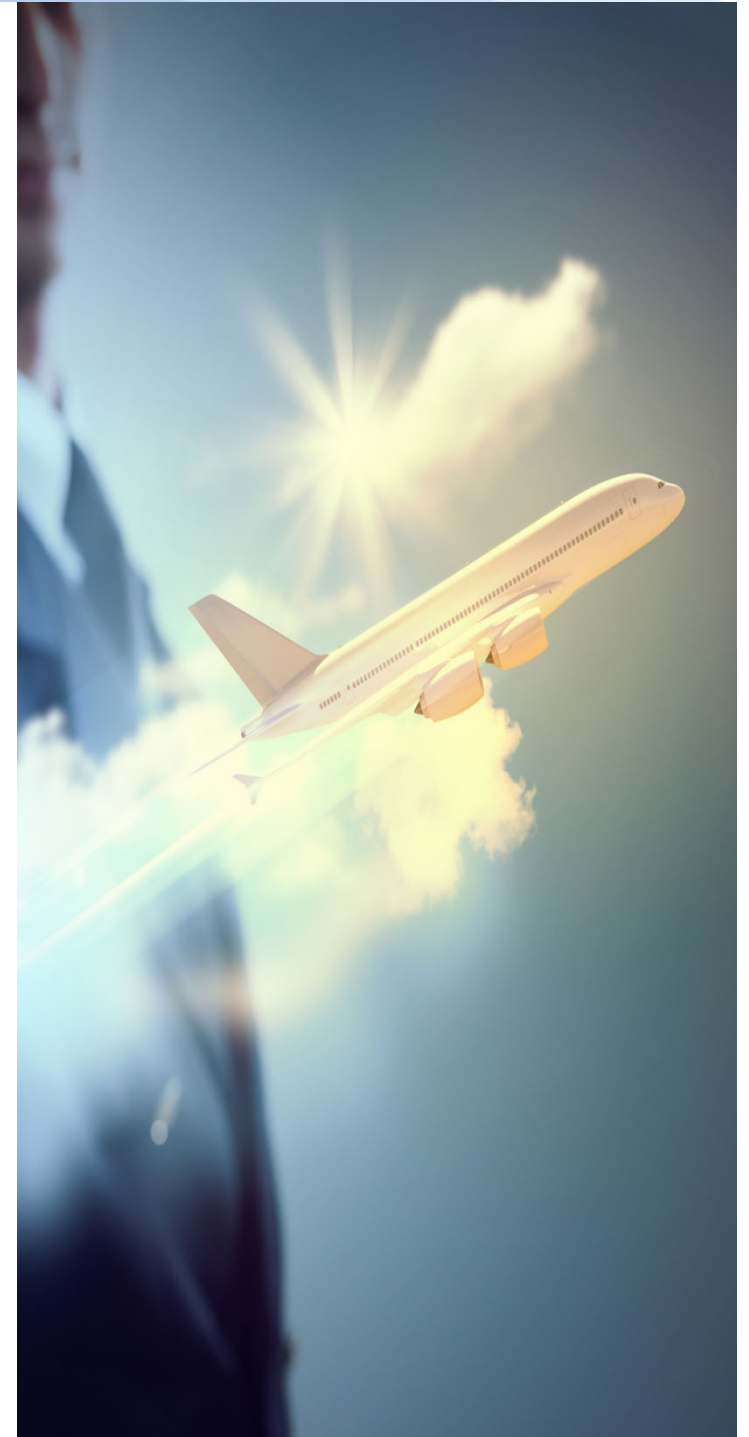


Systems Thinking – Thinking **Technical Operations Perspective**

Presented to:
Verification & Validation Summit 2018

Presented by:
Donald Taylor, AJW-135
Technical Operations In-Service Manager

Date: September 20, 2018



Agenda

Systems Thinking – Thinking ...

