Intro – what job? What period? What purpose?**
- **Progress from last time**
  - **What did we say we would do & what did we actually do?**
  - **Were there mitigating situations? Problems? Successes?**
- **Plan for next interval**
  - **What will we get done?**
- **Issues that need audience input**
- **Full example posted on Blackboard**
- **Your first TSR is due September 25**

**MEMO Number** EFCLEA-Inm-0117  
**DATE:** February 6, 2010  
**TO:** Carole Plessey-Gourdan, David Kingdon-Jones  
**FROM:** EFC LaBerge  
**SUBJECT:** Progress report contract INM08-4581JB

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**1 INTRODUCTION**

This memo provides the progress report required by contract INM08-4581JB. This report covers the January 3, 2010 through February 6, 2010. All of the tasks discussed in this report have been performed under the 2009 contract extension given by Amendment 1. Effort in the next period (March 2010) will be covered under remaining 2009 Amendment 1 funding, in accordance with Amendment 2 of January 4, 2010.

**2 COMPLETED WORK**

The key effort during this reporting period was a detailed review of the requirements imposed by the new ICAO Global Operational Data Link (GOLD) document, currently under revision under the leadership of the FAA's Tom Kraft. This effort included review of the document, preparation of detailed individual comments and rationale, repeated coordination telephone conversations with Alan Schuster Brince, Gary College, Andrew Ives, and Steve Kong, and support of Steve as we briefed the suggested changes to the GOLD working group. Although changes to the GOLD document are outside the scope of SC-222, Inmarsat's overall plan is to use GOLD-compatible performance as the basis for its declarations of performance for Swift Broadband Safety Service to SC-222. Therefore, progress on SC-222 documents is directly related to comprehension and clarification of the GOLD document. My comments and suggested resolutions are contained in technical memo EFCLEA-Inm-0116C, copies of which have been delivered by e-mail to Gary College, Andrew Ives, and Steve Kong.

In addition, I have coordinated with Mike Rockwell, Secretary of the AEEC Air-Ground Communication Subcommittee (AGCS). We have tentatively scheduled a joint AGCS-SC-222 meeting for 5 consecutive days August 2-6, 2010 at the ARINC facility in Annapolis, MD.

**3 WORK EXPECTED DURING NEXT PERIOD**

With the resumption of full-time classes, I expect that my direct efforts toward the contract will be somewhat reduced from January levels for the next few months. The February-March time frame will include the following efforts: 1) scheduling and coordination of at least two SC-222 joint telephone calls, one tentatively scheduled for the week of February 15-19 and the other for the week of March 22-26; 2) preparation of the next revision of draft DO-270 material; 3) preparation of the next revision of draft DO-262 material; 4) development of the agenda and schedule for the April 19-20 meeting of SC-222.


**4 ISSUES FROM PREVIOUS REPORTS**

The biggest current technical issue continues to be a lack of definition for the declaration table (Table 2-1) for the MARS. At this point in the process, it is perfectly acceptable to have entries that reflect goals and not requirements; we have nearly a year of refinements in the actual numbers. We cannot advance the document preparation process without such information. The current state of the draft version of the equivalent MOPS declaration table is sufficient for preparation of version 0.x of the DO-262 material. We have made no significant progress on this issue since the previous status report in August 2009.

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## Informal tech notes or memos

- **Short (5-10)(memo) to moderate (30)(note) pages**
- **The purpose is to document a technical decision, derivation or tradeoff**
- **It doesn't exist if it isn't written down**
- **Your audience may be *you*: you *will* forget how you worked the problem in a few years.**
- **Contents are very flexible**
  - **Intro – what's the topic or problem**
  - **May have background / analysis / discussion sections.**
  - **Can be written at a technical level**
  - **This is a vehicle to document your Fermi problem assumptions**
- **You need to be able to find it again!**



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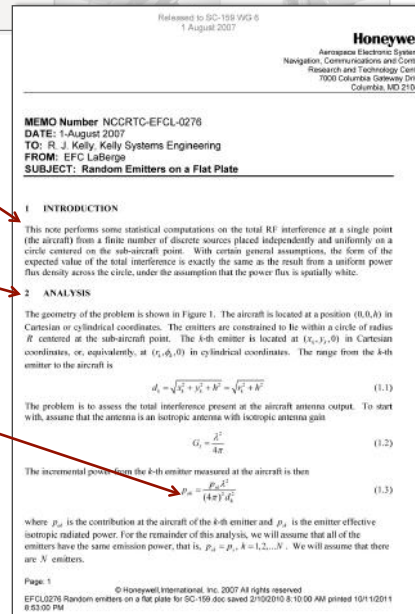
Week 1    1-14

### •Contents are very flexible

#### •Intro – what's the topic or problem

#### •May have background / analysis / discussion sections.

#### •Can be written at a technical level



## Working Papers

- Generally beyond your team, but for technical experts
- Typically trying to suggest a path forward, or present a technical case
- Expect debate and disagreement!
- Organized much like a tech note...
- ...but the writing may be more formal, with more explanation
- Technical details often (but not always) removed to appendix.
- ALWAYS carry identifying number
- May be "improved" versions of tech notes.



