Navigating the standards process quickly to maximize data interoperability

Scott Houchin & Dr. Stephen Redman
The Aerospace Corporation

Ground System Architectures Workshop
28 February 2023

It *is* possible to develop standards quickly
It doesn't have to be a long drawn-out process!

- Aerospace customer developing a system that would produce ISR tracking data
- Looking toward a "planned" Edition B of NATO ISR Tracking Standard (STANAG 4676)
- Edition A "unusable" due to bloat, lacked key capabilities, and could not be easily extended

- March 2018 to October 2018 – Aerospace leads team of NATO Imagery Working Group (IMWG) members to completely rearchitect standard, achieve committee approval and create sufficient confidence for early implementers to start building

- How did we do it?
  - *The right completion criteria*
  - *The right openness*
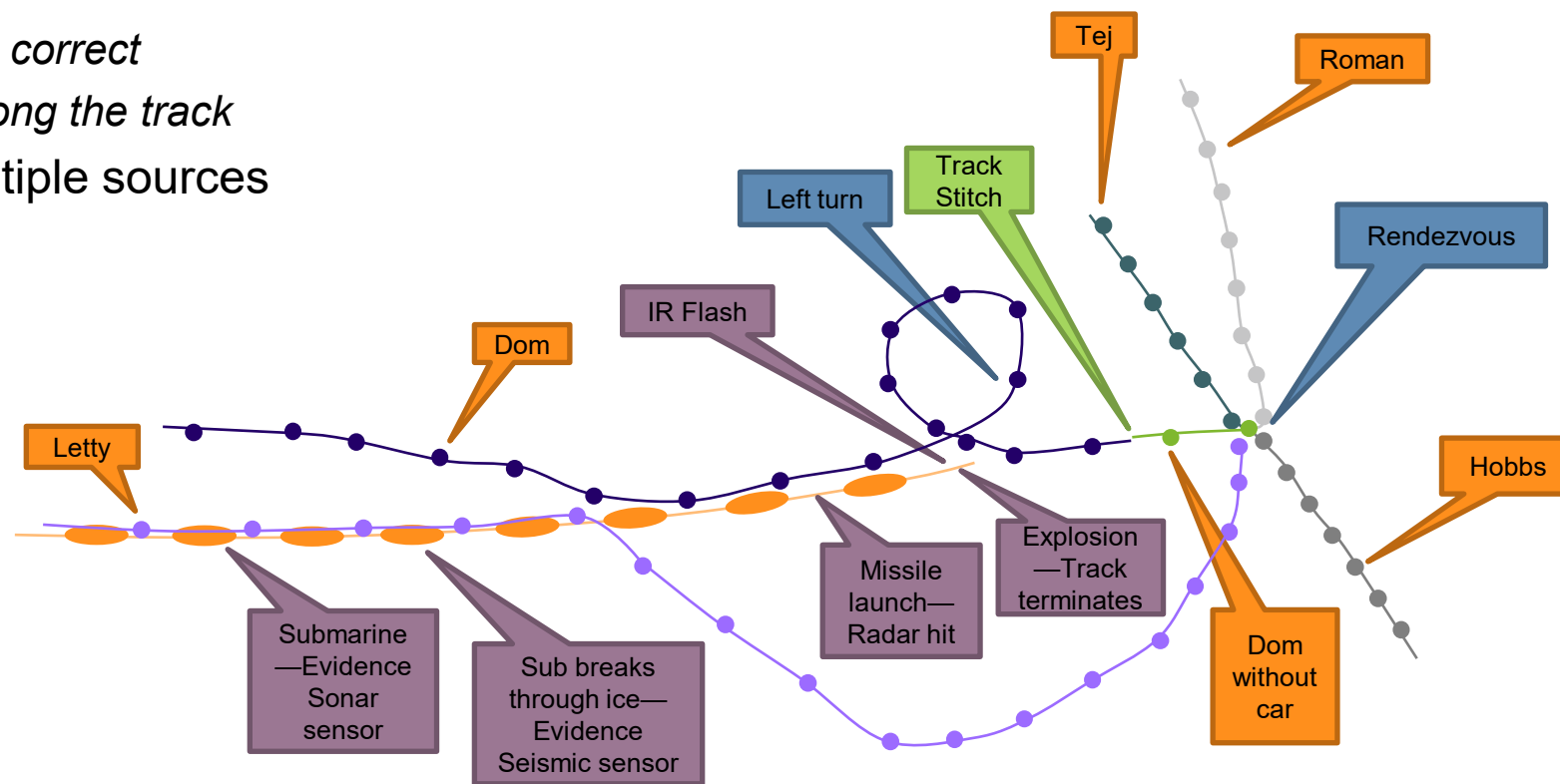 - *The right people and the right roles*
  - *The right follow-through*

