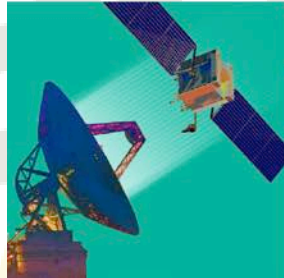# Ground System Architectures Workshop
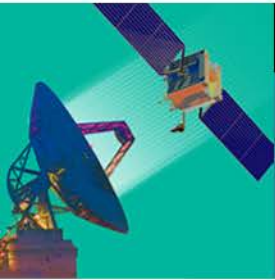
GSAW Summary

Session 15

Sam Cantrell and Supannika Mobasser,

The Aerospace Corporation

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Challenge of Change

- Space is a congested, competitive and contested environment.
- Governments are allowing more access to space.
- Current architectures are based on budgets that don't exist anymore.
- Get information to warfighters at the "Speed of need"
- We need the change now not tomorrow or next year.
- Is the rate of change faster than the acquisition cycle?
- To leverage the commercial world, we must embrace the rate of change in the commercial world.
- Deliver change without disruption
- Bake security in from the beginning

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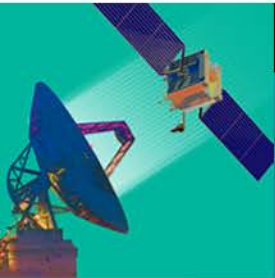
A More Agile Development

- Current acquisition models don't easily support an agile acquisition
  - Traditional, sequential, governmental *acquisition model* isn't agile friendly
  - Traditional, sequential, governmental *review model* isn't agile friendly

- Tight production schedules require strict adherence to standards
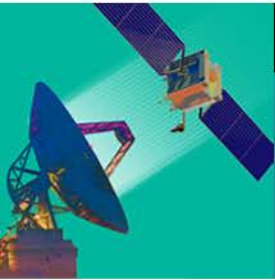
More Reliance on Automation

- Define automation at the beginning of a mission rather than asking "what can we automate?" at the end.

- "Human *in* the loop" vs. "human *on* the loop".

- "Assisted automation is tough, unattended is tougher."
  - Extensive data validation and integrity

- Fights operator boredom but when a system goes lights out, how do operators retain proficiencies for anomalies?

- Lights dim vs. lights out

- Enabled saving $20k/month, a 40% reduction in labor, 92% of daily task time.

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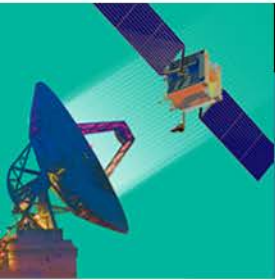
Virtualization

- Virtualizing in general is challenging
  - Virtual/enterprise drives toward smaller away from monolithic stovepipes. However the contracting environment is geared for large "bites".
  - "Cost is too high to build small"

- How can we secure an architecture in a virtualized environment?

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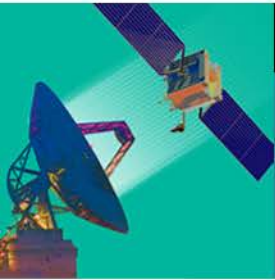
The European Approach
vs. "Too Big to Succeed"

- Costs of ground can be more than costs of the space or launch vehicle, if you factor in labor over system lifetime

- Collaboration Enforcement; key to European paradigm

- European Community Open Source – Free and Required

- Select technologies, not necessarily the *best in class* but *ones that will work together*.

- "The true measure of a standard's success is not that it is <u>required to be used</u> but that it is <u>used when not required</u>."

- Standards can be produced only when there is a consensus.

- Risk drives the choice of standards

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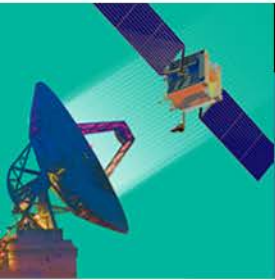
Evolving Solutions

- RESTfull
- JSON
- Containers
- Cloud
- Public/private partnership: Costly *not* to do it.
- Open source: Moves money around and has the potential to save money
- Focus on Mission *Effectiveness* rather than Mission *Success*

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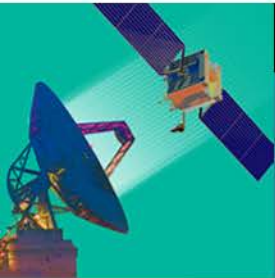
Tidbits

- *Flexible requirements* does not mean *no requirements*.
- "If you wait till the last minute, it only takes a minute."
- Gmail was our ground system…literally.
- "Change" as in "Don't change my system"!
- "If we had an endless pot of money it would be much, much easier."
- Silos as a Service (SaaS)
- Limitations can actually add value
- Don't make up a new standard when one already exists
- "Maybe it isn't a requirement if we can't afford it"
- "90% success overall; 100% on a good week, but it's not always a good week."
- Ground systems are very complex, just like playing Jenga
- Build vs Buy vs Grab

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