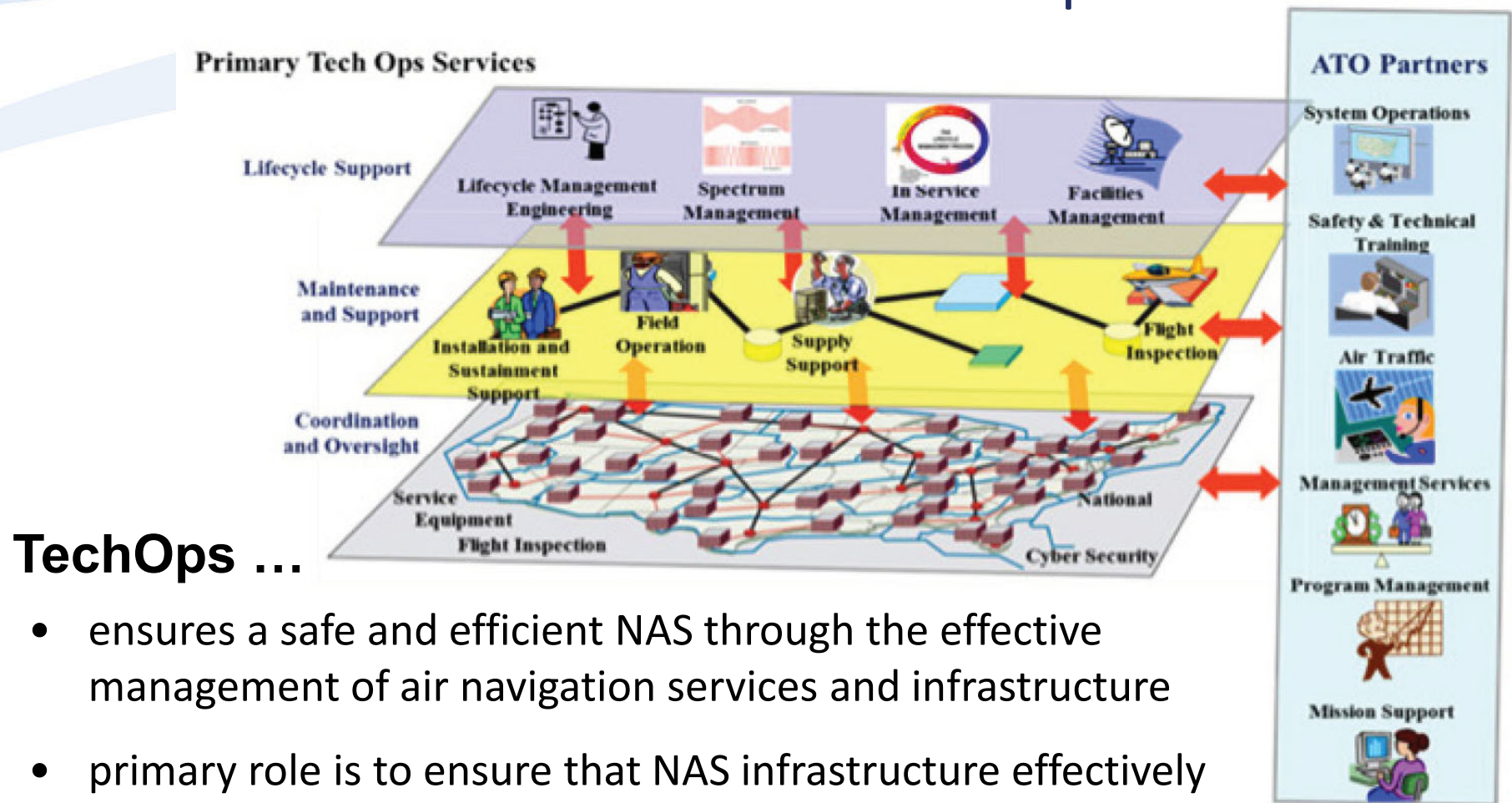
- ✦ Introduction - Who is Technical Operations?
- ✦ FAA Lifecycle Management
- ✦ Evolutionary or Revolutionary
- ✦ Culture – The People



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Introduction - Who is Technical Operations?



[Source: TechOps Conops 2015]



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Introduction - Who is Technical Operations?

- **TechOps** operates and maintains both legacy NAS systems and NextGen systems



NAS is comprised of over **66,000** pieces of equipment including both legacy and NextGen systems

Operates
 **24** hours a day
7 days a week
365 days a year



Maintained by a technical workforce,
~5,900 employees located across the country



at **more than 440** facilities with technical specialists in various disciplines of Automation, Communications, Environmental, Navigation, and Surveillance

- TechOps **organization is a complex system of systems**
- The objective is the required level of service to the end user at optimal lifecycle cost to the FAA everyday.