We did it, and you can do it too!

ISR tracking overview
Community need – a flexible standard to accommodate complex sets of observations

- Records ground/sea/air/space tracks of real-world objects, including
  - *Identity of tracked objects*
  - *Relationships between tracks*
  - *Evidence used to conclude track is correct*
  - *Real world events that occurred along the track*
- Enables fusion of tracks from multiple sources

THE FATE OF THE FURIOUS

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Tej

Roman

Left turn

Track Stitch

Rendezvous

IR Flash

Dom

Letty

Hobbs

Submarine—Evidence Sonar sensor

Sub breaks through ice—Evidence Seismic sensor

Missile launch—Radar hit

Explosion—Track terminates

Dom without car

Entire scenario, ridiculous as it may be, can be accurately expressed using updated standard

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The right completion criteria
Be clear about what "done" means

- Does "done" mean fully approved and promulgated?
- Or does it just mean that the standard is stable enough that risk of substantial incompatible change is small?

- Differentiate "development" from "process"
  - *Know when review moves from technical analysis to nitpicking to rubber stamping*
    - "Every item needs its own timestamp" vs.
      "It's supposed to be the vertical line separator in 'Rec. ITU-T H.266 | ISO/IEC 23090-3'"

- STANAG 4676
  - *Data format standard using XML encoding*
    - XML is self-describing
    - Self-describing means forward compatibility
    - Forward compatibility means if we forget something, we can jam it in later
  - *Data formatting, not the science of tracking algorithms*
  - *Technical completion declared after working group approval, only one stage, no formal ballots*
    - Formal nations balloting is for "NATO" to agree to use the already existing standard

The right completion criteria
And what will happen if we don't get to "done"

- Upfront that we were shooting for "done" in October 2018

- OMB Circular A-119 – "All federal agencies must use **voluntary consensus standards** in lieu of government-unique standards in their procurement and regulatory activities, except where inconsistent with law **or otherwise impractical**."[†]
  - *If a suitable standard doesn't exist, and we can't reach consensus on a reasonable schedule, then we're off the hook*

- Interchange between key systems was guaranteed through program acquisition process

- Program was fully prepared to "do its own thing" if we couldn't get the standard done "on time"

† Emphasis mine
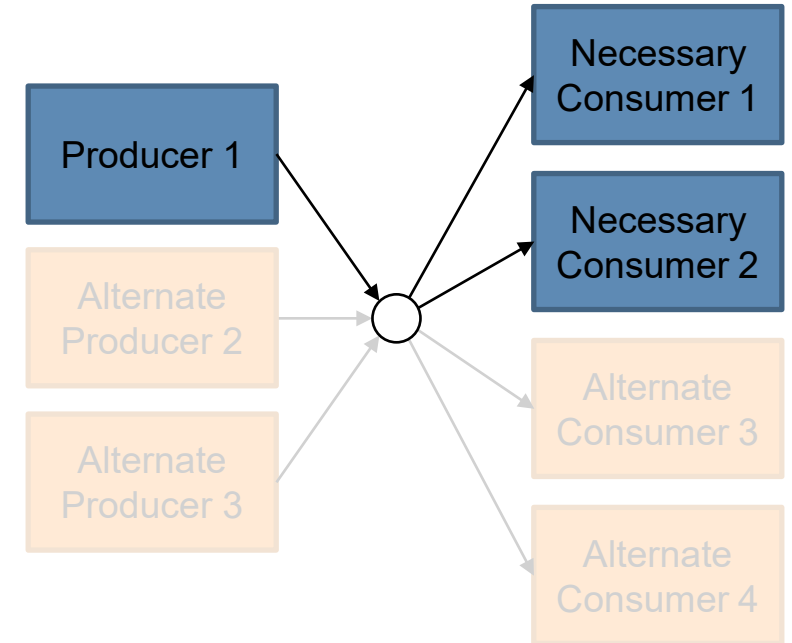
Having a broad ecosystem of producers & consumers using this same data format is a bonus, not a requirement!

