



SAAB

BENEFITS OF A COLLABORATIVE PRE-DEPARTURE REROUTING PROCESS AT IAH AIRPORT



Carpenter and Levy
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Saab Sensis Corporation

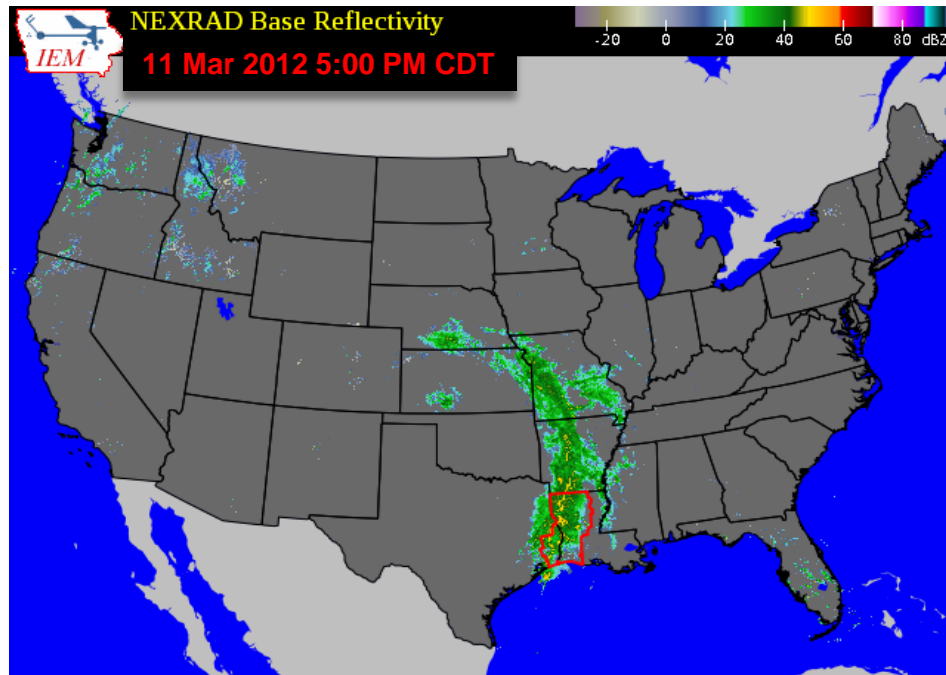
ACKNOWLEDGEMENTS

- Mr. Timothy Matuszewski, Mr. Wayne Eastus, and Mr. Frank Turanski of United Airlines

TALK OUTLINE

- What's the context of our problem?
- What are we trying to establish?
- Benefits analysis approach.
- What are our major findings?
- And what did we learn?

