Netherlands Defence Academy

Measuring Potential Benefits of NCW: 9/11 as case study

Prof. dr. Tim Grant
Professor, Operational ICT & Communications
TJ.Grant@NLDA.nl

Outline

Goal:

- To present results of NCW thought experiment

Structure:

- Introduction & background
- FAA & NORAD ConOps
- Chronology
- C2 shortcomings
- Using NCW to rectify shortcomings
- Conclusions & recommendations

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Introducing myself

Qualifications:

- BSc Aeronautical Engineering, Bristol, UK
- Defence Fellowship (Masters), Brunel, UK
- PhD Artificial Intelligence, Maastricht, NL

Experience:

- 1966-87: Royal Air Force officer, UK & SG
- 1987-2004: Consultant, Atos Origin, NL:
  Dutch-French ICT company
- 2001-date: Professor, U. Pretoria, ZA:
  Computer Science Department
- 2004-date: Professor, NLDA, Breda, NL:
  Operational ICT & Communications

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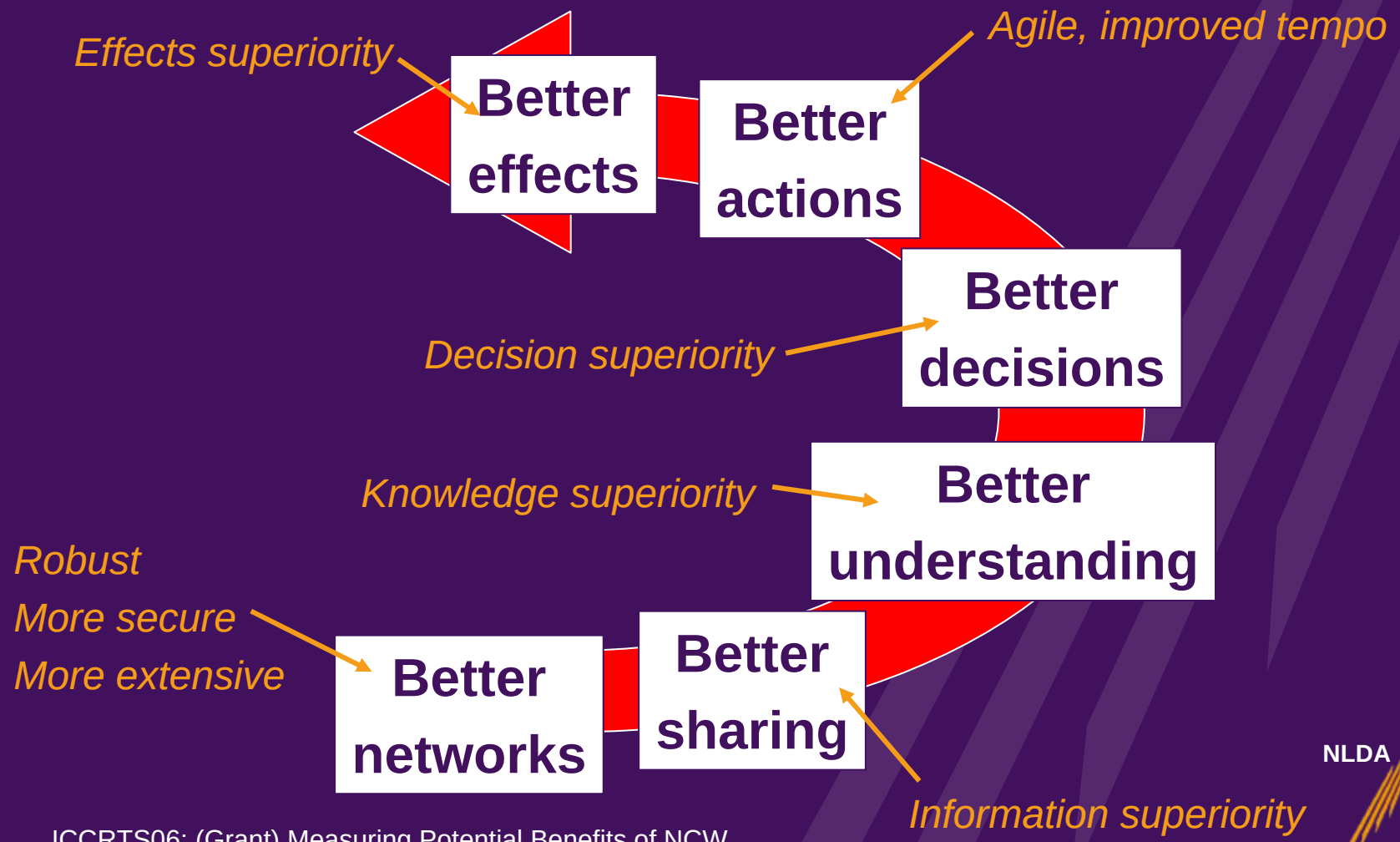
Background (1)

