1
00:00:06,869 --> 00:00:05,269
good morning and welcome to the kennedy

2
00:00:09,830 --> 00:00:06,879
space center for this aeronautics

3
00:00:11,110 --> 00:00:09,840
research update the first a in nasa

4
00:00:12,629 --> 00:00:11,120
stands for aeronautics so it's

5
00:00:14,789 --> 00:00:12,639
particularly fitting that the

6
00:00:17,029 --> 00:00:14,799
aeronautics research mission directorate

7
00:00:19,510 --> 00:00:17,039
should kick off this day of briefings on

8
00:00:22,790 --> 00:00:19,520
nasa's upcoming activities with me on

9
00:00:24,870 --> 00:00:22,800
the panel today are ed wagner who is the

10
00:00:27,109 --> 00:00:24,880
director of the integrated systems

11
00:00:28,390 --> 00:00:27,119
program office at nasa headquarters in

12
00:00:31,429 --> 00:00:28,400
washington

13
00:00:33,830 --> 00:00:31,439

and john kavalowski who is director of

14
00:00:36,150 --> 00:00:33,840
the airspace systems program office at

15
00:00:37,270 --> 00:00:36,160
nasa headquarters in washington and

16
00:00:39,510 --> 00:00:37,280
they're going to talk to you a little

17
00:00:42,709 --> 00:00:39,520
bit today about how nasa is working to

18
00:00:45,590 --> 00:00:42,719
make air travel safer greener and more

19
00:00:47,270 --> 00:00:45,600
efficient for you the flying public ed

20
00:00:49,430 --> 00:00:47,280
yeah we'd like to start off

21
00:00:52,549 --> 00:00:49,440
this the aeronautics part of the what's

22
00:00:55,670 --> 00:00:52,559
next discussion just with a few economic

23
00:00:58,229 --> 00:00:55,680
factoids that help explain why nasa

24
00:01:00,229 --> 00:00:58,239
is working in aeronautics as you know

25
00:01:02,470 --> 00:01:00,239
aviation touches most of the general

26
00:01:05,509 --> 00:01:02,480
public and the taxpayers it has a huge

27
00:01:08,230 --> 00:01:05,519
impact on our economy

28
00:01:10,390 --> 00:01:08,240
aviation manufacturing and associated

29
00:01:13,109 --> 00:01:10,400
services are a powerful economic

30
00:01:15,590 --> 00:01:13,119
generator as a matter of fact it reduces

31
00:01:17,270 --> 00:01:15,600
the country's negative trade balance by

32
00:01:19,429 --> 00:01:17,280
about eight percent

33
00:01:22,230 --> 00:01:19,439
uh one quarter of all u.s companies

34
00:01:24,710 --> 00:01:22,240
sales depend on air transportation

35
00:01:27,350 --> 00:01:24,720
the aviation industry provides provides

36
00:01:31,270 --> 00:01:27,360
five 000 manufacturing jobs and another

37
00:01:34,310 --> 00:01:31,280
165 000 transportation service jobs

38
00:01:37,350 --> 00:01:34,320

and these jobs support over 150

39
00:01:38,310 --> 00:01:37,360
domestic airlines that are flying over 8

40
00:01:40,469 --> 00:01:38,320
000

41
00:01:42,950 --> 00:01:40,479
aircraft transporting around 2 million

42
00:01:44,789 --> 00:01:42,960
passengers a day

43
00:01:48,630 --> 00:01:44,799
these airlines bring in a combined

44
00:01:50,069 --> 00:01:48,640
operating revenues of over 140 billion

45
00:01:52,230 --> 00:01:50,079
dollars a year

46
00:01:53,670 --> 00:01:52,240
so you can see it's a powerful economic

47
00:01:55,270 --> 00:01:53,680
force for the

48
00:01:57,429 --> 00:01:55,280
for the nation

49
00:01:59,270 --> 00:01:57,439
now for the past several years nasa

50
00:02:01,429 --> 00:01:59,280
aeronautics has

51
00:02:03,670 --> 00:02:01,439
been given some very powerful national

52
00:02:06,069 --> 00:02:03,680
level guidance starting with the

53
00:02:08,869 --> 00:02:06,079
national aeronautics r d policy which

54
00:02:11,190 --> 00:02:08,879