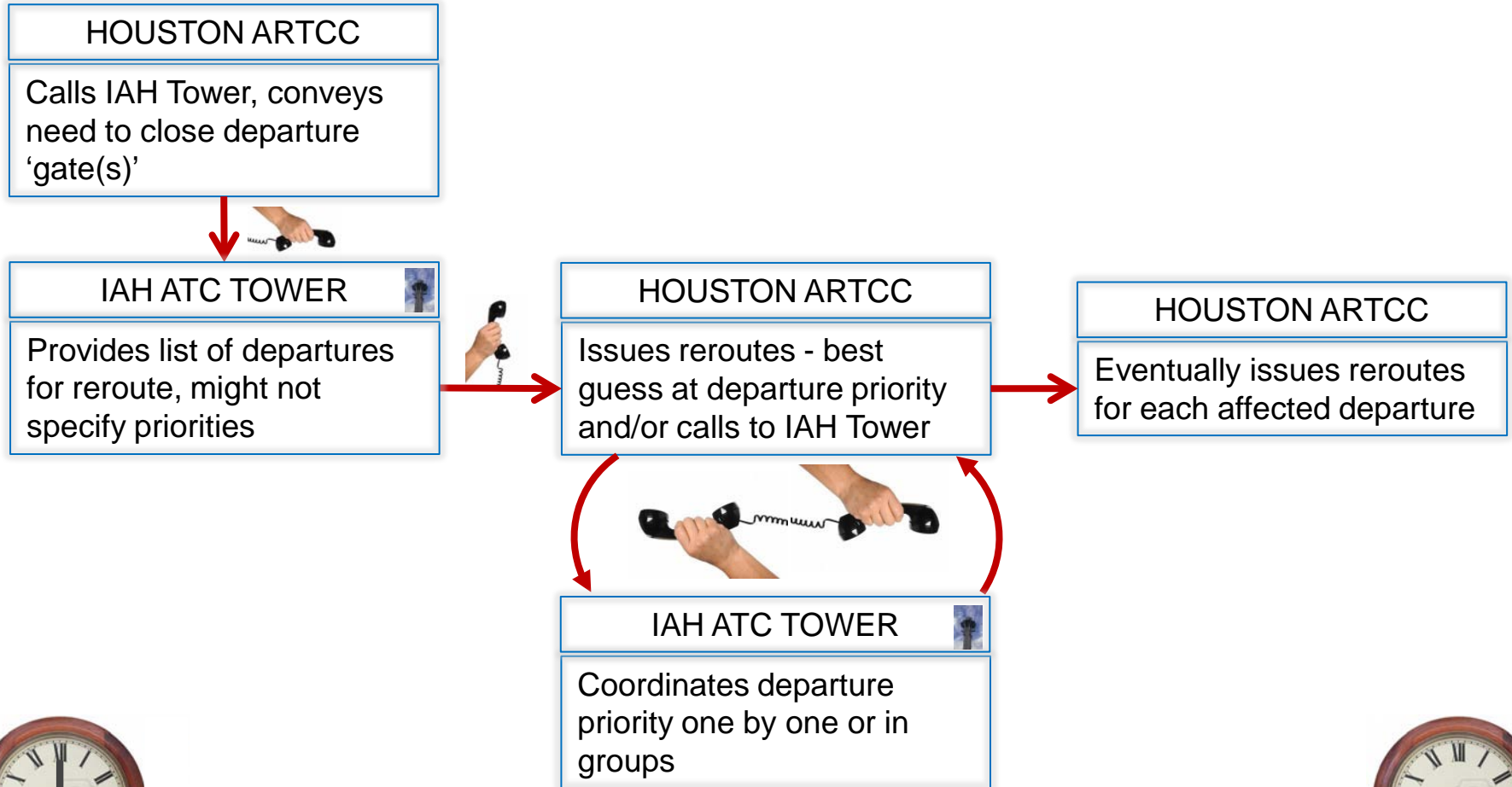
WHAT'S THE CONTEXT OF OUR PROBLEM?