Released to RTCA SC165 WG1  
14 May, 2000  
SC165/WG1-WP/455

**MEMO Number** IRIIDUM-EFCL-0156B  
**DATE:** 2 May 2000  
**TO:** SC165, Working Group 1  
**FROM:** E F C LaBerge  
**SUBJECT:** Further Update of North Atlantic Volumetric Model Including Victim Antenna Pattern and Revisions Suggested by WG1/48

**Introduction**

SC165/WG1-WP/438 (IRIIDUM-EFCL-0151C) developed a volumetric model for estimating the "unavailability" of Iridium service due to interference from Inmarsat equipped aircraft. SC165/WG1-WP/439 (IRIIDUM-EFCL-0152) detailed a set of assumptions necessary to apply that model to North Atlantic airspace. In SC165/WG1-WP/441, Inmarsat proposes new specifications for the harmonics, spurious and noise emissions of AES equipment. Based on those assumptions, SC165/WG1-WP/448 (IRIIDUM-EFCL-0154) concludes that the single-unit unavailability of Iridium communications on a single Iridium-equipped aircraft operating in an airspace with Inmarsat equipped aircraft is approximately  $3.2 \times 10^{-5}$ , assuming an average load of 0.05 Erlangs/aircraft. The maximum fleet unavailability, that is, the probability that at least one Iridium-equipped aircraft, operating in a mixed airspace containing both Iridium and Inmarsat equipped aircraft experiences harmful interference is  $2.5 \times 10^{-5}$ .

WP448 acknowledges that the volumetric model has certain shortcomings. Specifically, WP448 does not include the antenna pattern of the victim aircraft when computing the affected interference volume. This can result in an overly optimistic estimate of the availability effects. Furthermore, discussions during the WG1-48 meeting in February, 1999, indicated that some of the assumptions should be reviewed. This working paper adds the necessary features to properly account for victim antenna pattern and simultaneously adopts the recommendations made during the WG1 meeting.

This working paper (IRIIDUM-EFCL-0156B) is a revision of the material presented to SC165 Working Group 3 in SC165/WG3-WP/623, which was presented to the March meeting of WG3. At that time, George Cobley noted that the model used to include the effects of victim aircraft antenna patterns for the case where the victim aircraft was below the source aircraft did not properly account for the resultant polarization mismatch between source and victim antennas. Further discussion with Orville Nyhus confirmed this error. This version more completely accounts for this effect, with the result that the predictions are better (i.e. decreased unavailability) than those reported in the WG3 paper. The current version will be submitted to WG3 at its June meeting.

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Released to RTCA SC165 WG1  
14 May, 2000  
SC165/WG1-WP/455

volumetric model results reported in WP439 and WP448. Less gain in the victim antenna pattern means a smaller interfering signal into the victim receiver and, therefore, smaller interference effects. Elevation angles below the horizon when measured at the victim correspond to victim positions above the source. On the other hand, at angles more than about 20 degrees above the horizon, Figure 1 indicates antenna gains of 0 dB or higher. This is 10 dB higher than the assumption, and results in a 10:1 increase in the interference volume affected at such angles. An increase in any particular interference volume increases the average volume,  $\bar{V}$ , and, in accordance with (1.1), increases the unavailability.

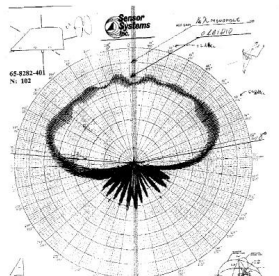


Figure 1: AIRSAT 1 Blade Antenna Pattern over Representative Ground Plane

Mitigating this increase in antenna gain is an increased polarization loss factor. While the source antenna is right hand circularly polarized, its effective polarization below the horizon changes sense to left hand circular, or, at the very least, to near-linear. On the other hand, the victim antenna remains circularly polarized. This mismatch results in a polarization loss that can be expressed as:

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Week 1 1-17

## Specification Documents

- We'll talk about Specification Documents on Wednesday and start some simple tasks.

## Requirement Documents

- You will be (or are in the process of ) writing one
- May be combined with a system design document...
- ...the Iridium Air Interface Spec is the best example I've ever seen.
- (I'll try to get a partial copy)
- Follow the rules I gave earlier