was published in 2006

55
00:02:13,190 --> 00:02:11,200
this uh dictated that a

56
00:02:15,030 --> 00:02:13,200
national aeronautics r d plan be

57
00:02:17,030 --> 00:02:15,040
developed and that the first generation

58
00:02:19,990 --> 00:02:17,040
of that plan was developed in are

59
00:02:22,070 --> 00:02:20,000
published in december 2007

60
00:02:24,790 --> 00:02:22,080
that was followed with an update to that

61
00:02:27,030 --> 00:02:24,800
plan in february of 2010

62
00:02:28,550 --> 00:02:27,040
these documents established six basic

63
00:02:31,910 --> 00:02:28,560

tenants for

64
00:02:33,589 --> 00:02:31,920
aeronautics r d mobility through the air

65
00:02:35,910 --> 00:02:33,599
being of vital importance to the

66
00:02:37,270 --> 00:02:35,920
economic stability growth and security

67
00:02:39,270 --> 00:02:37,280
as a nation

68
00:02:40,949 --> 00:02:39,280
assuring energy availability and

69
00:02:42,550 --> 00:02:40,959
efficiency

70
00:02:43,910 --> 00:02:42,560
making sure that the inter that the

71
00:02:46,229 --> 00:02:43,920
environment is protected while

72
00:02:48,710 --> 00:02:46,239
sustaining growth in aviation

73
00:02:51,270 --> 00:02:48,720
and maintaining aviation safety that

74
00:02:53,589 --> 00:02:51,280
that's paramount to the work that's done

75
00:02:55,190 --> 00:02:53,599
and then aviation that's also vital to

76
00:02:57,430 --> 00:02:55,200
the national security and homeland

77
00:02:59,110 --> 00:02:57,440
defense and then the sixth tenant is

78
00:03:01,750 --> 00:02:59,120
making sure that we have world-class

79
00:03:03,190 --> 00:03:01,760
facilities that are available to support

80
00:03:05,350 --> 00:03:03,200
the work that needs to be done for

81
00:03:10,149 --> 00:03:05,360
aeronautics r d

82
00:03:12,470 --> 00:03:10,159
and the policy

83
00:03:15,670 --> 00:03:12,480
the vision 100 legislation the century

84
00:03:17,830 --> 00:03:15,680
of aviation act of 2003

85
00:03:20,149 --> 00:03:17,840
was established the joint planning and

86
00:03:22,229 --> 00:03:20,159
development office and charged that

87
00:03:24,229 --> 00:03:22,239
office with developing a plan for the

88
00:03:26,309 --> 00:03:24,239

next generation air transportation

89
00:03:27,910 --> 00:03:26,319
system and john will be describing that

90
00:03:30,309 --> 00:03:27,920
later during the

91
00:03:33,270 --> 00:03:30,319
during his part of the presentation

92
00:03:34,869 --> 00:03:33,280
and then in august in 2007

93
00:03:36,470 --> 00:03:34,879
the joint planning and development

94
00:03:38,070 --> 00:03:36,480
office published what they call the

95
00:03:40,710 --> 00:03:38,080
integrated work plan which is

96
00:03:41,750 --> 00:03:40,720
essentially a road map from where we are

97
00:03:43,110 --> 00:03:41,760
today

98
00:03:46,229 --> 00:03:43,120
to the next generation air

99
00:03:48,390 --> 00:03:46,239
transportation system in 2025

100
00:03:51,190 --> 00:03:48,400
and this included a detailed research

101
00:03:53,350 --> 00:03:51,200
and development plan

102
00:03:54,470 --> 00:03:53,360
now the first slide that we have this

103
00:03:57,830 --> 00:03:54,480
morning

104
00:04:00,789 --> 00:03:57,840
shows the how nasa aeronautics program

105
00:04:03,509 --> 00:04:00,799
focuses on conducting research

106
00:04:05,030 --> 00:04:03,519
in support of next gen safety energy

107
00:04:06,229 --> 00:04:05,040
inefficiency and reducing the

108
00:04:08,869 --> 00:04:06,239
environmental

109
00:04:11,110 --> 00:04:08,879
impact and this work is organized around