NCW tenets ("value chain"):



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Background (2)

NCW demonstrations, experiments & case studies:

- "Thought experiments" minimise cost & time
- Take actual, non-networked event:
  - Well-documented, with timeline
- Ask research question:
  - What if units involved had been networked?
- Compare hypothetical & actual outcomes

Events of September 11, 2001, meet criteria:

- 9/11 Commission Report available for US$10
- Declassified timeline published on:
  - http://www.archives.gov/9-11-commission

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FAA & NORAD ConOps (1)

Federal Aviation Authority (FAA):

- Mission:
  Smooth flow of air traffic over Continental US (CONUS)
- Concerns:
  Bad weather & airport congestion
- Radar coverage:
  CONUS

North American Aerospace Defense (NORAD):

- Mission:
  Defend CONUS from external attack
- Concerns:
  Russian bombers & missiles
- Radar coverage:
  Boundaries of CONUS, looking outwards

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FAA & NORAD ConOps (2)

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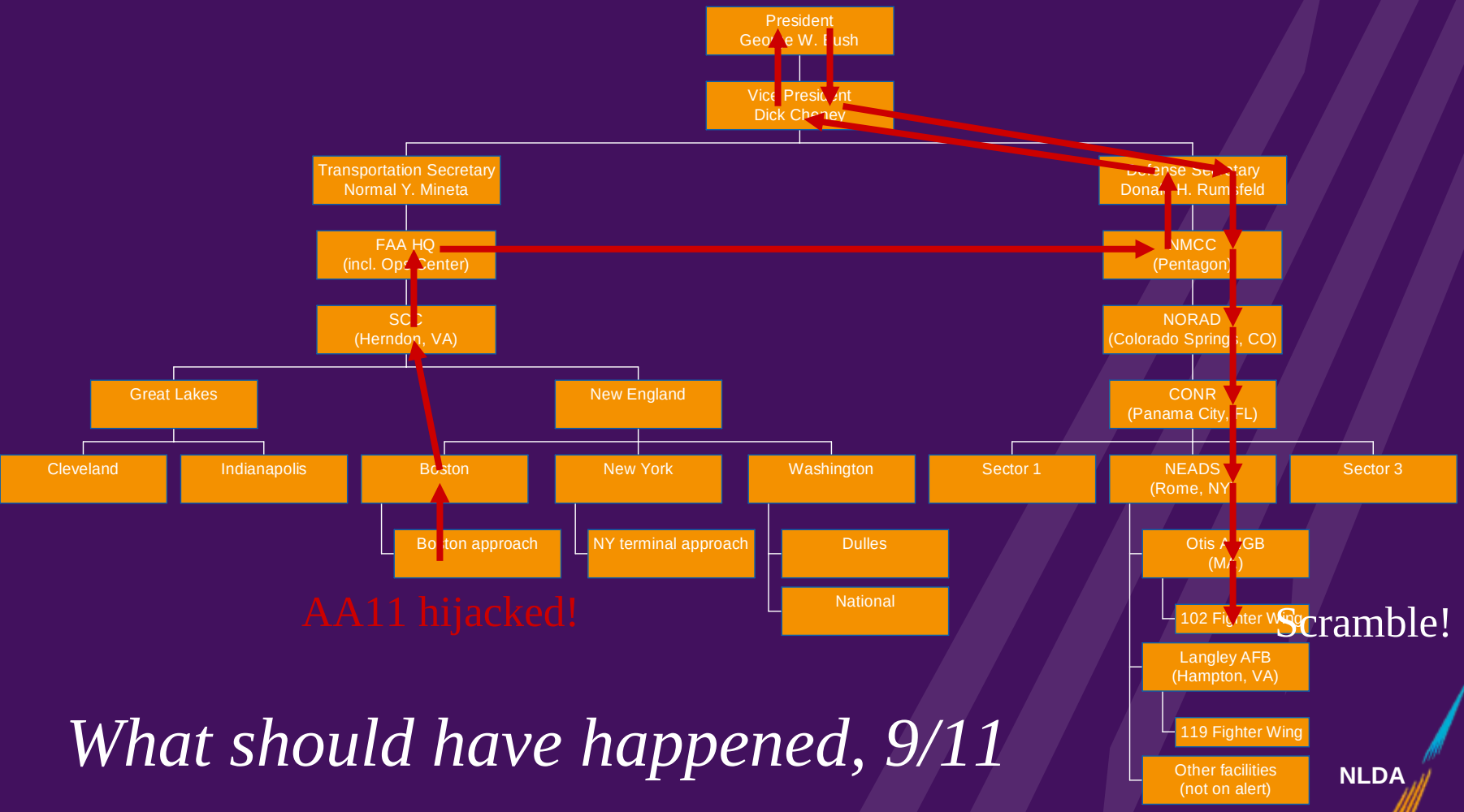
FAA & NORAD ConOps (3)