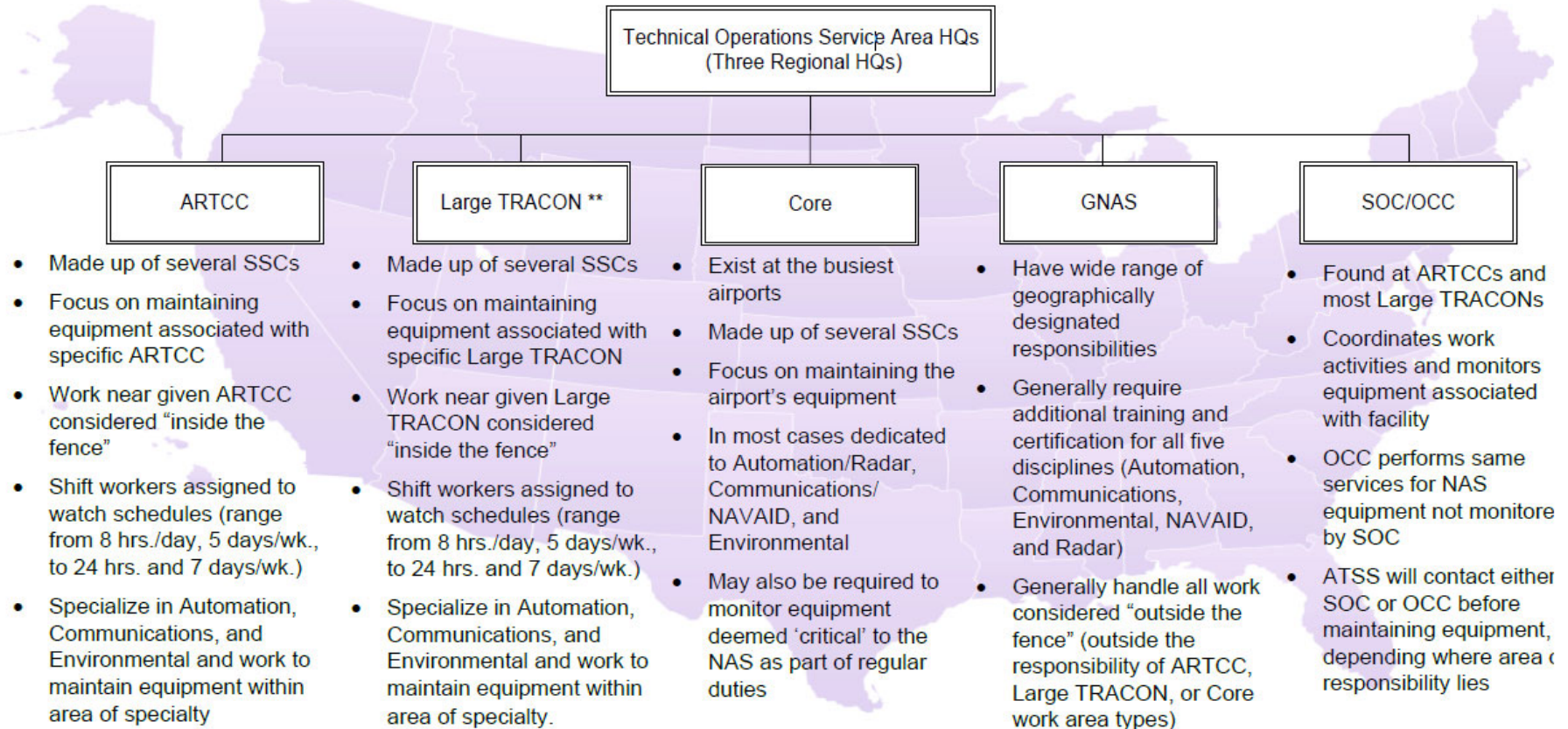
[Source: TechOps Conops 2015]



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Introduction - Who is Technical Operations?



