Aviation safety certification: diagnostic results

Federal Aviation Administration

August 1, 2015

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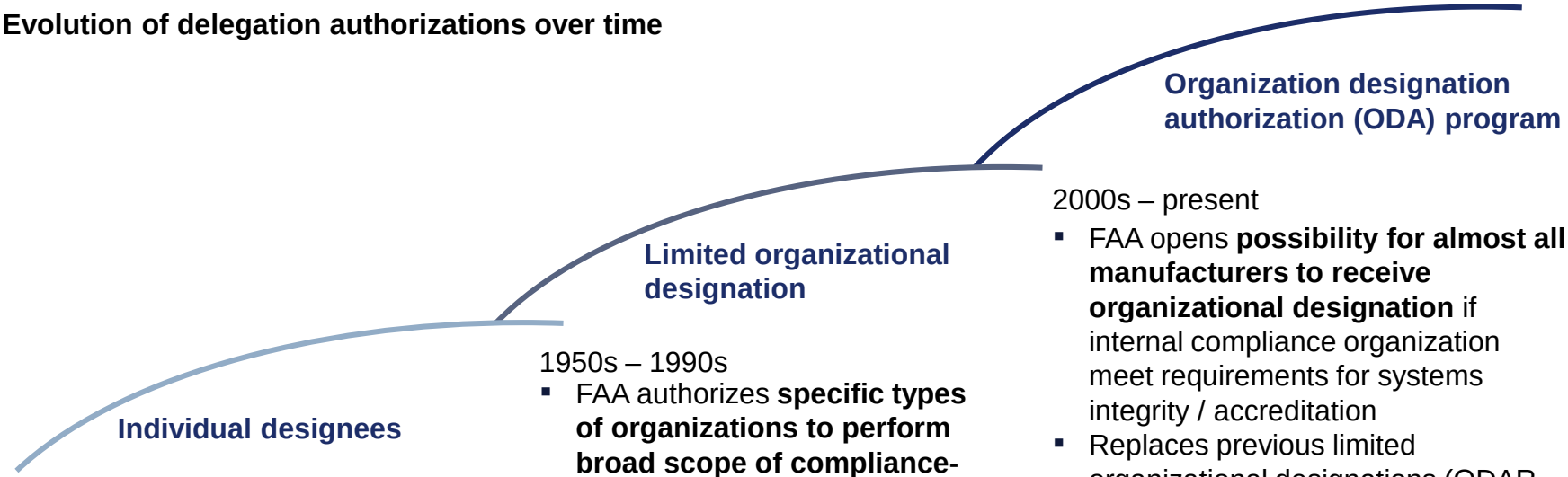
Over the coming years, AVS will need to adapt to meet an increasing and changing demand pipeline

	Description of trend	Impact on certification
Increases in development programs	▪ Most OEMs, particularly air-framers, are anticipating higher volume of projects at higher average complexity over next 5 years	▪ Unless the FAA adapts, demand for FAA involvement in projects will continue to increase, creating stress on the workforce/key processes
Globalization	▪ Increase in international competition ▪ Increase in globalization of supply chain (e.g., higher volume and more complex products made overseas)	▪ Increased importance on harmonizing global standards ▪ Increased pressure on providing “level playing field” as a regulator
Increased customization	▪ Rising customer expectations for aircraft customization ▪ High volume of configuration options in catalogs (e.g., interiors)	▪ Often validated near the end of the process, putting on critical path ▪ Can result in high pressure situations due to high customer visibility
New technologies	▪ Innovation in aviation and other industries continues to accelerate and drive change (e.g., composite structures, onboard wifi, multi-core processing)	▪ Increased importance on moving from “reactive” to “proactive’ model (e.g., setting clear policy, standards, or guidelines for industry before product implementation)

ODA is the latest and most comprehensive in a series of steps towards increased delegation and leverage of industry resources in certification

Evolution of delegation authorizations over time



Individual designees

1920s – 1940s

- FAA allows **designated individuals**, either within or outside of manufacturers, **to make compliance findings** in support of various certifications
  - Designated engineering representatives (DERs)
  - Designated manufacturing inspection representatives (DMIRs)
  - Designated airworthiness representative (DARs)

Limited organizational designation

1950s – 1990s

- FAA authorizes **specific types of organizations to perform broad scope of compliance-related activities** through FAA-certified internal compliance organizations
  - Organizational delegated airworthiness representative (ODAR)
  - Delegated option authorization (DOA)
  - Designated alteration station (DAS)
  - Special federal aviation regulation #36 (SFAR36)

Organization designation authorization (ODA) program

2000s – present

- FAA opens **possibility for almost all manufacturers to receive organizational designation** if internal compliance organization meet requirements for systems integrity / accreditation
- Replaces previous limited organizational designations (ODAR, DOA, DAS, SFAR36)
  - Type certification (TC)
  - Supplementary TC (STC)
  - Parts manufacturing approval (PMA)
  - Major repair, alterations, and airworthiness (MRA)
  - Production certification (PC)
  - Technical standard order (TSO)
  - Airman knowledge test (AKT)
  - Air operator certification (AO)

- **The certification model has continuously evolved to handle more volume with proportionally fewer resources**
- **ODA allows manufacturers relatively broad authorization** to define, plan, and test compliance in pursuit of various certifications but **requires a dedicated internal organization with stringent audit and control standards**

SOURCE: Internal documents, internal interviews

The original intent of ODA was to bring a systems-based approach to certification and to allow for significant delegation of compliance activities

Systems based approach to focus on safety-critical matters

- "The ODA program… establishes a more comprehensive, **systems-based approach** to managing designated organizations[1]"
- Organizational designees have gained significant experience… [which] has allowed the FAA to **focus on more critical areas**[1]"
- "The effect of this program will be to… allow the FAA to **concentrate its resources on the most safety-critical matters**[1]"

Delegation of compliance finding to OEMs

- "An ODA that has no documented limitations would enjoy full ODA authority, and have delegation to **perform all activities with the exception of those defined as inherently governmental**[2]"
- "The **procedures manual** defines an ODA holder's **authority and limitations**… [which] determines the functions it may perform[2]"

Takeaways

- ODA framework lays conceptual groundwork for a systems-based approach
- ODA policy grants OMTs high discretion for risk-adjusted involvement
- Unless OMTs impose ODA limitations, ODA fully delegates to OEMs

1 CFR Final Rule, Establishment of Organizational Design Authorization Program, Oct 13, 2005
2 Order 8100.15B

SOURCE: CFR Final Rule, Order 8100.15B

Early internal interviews surfaced a number of pain points (1/2)

Category	Theme	Pain point	Representative quotes
Internal to applicant	1 Applicant capabilities and systems	▪ Applicant capabilities and systems face challenges keeping pace with the frontiers ▪ Some applicants have limited experience or deficiencies in specific areas, requiring more support throughout the process	"Many companies haven't set up the systems to build compliance…it's not just an ODA responsibility, it's everyone's responsibility"
	2 Business model decisions	▪ Business model decisions (e.g., custom-ization, delivery commitment) often made in advance and independent of certification planning and don't account for the process	"Companies make decisions independent of certification and can't make deadlines or don't set the right timelines"
	3 ODAs apply a "higher bar"	▪ Applicants perceive that ODAs are more stringent than ACO members were previously	"When they disagree with their FAA specialists, some OEMs go above to management, causing friction with frontline"
Applicant-FAA interaction points	4 Front-end alignment	▪ Lack of alignment with FAA early in certification planning can create pressures, uncertainty and delays throughout the process	"[FAA doesn't] get involved early enough in the upfront process"
	5 Culture and communi-cation	▪ Communication challenges between key FAA, ODA and industry stakeholders ▪ Opportunity to enhance change manage-ment to further advance ODA and change mindsets and behaviors (FAA and applicant)	"Everything boils down to communication and miscommunication" "We talk about change management…but we have the same issues and themes"

Early internal interviews surfaced a number of pain points (2/2)

Category	Theme	Pain point	Representative quotes
Internal FAA	6 FAA process inefficiencies	▪ Extra handoffs touch points, or redundancies in a project can create delays ▪ Misalignment with stakeholders creates extra work	"[The project] took a long time because it had to be worked through multiple agencies… it would've worked better if our processes and our people worked better together"
Internal FAA	7 Uneven application of standards	▪ Application of thresholds and standards varies across different companies ▪ Decentralization and variation in how the standards are applied ▪ Over-burdensome requirements for some given the context while under burdening others	"Challenge in balancing right amount of involvement; no formal system to determine what is important versus not" "People have trouble saying 'I used to touch and do this and now I don't do it like I did before'"
Internal FAA	8 Enhanced risk-based decision making possible	▪ Criteria to prioritize scarce resources according to risks can be improved to reduce variability	"We need to move to a more risk-based system: identify, mitigate and monitor – that's what safety management is all about"
External	9 External stressors	▪ Innovation puts continued pressure to keep up with frontier standards ▪ Unexpected shocks (changes in external standards, failed tests) create pressure	"Industry needs to engage immediately since FAA isn't up to date on the latest technologies"

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Four primary diagnostic takeaways emphasize need for change

A **ODA implementation has not met expectations** – while it has not been materially costly, it has not consistently delivered expected industry-wide benefits.

B While the certification process works well at the best performing OEMs, **industry identified five consistent concerns** about certification – difficulty building certification talent, long turnarounds, low levels of risk-based prioritization, adversarial mindsets, and lack of flexibility and discretion. International authorities echo industry frustrations.

C **Lack of consistent performance management systems, change-resistant frontline mindsets, and skills challenges** contribute to variable performance**. Disagreement on safety relevance** contributes to uneven application of standards.

D The **Boeing-BASOO relationship** is the most important and contentious. While BASOO's PNL and issue paper response times are comparable with other ACOs, disconnects between Boeing and BASOO may require a relationship reset.

Overarching consensus is need for **risk-based systems oversight** with **forward-looking standards** function, **well executed** across the field

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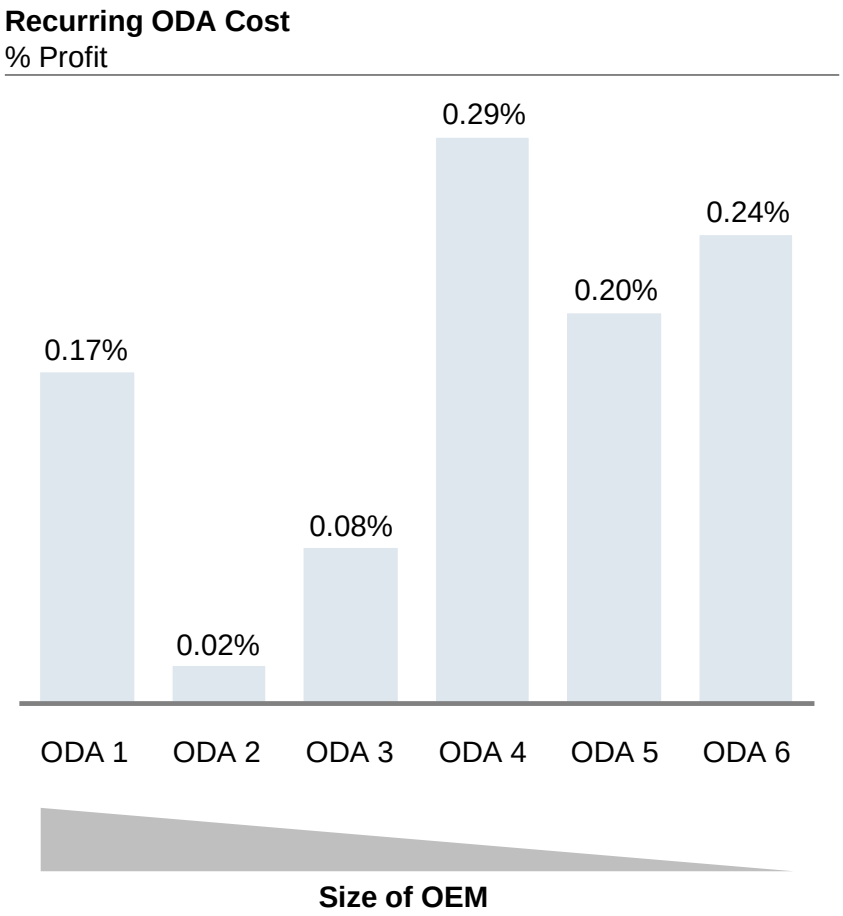
A. ODA costs and benefits

ODA implementation has not met expectations – while it has not been materially costly, it has not consistently delivered expected industry-wide benefits.

1. ODA involved minimal costs but resulted in administrative burden
2. Industry feels that ODA has not yielded the expected increase in delegation, prioritization and flexibility
3. Certification pipeline is expected to grow, driving industry concerns

ODA implementation has not met expectations – while it has not been materially costly, it has not consistently delivered industry-wide benefits

The recurring cost of ODA ranges from $1-11 million/ year, or less than 0.5% of profit for all OEMs…



…However, OEMs feel a larger administrative burden without corresponding benefits

Administrative burden has increased substantially

> "I never expected the level of administrative burden ODA entails. I have three people working full time for me just to handle the admin."

> "Our certification plans have increased 400% in size since introducing ODA."

Industry feels that ODA hasn't yielded the increase in delegation, prioritization and flexibility they expected

> "What we need is more flexibility and autonomy. ODA has actually had the opposite effect. Relationships with the FAA have been replaced by a formal, rigid process."

> "Overall, not only did delegation not increase as intended, but we have less delegation now than we did before."

SOURCE: OEM interviews, company financial reports

1 Size of certification plans has increased dramatically post-ODA transition at some OEMs

Additional requirement

	Project[1]	Year	Type	Cert plan size pages	Description pages
Pre-ODA	**525B-CJ3**	2004	DOA	**336**	**90**
	680 – Sovereign	2004	Standard cert	**24**	**12**
	510 – Mustang	2006	DOA	**347**	**106**
ODA	**510 – Mustang**	2010	DOA then ODA	**4600**	**339**
	680A – Latitude	2015	ODA	**5896**	**1321**
Impact			**Average pre-ODA**	**236**	**69**
			Average ODA	**5,248**	**830**
			% change	**2124%**	**1103%**