What should have happened, 9/11

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Chronology, 9/11 (1)

Sources:

- Declassified 9/11 Commission staff report, 12 Sep 05
  - Chronology
- 9/11 Commission Report (US$10), 2004:
  - Notes to Chapter 1
  - Chapter 1: “We Have Some Planes”
- Aviation Week & Space Technology special report:
  - Three parts, 2002
  - Initial report of events in FAA SCC, 2001

Analysis:

- Two-dimensional matrix (spreadsheet form):
  - Rows = events (time-points)
  - Columns = actors
- See paper for extract

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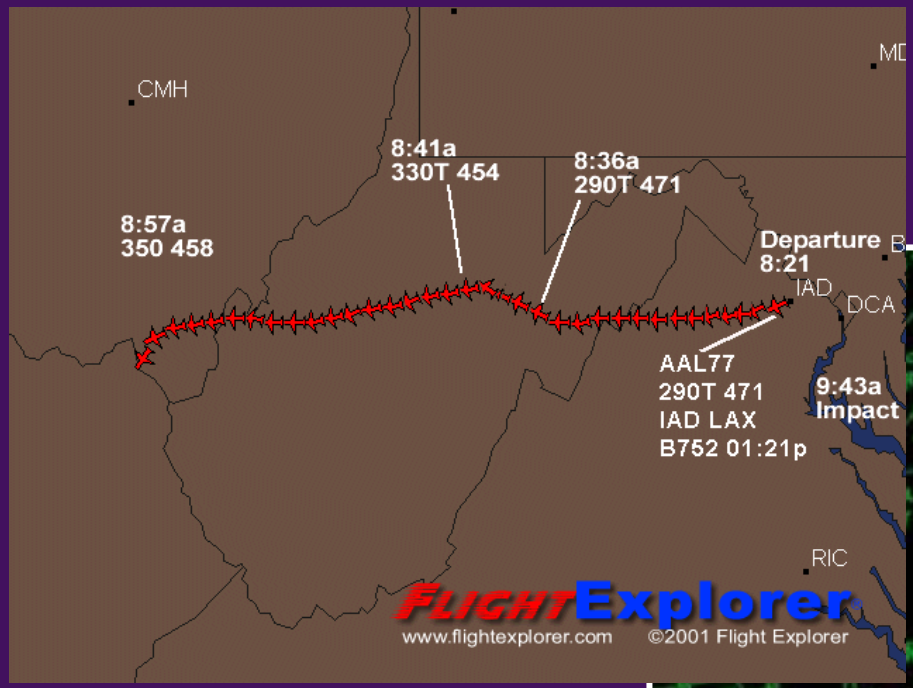
Chronology, 9/11 (2)



