



Toward Realistic Acquisition Schedule Estimates: 737MAX Case

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Acquisition Research Symposium
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Overview

- The Course Of The 737Max Tragedy: What Happened And Why It Happened
- Systems Perspectives: A Useful Approximation Of How It Happened



The Course of the Tragedy

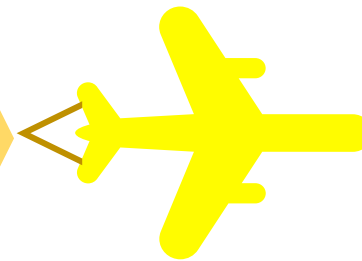
The Need For Speed: Keep Up With Airbus, but...
Airbus Steals A March With A320neo (2010-11)



Boeing Promises Quick and Timely Delivery Of a
737 Variant, but...
Design Constraints Quickly Surfaced



New Engine, Which Needed Relocation (Up
And Forward)
And Which Included No New Pilot Training
(Same Aircraft Type)

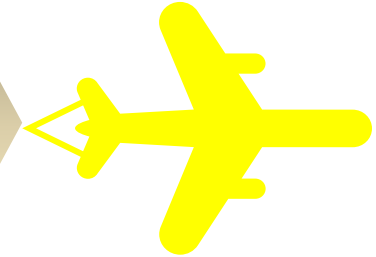


The Course of the Tragedy

Test Program Revealed Handling Difficulties In Two Flight Regimes

High-speed Handling (Minor Fix, MCAS1)

Low Speed Pitch-up (Aggressive Fix, MCAS2)



MCAS2 Not Communicated Well

- ... Within Boeing
- ... To the Regulators
- ... To the Pilots



Result: Two Catastrophic Accidents



The Challenge of Schedule Estimation

- Historically, the Aerospace and Defense world has a poor track record on estimating and maintaining schedules leading to two recurring questions:
 - *Why Do development projects always take longer than estimated? **and***
 - *Why are we surprised when they do take longer?*
- There exist many formal processes (CPM/ PERT) for estimating schedules, although even these processes are imperfect
- In the case of the 737Max, it seems however, that business and competition concerns won out over even the most rudimentary schedule calculations