1 Based on selected certification plans of similar complexity level from Cessna

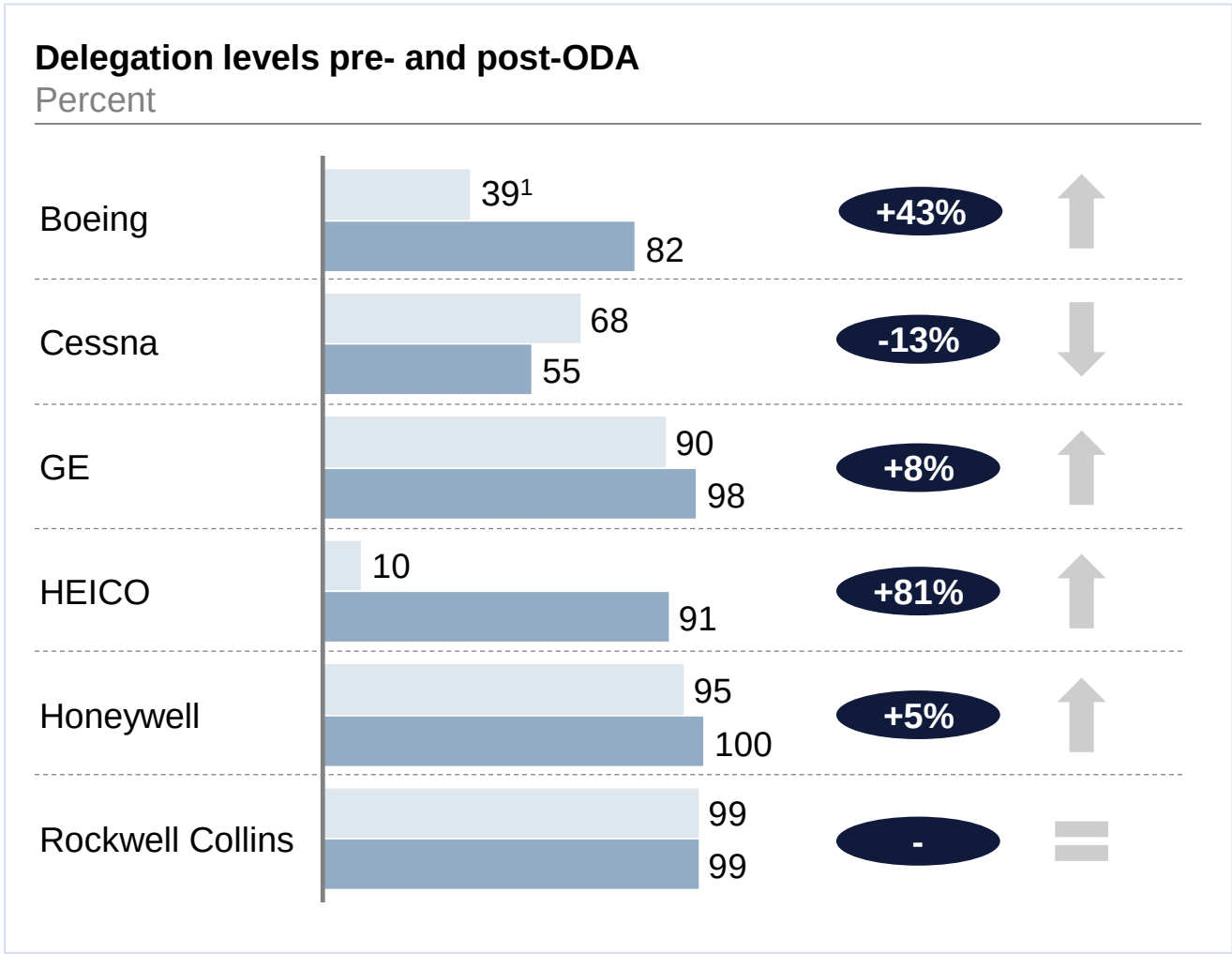
SOURCE: OEM interviews

2 Industry feels that ODA has not yielded the increase in delegation, prioritization and flexibility they expected

Value driver	Description	OEM and FAA viewpoints
Delegation	▪ There has not been a universal increase in delegation across all OEMs	**"We had hoped that ODA would increase our level of delegation, but in reality, there was very little change for us."**
Prioritization	▪ OEMs feel that under ODA the FAA has become more process-oriented rather than risk-based	**"We [the FAA] have DOIP audit discrepancies as requiring a recall or not requiring a recall and there is no further prioritization. We recognize that there should be."**
Flexibility	▪ Because ODA is very process-driven, OEMs feel that their flexibility and autonomy have decreased	**"ODAs have less flexibility than DERs or traditional FAA systems. It seems like the ODA is more stringent than DERs everywhere."**

SOURCE: OEM interviews

2 Many companies have seen an increase in delegation, but the trend has not been consistent across the board



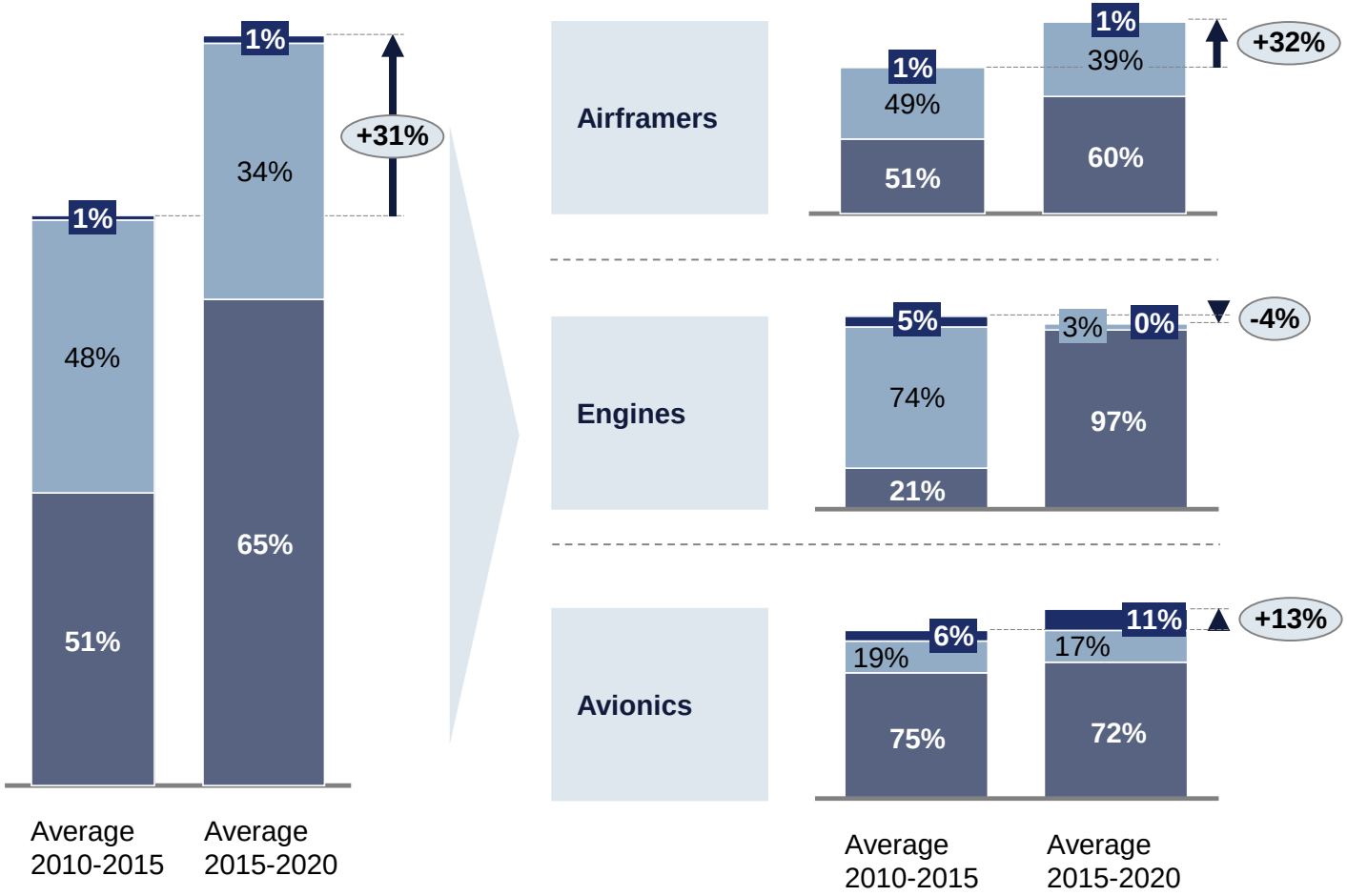
1 Represents pre-DOA delegation level (~2006); Boeing delegation levels calculated on a by-project basis.

SOURCE: OEM interviews

3 Industry concerns are driven primarily by their forward-looking pipeline projections

High complexity
Medium complexity
Low complexity

Project pipeline
# of projects



- **There are four major drivers for OEM development pipelines**
  - Increases in project development
  - Accelerating globalization
  - Increased demand for customization
  - New, innovative technologies
- **We can solve a portion of the pipeline problem by finding a system solution for what industry considers low complexity projects**

SOURCE: OEM internal data

3 There are three main areas in which certification activity can impact OEMs; industry is worried that these will be affected going forward

OEM value driver	Impact on OEMs
Setting of ambitious schedules	▪ "First movers" have the upper-hand in gaining market share for new products ▪ **Releasing a product a year later will mean delaying if not entirely forfeiting that revenue,** as new products from other suppliers will create obsolescence for your product at the same speed, simply **cutting a year out of peak revenue-generation for your product**
Adherence to set schedules	▪ Industry will often face customer penalties if they miss a deadline they set for EIS and subsequent deliveries ▪ **Although certification is rarely the cause of EIS delays, it's positioning at the end of the product development cycle means speed improvements can deliver cost avoidance** when critical path situations arise
Ability to bring innovative products to market	▪ Ability to innovate rapidly is a competitive advantage, especially as international players become more important

In the context of the growing pipeline, **industry is concerned that if nothing changes in the current certification structure** regarding delegation, prioritization and flexibility, **these three overarching goals will suffer**

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B. Industry and external views

While the certification process works well at the best performing OEMs, industry identified five consistent concerns about certification. International authorities echo industry frustrations.

4. A few key best practices drive good certification performance at successful OEMs
5. Industry has difficulty building certification talent
6. Industry complains of long turnarounds on PNLs, issue papers, and retained findings
7. Industry wants more risk-based prioritization
8. Adversarial mindsets and lack of trust complicate frontline relationships
9. ODAs feel lack of flexibility and discretion
10. While international authorities feel similar pain, they feel FAA digs into too many non-safety-critical details

4 A few key best practices drive good performance at successful ODAs

Best practice	Description	ODA viewpoint
Prioritization process	▪ Frequent, transparent prioritization meetings between the applicant and ODA, as well as the ODA and OMT	**"We meet every week to make sure we align on what needs to be done, and what our priorities are."**
Escalation process	▪ Well-defined processes for escalating issues that prioritize internal resolution and strictly limit escalation with the FAA	**"85% of our issues are handled entirely internally and never escalated to the FAA."**
Definition of roles and responsibilities	▪ Training provided to UMs detailing their roles and responsibilities for each "hat" they wear ▪ UM responsibilities called out separately under "showing" and "finding" roles	**"We make sure that UMs understand that they have clear and distinct roles for showing and finding."**
ODA manual	▪ Leaner ODA manual built on the lessons learned from other ODAs ▪ Manual that only addresses processes directly related to the ODA and avoids providing unnecessary detail	**"What we found helpful is to limit ourselves solely to what needed to be in the manual. Everything else is an internal operating procedure."**
Proactivity	▪ Engaging earlier in the development process with the FAA on new technology	**"We start interacting with the FAA early and often to familiarize them with our new technology."**

SOURCE: OEM interviews

5-9 OEMs identified consistent pain points across five areas that they feel ODA has not yet overcome

Issue	Frequency, # of OEMs	Industry viewpoints	
5 Difficulty building certification talent	7	"We have a tough time getting talent into the ODA. We can't recruit easily, and the training is different from a DER even though the job is the same."	"We have a guy who has been doing test set-up conformity for 30 years, and he isn't allowed to be qualified as a UM due to a different two-year requirement."
6 Long turnarounds on PNLs, issue papers and retained findings	6	"Issue paper resolution is slow and the turnaround times for PNLs and UM appointments are too long. These have the potential to be critical path."	"One of our PNLs took over 200 days to turnaround, and when it was, there were no retained findings. How can they explain it taking that long?"
7 Low level of risk-based prioritization	6	"It's a check-the-box exercise. There is no process for prioritizing safety within the ACOs or between the OMT and the ODA leads."	"We have to do a full root-cause analysis for an LOI on using sticky notes. That's the same process as for a safety-related LOI. It's insane."
8 Adversarial mindsets and lack of trust	6	"It's a cultural thing. The FAA frontline wants to make findings, and people find it hard to transition to an auditor role."	"It often feels like the FAA frontline won't delegate more because they are afraid they won't have enough interesting work otherwise."
9 ODAs feel lack of flexibility and discretion	5	"The lack of ODA flexibility compared to the traditional FAA discretionary authority represents one of the most significant pain points for the company."	"Our customers are going to places down the road for aftermarket work because they use DERs instead of an ODA and can get the job done faster."

SOURCE: OEM interviews

5 ODAs find that experience and training requirements, and concurrence turnarounds for UMs make talent acquisition difficult

There are stricter requirements for UMs

Additional requirement

DAR/DMIR
FAA Order 8100.8D

- Must have 60 months of experience in making conformity determinations specific to authorizations sought, or
- Applicant must show evidence of 60 months experience with Quality Control methods and techniques

ODA UM
FAA Order 8100.15B

- Must have 60 months of experience in making conformity determinations specific to authorizations sought, or
- Applicant must show evidence of 60 months experience with Quality Control methods and techniques
- Each ODA UM determining conformity of compliance test set-ups must have 2 years of experience performing conformity inspections of compliance test setups per FAA ODA Order 8100.15 Section 3-5c(5)[1]

In addition to inconsistent and strict restrictions for UMs, OEMs highlight **two additional concerns for talent acquisition**:

- Redundant training and assessments
- Long turnaround times on UM concurrences

"We have a guy who has been doing test set-up conformity for 30 years, and he isn't allowed to be qualified as a UM due to the two-year requirement."

SOURCE: OEM interviews

8 OEMs and the FAA jointly identify issues with mindsets, but sometimes see different causes for the behavior

Perceived issue	OEM view	FAA view
"Finding" mindset	"Many in the FAA feel that they aren't adding any value unless they come up with findings. Otherwise they think they haven't played a role at all."	"Many of our engineers feel pressure to come up with findings. They believe they aren't doing their jobs well if they do not have findings."
Transitioning from "engineers" to "auditors"	"It often feels like FAA frontline workers just aren't implementing ODA in the form it was intended."	"Some on the frontline worry that the transition to ODA means transitioning from an engineer to an auditor role, so they retain more to avoid losing touch with the technical details."
Adversarial mindset	"It's hard to collaborate with the FAA sometimes. For example, when we brought a continuous improvement idea to them, they told us it was simply proof they should delegate less to us because we had found possible improvements."	"We often have trouble finding people with the right mindset for this job. We need people who want to work with OEMs, but many see the process as fundamentally adversarial."
Lack of trust	"It often feels like the FAA frontline doesn't trust us, and in return we tend not to trust them to delegate everything they should to us."	"The truth is, some of our people don't trust OEMs to put safety first, and that makes it difficult to feel comfortable fully delegating everything we can to the ODAs."
Lack of proactivity	"We keep waiting for the FAA to set the standards so we can follow them."	"We have the wrong people talking to Boeing…The standards staff waits for a PNL to come in instead of being the first point of interaction with the OEM on new technology."

SOURCE: Interviews, June & July 2015

10 While international authorities feel similar pain, they feel FAA digs into too many non-safety-critical details

Theme	International authority and OEM viewpoints
There are consistent pain points across aviation authorities	"EASA is highly involved in our projects… it is unnecessary and takes a significant amount of time for us to work with them"
	"For small players, the projects often get lost in the shuffle because there are other, more important matters from the big players"
The FAA is more involved in validation & compliance finding than its international counterparts	"When we need concurrence from FAA and EASA, by comparison the FAA is unnecessarily more demanding … they look at this because they've always looked at this"
	"The FAA process is very, very heavy from a tracking management, 'check the box' place."
Rule application is inconsistent across ACOs	"When somebody says I'm having trouble with the FAA, I always say: which FAA?"
	"In the U.S. there is not a harmonized system in place... The ACOs are like different cultural interpretations"

SOURCE: Interviews, June & July 2015

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C. Internal FAA diagnostic

Lack of consistent performance management systems, change-resistant frontline mindsets, and skills challenges contribute to variable performance. Disagreement on safety relevance contributes to uneven application of standards.

11. Performance data is sparse and data quality is poor
12. Performance management tools and metrics vary widely across ACOs
13. Frontline skills and mindsets have not been optimized for organizational oversight
14. Key certification processes are slow, and variable across ACOs
15. ACOs apply regulatory standards inconsistently
16. FAA and industry disagree on safety relevance of DOIP audit findings

We examined certification strengths and improvement areas across four dimensions

Process Efficiency

Does the FAA provide a disciplined focus on end-to-end value streams to deliver an appropriate product/service, on time, to the appropriate standard?

Management Systems

Are performance levels transparent?

How do ACOs take ownership for outcomes and solutions?

Mindsets and Behaviors

How do people take ownership for outcomes and are they empowered to push for continuous improvement?

Organization and Skills

Are the work and the talent properly aligned?

Does the frontline get the support they need?