** Large TRACONs may contain a SOC

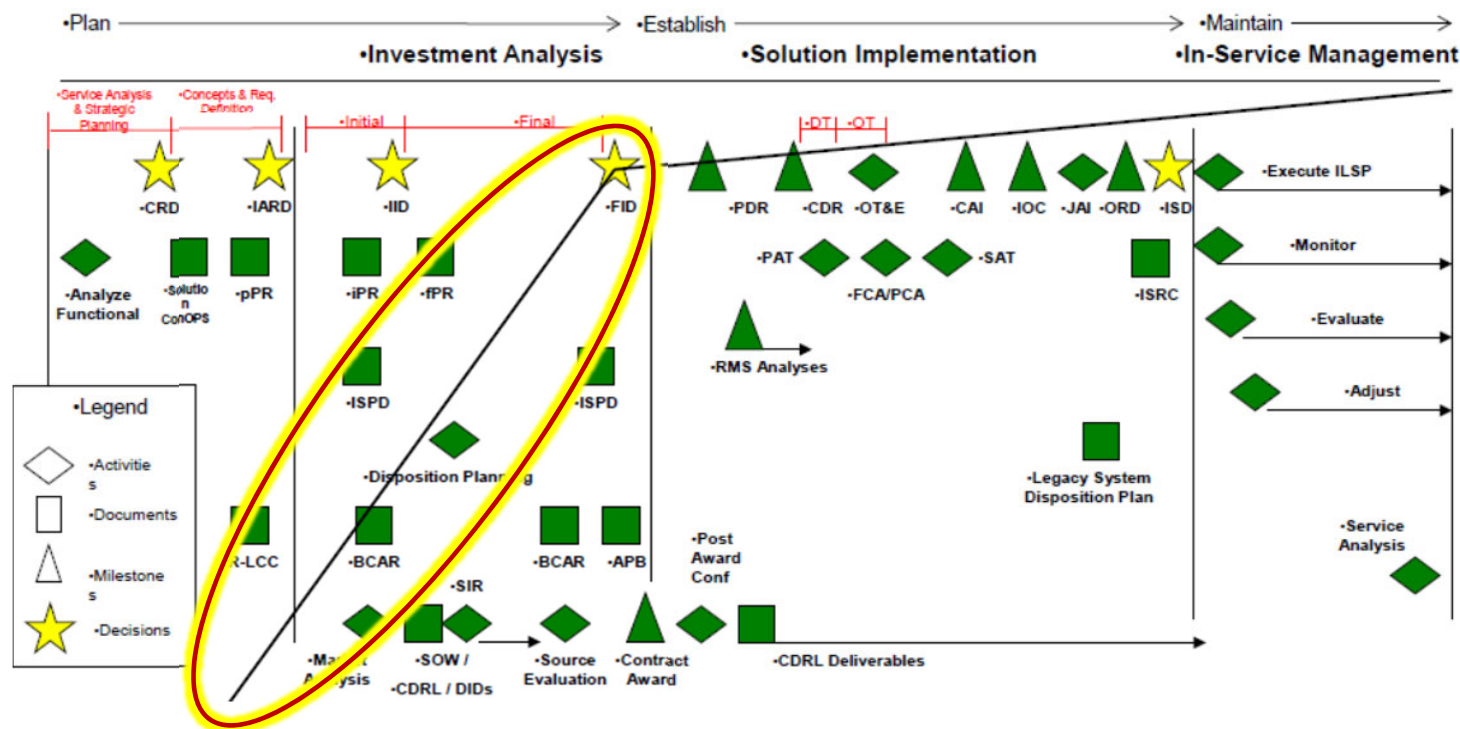
[Source: TechOps Technician Workforce Strategy 2015]



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Systems Thinking - Thinking FAA Lifecycle Management



Investment Analysis phase ...

- is the most cost effective opportunity to set '*right*' a program's Integrated Logistics Support (ILS) for system sustainability and supportability during the **In-Service phase** ... lasting 20yr+, 30yr+, 45yr+