110
00:04:14,070 --> 00:04:11,120
five areas of research

111
00:04:17,110 --> 00:04:14,080
arrow's largest research area is focused

112
00:04:19,909 --> 00:04:17,120
on a broad suite of vehicles fixed-wing

113
00:04:22,710 --> 00:04:19,919

vehicles that fly from subsonic through

114
00:04:25,749 --> 00:04:22,720
transonic through supersonic speeds

115
00:04:27,110 --> 00:04:25,759
focusing on efficiency emissions fuel

116
00:04:29,270 --> 00:04:27,120
consumption

117
00:04:31,189 --> 00:04:29,280
increased mobility through the air for

118
00:04:34,390 --> 00:04:31,199
faster transportation

119
00:04:36,469 --> 00:04:34,400
and in the case of supersonic vehicles

120
00:04:39,110 --> 00:04:36,479
in reducing the sonic boom or making

121
00:04:41,189 --> 00:04:39,120
sonic boom more acceptable

122
00:04:43,110 --> 00:04:41,199
in this area we also do work in

123
00:04:45,110 --> 00:04:43,120
rotorcraft just think helicopters and

124
00:04:48,070 --> 00:04:45,120
the way helicopters can

125
00:04:49,990 --> 00:04:48,080
fit into the air transportation system

126
00:04:52,790 --> 00:04:50,000
by having helicopters with increased

127
00:04:55,430 --> 00:04:52,800
speed range and payload while decreasing

128
00:04:57,350 --> 00:04:55,440
noise and emissions associated with them

129
00:05:00,390 --> 00:04:57,360
and then hypersonic vehicles and this

130
00:05:02,230 --> 00:05:00,400
enables air breathing access to space

131
00:05:04,629 --> 00:05:02,240
high mass

132
00:05:07,110 --> 00:05:04,639
entry descent and landing into all

133
00:05:09,430 --> 00:05:07,120
planetary atmospheres

134
00:05:11,350 --> 00:05:09,440
the second area is research and air

135
00:05:13,670 --> 00:05:11,360
traffic management this is focused on

136
00:05:16,790 --> 00:05:13,680
developing and demonstrating concepts

137
00:05:19,350 --> 00:05:16,800
technologies capabilities that enable

138
00:05:21,830 --> 00:05:19,360

any air traffic service provider in our

139
00:05:24,390 --> 00:05:21,840
case for the u.s it's the faa

140
00:05:26,550 --> 00:05:24,400
to provide major increases in air

141
00:05:29,189 --> 00:05:26,560
traffic management effectiveness

142
00:05:30,790 --> 00:05:29,199
flexibility and efficiency in our system

143
00:05:32,710 --> 00:05:30,800
and john will be discussing this a

144
00:05:35,670 --> 00:05:32,720
little later as well

145
00:05:38,550 --> 00:05:35,680
the third area we conduct cutting edge

146
00:05:40,230 --> 00:05:38,560
research into safety this produces tools

147
00:05:43,430 --> 00:05:40,240
methodologies

148
00:05:45,430 --> 00:05:43,440
concepts various technologies to improve

149
00:05:48,070 --> 00:05:45,440
the safety attributes of current and

150
00:05:50,310 --> 00:05:48,080
future aircraft and overcome some of the

151
00:05:53,029 --> 00:05:50,320
safety barriers that would otherwise

152
00:05:57,189 --> 00:05:53,039
constrain the realization of the next

153
00:06:01,670 --> 00:05:59,990
the newest area of research is focused

154
00:06:03,029 --> 00:06:01,680
on integrated systems and we're

155
00:06:04,950 --> 00:06:03,039
conducting this

156
00:06:07,749 --> 00:06:04,960
research on promising concepts and

157
00:06:09,510 --> 00:06:07,759
technologies demonstrating those

158
00:06:12,790 --> 00:06:09,520
benefits in a relevant testing

159
00:06:14,550 --> 00:06:12,800
environment we have two primary projects

160
00:06:15,990 --> 00:06:14,560
in that area right now

161
00:06:17,670 --> 00:06:16,000
the first one we'll be talking about

162