Maintaining focus on public safety and effective working relationship with applicant

11 Performance data is not tracked comprehensively, and can be inconsistent with data tracked by industry

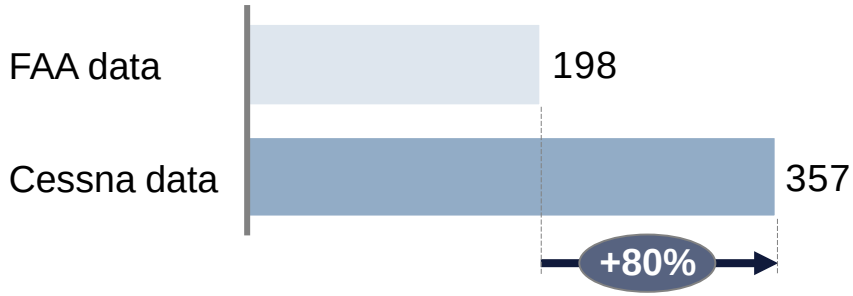
Gaps in performance data tracking

Some data is not tracked at all	▪ End-to-end issue paper resolution time ▪ End-to-end certification process time
Some data is not central or standardized	▪ PNL response time ▪ Issue paper tracking outside TAD
Data quality is often poor	▪ Less than 50% of records in the CPN database are complete ▪ Completion dates often entered incorrectly

Data inconsistency: Cessna example

Project code: ST5401WI-T, submitted 6/23/2010

Issue paper resolution time, days



Data inconsistency: HEICO example

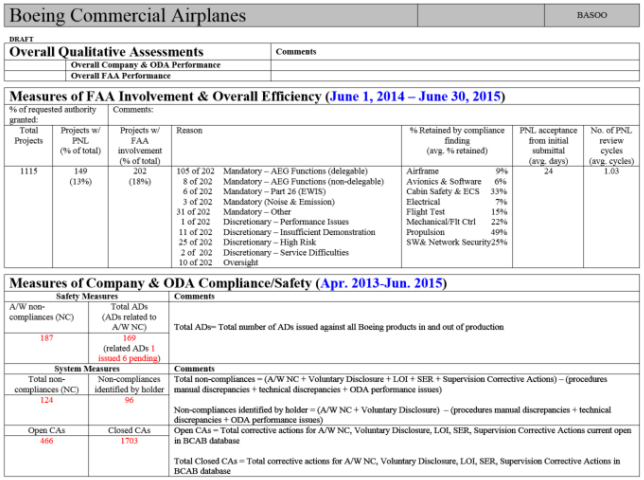
Project code: PM14478AT-T, submitted 3/11/2014

Issue paper resolution time, days

SOURCE: FAA TAD Issue papers database, Cessna certification project tracking data, HEICO certification project tracking data as of July 2015

12 Performance management tools and metrics vary widely across different ACOs

The ODA scorecard has improved national tracking of important metrics…



Boeing Commercial Airplanes — BASOO

DRAFT

Overall Qualitative Assessments — Comments

Overall Company & ODA Performance

Overall FAA Performance

Measures of FAA Involvement & Overall Efficiency (June 1, 2014 – June 30, 2015)

% of requested authority granted: Comments:

Total Projects	Projects w/ PNL (% of total)	Projects w/ FAA involvement (% of total)	Reason	% Retained by compliance finding (avg. % retained)	PNL acceptance from initial submittal (avg. days)	No. of PNL review cycles (avg. cycles)
1115	149 (13%)	202 (18%)	105 of 202 Mandatory – AEG Functions (delegable) 8 of 202 Mandatory – AEG Functions (non-delegable) 6 of 202 Mandatory – Part 26 (EWIS) 3 of 202 Mandatory (Noise & Emission) 31 of 202 Mandatory – Other 1 of 202 Discretionary – Performance Issues 11 of 202 Discretionary – Insufficient Demonstration 25 of 202 Discretionary – High Risk 2 of 202 Discretionary – Service Difficulties 10 of 202 Oversight	Airframe 9% Avionics & Software 6% Cabin Safety & ECS 33% Electrical 7% Flight Test 15% Mechanical/Flt Ctrl 22% Propulsion 49% SW& Network Security25%	24	1.03

Measures of Company & ODA Compliance/Safety (Apr. 2013-Jun. 2015)

Safety Measures		Comments
A/W non-compliances (NC)	Total ADs (ADs related to A/W NC)	Total ADs= Total number of ADs issued against all Boeing products in and out of production
187	169 (related ADs 1 issued 6 pending)	
System Measures		**Comments**
Total non-compliances (NC)	Non-compliances identified by holder	Total non-compliances = (A/W NC + Voluntary Disclosure + LOI + SER + Supervision Corrective Actions) – (procedures manual discrepancies + technical discrepancies + ODA performance issues) Non-compliances identified by holder = (A/W NC + Voluntary Disclosure) – (procedures manual discrepancies + technical discrepancies + ODA performance issues)
124	96	
Open CAs	Closed CAs	Open CAs = Total corrective actions for A/W NC, Voluntary Disclosure, LOI, SER, Supervision Corrective Actions current open in BCAB database Total Closed CAs = Total corrective actions for A/W NC, Voluntary Disclosure, LOI, SER, Supervision Corrective Actions in BCAB database
466	1703	

- Metrics include:
  - Number of projects with PNL
  - PNL turnaround speed (days)
  - % of requested authority granted
  - % projects with FAA involvement
- Industry sees ODA scorecard very positively, as a step in the right direction

…but there is still a lot of variation between ACOs in management tools and metrics, with some better off than others

	BASOO	ECO	LA	Wichita	Atlanta
Primary project tracking system	BTS[1]	CAWC[2]	LA-specific	WATS[3]	Share-Point
System owner	BASOO	GE	ACO	ACO	FAA
Accessible by OEM	✗	✓	✗	✗	✗
Target response time (days)	10-20	30	30+	45	30
Prioritization process	Email-based	Online system	OEM not in loop	Email-based	Email-based
Productivity or quality metrics	✗	✗	✗	✗	✗

1 Boeing Tracking System
2 Certification Airworthiness Web Center
3 Wichita Activity Tracking System

SOURCE: ACO manager interviews, July 2015

13 Frontline workers are recruited based on outdated skills needs: job descriptions contain less than 10 words on delegation and auditing

Job title: Aerospace Engineer (Propulsion) March 2015

Duties and Responsibilities: Incumbent serves as an Aerospace Engineer with responsibility for regulatory oversight of aircraft or rotorcraft certification programs and continuing operational safety in the propulsion technical discipline. Incumbent is responsible for applying safety management principles using engineering knowledge and risk management techniques. Responsibilities include review and evaluation of regulatory compliance for aircraft or rotorcraft certification projects and initiation of safety determinations for continuing airworthiness. Incumbent supervises and audits delegated organizations, individual products, and processes for compliance with applicable requirements. Incumbent also performs other duties as assigned.

Knowledge, Skills and Abilities (KSAs): (List each item)

1. **KNOWLEDGE OF FAA AIRCRAFT PROPULSION SYSTEMS.** Incumbent requires expert technical knowledge of Aircraft or Rotorcraft Propulsion systems in order to evaluate compliance with applicable requirements. Please provide information demonstrating your knowledge of Aircraft/Rotorcraft Propulsion Systems, level of involvement, and disciplines represented.
2. **KNOWLEDGE OF FAA CERTIFICATION REGULATIONS, POLICIES AND PROCEDURES FOR AIRCRAFT PROPULSION SYTEMS.** Incumbent must have a working knowledge of certification of Propulsion Systems of civil or military aircraft. Describe your experience which would indicate knowledge of Propulsion Systems and certification procedures for aircraft propulsion systems.
3. **ABILITY TO PLAN AND CARRY OUT THE IMPLEMENTATION OF NEW OR REVISED POLICIES, PROCEDURES AND PROCESSES IN AN ORGANIZATION.** Describe your experience in planning, scheduling, directing or fostering cooperation among project team members including yourself, to satisfactorily complete complex projects in a timely manner, or implement policies, procedures and processes. Be specific in terms of project management experience, including the project complexity, team member qualifications, and the degree of successful completion.
4. **ABILITY TO PREPARE CLEAR AND CONCISE WRITTEN DOCUMENTS.** Incumbent must prepare clear and concise documents to compel others to take a course of action, instruct others in carrying activities, or explaining the purpose, goals, and objectives of a policy or regulations. Please describe your experience in this area.
5. **ABILITY TO EXPLAIN, ADVOCATE AND NEGOTIATE WITH INDIVIDUALS AND GROUPS.** Incumbent must be able to explain, advocate and negotiate with individuals and groups internally and externally to resolve problems and achieve understanding of issues. Describe your experience in coaching, mentoring, supervising and collaborating with individuals and designated organizations. Give an example of a situation where you cooperated with co-workers, supervisors, managers, and/or customers to enhance a product or service or the success of the organization.

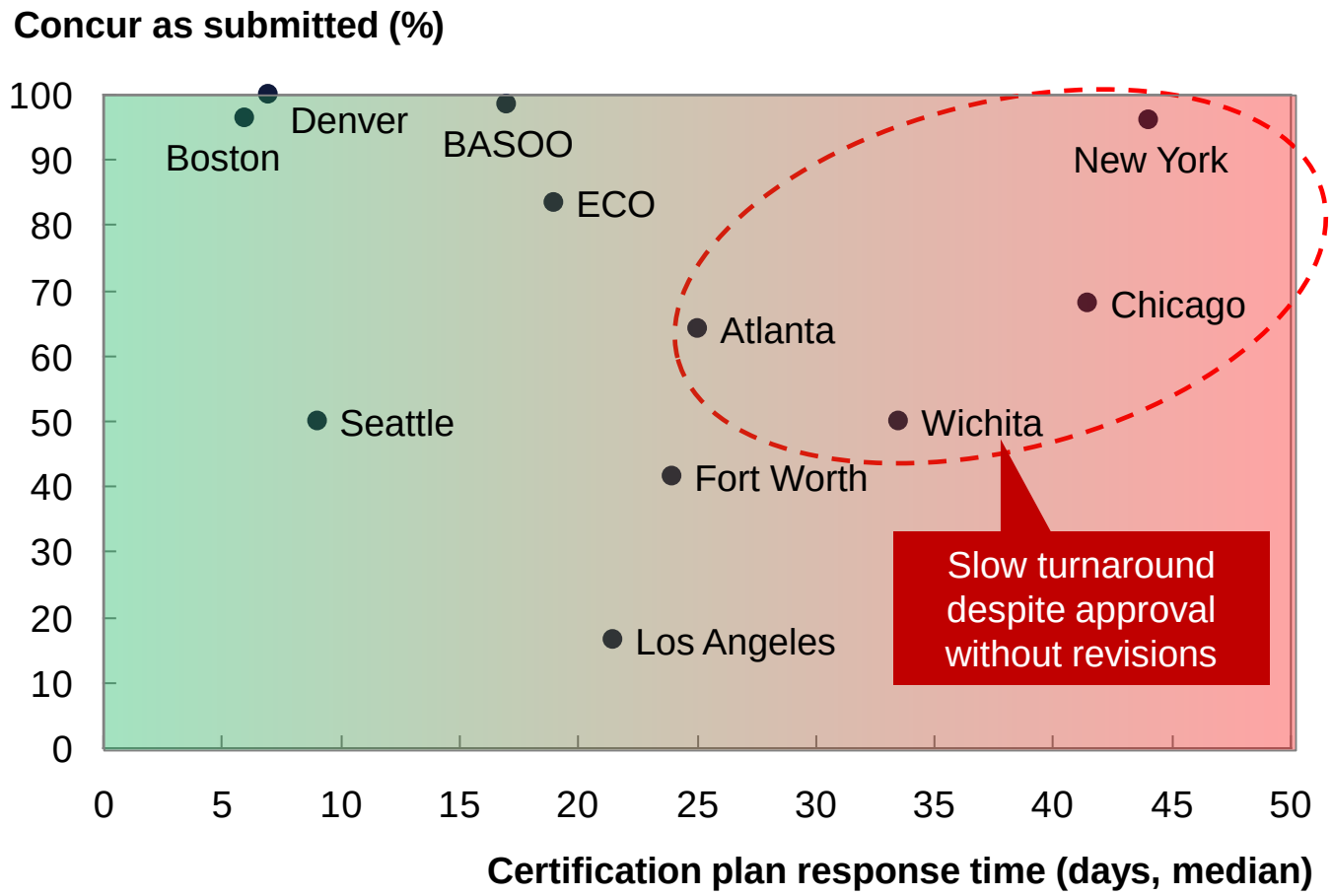
New skills added since ODA

"Supervises and audits delegated organizations"

"…Collaborating with… designated organizations"

SOURCE: FAA job description, Aerospace Engineer (Propulsion), Series 0861, Level 3, Pay Band I, March 2015

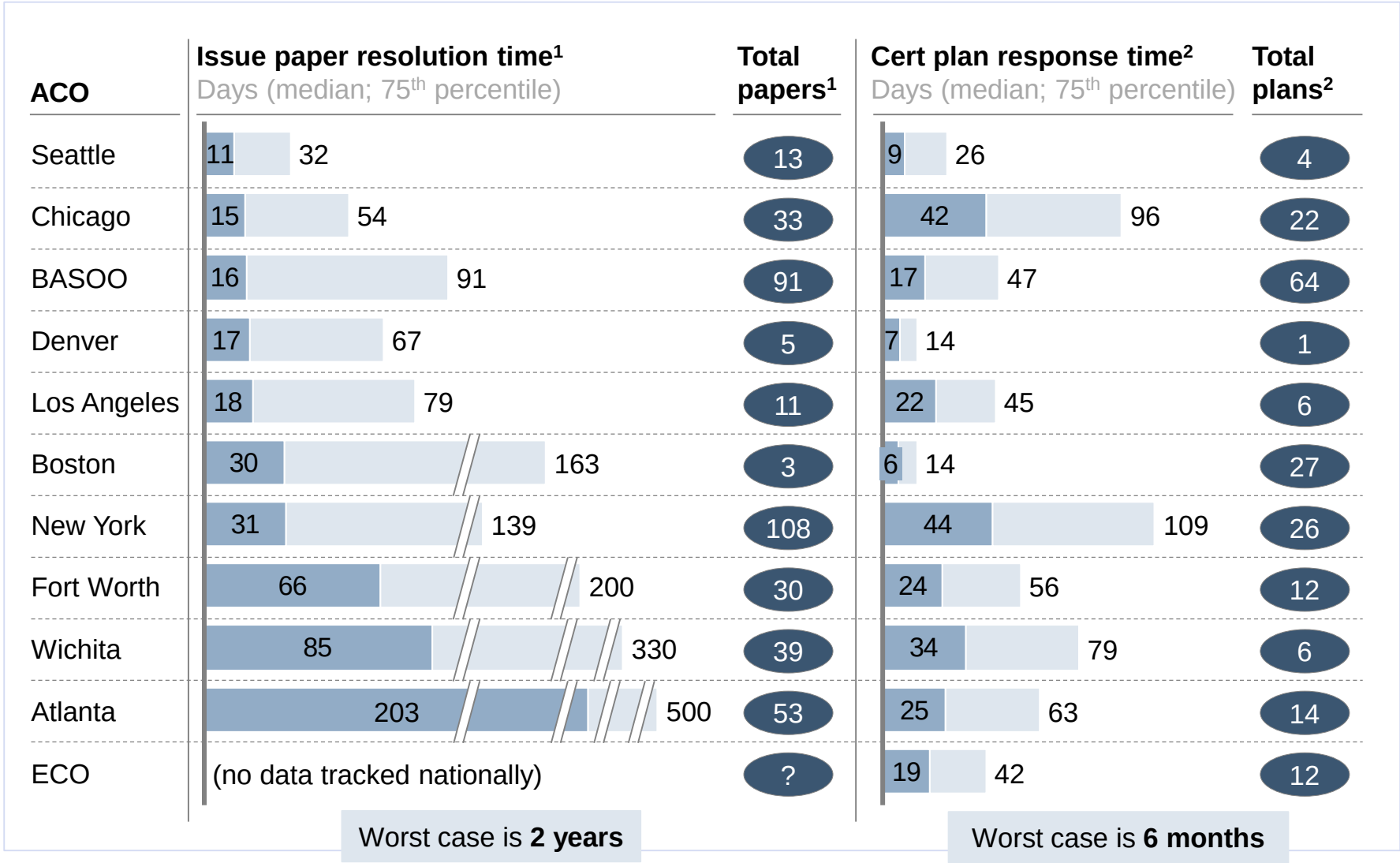
14 Certification plan response time is often slow, despite a large portion of plans being approved without revisions



- At some ACOs, most certification plans are approved as submitted, without revisions
- However, there is no correlation between response time and concurrence as submitted
- Both small and large OEMs report a lack of transparency into the process