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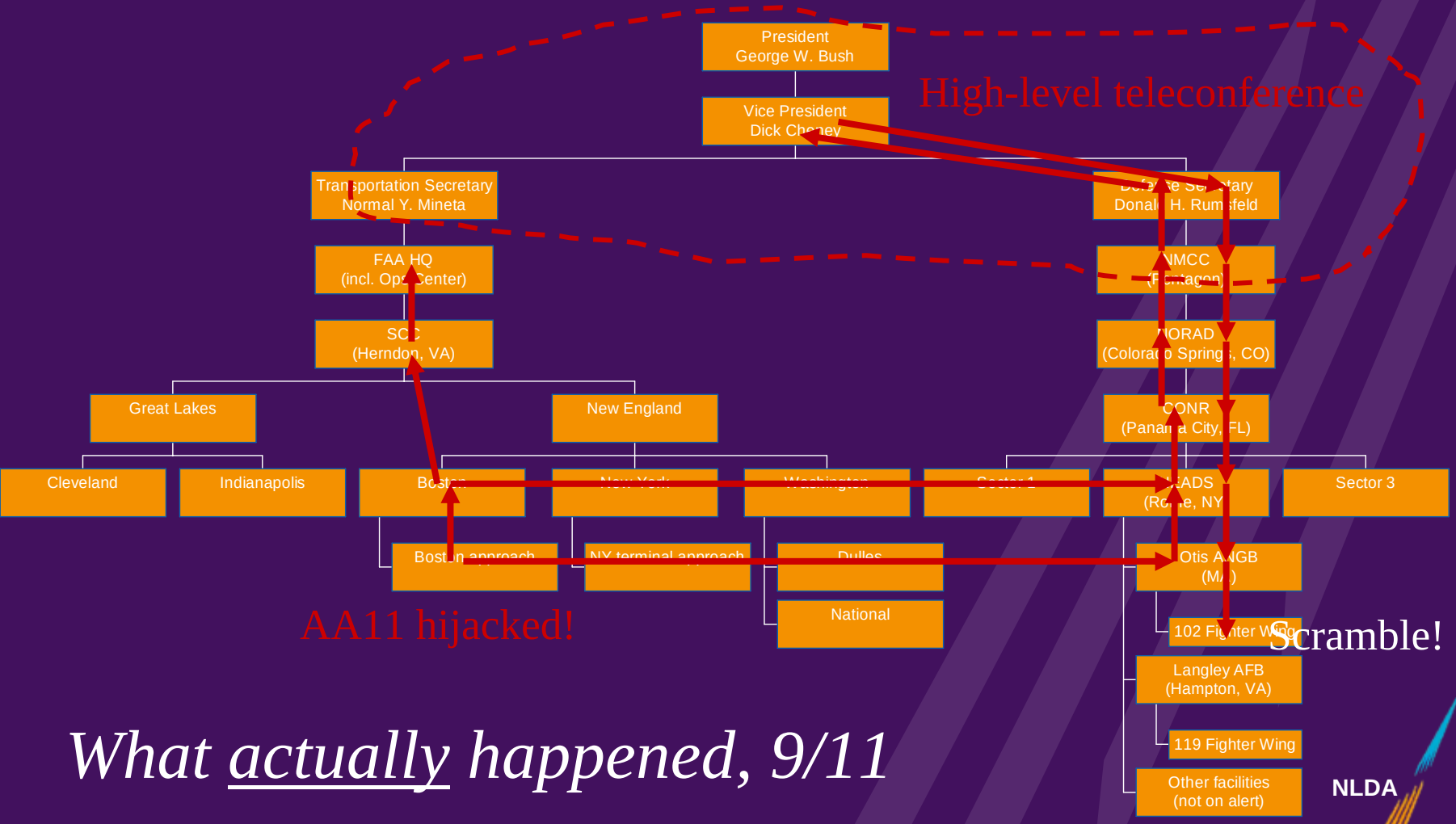
Chronology, 9/11 (3)