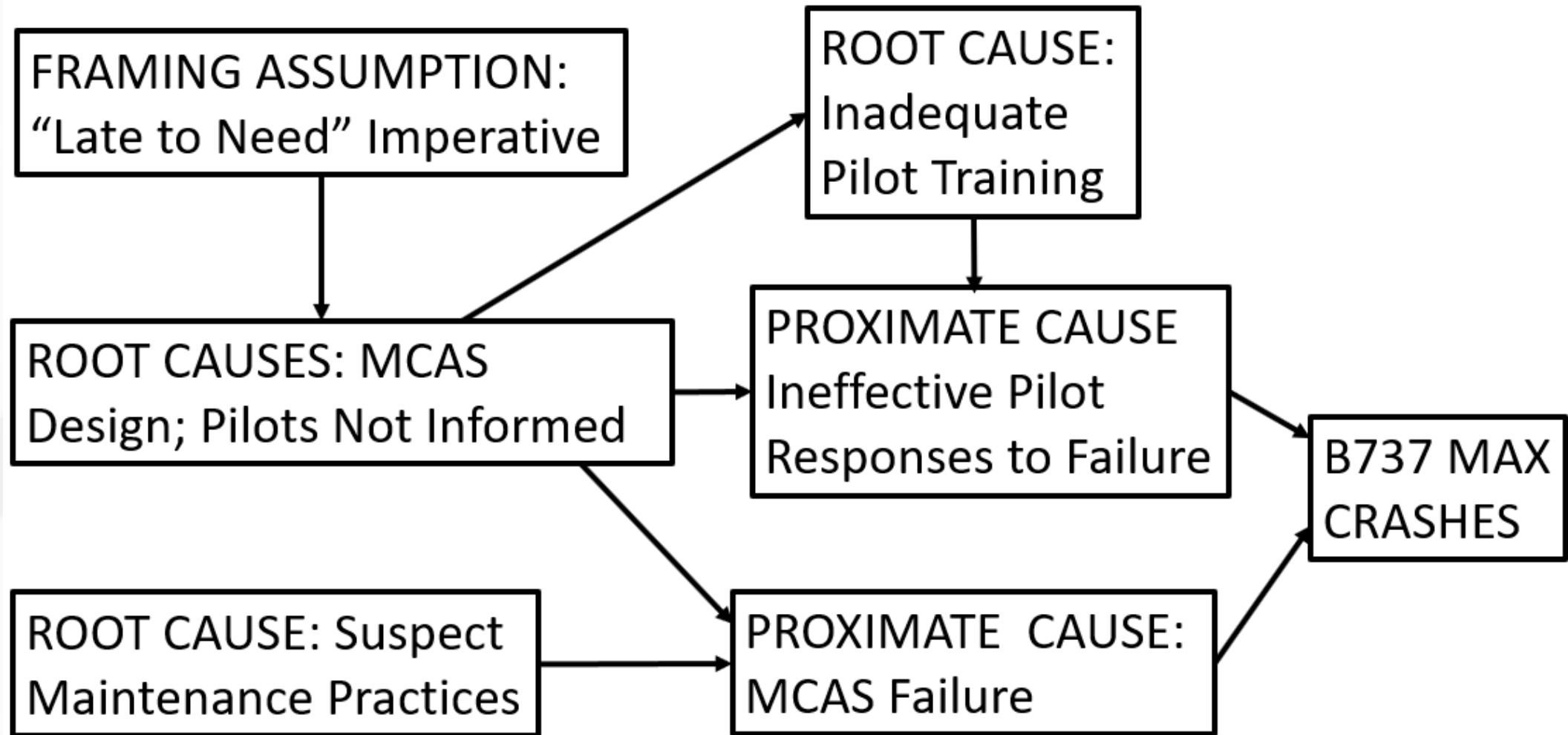
Time is More Complex Than Money

The 737 Max was developed as an Aspirational Schedule

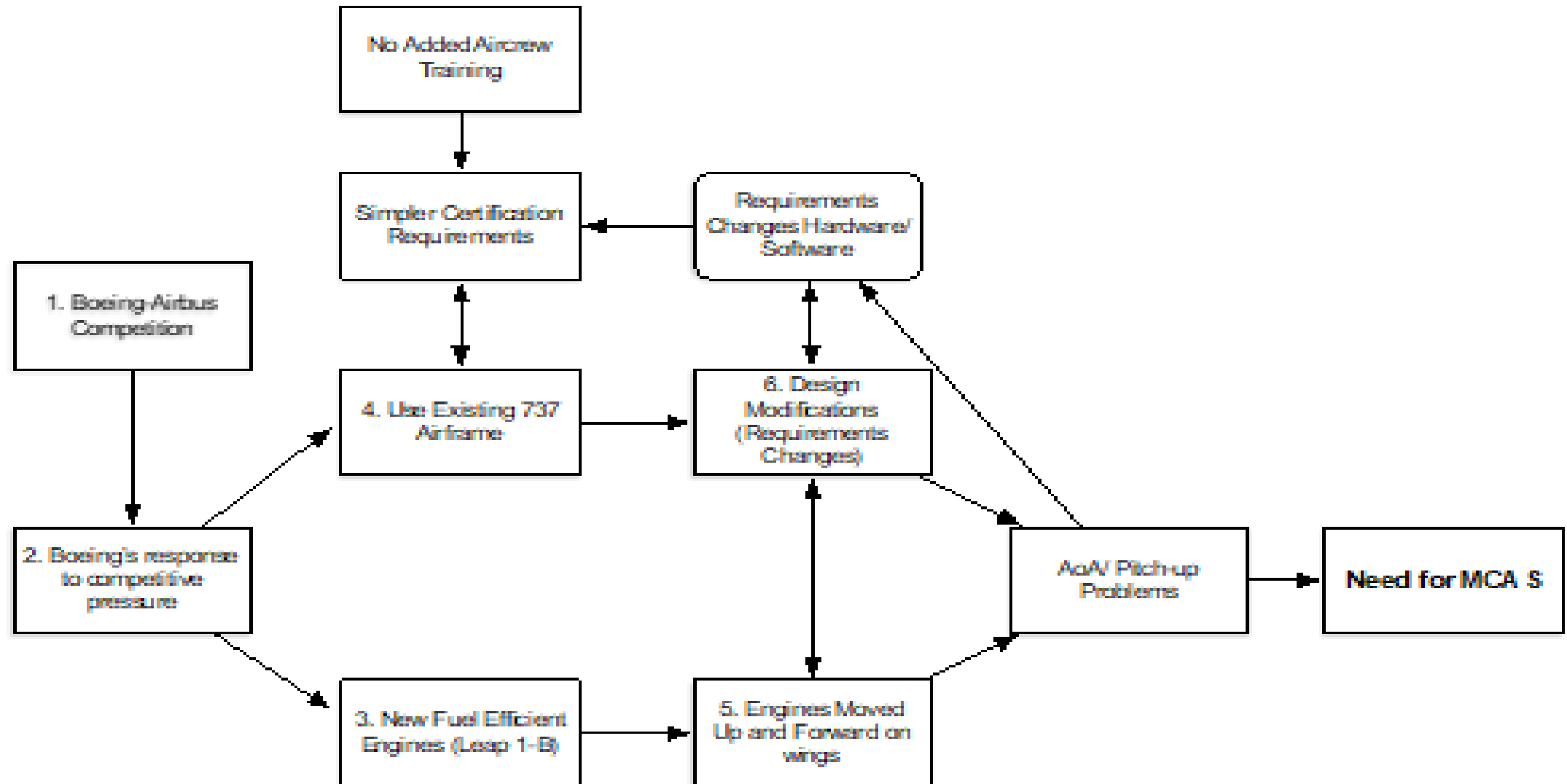
Where...

An ASPIRATIONAL SCHEDULE is defined as a political, competitive or business desire, aim or goal -- rather than experience-based scheduling estimates.

Root Cause Analysis of the Fatal Accidents



Decision Dynamics Leading to MCAS2



Some findings

- ADOPTING ASPIRATIONAL SCHEDULES AND TAKING THEM SERIOUSLY ENTAILS SERIOUS RISKS:
 - LATE DELIVERY OF NEW SYSTEM, WITH ATTENDANT CONSEQUENCES (F-35)
 - STICKING WITH THE SCHEDULE, RISKING FLAWED PRODUCT (737MAX)
- IT'S RELEVANT TO DOD NOW. DOD ACQUISITION HAS A WIDESPREAD YEARNING FOR SPEED. EXAMPLES INCLUDE ...
 - DIGITAL CENTURY SERIES
 - NEW ICBM (GBSD)
 - DOD DIRECTIVES (e.g., DODI 5000.81, 31 Dec 19)
- ROOT CAUSE ANALYSES AND DECISION DYNAMICS ARE USEFUL CASE STUDY METHODS FOR ACQUISITION SCHEDULES
- REALISTIC SCHEDULE ESTIMATES ARE IMPORTANT

“Let programs dictate schedules.”
Creedon, 2021



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Text on time management. More text here and more text here. You can replace the text below with any text of your own.