SOURCE: ACO Internal ODA Metrics from Q3 2014

14 Certification process flow times vary widely across different ACOs



1 Transport Airplane issue papers resolved from 3/1/2013 to 3/1/2015; no data tracked nationally for other Directorates
2 Certification plans responded to during Q3 2014; no reliable data is available nationally for any other quarter

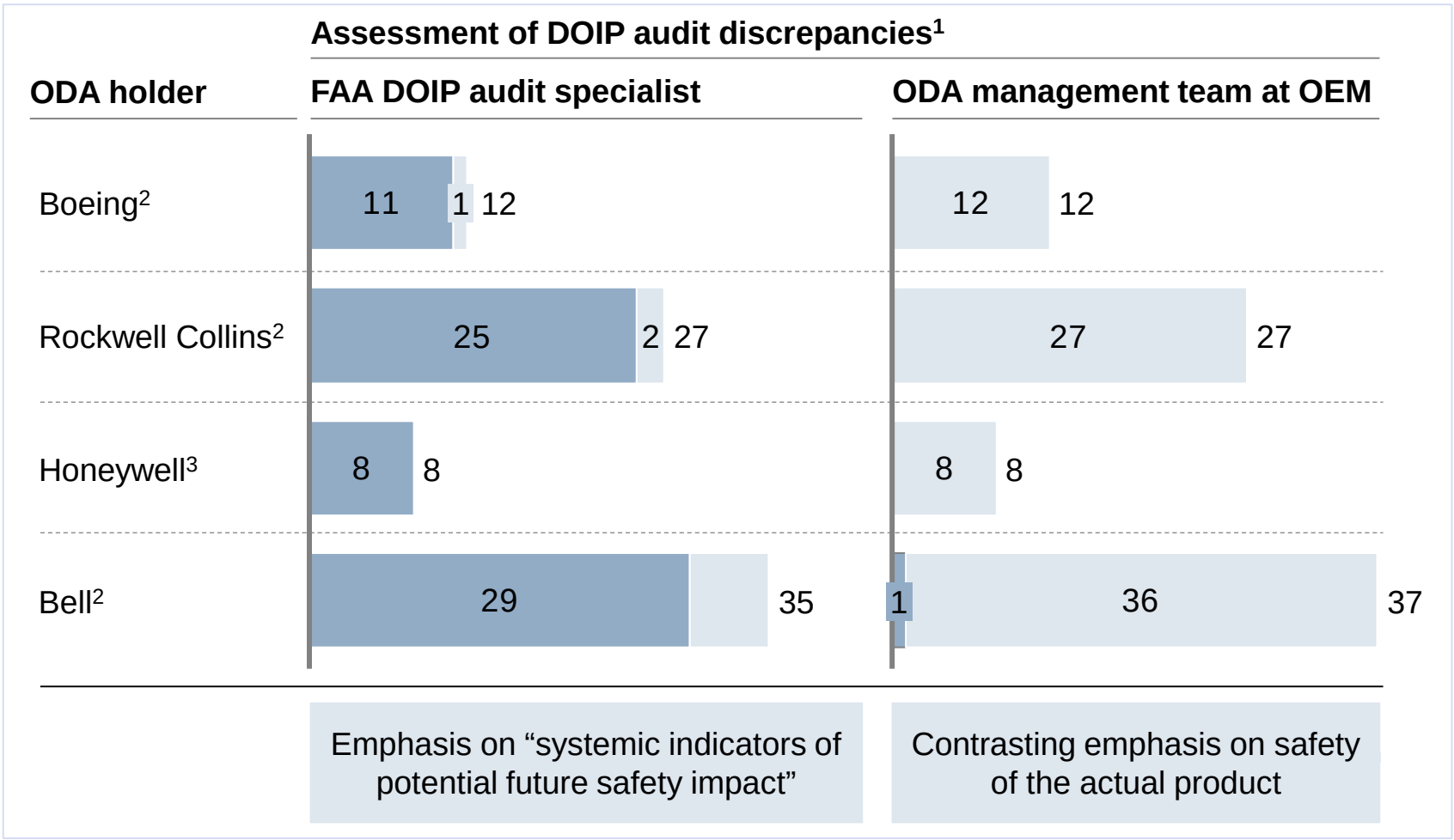
SOURCE: ACO Internal ODA Metrics from Q3 2014; TAD Issue Paper Database

15 ACOs apply regulatory standards inconsistently, according to examples cited by industry

Case study	Context	Description	Impact
Inconsistent uses of issue papers	▪ STC for a standby flight display ▪ STC was to be applied to a part 27 helicopter	▪ Three months after the STC was submitted, the FAA informed the applicant that there would be **an additional issue paper required** for the lithium ion battery in the display ▪ **Three years earlier, another company that obtained a part 27 STC** for the same standby flight display through a different ACO, **did not have to meet the requirements of the issue paper** ▪ In the intervening three years **there had been no change in the regulatory requirements**	▪ Certification **delay of ~3 weeks** ▪ **$19,000 in additional testing and qualification**
Inconsistent standards application between individuals	▪ STC for a GPS navigation unit ▪ STC was to be applied to a part 29 helicopter	▪ The GPS unit, with integral waypoint display, was installed on the center console of the helicopter, **in accordance with AC 20-138, in a "location readily accessible to the pilot"** ▪ **The FAA test pilot stated that the display had to be in the pilot's primary field of view, and that the AC guidance would not be permitted** to be used in this case ▪ The applicant viewed this as the **FAA test pilot applying a personal airworthiness standard that did not go through the regulatory process** prescribed by the Administrative Procedures Act, and denied use of FAA approved guidance	▪ The **GPS unit had to be removed and the helicopter was delivered to the customer without it** because there was no room for the display in the primary field of view ▪ The applicant views the GPS as a safety enhancing feature and therefore sees its removal as a **denial of safety-enhancing technology**

SOURCE: Industry interviews, July 2015

16 FAA and industry disagree on what "good compliance" looks like, and the safety-relevance of DOIP audit findings



1 Based on an ex post qualitative assessment of discrepancy records; not part of mandatory DOIP audit procedures
2 DOIP audit in FY 2014
3 DOIP audit in FY 2015

SOURCE: DOIP audit data; internal FAA analysis

Contents

D. Boeing/BASOO deep dive

The Boeing-BASOO relationship is the most important and contentious. While BASOO's PNL and issue paper response times are comparable with other ACOs, disconnects between Boeing and BASOO may require a relationship reset.

17 Boeing is growing in size and product complexity

18 Boeing identified resourcing, FAA mindsets, timeliness and predictability as major concerns

19 BASOO is comparable with other ACOs in terms of PNL and issue paper performance

20 There are significant disconnects between Boeing and BASOO

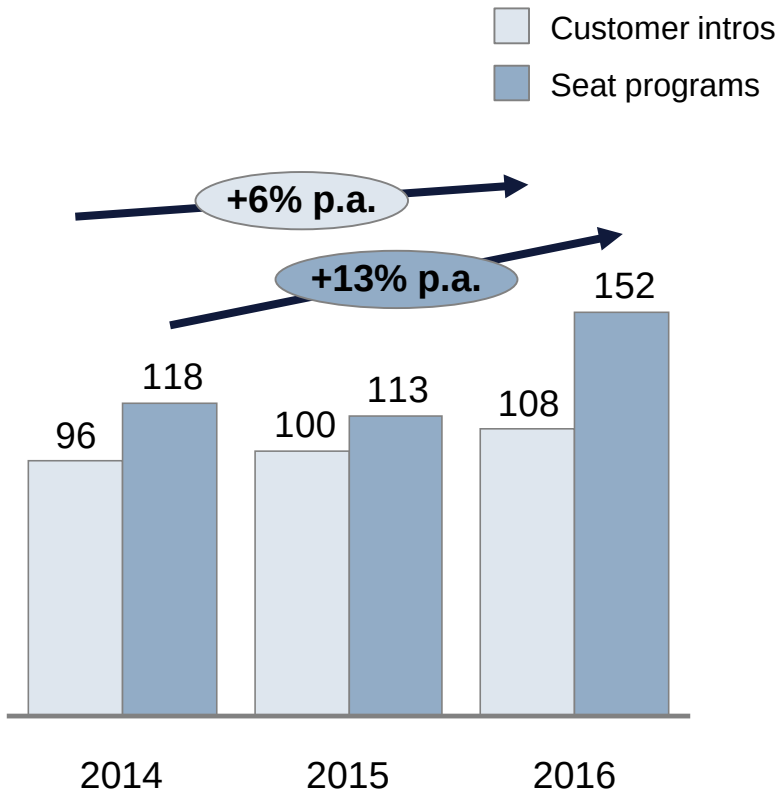
17 Boeing could be considered the most important AIR stakeholder by virtue of size and growing product complexity

Boeing is the largest OEM stakeholder by volume of projects by a significant margin…

Project Submittals, Jan 2012 – May 2015

	No. submitted	% of total
Boeing	3,703	28
ASU	326	2
Gulfstream	274	2
Delta Engineering	272	2
Sikorsky Aircraft	267	2
HEICO	255	2
Airbus	207	2
General Electric	186	1

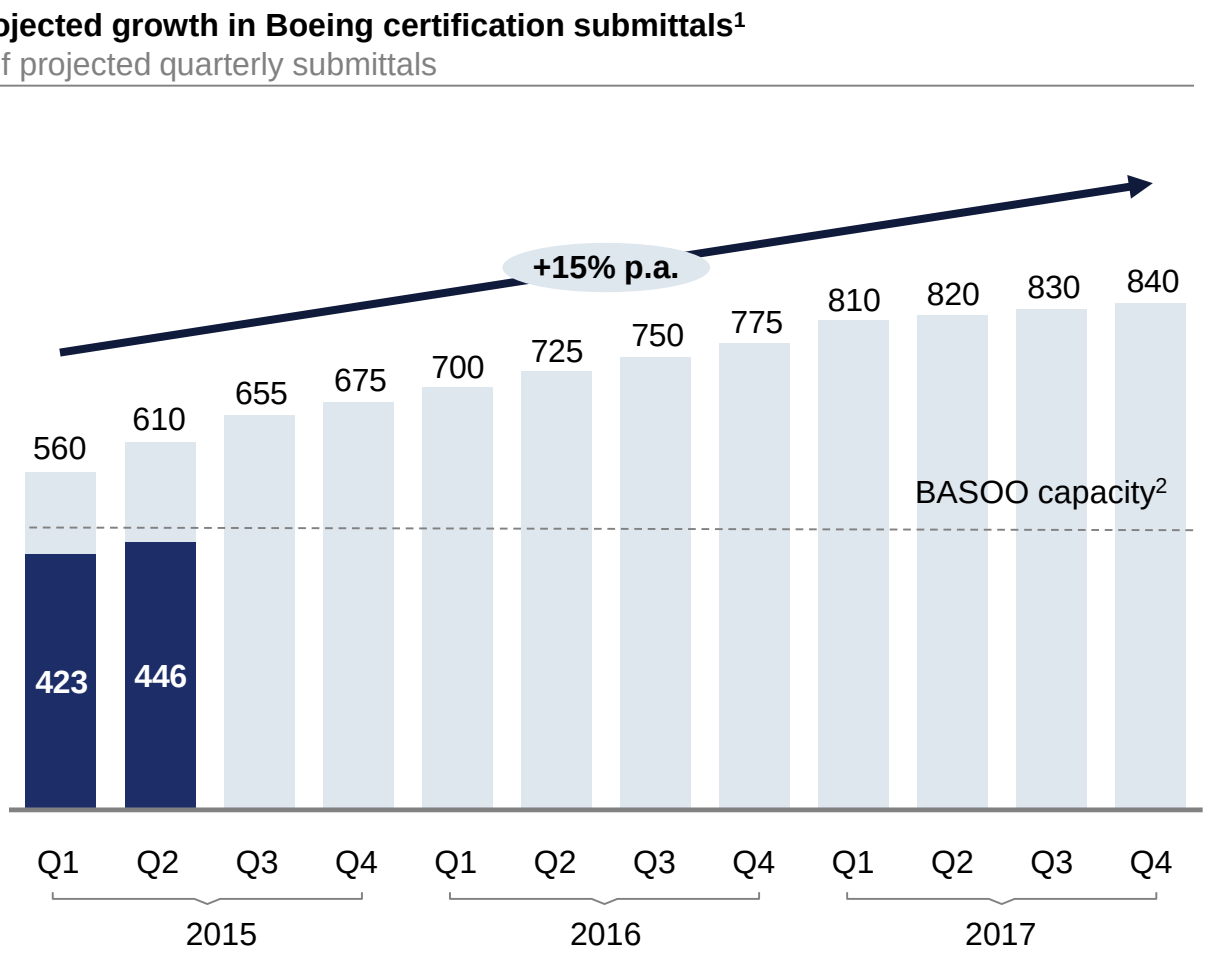
…and manages significant and growing product complexity and configuration change



SOURCE: FAA CPN Database, Boeing Achieving Configuration and Design Excellence, Boeing Certification Forecast

17 Projected 15% annual growth in Boeing's certificate submissions will overwhelm BASOO at current level of involvement

Projected growth in Boeing certification submittals[1]
# of projected quarterly submittals



If Boeing's projections of significant and sustained growth in certification submittals are realized, this may put additional pressure on already constrained FAA resources

1 Includes all certification submittals that require an FAA response (e.g., retained deliverable reviews, PNLs, EASA/FCAA, AMOC, flight test plans, issue papers); does not include oversight and procedures correspondence or submittals

2 Calculated based on 2013-2014 average completed submittals per quarter

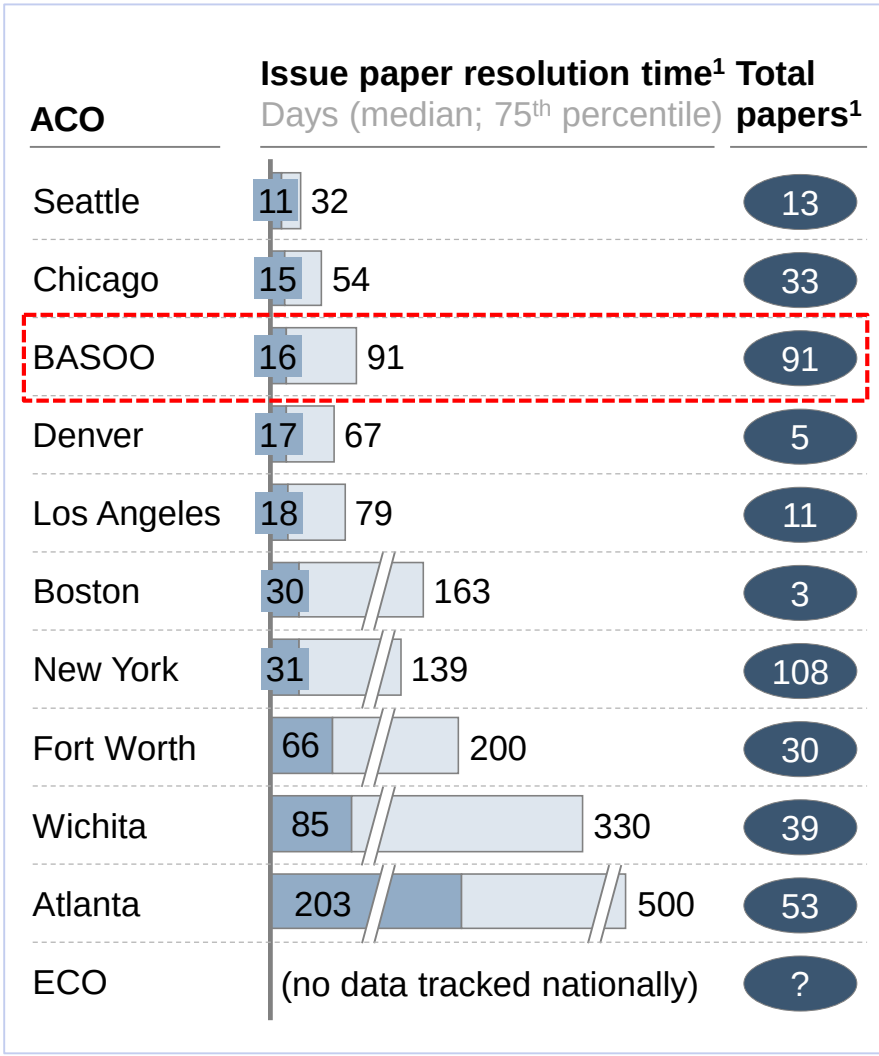
SOURCE: Boeing Quarterly Certification Projections