00:06:20,070 --> 00:06:17,680
today environmentally responsible

163
00:06:22,070 --> 00:06:20,080

aviation and the second one has to do

164
00:06:24,070 --> 00:06:22,080
with integrating unmanned aircraft

165
00:06:26,390 --> 00:06:24,080
systems into the national airspace

166
00:06:28,550 --> 00:06:26,400
system looking at capabilities that

167
00:06:31,590 --> 00:06:28,560
reduce the technical barriers to do that

168
00:06:33,749 --> 00:06:31,600
to be able to safely uh operate unmanned

169
00:06:34,870 --> 00:06:33,759
aircraft in in the national airspace

170
00:06:36,870 --> 00:06:34,880
system

171
00:06:39,189 --> 00:06:36,880
and then all of this research is built

172
00:06:41,670 --> 00:06:39,199
on a foundation of both ground and

173
00:06:43,909 --> 00:06:41,680
flight test facilities

174
00:06:45,990 --> 00:06:43,919
nasa manages

175
00:06:48,390 --> 00:06:46,000
these testing assets to ensure the

176
00:06:50,629 --> 00:06:48,400
relevance and the viability of the

177
00:06:51,589 --> 00:06:50,639
testing capability to meet the united

178
00:06:54,790 --> 00:06:51,599
states

179
00:06:57,029 --> 00:06:54,800
aero industry needs

180
00:06:59,270 --> 00:06:57,039
so recent augmentations to the aero

181
00:07:01,189 --> 00:06:59,280
budget was a clear signal that congress

182
00:07:05,430 --> 00:07:01,199
values aeronautics and the work that we

183
00:07:07,430 --> 00:07:05,440
do in r d in 2010 we got a permanent

184
00:07:09,189 --> 00:07:07,440
increase of around 60 million dollars

185
00:07:11,189 --> 00:07:09,199
that allowed us to launch the integrated

186
00:07:13,270 --> 00:07:11,199
systems research program

187
00:07:15,830 --> 00:07:13,280
and then this year we got an additional

188
00:07:18,629 --> 00:07:15,840

30 million dollars for new efforts that

189
00:07:21,830 --> 00:07:18,639
include getting the

190
00:07:24,309 --> 00:07:21,840
uas and the nas project started

191
00:07:25,909 --> 00:07:24,319
verification and validation of complex

192
00:07:27,990 --> 00:07:25,919
systems that's being worked out of the

193
00:07:29,990 --> 00:07:28,000
safety program and some additional

194
00:07:31,990 --> 00:07:30,000
funding for innovative concepts in

195
00:07:35,749 --> 00:07:32,000
aviation work

196
00:07:38,550 --> 00:07:35,759
our budget in 2011 was 533 million

197
00:07:40,870 --> 00:07:38,560
dollars that supports the research of

198
00:07:42,870 --> 00:07:40,880
1370-ish

199
00:07:45,430 --> 00:07:42,880
civil servants that are doing the the

200
00:07:47,749 --> 00:07:45,440
work of aeronautics and these are

201
00:07:49,749 --> 00:07:47,759
primarily housed at four

202
00:07:51,589 --> 00:07:49,759
nasa centers ames research center in

203
00:07:53,350 --> 00:07:51,599
mountain view california which is just

204
00:07:55,749 --> 00:07:53,360
south of san francisco

205
00:07:57,670 --> 00:07:55,759
dryden flight research center

206
00:08:00,629 --> 00:07:57,680
which is adjacent to edwards air force

207
00:08:02,790 --> 00:08:00,639
base east of los angeles glenn research

208
00:08:05,189 --> 00:08:02,800
center in cleveland langley research

209
00:08:11,270 --> 00:08:05,199
center in hampton virginia which is in

210
00:08:14,869 --> 00:08:13,510
so how do we accomplish this work the

211
00:08:17,670 --> 00:08:14,879
strategy

212
00:08:19,510 --> 00:08:17,680
of our investments is really we take a

213
00:08:21,430 --> 00:08:19,520

three-pronged approach we start with the

214
00:08:23,189 --> 00:08:21,440
ideation process or what i call the

215
00:08:24,869 --> 00:08:23,199