What actually happened, 9/11

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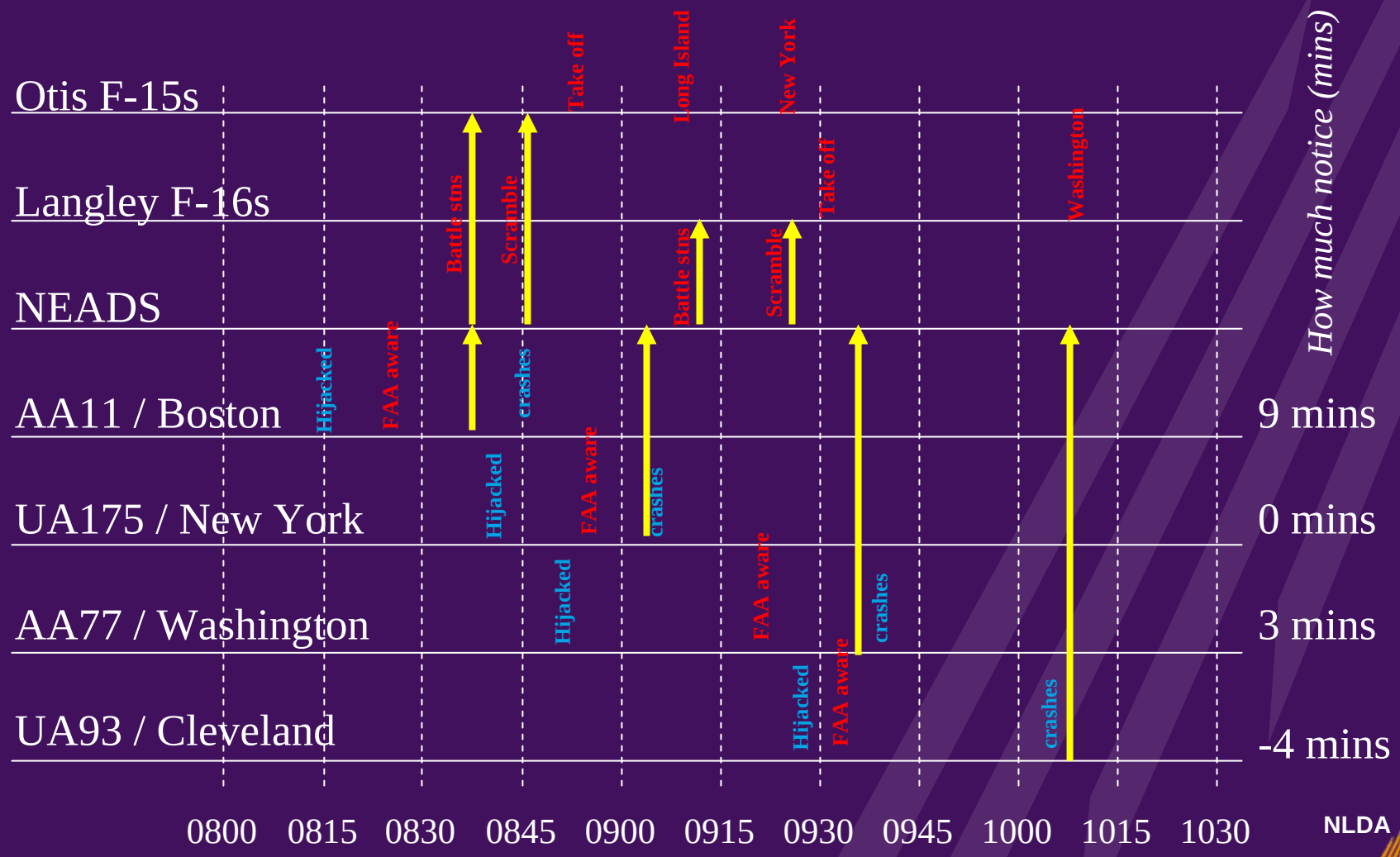
Chronology, 9/11 (4)



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C2 shortcomings

Within civil ATC / military air defence system:

- Strategic surprise:
  - Lacked response to multi-aircraft suicide hijacking
- Command & reporting chain:
  - Up & down multi-level hierarchy -> communication delays
  - Nobody had “big picture”; lack of shared SA
- Human error:
  - Failure to follow procedures (advantageous!)
- Technical problems:
  - Incompatible radar systems = no interoperability

Within Al Qaeda:

- Broadcast: “We have some planes”

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Using NCW to rectify shortcomings (1)

Assumptions:

- FAA & NORAD control centres linked to *hijack network*:
  Could be VTC / chat / webpage / blog / database etc.
- All actors net-ready & trained
- Procedures adapted to network
- Everything else unchanged