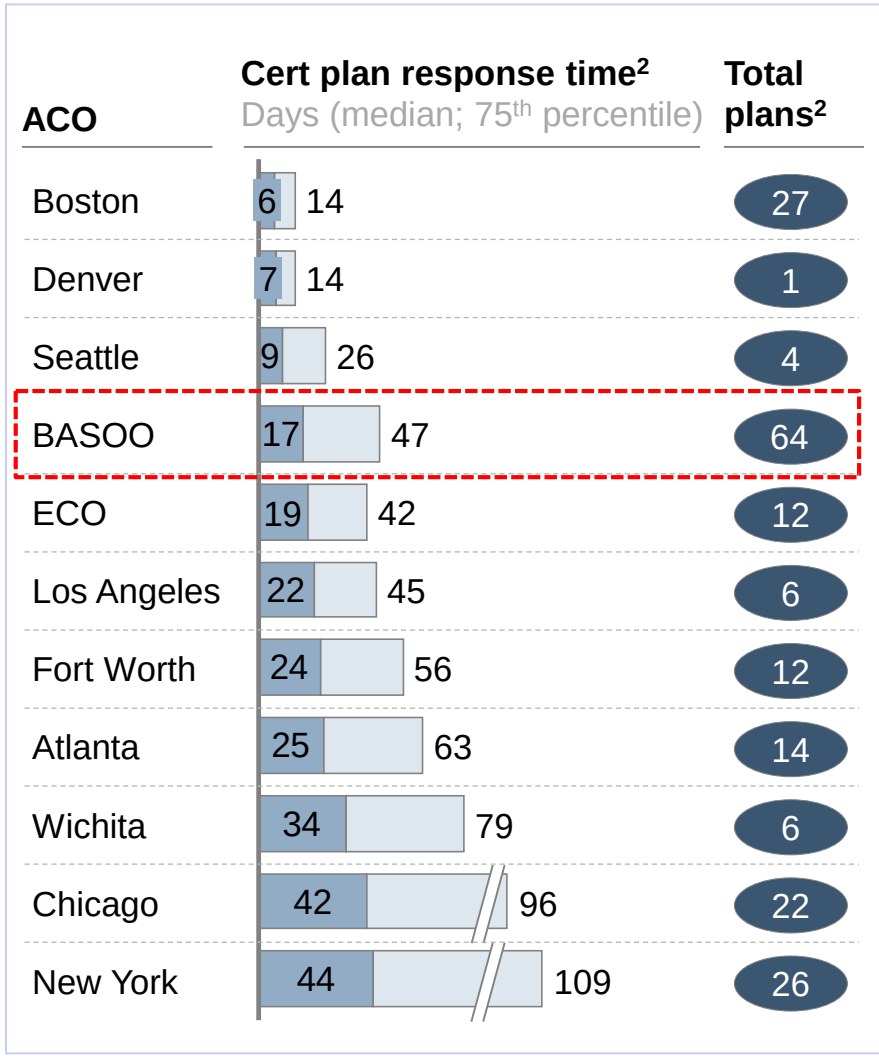
18 Boeing voiced five concerns with the current certification processes

	Theme	Description	Representative quote
1	**Growing certification workload not matched by increase in FAA headcount**	▪ Major programs are increasing in scope and annual deliveries are expected to grow (from 700 to ~1,100/year) ▪ FAA headcount is forecasted as flat	**"We are looking at a tsunami of work over the next 5 years… given that we already have a backlog of work, the bottleneck is only going to get worse unless something changes"**
2	**Adversarial relationship and lack of trust**	▪ Both parties don't feel they are in a safety and compliance partnership ▪ Delegation is extremely low at project outset (e.g., 30%) and increases over life of project with little explanation	**"Our relationship has deteriorated to the point where every non-compliance finding is viewed as a systemic problem… as if we don't have a commitment to safety…"**
3	**FAA is not meeting agreed-upon turnaround targets**	▪ Timelines for receiving FAA feedback/approval are too long and unpredictable ▪ Between 50-60% of deliverables are completed after agreed-upon targets	**"We measure FAA and Boeing performance to standard flow; over 50% of FAA deliverables are completed after the standards we agreed upon"**
4	**Late breaking news/ issue papers**	▪ FAA interpretations of requirements are perceived as "coming late" – Pain is acute for cabin interiors ▪ Perception of new interpretations of standards or "moving goal posts"	**"We find out late in the process that there is a problem which was not raised by the FAA earlier… this causes us to involve more senior FAA leadership to get an answer"**
5	**Need for American competitiveness and a "level playing field"**	▪ EASA perceived as promoting Airbus more than FAA promotes Boeing ▪ EASA recognizes int'l standards which make for quicker/easier interactions ▪ International harmonization is lagging	**"The FAA is more reactive than EASA… EASA supports Airbus in a way that isn't mirrored by the FAA with us"**

SOURCE: Interviews, July 2015

19 On issue paper resolution and PNL processing, BASOO is a relatively high performer when compared with other ACOs





1 Transport Airplane issue papers resolved from 3/1/2013 to 3/1/2015; no data tracked nationally for other Directorates
2 Certification plans responded to during Q3 2014; no reliable data is available nationally for any other quarter

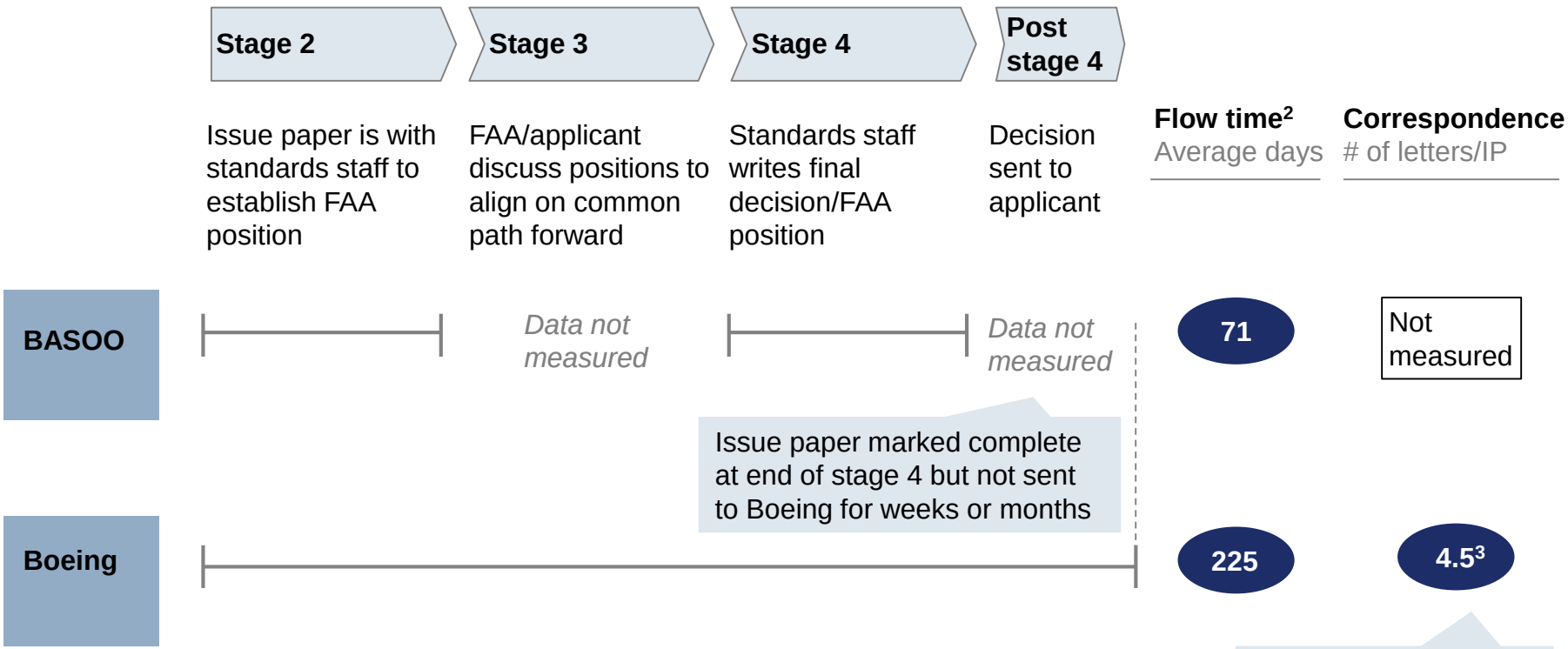
SOURCE: ACO Internal ODA Metrics from Q3 2014; TAD Issue Paper Database

19 For issue papers, data gaps and measurement inconsistencies between BASOO and Boeing have large impact on conclusions

Indicates data is recorded

Issue Paper process, stages 2-4[1]

Not drawn to scale



1 Stage 1 includes a description of the issue by the applicant; not shown here

2 Flow times measured from March 2013 – March 2015

2 Average number of correspondence per issue paper for 787-9 program

SOURCE: TAD Issue Paper Database, Boeing Open Items List Metrics, Issue Papers from 787-9 program

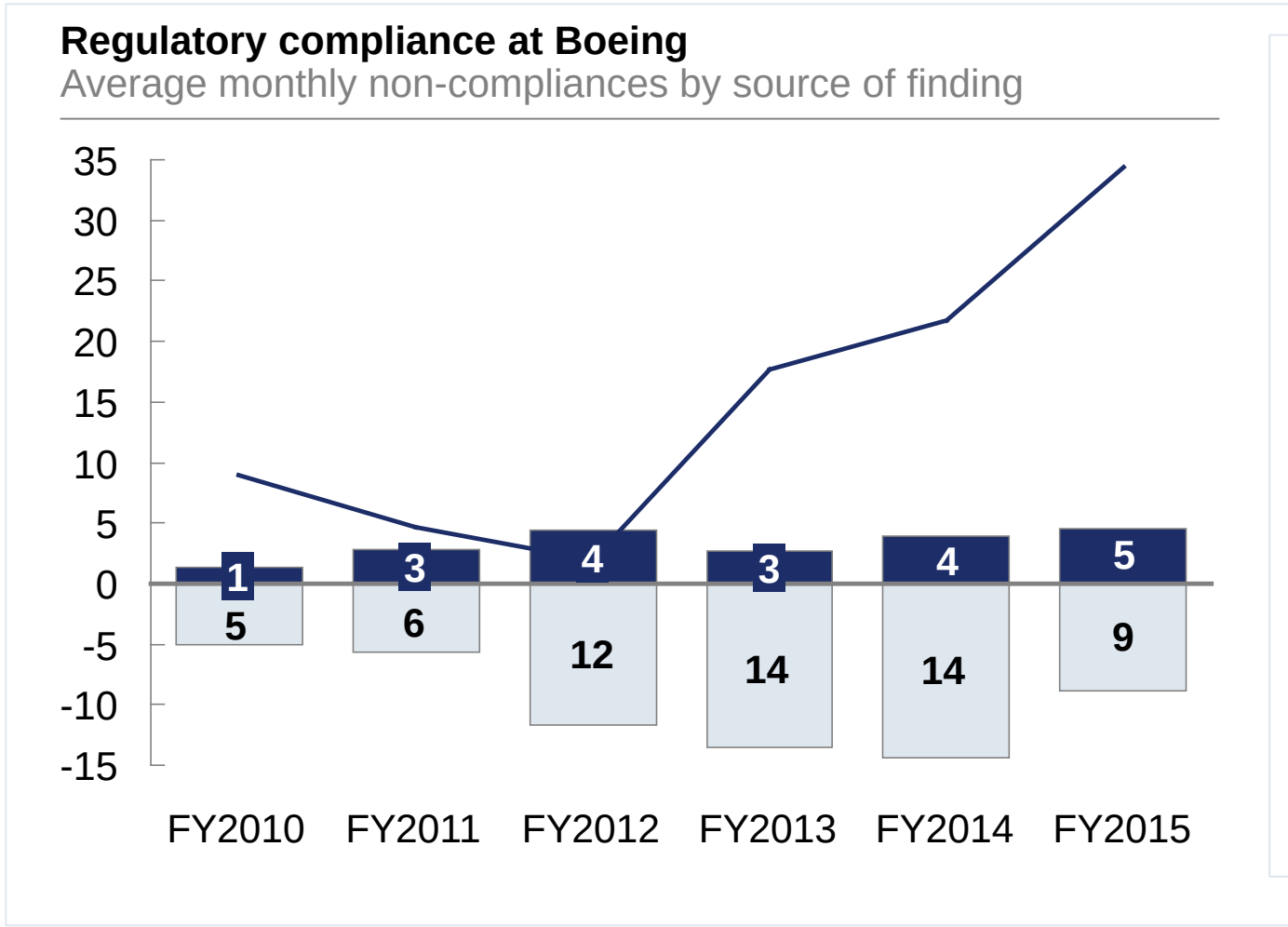
20 In spite of relative BASOO-ACO performance data, the FAA and Boeing need a relationship reset for three primary reasons

	Description
1 Disconnect on what constitutes consistent regulatory compliance	▪ BASOO and Boeing use different metrics and methods of measurement to determine compliance ▪ Data is not consistent between Boeing and FAA databases
2 Some history of poignant "missteps" and non-compliances	▪ Boeing makes liberal use of "elevator stories" and other anecdotes of FAA missteps ▪ FAA discovery of non-compliances has led to enforcement and investigative reports
3 Boeing's growing scale and complexity require an evolution of the BASOO concept	▪ Foundation of the BASOO in 2008 has been followed by considerable change which has not necessarily been reflected in key processes, management systems, and organizational design and skills ▪ BASOO needs to broadly shift from "project-level involvement" to oversight, education, and mentorship

Implications

- Both FAA and Boeing can point to missteps in the past which have increased dissatisfaction and eroded confidence
- A plan is needed to "reset the relationship" and move forward to deliver the full benefits of ODA while improving safety

20 Since 2011, BASOO findings of non-compliance have remained steady at 3-5 per month despite steady increase in BASOO supervision



- Findings of non-compliance typically scale with increase in supervision activities, yet total non-compliances remain fairly constant
- Boeing's perspective on self-disclosures is they are "below the line" (i.e., reflective of a healthy system)