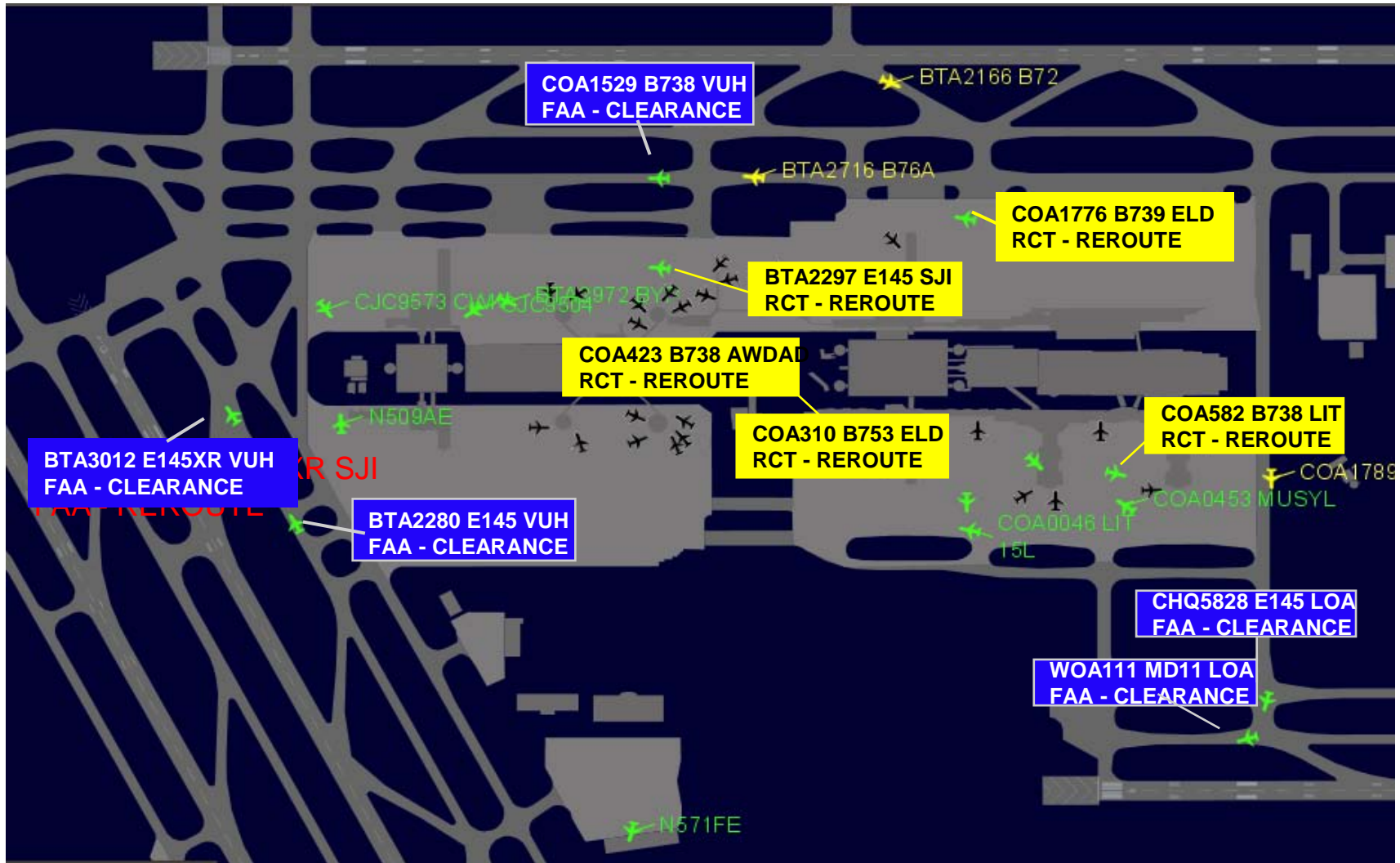
Source: <http://mesonet.agron.iastate.edu/current/mcview.phtml>

- Sudden, fast-moving convective storms warrant “gate” closures
- ATC controllers must react tactically, reroute departures around storms