Producer 1

Alternate Producer 2

Alternate Producer 3

Necessary Consumer 1

Necessary Consumer 2

Alternate Consumer 3

Alternate Consumer 4

The right openness
Let everyone watch the sausage making!

- If you want others to put inherent trust in your final result, they have to trust how you got there!

- STANAG 4676 Edition B development schedule
  - *April to Early June – 2-hour virtual TEMs, 3×/week*
    - Core team plus anyone else that wanted to show up

  - *Late June – Full draft preview release for IMWG and partner US agency comments*
    - Nothing out of bounds – tear it to shreds if that's what you think!
  - *July – Comment review TEM*

  - *September – 2nd preview release*
  - *October – "final draft" and approval at in-person IMWG*
    - Live text updates made at and directly after meeting to address final discussion points

Now is not the time to hold information until it meets your corporate quality standards!

The right people and the right roles

- IMWG had been mulling about Edition B for over a year! **with no progress**!

- So just having smart people clearly isn't sufficient
  - *Necessary, but not sufficient!*

- Looked back after-the-fact and identified non-obvious key roles different team members unconsciously stepped into

Beyond Subject matter experts (SMEs) and Technical Editors

Cheerleader
Rallies the team to success

- If you believe that the standards process will take a long time, **then it will take a long time**

- Someone on the team needs to be voice of

"*we can do this*"

- It doesn't have to be overt
- You don't need pom-poms or pep rallies
- It doesn't have to be fake
- You don't have to ignore technical realities

- But the voice needs to be continuous and unwavering

Mood and enthusiasm matter, even in the technical realm

Linguist

*Ensures standard is unambiguous beyond SMEs*

- Deciding amongst yourself that terms are unambiguous isn't good enough!
- Because you're writing the standard
  for the public, not the editors!

- Role should *not* be filled by a SME!
  - *"Of course I know the subtleties of the terms!
    I wrote the descriptions!"*
- Requires a questioning attitude – "do you really mean …?"

- When non-users understand what the standard can do, they get excited about the standard
- When they don't understand it, it's just another pile of meaningless buzzwords

Common usage of terms matter, and subtlety should be avoided!