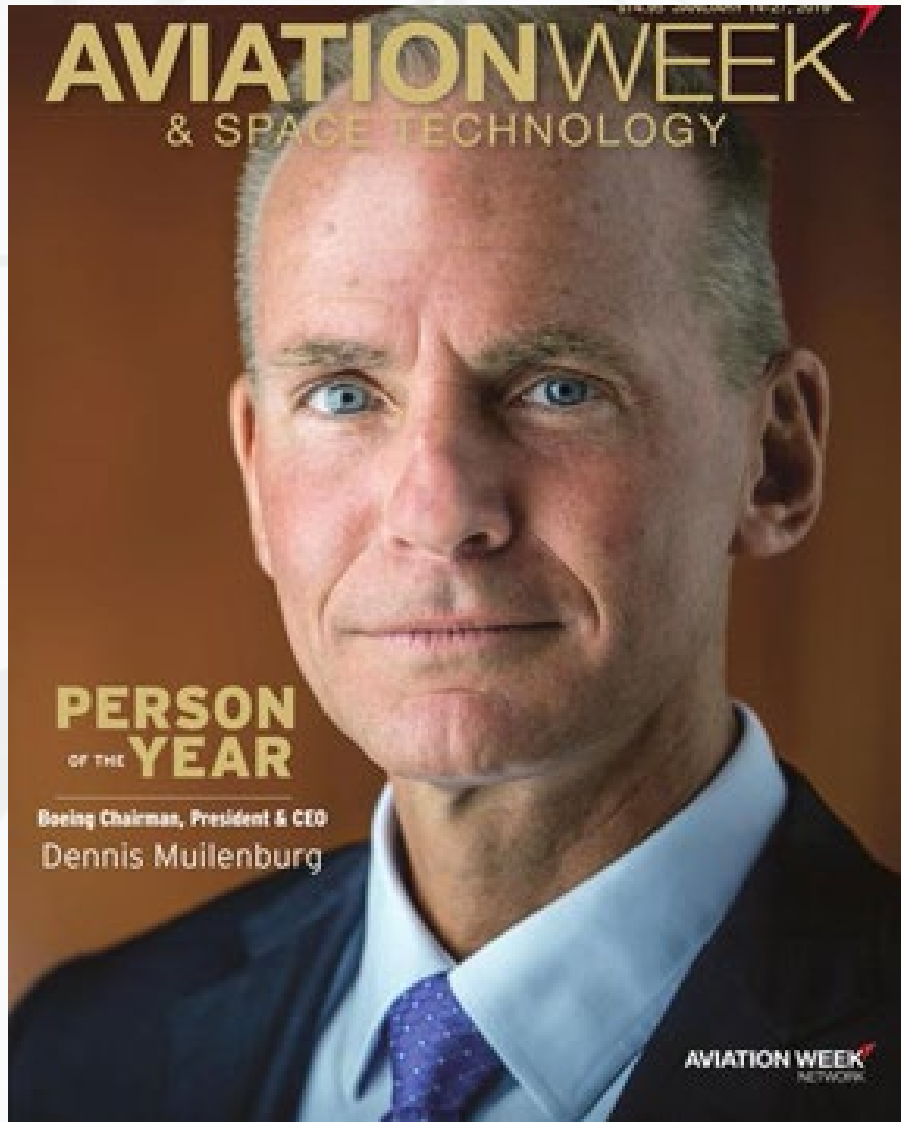
TIME

WHY 737MAX?

AN EXCELLENT TARGET OF OPPORTUNITY

- AEROSPACE PROGRAM WITH TECHNICAL AND PROGRAM MANAGEMENT ISSUES
- HIGHLY PUBLICIZED WITH SOME EXCELLENT REPORTING AND ANALYSIS IN THE PUBLIC RECORD, MATERIAL FOR ...
 - ROOT CAUSE ANALYSIS
 - DECISION DYNAMICS ANALYSIS