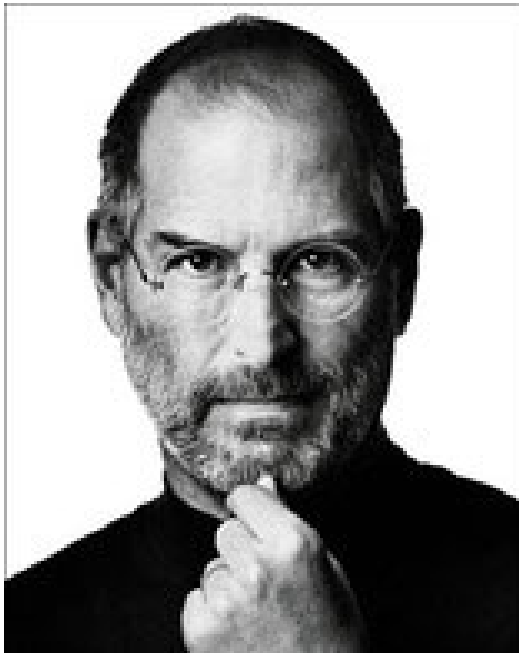


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FAA Lifecycle Management

- Our system tech refresh philosophy purposefully “*dumb down*” current, contemporary technology employment ...



“People don't know what they want until you show it to them. That's why I never rely on market research. Our task is to read things that are not yet on the page.”

- Steve Jobs

Does it make sense to purchase an iPhone X just to disable all its features for talk only,

... why do we do this for NAS?

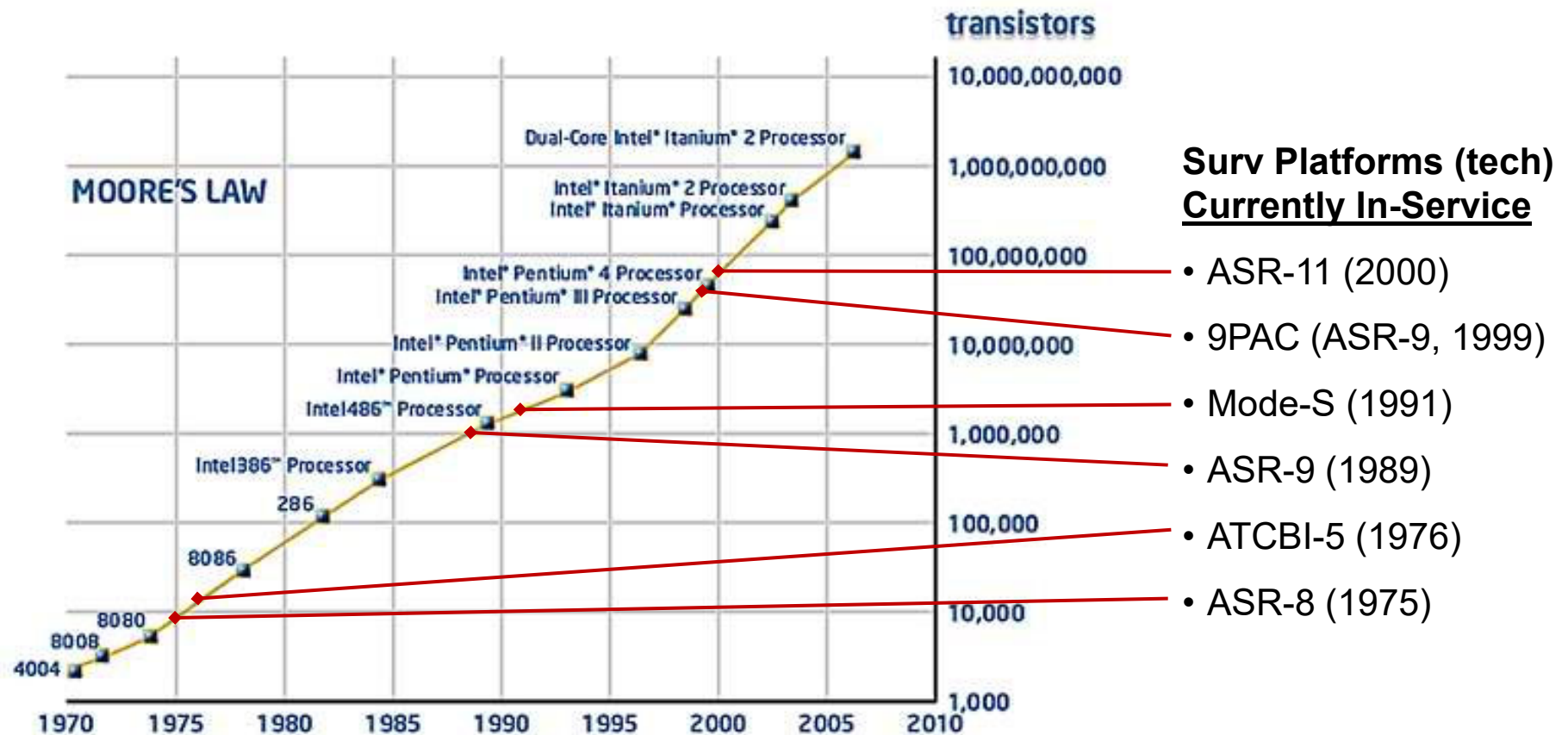
Think ...