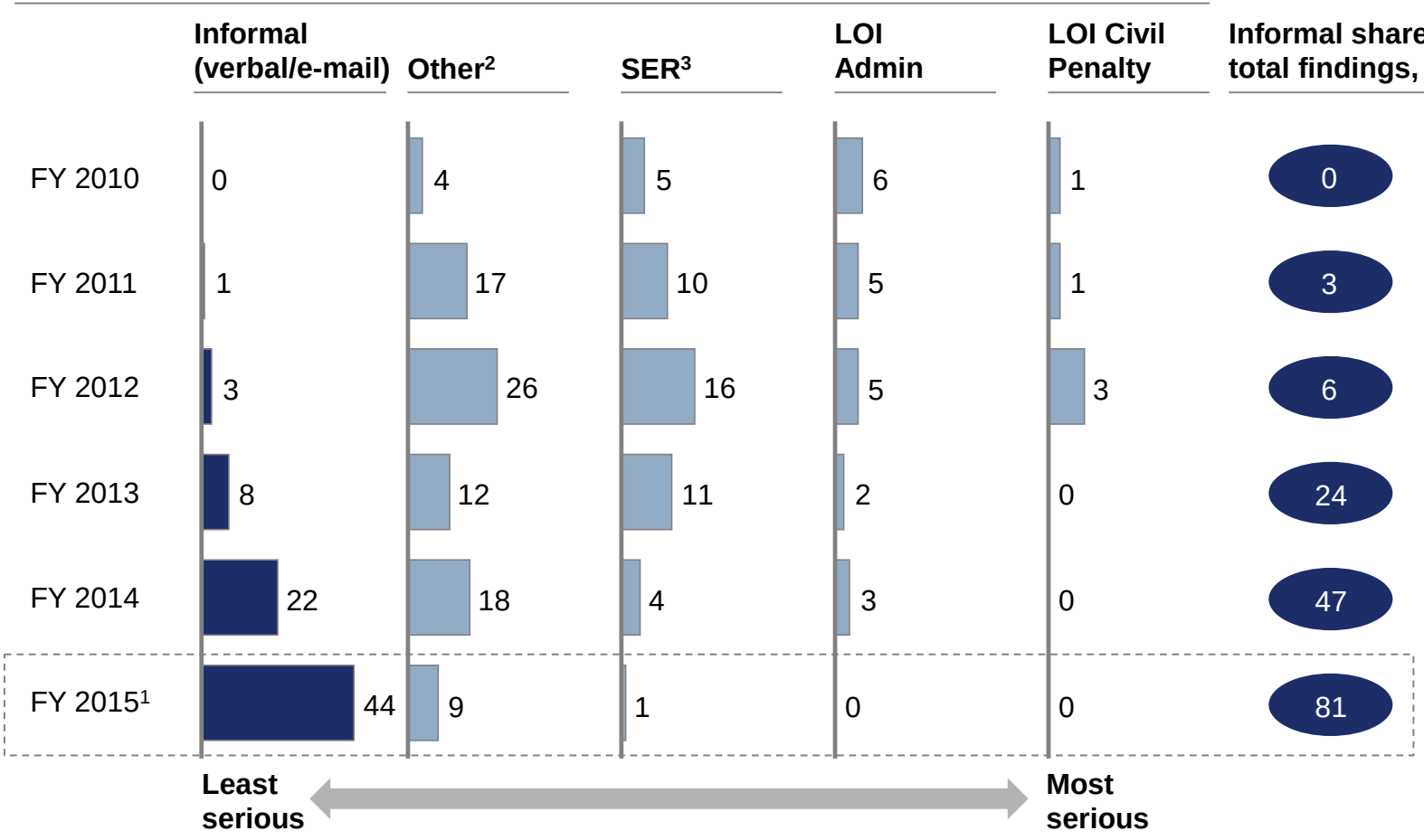
1 Includes LOI, SER, informal enforcements (verbal/e-mail), and "other" non-compliance conditions found

2 Letters of Acknowledgment (LOA) and Part 25 airworthiness non-compliances

SOURCE: FY10-15 Total BASOO Enforcement activity: \\NW\Data\RegAdmin-Files_Team-Compliance_Admin\Enforcement\Metrics\Self Surveillance

20 Not all non-compliances are created equal: share of BASOO findings increasingly comprised of informal notifications

Breakdown of actions taken in response to non-compliances discovered by BASOO
# of non-compliances as reported by BASOO



Out of total non-compliance findings discovered by BASOO, relative share which are informal/ verbal increased from 0% to over 80% since 2010, further suggesting improvement in compliance record

1 Annualized (i.e. if current rate continues through the end of the fiscal year, Sept 30, 2015)
2 Includes any "other" conditions requiring corrective action (supervision letters); 3 Surveillance Evaluation Record

SOURCE: FY10-15 Total BASOO Enforcement activity: \\NW\Data\RegAdmin-Files_Team-Compliance_Admin\Enforcement\Metrics\Self Surveillance

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We conducted workshops with & gathered data from 10 industry players

Company	Senior management & certification experts contacted	FAA kick-off lead	Meeting date
Boeing	Mike Delaney (VP Eng), John Hamilton (VP Reg Affairs), Lindsay Anderson (VP Qual)	Peggy, Jeff Duven	Tues, June 23
Textron Aviation	Michael Thacker (VP Engr), Randy Shields (ODA admin)	John Hickey, Dorenda	Wed, June 24
Bell Helicopter	Cathy Kilmain (VP Eng), Tom Archer (ODA admin)	Peggy, Kevin Kendall	Thurs, June 25
Honeywell	Chris Eick (ODA admin)	John Hickey, Jeff Duven	Wed, June 17
Rockwell Collins	Roger Southgate (Dir Avionics Cert), Marisa Stephenson (ODA admin)	John Hickey	Thurs, June 18
Gulfstream	Dan Nale (VP Prgs, Eng, Test), Bill Whitton (ODA admin)	Peggy	Tues, July 7
GE	Gary Mercer (VP & Chief Engr), Paul Hill (ODA admin)	Peggy	Mon, June 29
HEICO	Luis Morell (President Parts & Repair), Marco Cuberos (ODA admin)	Colleen D'Alessandro, Dorr Anderson	Thurs, July 2
ICON, CubCrafters	Kirk Hawkins (ICON CEO) Eric Leaver (CubCrafters Dir of Eng)	Dorr Anderson	Wed, July 29 Mon, July 20

In addition, we spoke with the following international authorities and industry players:

- EASA
- TCCA
- Airbus
- Dassault
- Bombardier

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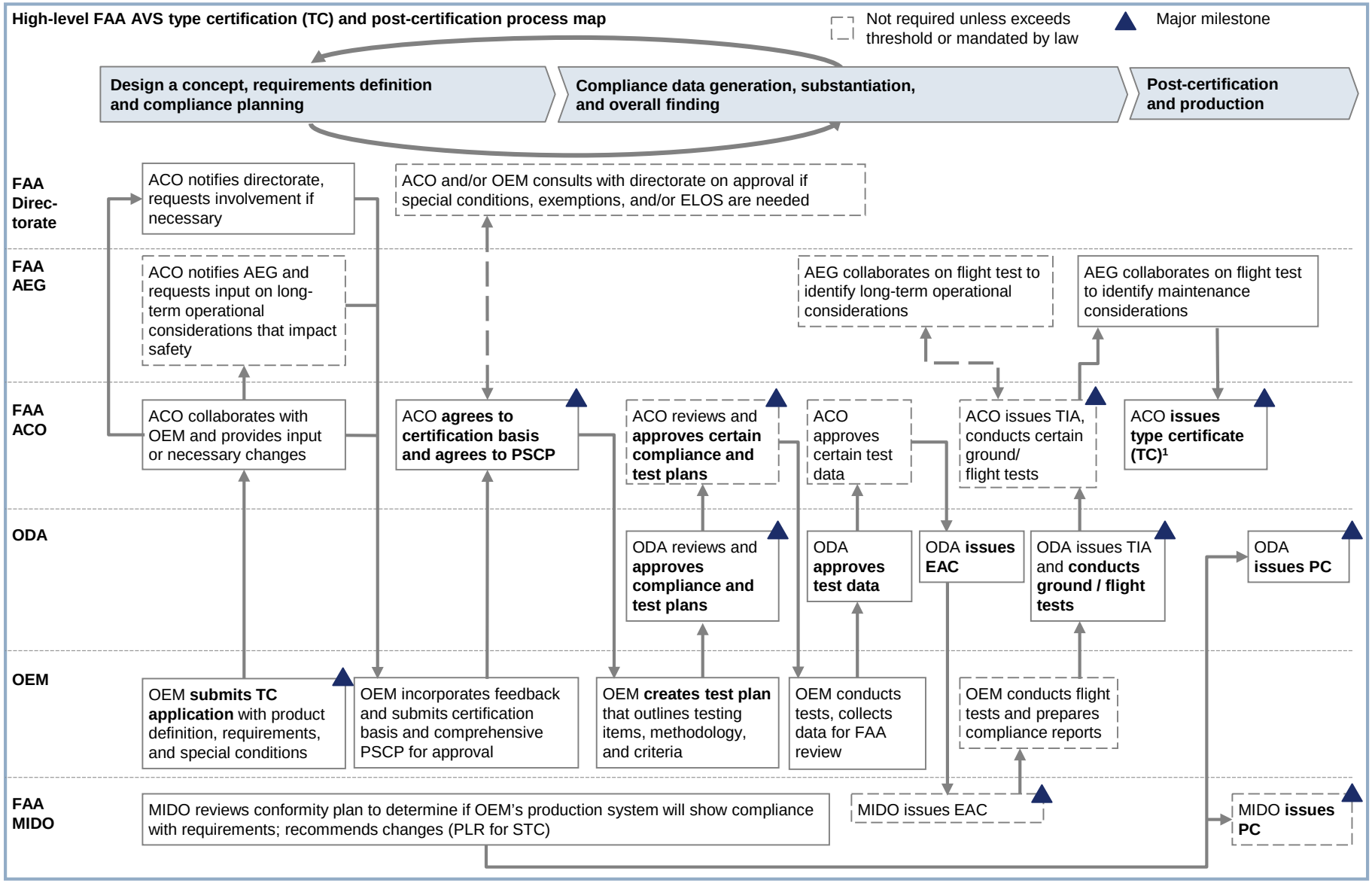
Overview of current certification process with ODA interaction

NOT EXHAUSTIVE

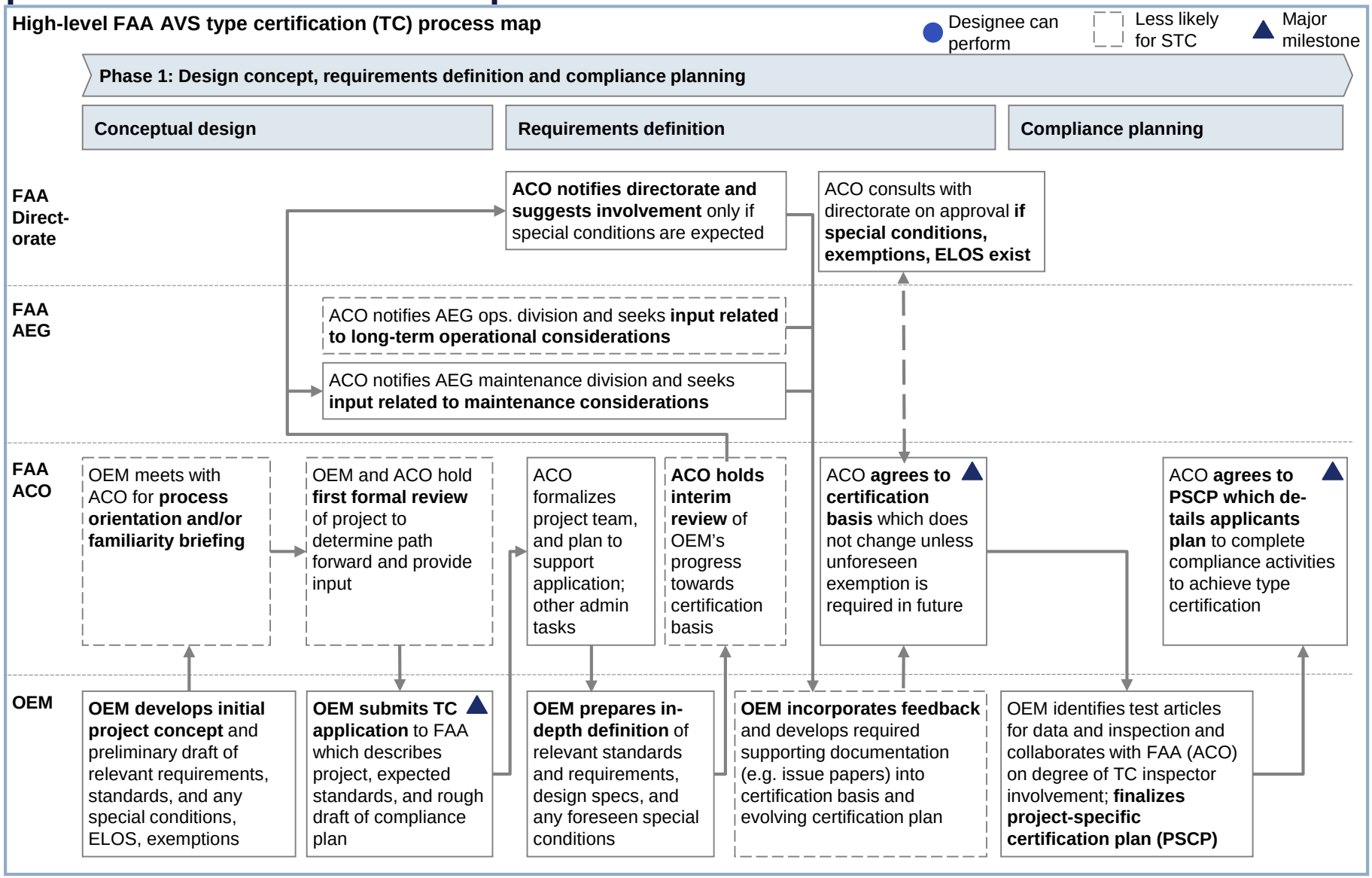


1 ODA can only issue STC, not TC

SOURCE: Internal documents; internal interviews; 8110.4 certification manual

For projects with no standards and/or a new method of compliance, pain points continue to exist in phase 1

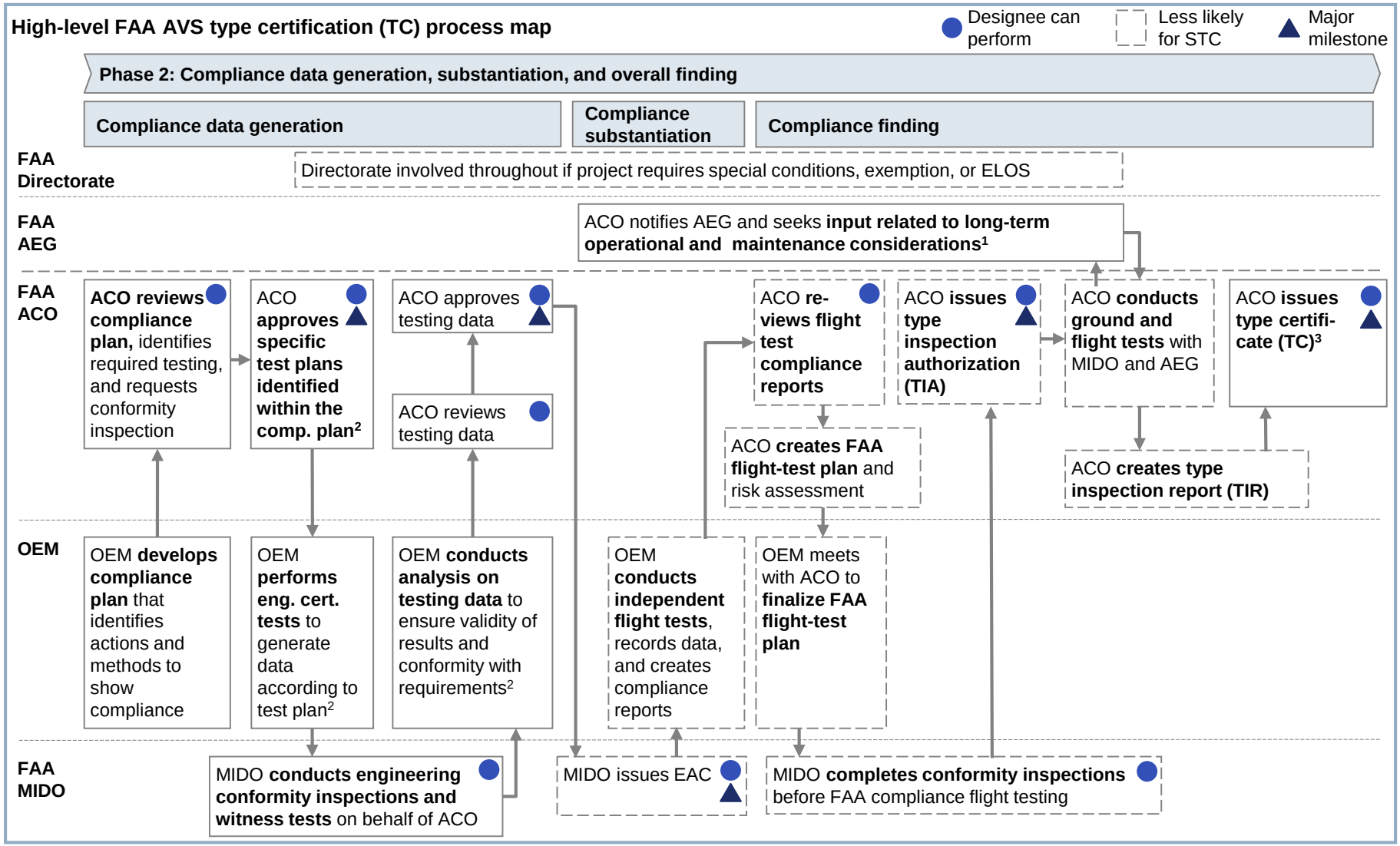
NOT EXHAUSTIVE



SOURCE: Internal documents; internal interviews; 8110.4 certification manual

Pain points from phase 1 may persist in the beginning of phase 2 for projects that require a new method of compliance

NOT EXHAUSTIVE



1 Operational considerations optional depending on STC 2 Steps are repeated several times based on # and type of tests (e.g., analysis, comparison)
3 ODA can only issue STC, not TC

SOURCE: Internal documents; internal interviews; 8110.4 certification manual

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How is the certification process working for you today?