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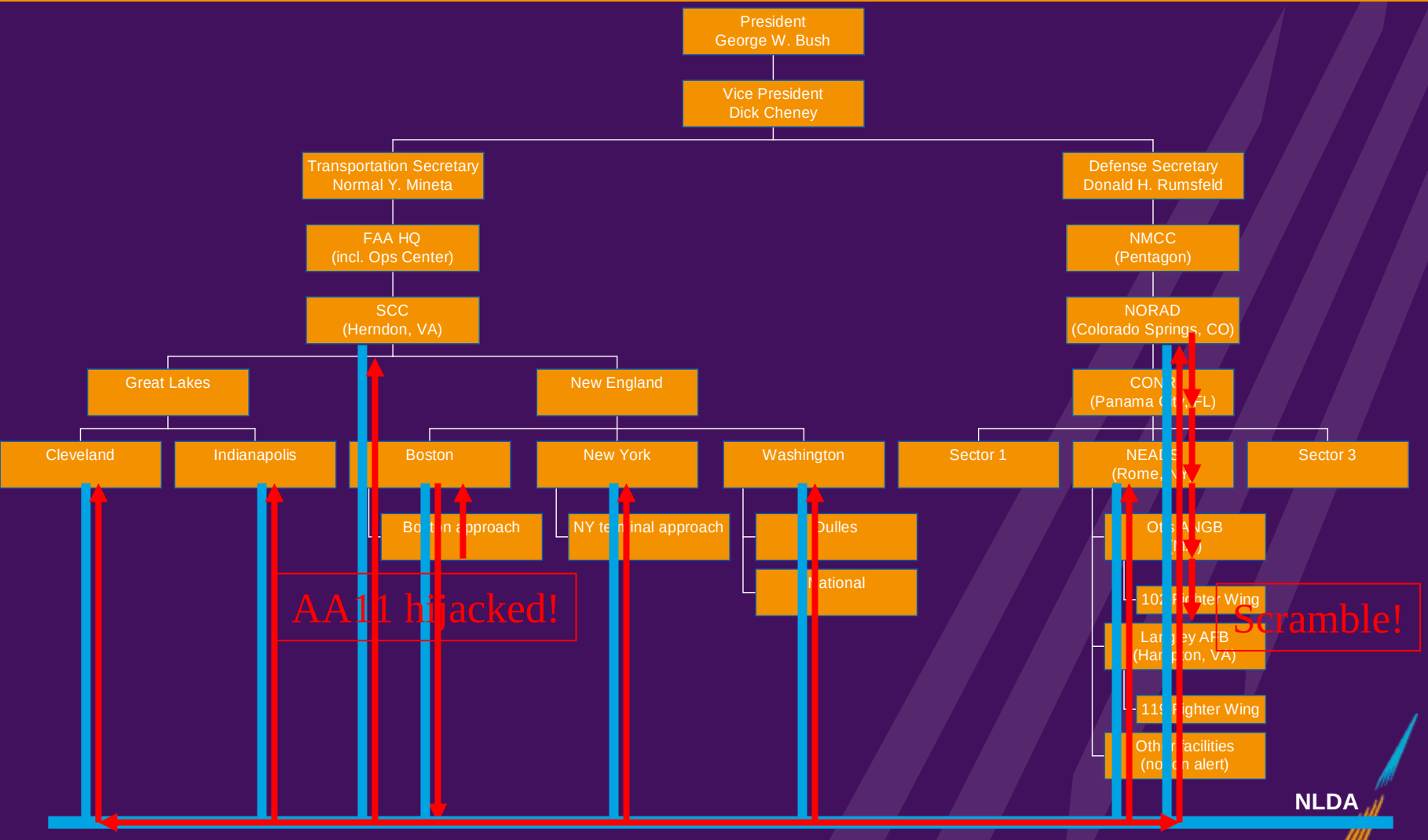
Using NCW to rectify shortcomings (2)