Evolutionary ... equipment & culture



Systems Thinking - Thinking Evolutionary over Revolutionary

- **FAA locks itself into 'legacy' paradigms –**
“cement shoes” – makes swimming challenging!



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Evolutionary over Revolutionary

“The major challenges moving forward will be the balancing of the workforce’s skillsets between the legacy NAS and NextGen systems and services, the sustainment of our aging infrastructure.”

[Source: TechOps Conops 2015]

- **Talent typically vested in legacy**
 - it takes a while for people to come to grips with new methodologies
 - *“Typically, a surgeon will propose surgery as the solution”*
 - HW engineer = HW solution; SW engineer = SW solution



Evolutionary over Revolutionary

- **Plan for DMSMS monitoring** - tech lifecycles = ~5yr; Gov't = 20yr+
 - **Plan for Modernization and Sustainment evolution**
 - **Plan for Interchangeable Parts between platforms**
 - + Look for scalable evolutionary solutions
 - + Consolidate logistics
 - **Engage Virtual Teams**
 - + Leverage current organization as *"pool of talent"*
 - + Systems Thinking cross-platform & across the org *"aisle"*



Evolutionary over Revolutionary

Example ...

- **Surveillance Interface Modernization (SIM)**
 - + Implementation failed to fully appreciate existing legacy issues
 - + Legacy tech was a significant issue
- **Fused Mode Tracker (new tech)**
 - + Implementation failed to fully appreciate existing legacy issues
 - + Registration was a significant issue
 - + Tracker req'd higher resolution target position reporting



Culture – The People

Core Value: People are our strength. Our success depends on the respect, diversity, collaboration, and commitment of our workforce. [Source: FAA Values]

Tribal Approach (in active use today)	Systems Thinkers
<i>“King for the Day”</i> <ul style="list-style-type: none">• policy, practices & designs dependent on specific person• <u>Effect</u>: they move on, their policy “dies”	<ul style="list-style-type: none">• cultivate relationships• bridge organizations• share talent (talent pools)• share ideas• committed to constant & never-ending improvement
<i>“Not Invented Here”</i> <ul style="list-style-type: none">• Talent typically vested in legacy; team fragmentation, duplication of effort• <u>Effect</u>: stagnates team thinking, suppresses younger mbrs	
<i>“We have always done it this way”</i> <ul style="list-style-type: none">• Rigid policy/process conformance, do not know why• <u>Effect</u>: either “full on” or “AWOL”, variance in the product	
<i>“one size fits all” or “one and done”</i> <ul style="list-style-type: none">• all situations “shoehorned” into a single process• <u>Effect</u>: team agility, flexibility, creativity are absent	<ul style="list-style-type: none">• promote diversity of thought work to improve policy/process• explore creative approaches• include team member perspective



Systems Thinking – Thinking Culture – The People

The only way to transform a culture is to “grow” & evolve out of it

“Linear thinking tends to focus on addressing surface-level behaviors – or symptoms.”

Linear Thinkers	Systems Thinkers
Break things into component pieces	Are concerned with the whole
Are concerned with content	Are concerned with process
Try to fix symptoms	Are concerned with the underlying dynamics
Are concerned with assigning blame	Try to identify patterns
Try to control chaos to create order	Try to find patterns amid the chaos
Care only about the content of communication	Care about content but are more attentive to interactions and patterns of communication
Believe organizations are predictable and orderly	Believe organizations are unpredictable in a chaotic environment

[Source: Ollhoff, J., Walcheski, M., (June/July 2006) *Making The Jump To Systems Thinking*, Pegasus Communications]



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Systems Thinking – Thinking Culture – The People



“Most leaders instigating change are like gardeners standing over their plants, imploring them: “Grow! Try Harder! You can do it!”

... But if a seedling has no room to grow, no soil, and no water, it will never become a tree.”