Level of 'pain' in the process, by primary contributor and phase in the certification process

Primary contributor	Phase 1: Design concept, requirements definition and compliance planning	Phase 2: Compliance data generation, substantiation, and overall finding	Phase 3: Post-certification and production
Internal FAA actions			
Internal OEM actions			
FAA-OEM interactions			
Other external influences			

Phase of AVS Type Certification process

Key questions

- What parts of the process have you found to run smoothly?
- Where are your biggest pain points in the certification process?
- What is driving the pain points for you?
  - Internal business constraints?
  - FAA processes?
  - Communication issues?
  - Alignment issues?
- Are there particular products/product types that go through this process with more or less ease?
- What impact does it have when you run into each of these pain points in the process?

Identifying “pain points” in the FAA Safety Certification process

Source	Guiding questions
FAA internal actions	▪ **Threshold:** which projects does the FAA choose to engage on? ▪ **Timing:** at what stage does the FAA engage in the process? ▪ **Process:** how efficiently does the FAA execute its part of the process? ▪ **Mindset:** how does the mindset of FAA personnel affect the process? ▪ **Skills:** which skills are important for the FAA to facilitate certification?
OEM internal actions	▪ **Timing:** how does certification planning drive business decisions? ▪ **Collaboration:** how does ODA interact with the rest of your business? ▪ **Adverse events:** how does ODA respond to unexpected issues? ▪ **Market forces:** how is the certification process affected by your response to market forces? (e.g. supply chain globalization, customization) ▪ **Mindset:** how does the mindset of your personnel affect the process? ▪ **Skills:** which skills are OEMs developing to get the most out of ODA?
FAA-OEM interactions	▪ **Communication:** how clear are the FAA and OEM with each other? ▪ **Prioritization:** how do the FAA and OEM jointly prioritize efforts? ▪ **Collaboration:** how collaborative are the FAA and OEM in certification? ▪ **Organization:** does structure of the FAA and OEM facilitate collaboration?
Other	▪ Are there any other external factors affecting efficiency of certification?

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Initial industry interviews reveal that the FAA and industry perspectives differ on the perceived value of industry's investment in ODA

Current FAA perception	Contrasting industry view
▪ PNLs delegated fully to ODAs work smoothly because FAA never has to touch them again	▪ The engineering/project organization (the "applicant") finds that ODAs are often more stringent with compliance than ACOs used to be ▪ DERs used to help with the showing and finding portion of the compliance work, but now ODAs are much more careful to maintain the separation, driving loss of knowledge and inefficiency
▪ Industry can more easily flex resources to address their needs when they retain control under ODA	▪ Industry has a difficult time finding appropriate talent to staff their organizations due to what is perceived as excessive training and experience requirements
▪ Front-line employees are appropriately applying ODA principles	▪ The front-line relationship with industry is getting progressively worse, and they are trusting us less, not more
▪ Most OEMs have achieved major ODA benefits and want to expedite progression to CDO	▪ Alignment from OEMs that the focus should be on materially improving ODA's benefits, before looking at implementing a CDO model

SOURCE: Interviews, June 2015

Most industry players want to focus FAA dialogue on how to achieve significantly more benefit under ODA before exploring a move to DO/CDO

Industry perspective	Representative quotes
1 **We need to accelerate the benefits of ODA to relieve anticipated near-term bottle-necks**	”We just invested in ODA… we should improve how ODA works before moving to a new model”
	“We have immediate needs ahead of us which need to be addressed by both parties before the slow journey to a CDO model”
	“FAA needs to rebuild trust with industry by delivering some ODA benefits, which will also lay the path toward CDO”
	“We already have a design assurance function and we are in the process of developing an independent compliance verification function, all of which are necessary building blocks for a compliant system in the future… but we are not there yet”
	”ODA was seen as a stepping stone to CDO from the beginning, but it needs time to play out”
2 **FAA may not have the right capabilities and mindsets to make a near-term transition to CDO**	“In theory we support the move to CDO, but we have concerns about the structure and mindsets of the FAA to make CDO happen successfully”
	“Even in a CDO model, the FAA would still rely excessively on compliance finding activities”
	“CDO would be even more onerous than ODA, as the FAA has not proven they have the capability to do oversight.”

SOURCE: Interviews, June 2015

Industry identified ODA scorecards, increased delegation, strong FAA relationships, and certification knowledge as key strengths (1/2)

Strength	Description	Representative quotes
1 **ODA scorecard**	▪ Industry view the ODA scorecard as a great initiative and starting point for dialogue on FAA interaction ▪ Although a few suggestions were made to improve how it works, the scorecard is seen as a great building block for concrete FAA-industry dialogue on cooperation in certification improvement	"It's a good effort they're doing there" (FAA initiating the ODA scorecard) "The pilot program should be expanded to include the whole industry"
2 **Increased delegation**	▪ Industry ODAs handle minor changes without FAA ▪ Benefits are seen in more control and predictability	"Previously we relied on individual DERs, now we have a whole organization."
3 **Working relationships**	▪ Some in industry highlighted the willingness and dedication of their ACO to help them meet critical deadlines as a major strength in the system ▪ This is based on strong relationships between former DERs and FAA specialists, built over many years	"When I pick up the phone and talk to the FAA, I'm able to expedite certain things" "Our FAA contacts are very cooperative, willing to help us resolve problems"
4 **Increased certification knowledge**	▪ Some design organizations highlighted that ODA has required them to learn more about certification ▪ They view this education as important in helping them better plan for and develop their products	A project manager: "I like that my role has increased in certification. It gives me more control over the process."

SOURCE: Interviews, June 2015

Industry identified ODA scorecards, increased delegation, strong FAA relationships, and certification knowledge as key strengths (2/2)

Strength	Description	Representative quotes
5 **PMA, MRA, and TSO processes**	▪ The ability to issue their own PMA TCs was highlighted as a strength, providing more control and the ability to increase the speed of the process ▪ Similarly, non-ODA processes like TSOs and ODA processes that do not require PNLs like MRA were seen as strengths offering control and speed	"Before ODA, you would put a package together and wait for MIDO approval. Now, you just notify the MIDO to ask if they concur, and we issue it right away."
6 **Enabling small businesses and innovation across spectrum**	▪ Full certification service to all applicants creates equity in the coverage and supports the ability of small business in the industry, a frequent source of innovation	"Recently had 2 companies say 'what would it take to move [to the US], FAA doesn't discriminate [on size] and we want to move the company there'"

SOURCE: Interviews, June 2015

Small OEMs experience pain points consistent with larger players but emphasize the need for performance-based rules and shorter regulatory turnaround times

Theme	Quotes
Interactions with the FAA can be inconsistent and lack transparency	"We couldn't agree on what was required to conform, so we moved to a different ACO and submitted the exact same plan without any problems."
	We submitted our project over a year ago. It's like it's fallen into a black hole… we can't seem to get a response from the FAA."
Long and unpredictable regulatory turnaround times impact ability to secure capital	"An investor needs a firmer timeline than what's happening in certification. How do you make an investment in a project when the FAA regulatory delays prevent you from coming to market?"
	"Capital markets are an important part of the equation, and investors hate risk driven by regulation because it is so unpredictable."
Support performance-based standards and the Part 23 rewrite but worried about the cultural shift	"I am optimistic that the Part 23 rewrite will support innovation, but the big question is will the FAA be able to support the cultural shift?"
	"It's an extraordinary opportunity. Performance-based standards are the answer for all aircraft. But I'm also nervous that in practice, people will do things the way they have always been done."
See evidence that EASA is surpassing the FAA on supporting innovation for small players	"In the last year, I've been very impressed with EASA's support of innovation through their Part 23 rewrite."
	"EASA regulators recognize that they need new thinking to support innovation."

SOURCE: Interviews, July and August 2015

Contents

Case Study: EASA

Context

- EASA uses a DOA model, very similar to FAA-proposed CDO model
- Systems approach initiated~15 years ago; centralized under European authority ~10 years ago
- EASA has three levels of DOA certification
  - DOA: OEM can make major changes and is responsible for all compliance finding
  - Alternative Procedure for DOA (ADOA): OEM can make minor change and some major changes, EASA finds compliance
  - No DOA: OEM is limited to only minor changes and repairs, EASA finds all compliance

Regulator and applicant role

- Under DOA, EASA surveillance is performed in two parallel processes
  - OEM systems surveillance to monitor OEM design activities and privileges
  - Real-time project certification surveillance to verify pre-determined steps within process
- Applicant is responsible for declaring compliance and holds all liability
- When project is out of compliance, OEM project team reports finding to DOA team

Core pain points in process

- Implementing a systems approach is a continuous workforce mindset transition
  - EASA product certification experts want to find compliance
  - Building confidence that the system is safe was an early challenge
- Managing complexity across the levels and types of DOA certification is a challenge
- OEMs continue to feel EASA is overly involved in real-time compliance
  - LOI policy (to be implemented in 2016) will codify situations in which EASA will be involved
- Some OEMs believe transition to DOA improved safety but hasn't been a positive ROI

Managing complexity and resource constraints

- Applicant DOAs are flexible and vary by scope, product type, and privileges
- Transitioning to a level of involvement approach to optimize/reduce EASA involvement with DOA
  - EASA involvement will be limited by the level of perceived risk

Key Insights

1) EASA tailors its level of compliance involvement based on the maturity, experience, and capabilities of each OEM
   - High performing companies receive DOAs; make major changes/find compliance without EASA involvement
   - For non-DOA holders EASA involvement determined by individual OEM performance and experience

2) Transitioning to a CDO model has been difficult and has required a large cultural shift:
   - Difficult for EASA engineers to move to a surveillance paradigm
   - OEM buy-in has been critical to the success of the DOA model

3) OEMs feel the level of "formalism" has increased under DOA and some believe it has yet to prove a positive ROI

SOURCE: Interviews, June and July 2014

The EASA certification model varies by OEM demonstrated capability

✓ OEM-authorized

Type of design	Demonstration of capability: DOA	ADOA	CP[1]
Aircraft type certificate			
▪ All aircraft	✓		
▪ European Light Aircraft (ELA) 2: <2,000 kg	✓	✓	
▪ European Light Aircraft (ELA) 1: <1,200 kg	✓	✓	✓
Engine type certificate			
▪ All engines	✓		
▪ Piston engine	✓	✓	
▪ Engine installed in ELA2 aircraft	✓	✓	
▪ Engine installed in ELA1 aircraft	✓	✓	✓
Propeller type certificate			
▪ All propellers	✓		
▪ Fixed or adjustable pitch propeller	✓	✓	
▪ Propeller installed in ELA2 aircraft	✓	✓	
▪ Propeller installed in ELA1 aircraft	✓	✓	✓
Supplemental Type Certificate (STC)			
▪ All STC's	✓		
▪ STC Group 1: DOA required	✓	✓	
▪ STC Group 2: Alternative procedure accepted	✓	✓	
▪ STC on ELA1 or its engine or propeller	✓	✓	✓
Minor changes	✓	✓	✓
Repairs			
▪ Minor	✓	✓	✓
▪ Major	✓	✓[2]	
▪ Major on ELA1 or its engine or propeller	✓	✓	✓
ETSO Authorization (ETSOA)		✓	

Key Insights

1. EASA provides explicit guidelines for the level of capability required to perform each design type
2. DOA authorizes OEMs to perform design types without EASA intervention, but OEMs can achieve certification with varying levels of EASA involvement under ADOA or CP programs

1 Certification Program
2 Upon Agency agreement
3 ELA: European Light Aircraft; ELA2: <2,000kg; ELA1: <1,200kg; STC Group 1: DOA required; STC Group 2: Alternative procedure accepted

SOURCE: https://www.easa.europa.eu/easa-and-you/aviation-domain/aircraft-products/design-organisations

Transport Canada Case Study: Transport Canada

Context

- TCCA is a delegation model, similar to the FAA ODA model
- Delegation is a two-pronged approach:
  - TCCA authorizes Designated Organizations (DAOs)
  - TCCA authorizes Designated Persons within DAO to act on TCCA's behalf
- Extent of DAO authorization is a function of organizational maturity and capabilities
- Larger OEMs are more closely aligned with a CDO model

Regulator and applicant role	• DAOs interact with the TCCA at three levels of surveillance during the certification process – Defining the compliance program for a project – "Level of Involvement:" Real-time certification surveillance of "high-risk" aspects of the project – OEM systems surveillance to monitor design functions and delegates of DAO • Delegates perform all designated finding and showing on behalf of TCCA • Applicant makes statement of project compliance
Core pain points in process	• LOIs: TCCA has had complaints from OEMs that they are inserting themselves unnecessarily into the certification process • Delegates do not fully understand approval criteria for certification • Scheduling: TCCA feels that OEMs set unrealistic certification schedules • Smaller OEMs without delegates can lose control of process and fail to achieve certification, leading to a burden on TCCA resources
Managing complexity and resource constraints	• LOI: risk-based determination for TCCA involvement in certification • Almost all TC applications are managed by TCCA headquarters, STCs are handled regionally • New legislation shits from prescriptive to performance-based rulemaking • New initiatives are working to address national standardization in rule application • National conference every three years to bring OEMs and TCCA together

Key Insights

1) Pain points are similar to those in the US
   - Industry concern that TCCA uses LOI to insert itself into the certification process unnecessarily
   - Supporting smaller OEMs without delegation privileges can be challenging and a tax on TCCA resources
   - National consistency of rule application has been difficult to achieve

2) TCCA has implemented several best practices
   - Conference to bring TCCA and OEMs to the table
   - Majority of TC applications are processed through TCCA headquarters