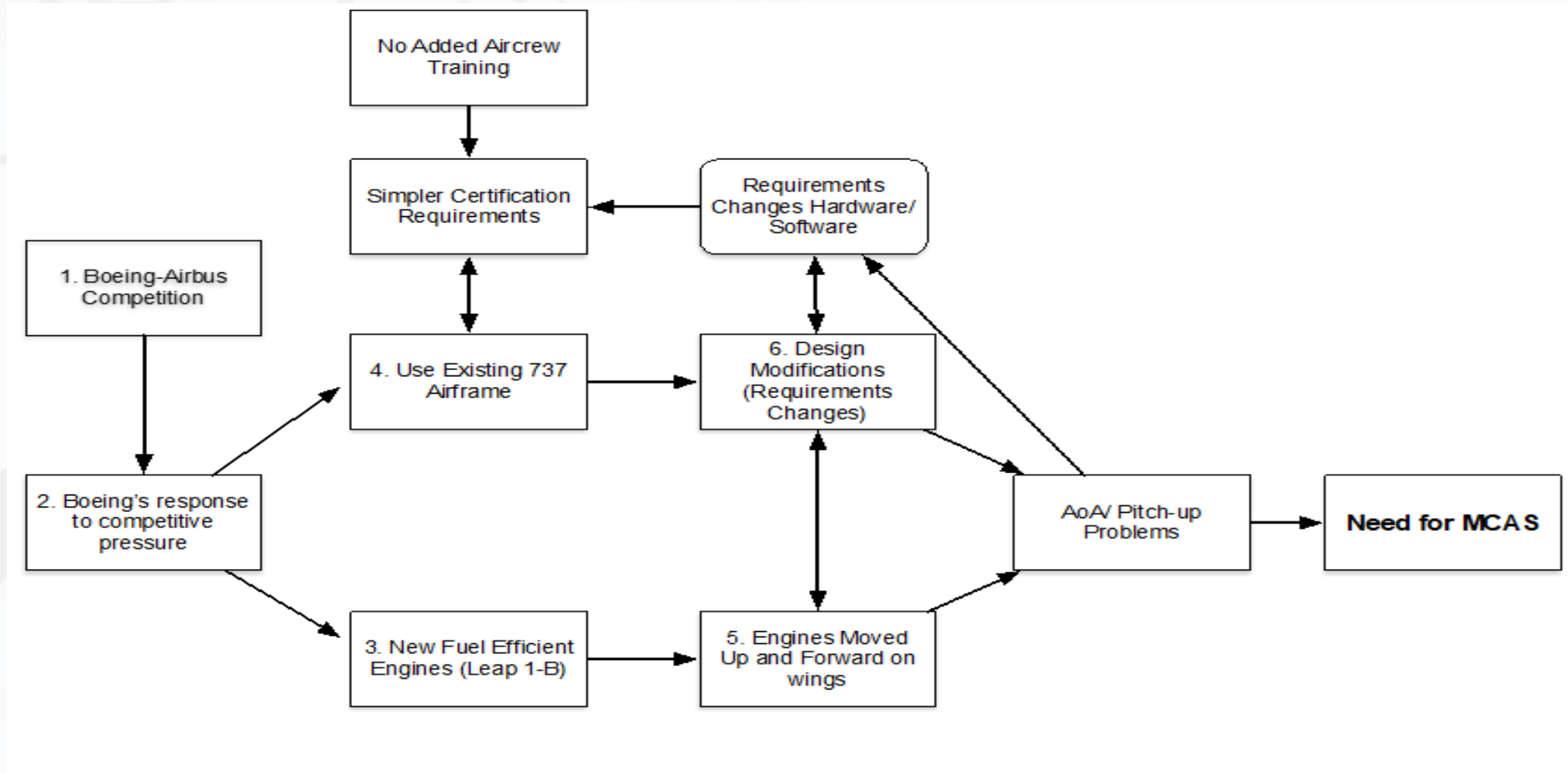
AFTERMATH: What a Difference a Year Makes