[Source: Senge, P; Kleiner, A; Roberts, C; Ross, R; Roth, G and Smith, B (1999) *The Dance of Change: The Challenges of Sustaining Momentum in Learning Organisations* Doubleday/Currency, New York]



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Culture – The People

Workforce development

“When considering candidates for a role, favor the ones with a track record of learning new things over the ones with a track record in that particular role.”

- **Select individuals for future organization capabilities**
 - ✦ Current practice is to address today's issue, but individual may not be able to grow with organization
 - ✦ Select for those skillful in asking purposeful questions that allow the ability to trace the implications of potential answers across the enterprise

[Source: Eric Schmidt & Jonathan Rosenberg, (2014) *How Google Works*
The rules for success in the Internet Century, Pegasus Communications]



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Culture – The People

Workforce development



- Build a cohesive, culture that supports *Mission, Vision, Values, and Learning*
- Cultivate a "*deep bench*" of talent"

- + Develop skill to foresee the obstacles that will arise naturally wherever growth & learning take place, otherwise change initiatives will fail
- + Define a framework of SME-defining capabilities



Systems Thinking – Thinking Culture – The People

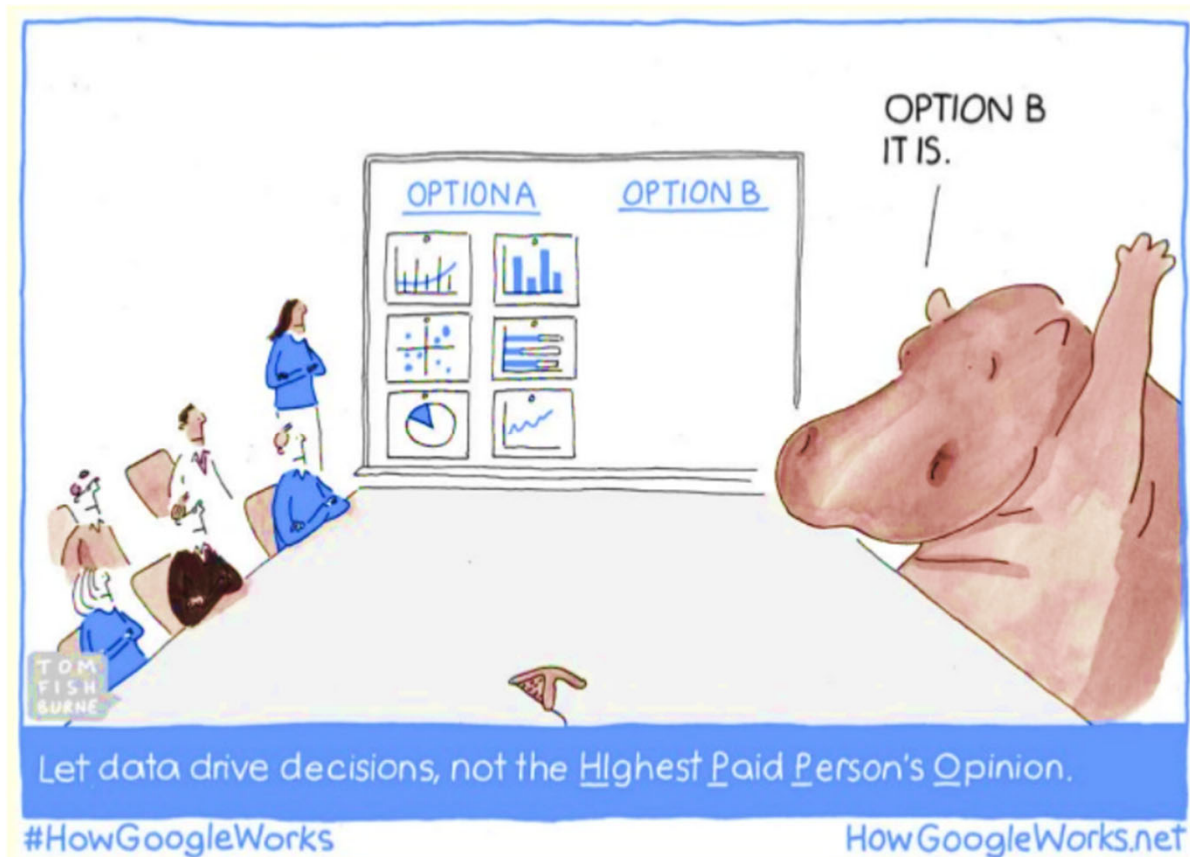


- **Transfer knowledge across disciplines**
 - Talent typically vested in legacy – it takes a while for people to come to grips with new methodologies
 - “Typically, a surgeon will propose surgery as the solution”
 - HW engineer = HW solution; SW engineer = SW solution
 - Studies show kindergartners learn skills & then start to apply them automatically in different scenarios