Peter Mark Roget, 1834

Inconceivable!
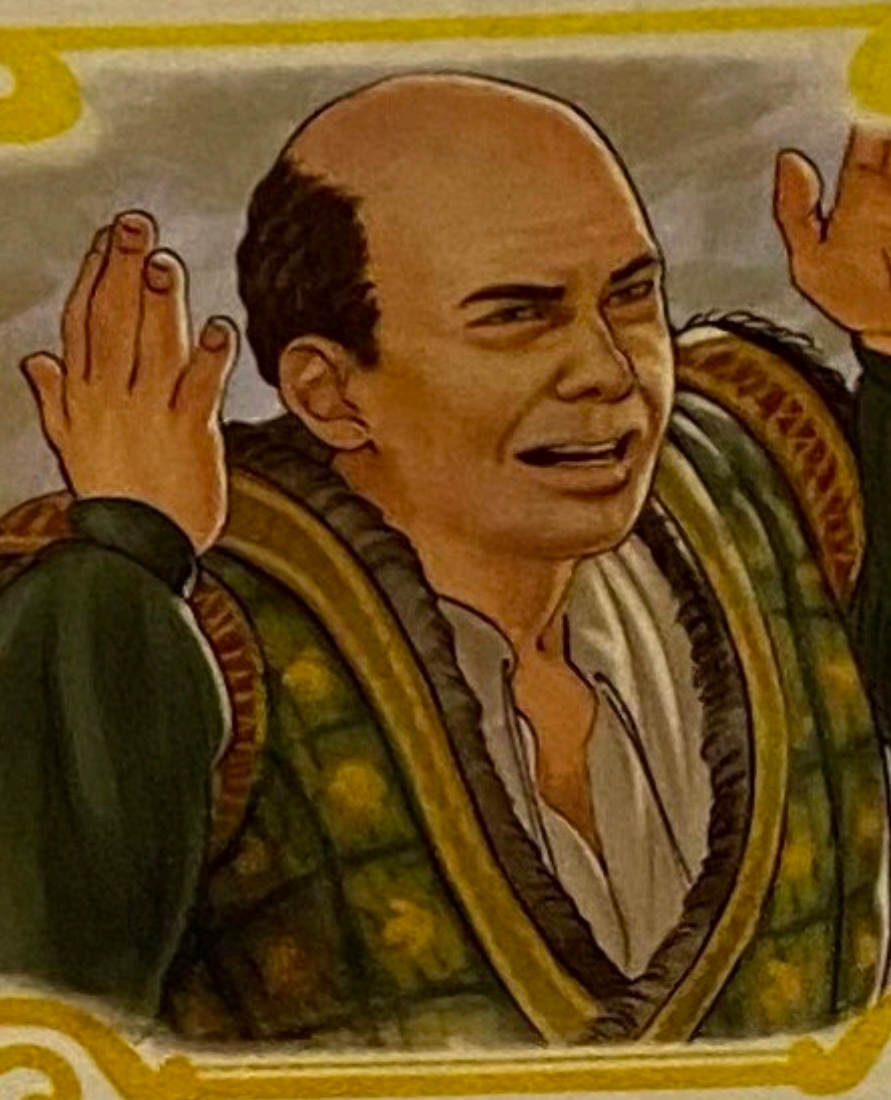
What's the big deal?!?!?
I included everything in the "Terms and Definitions"!

- If words don't mean what everyone thinks they mean
  - *The standard is ripe for misimplementation!*
  - *I can't **quickly** know that my needs are covered*
  - *I risk altering the meaning as the standard is extended*

- You are designing-in extensibility, aren't you?!?!?
  - *Avoid changing the interpretation of the term by how it's later used*
  - ***What a term doesn't mean is as important as what it does mean!***

- We're in a world of self-describing data
  - *Users will look at the data and interpret **based on what they think it means!***
  - *Without reading the standard!*

You keep using that word.
I do not think it means what you think it means

When you don't prioritize linguistics
Edition A track pedigree vs. track lineage

- Track pedigree – The association of specific detections with a track
  - *"I know that the tracked object was here at that time because I detected …"*
- Track lineage – The connections between reported tracks
  - *"It turns out that Track B is just a continuation of Track A"*

- From Merriam-Webster Dictionary
  - *ped·i·gree noun (pe-də-ˌgrē)*
    1. a register recording a line of ancestors
    2. a. an ancestral line; LINEAGE
       b. the original the history of something
  - *lineage noun (li-nē-ij)*
    1. descent in a line from a common progenitor
    2. a group of individuals tracing descent from a common ancestor

- From Merriam-Webster Thesaurus
  - *pedigree noun*
    - as in lineage
      the line of ancestors from whom a person is descended
    - Synonyms: lineage, ancestry, breeding, …
  - *lineage*
    - as in ancestry
      the line of ancestors from whom a person is descended
    - Synonyms: ancestry, pedigree, genealogy, origin, …

It's not OK if everyone in the room knows what we're talking about because you're trying to meet the needs of everyone NOT in the room

Applying linguistics

- Go back to the core meaning of the data
- Find terms that match that core meaning
- Use *common words* the way that *common people* use them!
  - *The thesaurus is your best friend!*
  - *Other resources at https://www.plainlanguage.gov/*

Track pedigree
I know that the tracked object w
here at that time because I
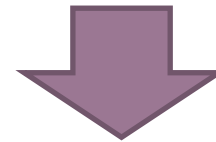detected …"

Sounds like a courtroom argument

Track lineage
It turns out that Track
is just a continuation of
Track A

Sounds like we're connecting two separate tracks

Evidence

Linkage

Find terms that even the layperson identifies with!