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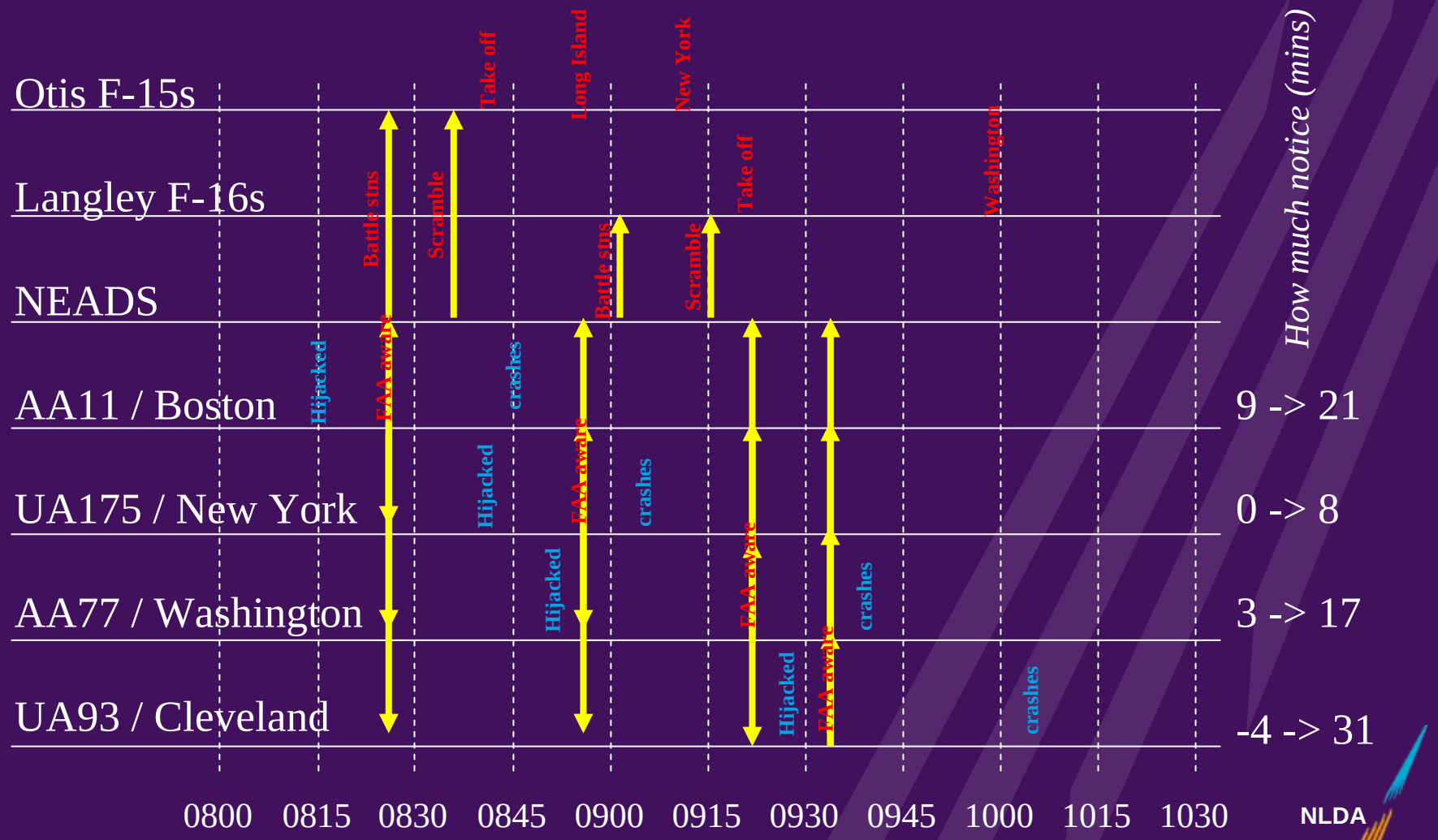
Using NCW to rectify shortcomings (3)



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Conclusions

Availability of network would have:

- Enabled better sharing of information:
  - Upholds NCW tenet (1)
- Short-circuited organisational hierarchy
- Changed course of events (see tables in paper)
- Increased notice to NEADS:
  - AA11: 9 -> 21 minutes
  - UA175: 0 -> 8 minutes
  - AA77: 3 –> 17 minutes
  - UA93: -4 -> 31 minutes
- Allowed engagement of UA93:
  - If pax had not stormed cockpit first
- Insufficient information in public domain to judge:
  - Effects on UA175 & AA77
  - NCW tenets (2), (3), & (4)

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Recommendations

We recommend:

- NLDA should develop multi-actor simulation:
  - Investigate possible command chains
  - Simulated actors based on OODA-RR model
- Investigate value of hijack network on quality of NEADS controllers' SA and decision making:
  - Needs additional information
- NLDA should seek other events that could be used as "thought experiments" in NCW

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Any questions?

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