Systems Thinking – Thinking Culture – The People

Less Crystal Balls and More Data, Please



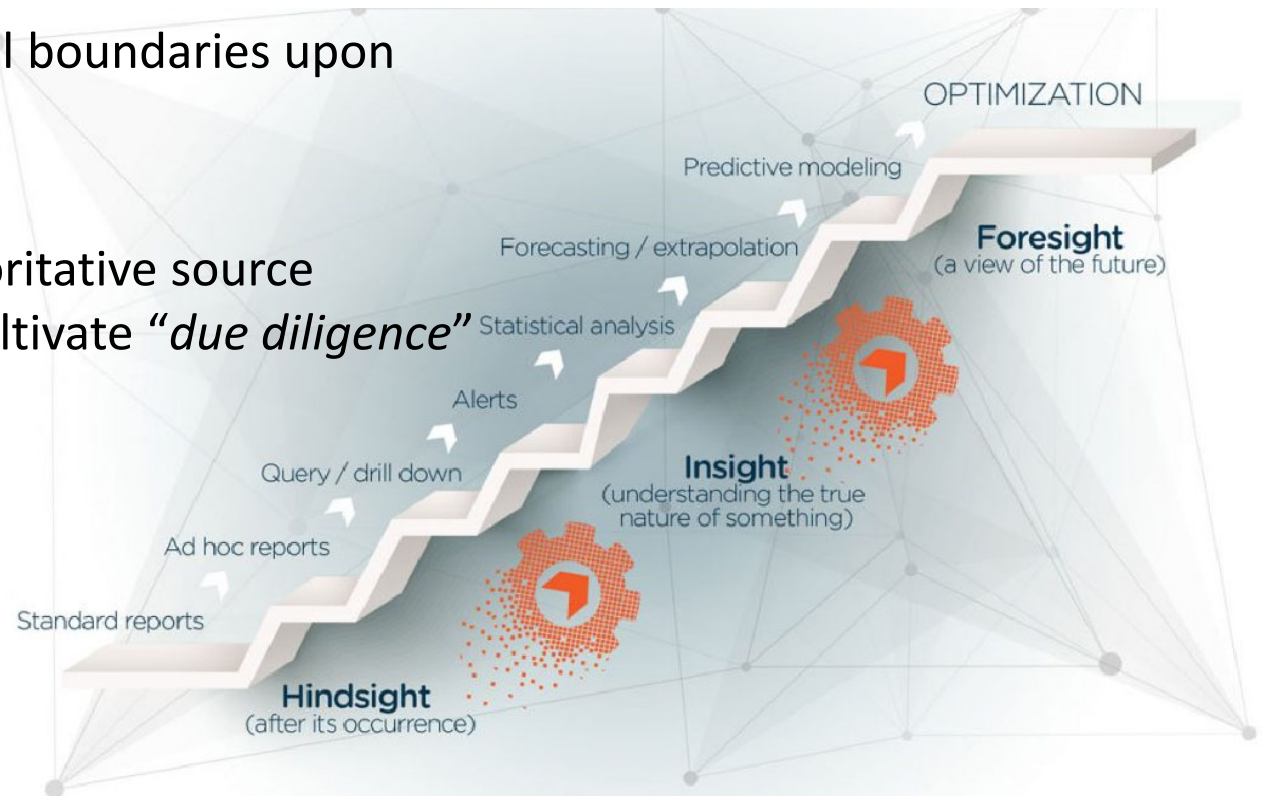
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Systems Thinking – Thinking Culture – The People

- **Data Driven Decision Making**

- ✦ We employ artificial boundaries upon ourselves
- ✦ Build reliable authoritative source infrastructure to cultivate “*due diligence*”



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IT'S KIND OF FUN TO DO THE **IMPOSSIBLE**

WALT DISNEY



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