SOURCE: Interviews, July 2014

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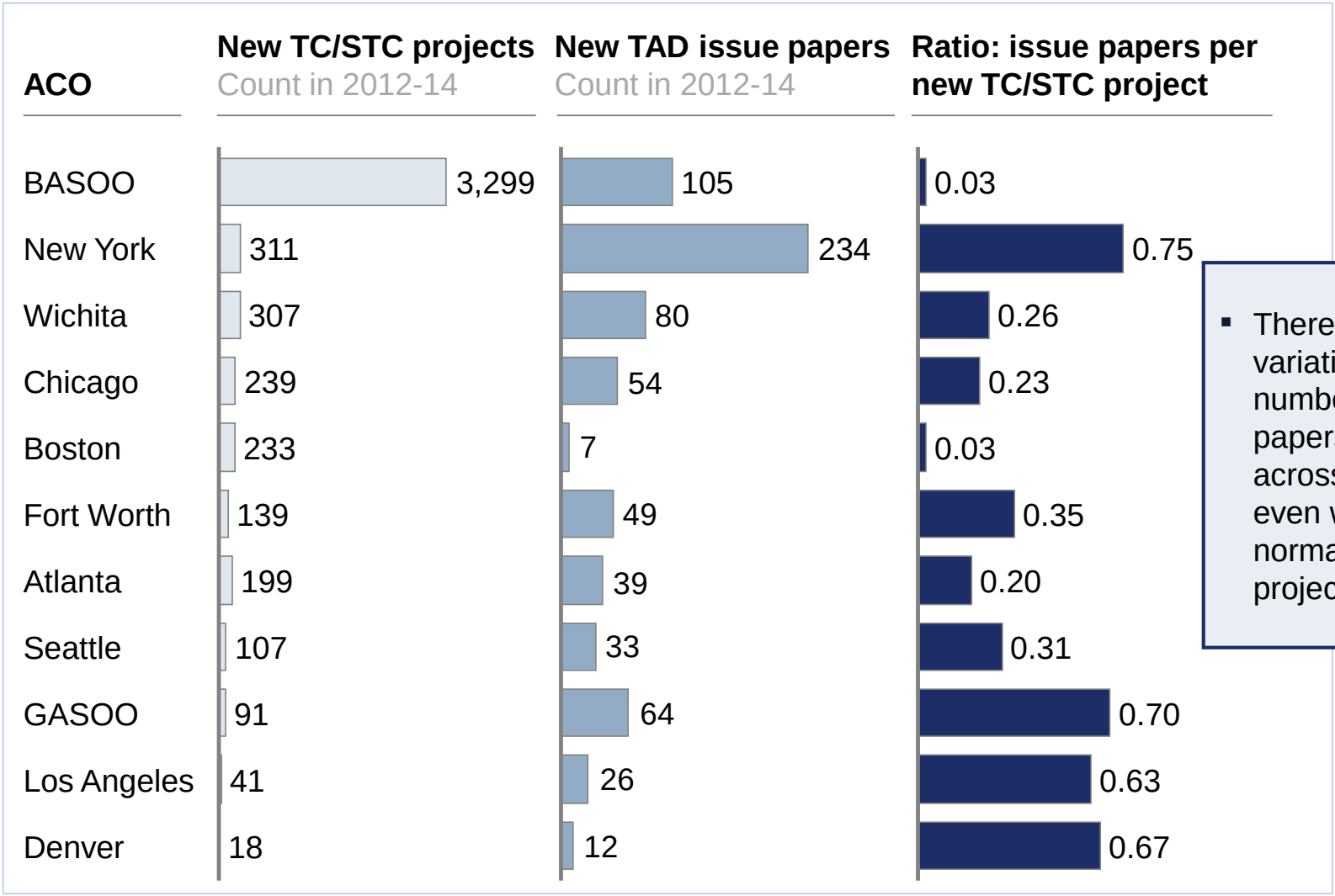
Conflicting interests can arise between OMT members' three responsibilities as overseers, technical specialists and managers

Roles and responsibilities of an OMT member

	Technical Specialist	Manager / Delegation	Auditor
Role			
Focus areas	▪ Engage on technical detail ▪ Passionate about a single technical area	▪ Fully leverage ODA organization ▪ Facilitate success of the ODA holder	▪ Oversee ODA organization at system level ▪ Assess compliance to regulations
Risk of conflict	▪ May over-engage on technical details, rather than delegate	▪ Excessive focus on delegation could result in missed details	▪ Excessive focus on compliance without true risk and ODA success in mind

Conflict between roles can hinder the operational intent of ODA, given pre-existing biases towards the Technical Specialist role

ACOs are inconsistent in their use of issue papers to resolve problems



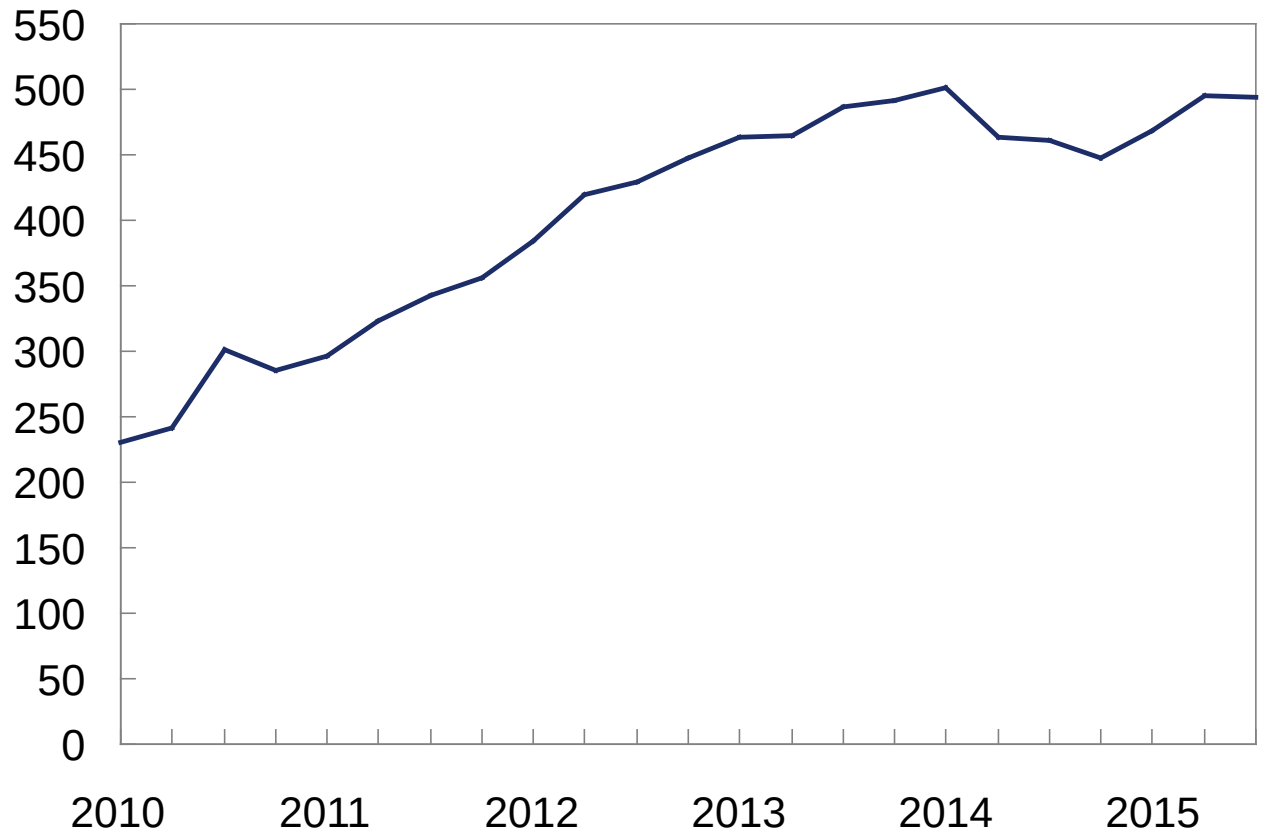
- There is a wide variation in the number of issue papers generated across ACOs, even when normalized by project volume

SOURCE: Internal FAA databases (TAD issue paper database; CPN database)

Doubling of open issue papers over last 5 years suggests opportunity to improve standard setting

Open TAD issue papers over time

Count at end of each quarter, across entire FAA



- More issue papers are being created than closed, consistently over the last 5 years
- Open issue papers drive delays in certification projects
- Issue papers can be reduced by setting new standards appropriately

SOURCE: Internal FAA databases (TAD issue paper database; CPN database)

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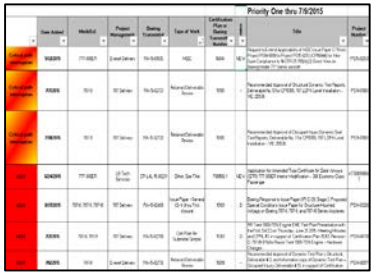
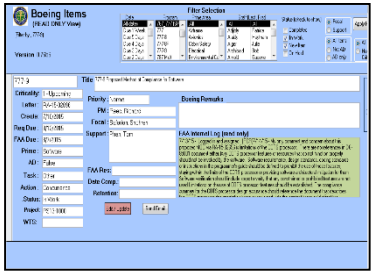
On the other end of the spectrum, processes and systems for managing inbound work from Boeing face significant challenges/opportunities

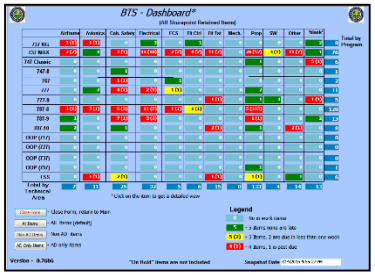
BTS/SharePoint process



- Each week, Boeing submits the 'Open Items List' to SharePoint and e-mails it to Program Managers
  - 'Open Items List' is an excel spreadsheet which includes descriptions and prioritization of outstanding certification work



- Access database loads information from 'Open Items List' into 'BTS' which allows BASOO to filter by due date, program, area, or staff name
- Employees handle prioritized requests and update BTS



- Dashboard color codes submittals by due date status according to development programs
- Provides view of where to focus on "red" and "yellow" areas

Primary benefits

- Boeing can directly submit work without re-entry into system by BASOO
- Excel format is easy to use

Challenges/opportunities

- Does not record timeline of BASOO/Boeing events or activities
- Does not track correspondence between Boeing and BASOO
- Requires use of multiple systems to complete work (e.g., e-mail, printed paper, BTS, SharePoint site)
- Does not support personalized employee-level dashboards for selecting work
- Cannot be accessed over the internet without downloading the entire Access database (which is prohibitively slow)
- Top-level dashboard is not dynamic and does not include key data views (e.g., days past due, who is responsible, drill down capabilities)
- Does not interface with work assignment tool or procedure

SOURCE: Interviews, July 2015

Performance targets for BASOO have not been consistently established across key dimensions

✓ Yes
✓ Partial
✗ No/not yet

	Source/forum	Has target been established?	Description
Applicant satisfaction	▪ ODA scorecard ▪ Ad hoc meetings to voice concerns ▪ Customer Satisfaction CSI	✗	▪ No specific targets established
Quality	▪ QMS Audits and Reports ▪ OIG Audits ▪ Employee Performance Management	✓	▪ OIG audits evaluate office adherence to orders ▪ Employee quality targets not in place
Timeliness	▪ ODA scorecard ▪ Boeing Tracking System/Sharepoint ▪ Program meetings ▪ Boeing Feedback charts	✓	▪ Standard flow time targets established for submittals ▪ Aggregate target not in place (e.g. x% within standard flow)
Productivity	▪ ASTARS and LDR data ▪ TAD Organizational Program Overview ▪ BTS Dashboard	✓	▪ Program overviews evaluate whether project is at risk of delay ▪ Employee productivity targets not in place (e.g., flow time expectations)
Employee engagement	▪ Various weekly/monthly meetings – Leadership Team – Airplane Program Compliance Team – Development/Production Program Team – Peer Group	✗	▪ Assessed ad hoc in meetings but no standard standing questionnaire to measure employee satisfaction or engagement

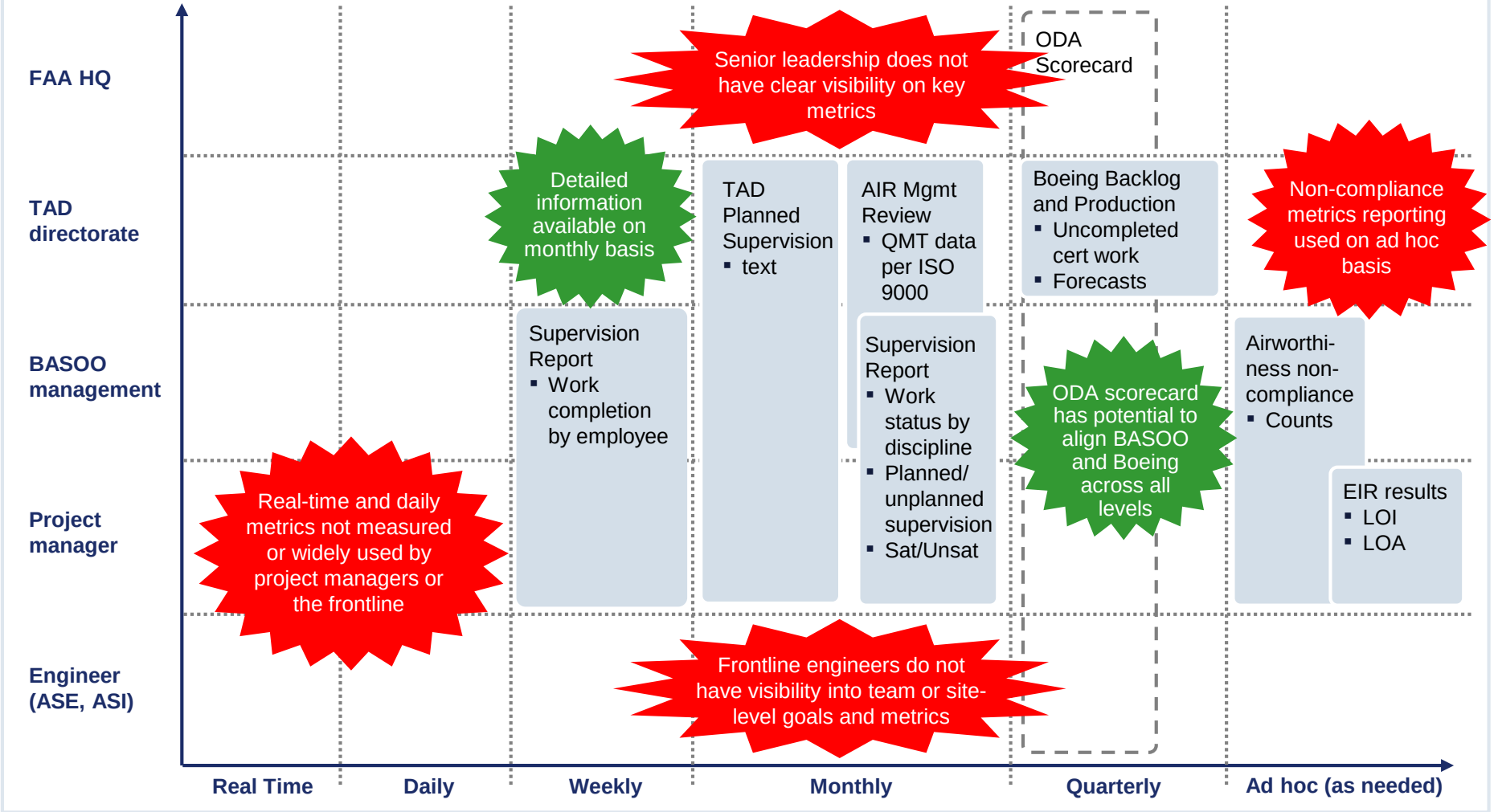
SOURCE: Interviews, July 2015

BASOO primarily measures performance monthly or ad hoc (as needed)

… Strengths

… Opportunities

BASOO metrics cascade[1]



1 Shaded areas represent sufficiently high user engagement with report; mere membership on e-mail distribution list, for example, is not represented

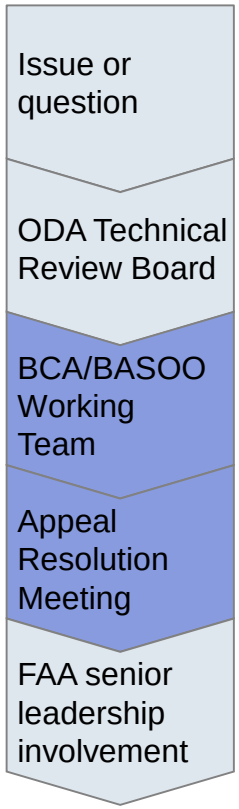
SOURCE: Interviews, July 2015

Issue resolution between Boeing and BASOO does not consistently follow established procedures

Boeing and BASOO have established procedures for escalating issues or questions…

- **Issue or question** — An issue or question is raised which cannot be answered within the engineering department
- **ODA Technical Review Board** — The ODA unit convenes a technical review board to provide guidance and direction
- **BCA/BASOO Working Team** — If resolution cannot be reached, Boeing and BASOO develop a working team to resolve the issue
- **Appeal Resolution Meeting** — Disagreements are to be resolved through a formal appeal resolution process with adequate documentation on both sides
- **FAA senior leadership involvement** — FAA senior leadership is involved when disagreements persist and/or issues may affect critical delivery path

… which BASOO indicates are not consistently being followed



BASOO describes repeated and recurring instances where Boeing leadership engages with FAA leadership before escalation process has run its due course

"When we find out late in the process that there is a problem which was not raised by the FAA earlier… this causes us to involve senior FAA leadership or else we run the risk of not meeting a critical deadline"
- Boeing manager

Potential solutions
- Revisit escalation guidelines and procedures for resolving issues in a timely manner by following best practices
- Explore how to strengthen working level and senior level relationships (i.e. hit "cultural reset" button)

SOURCE: Interviews, July 2015