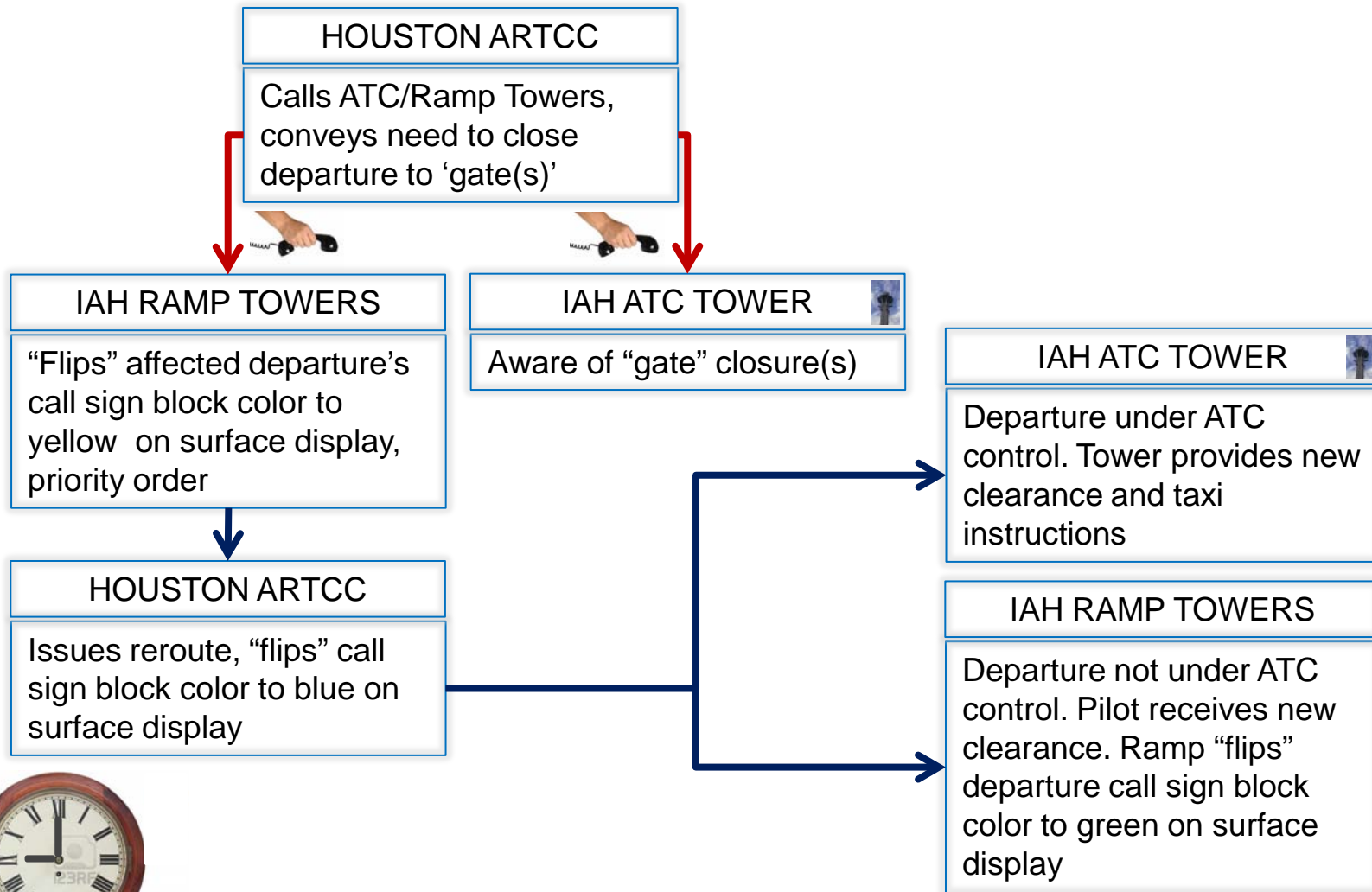
ORIGINAL REROUTE “PROCESS”



PROCESS IMPROVEMENT



REVISED REROUTE PROCESS



WHAT ARE WE TRYING TO ESTABLISH?

- Does new C-PDR process reduce taxi-out delays for affected departures?
 - Any indication the C-PDR process also supports more consistent performance?
 - Does C-PDR have observable secondary benefits?

- Other “soft” improvements resulting from the C-PDR process?
 - Reduced workload needed to manage reroutes?