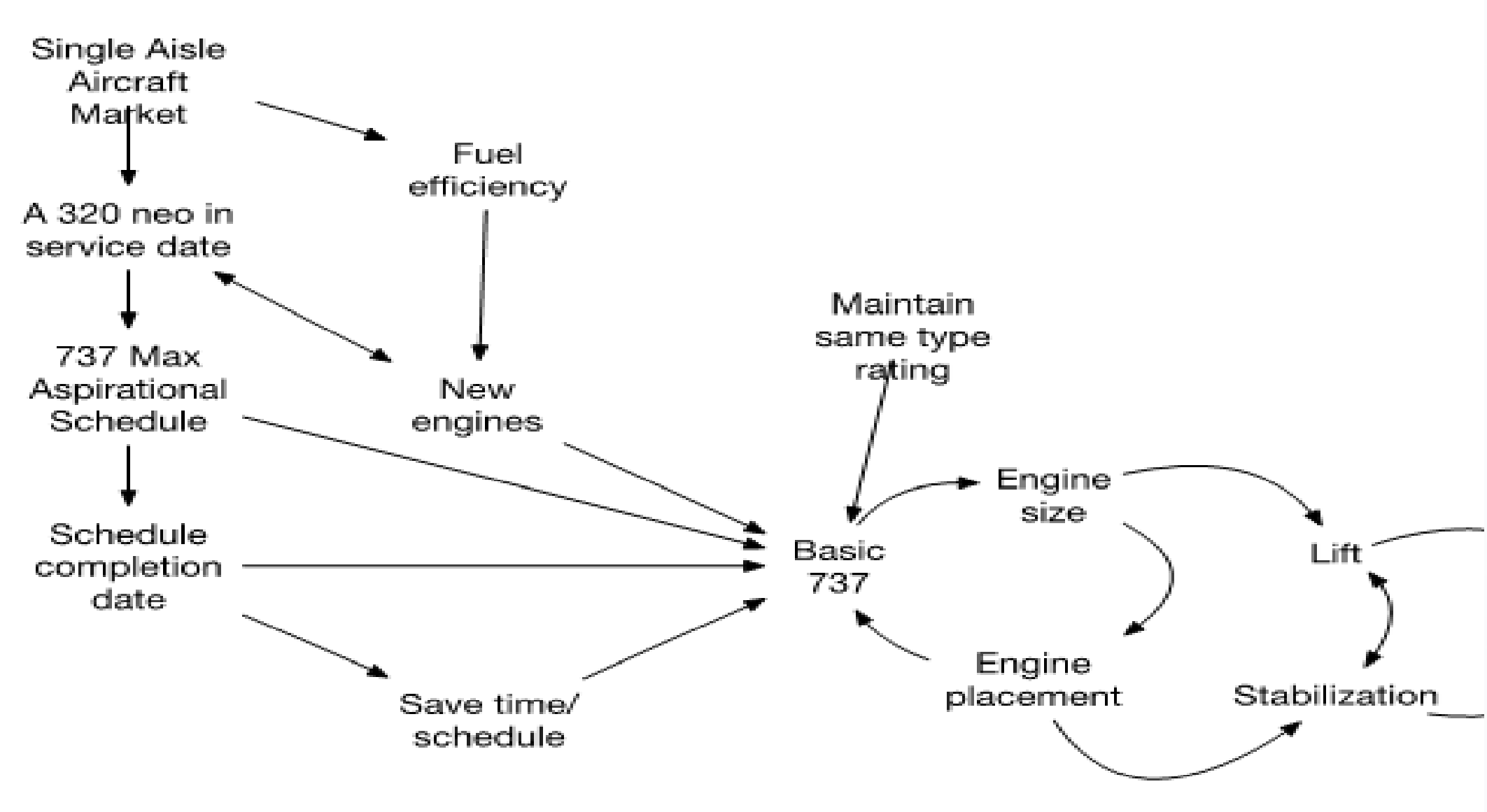
Wall Street Journal,
24 December 2019, B12

**Boeing Needs to
Jettison More Than
Its CEO (Sindreu)**

THE 737 MAX DEVELOPMENT "SYSTEM"



DYNAMICS OF MCAS (left)



DYNAMICS OF MCAS (right), PLUS CONSEQUENCES