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Imagineer
Paves the way to the future

- If the standard just meets the current needs, it will be obsolete by the time it's published

- You are planning for extensibility, aren't you!?!?!

- Role should *not* be filled by a SME!
  - *The SME is too focused on what can be done*
  - *Imagineer is focused on*
    - What we might want to do in the future
    - And how to design the current standard so we can add that capability later

What can we do tomorrow!

Voice of Sanity

Keeps the Imagineer in check

- Enabling next generation capabilities is cool,
  but if we can't do it, then we can't know if we did it right!
  - *We need a standard for today, not tomorrow!*

- Finally! A role for the SME
- The imagineer could also fill this role if they're able to control their imagination

- Imagineer works in tandem with the Voice of Sanity to chart a pragmatic path to the future

I don't know about ya'll, but I didn't really plan on dying today!

"Roman Pearce"

The right follow-through

Remember that done isn't really done until it's published

- You can still get bit by process
- You can still get bit by lurkers
- You can still get bit by overspecification

Turkey invades Cyprus, 1974

- Divides country into Turkish-aligned northern region and Greek-aligned southern region
- Only Turkey recognizes independence of northern region

UN Buffer Zone

Turkish Cypriot-
Administered
Area

Area controlled by
Cyprus Government
(Greek Area)

NordNordWest, CC BY-SA 3.0, via Wikimedia Commons

Who would think this would even matter to a standard for ISR tracking data!?!?!?

Both Turkey and Greece use veto power to send draft back to committee
Breaks silence procedure

- Ed. A cited STANAG 1059 – Letter Codes for Geographical Entities
- STANAG 1059 includes entry for Cyprus

- Turkey says reference must be removed
- Greece says reference must stay

- But we didn't actually use country codes at all in Ed. B!
  - *Pointed that out and deleted the reference, and everyone was happy*

- Forgetting to double check some ancillary details created a 6-month delay in formal ratification
- Used those 6 months to correct a few minor errors discovered by earlier implementors

Tips to avoid the unforseen

- Don't specify any more than necessary
- Focus on how the thing is used, not how it's produced
  - *There are likely many more users of the thing than producers*
  - *"At the discretion of the data provider" are some of my favorite words*
- Make sure the technical editor is keeping everyone on their toes!

In practice, "fast" is relative

It's up to you to decide how quickly you can move

- STANAG 4676 had many accelerators already in place

- We were starting with an approved Edition A (even though we drastically changed most of it)
- It's a data format standard, not a hardware standard
- Cost to make changes isn't catastrophic
- It's easy to add in things later – native forward compatibility through XML encoding
- We had immediate program need
- We had a body of implementers trying to use Ed A. that were itching for something they could use

Be as fast as reasonable

Developing standards doesn't have to be a long drawn out process

- Define "done" appropriately – you probably can declare victory well before publication
- Know if and when to walk away – you can't force everything to the common case

- Expose all the sausage making
  - *Ensure that the decision makers **trust the end result** by allowing them to **trust the process** <u>on their own terms</u>*

- Acknowledge that you need more than subject matter experts and technical editors
  - *Cheerleader*
  - *Linguist*
  - *Imagineer*
  - *Voice of Sanity*

- And don't forget the follow-through
  - *Remove the unnecessary*
  - *Make sure that it's clear how to consume what you're producing*
  - *Let the process run its course, and adapt implementations if necessary*

We did it, and you can do it too!

Questions?

Backup

Acronyms and initialisms

- IMWG – Imagery Working Group
- IEC – International Electrotechnical Commission
- ISO – International Organization for Standardization
- ISR – Intelligence, Surveillance, and Reconnaissance
- ITU – International Telecommunication Union
- ITU-T – ITU Telecommunication Standardization Sector
- NATO – North Atlantic Treaty Organization
- OMB – Office of Management and Budget
- SMB – Subject Matter Expert
- STANAG – STANdards AGreement
- TEM – Technical Exchange Meeting
- US – United States
- XML – eXtensible Markup Language