METHODOLOGY

- ▶ Compute and compare relevant metrics for...
 - ❑ All IAH departures on clear-weather days before and after introduction of C-PDR process
 - Did departure operations improve overall?
 - ❑ IAH reroutes and non-reroutes on bad-Wx before/after introduction of C-PDR
 - Compute same operational metrics

SOURCE DATA

► Periods investigated

- ❑ Before introduction of C-PDR
 - ❑ 32 clear-Wx days in Feb, Mar, and Apr 2009
 - ❑ 6 bad-Wx days Mar and Apr 2009
- ❑ After introduction of C-PDR
 - ❑ 31 clear-Wx days in Mar and Apr 2012
 - ❑ 9 bad-Wx days Mar and Apr 2012

► Sources of data

- ❑ Aerobahn: Departure gate, gate-out time, departure runway, wheels-off time, rerouted departures (2012)
- ❑ Subject matter expert: Rerouted departures (2009)
- ❑ Weather radar imagery
 - ❑ Verified clear- and bad-Wx days using RADAR/satellite imagery

IAH TAXI-OUT STATISTICS, CLEAR-WX DAYS

Metric	No C-PDR (2009) Clear day	C-PDR (2012) Clear day
Mean taxi-out duration (minutes)	13.9	13.2
Taxi-out duration variability (minutes)	7.1	5.8
No. of departures	14,438	16,436
95 th percentile taxi-out duration (minutes)	27.5	23.8

**Little systemic change in clear-day
departure operations before/after C-PDR**

IAH TAXI-OUT STATISTICS, BAD-WX DAYS

Metric	No C-PDR (2009) Bad-Wx day Re-routes	No C-PDR (2009) Bad-Wx Day Non re-routes	C-PDR (2012) Bad-Wx day UAL Re-routes	C-PDR (2012) Bad-Wx day Non re-routes
Mean taxi-out duration (minutes)	79.0	26.2	24.2	15.5
Taxi-out duration variability (minutes)	40.5	27.5	12.5	9.6
No. of departures	60	826	42	4,632
95 th percentile taxi-out duration (minutes)	163.3	89.0	49.3	32.3

C-PDR reduced average taxi duration for UAL reroutes

- Taxi duration reduced 55 minutes; “variability” reduced 28 minutes

Secondary effect: C-PDR also improved performance for non reroutes

IAH TAXI-OUT STATISTICS, CLEAR-WX AND BAD-WX DAYS

Metric	No C-PDR (2009) Clear day	No C-PDR (2009) Bad-Wx day Re-routes	C-PDR (2012) Clear day	C-PDR (2012) Bad-Wx day UAL Re-routes
Mean taxi-out duration (min)	13.9	79.0	13.2	24.2
Taxi-out duration variability (min)	7.1	40.5	5.8	12.5
No. of departures	14,438	60	16,436	42
95 th percentile taxi-out duration (minutes)	27.5	163.3	23.8	49.3

95th percentile taxi durations reduced significantly: 114 minutes

C-PDR performance on bad-Wx days not as good as for departures on clear-Wx days, but C-PDR helps appreciably

2012 REROUTES BY DEPARTURE PHASE

- Strategic reroutes: 5 [12.8%]
 - Initiated at least 30 minutes prior to gate out time
- Gate reroutes: 9 [23.1%]
 - Initiated no more than 30 minutes prior to gate out time
- Ramp-area reroutes: 14 [35.9%]
 - Initiated while departure taxied in ramp area
- Movement-area reroute: 10 [25.6%]
 - Initiated while departure taxied in movement area

Implies some workload distribution across ATC and Ramp controllers?

- ~ 75% of reroutes initiated while departure under Ramp Tower control

Emphasizes value of ramp-area situational awareness to prioritization

- In general, reroute “back to the gate”

WHAT WE LEARNED

- C-PDR process reduces taxi-out delays for affected departures, supports more consistent performance
- C-PDR has observable secondary benefits
 - On bad-weather days, non rerouted departures exhibit reduced taxi duration
- C-PDR contributes to “soft” improvements
 - Well-defined process and shared situational awareness eases pre-departure reroute coordination
 - Reroutes more often initiated when departure is in ramp – distributes some workload across IAH Tower and Ramp controller positions



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