ideation process

216
00:08:27,670 --> 00:08:24,879
and there's where we're taking just

217
00:08:30,469 --> 00:08:27,680
ideas that often researchers have from

218
00:08:33,269 --> 00:08:30,479
observations that have been made or

219
00:08:35,670 --> 00:08:33,279
what they think might work we funds fund

220
00:08:37,589 --> 00:08:35,680
this work either within the programs

221
00:08:39,430 --> 00:08:37,599
that we have or we have a way to

222
00:08:41,589 --> 00:08:39,440
actually fund this outside the programs

223
00:08:44,870 --> 00:08:41,599
where the ideas may not fit directly in

224
00:08:47,829 --> 00:08:44,880
a program in their most embryonic stage

225
00:08:50,630 --> 00:08:47,839
then this work is matured through our

226
00:08:52,949 --> 00:08:50,640
fundamental technology programs and then

227
00:08:54,470 --> 00:08:52,959
the more promising concepts

228
00:08:56,870 --> 00:08:54,480
are actually worked further in the

229
00:08:58,870 --> 00:08:56,880
integrated systems research program

230
00:09:00,949 --> 00:08:58,880
and in all of this we're dedicated to

231
00:09:03,670 --> 00:09:00,959
technology transfer and that is to

232
00:09:05,990 --> 00:09:03,680
various stakeholders which include

233
00:09:07,990 --> 00:09:06,000
industry and other government agencies

234
00:09:09,670 --> 00:09:08,000
and this ensures that the u.s taxpayer

235
00:09:11,269 --> 00:09:09,680
gets the most bang for their buck in the

236
00:09:13,430 --> 00:09:11,279
investment in the

237
00:09:15,590 --> 00:09:13,440
aeronautics work that we do

238
00:09:17,910 --> 00:09:15,600

we feel that this strategy enables

239
00:09:20,150 --> 00:09:17,920
game-changing concepts and technologies

240
00:09:22,389 --> 00:09:20,160
that are derived from advancing

241
00:09:25,190 --> 00:09:22,399
fundamental research that ultimately

242
00:09:27,590 --> 00:09:25,200
leads to understanding the feasibility

243
00:09:28,790 --> 00:09:27,600
of advanced aircraft systems the total

244
00:09:30,550 --> 00:09:28,800
systems

245
00:09:33,190 --> 00:09:30,560
and we know that we can't do this alone

246
00:09:35,430 --> 00:09:33,200
so we we do work we work closely with

247
00:09:38,550 --> 00:09:35,440
u.s industry with other government

248
00:09:40,630 --> 00:09:38,560
agencies with academia and international

249
00:09:42,230 --> 00:09:40,640
uh collaborations as well we've been

250
00:09:44,550 --> 00:09:42,240
strengthening our relationship with

251
00:09:45,910 --> 00:09:44,560
industry at the peer-to-peer level for

252
00:09:47,350 --> 00:09:45,920
several years

253
00:09:49,670 --> 00:09:47,360
and this year we're focusing on

254
00:09:51,829 --> 00:09:49,680
strengthening our relationship at the

255
00:09:52,990 --> 00:09:51,839
senior executive level and an example of

256
00:09:55,110 --> 00:09:53,000
this is the

257
00:09:57,110 --> 00:09:55,120
aeronautic-sponsored industry roundtable

258
00:09:58,230 --> 00:09:57,120
that we'll be kicking off later this

259
00:09:59,829 --> 00:09:58,240
year

260
00:10:01,430 --> 00:09:59,839
and in addition to this we've been

261
00:10:04,230 --> 00:10:01,440
working to develop international

262
00:10:07,030 --> 00:10:04,240
partnerships in areas where each party

263
00:10:09,990 --> 00:10:07,040

has some capability or assets that is

264
00:10:12,550 --> 00:10:10,000
mutually beneficial to the other

265
00:10:14,310 --> 00:10:12,560
so after some introductory remarks

266
00:10:15,990 --> 00:10:14,320
john's going to narrate a short video

267
00:10:18,230 --> 00:10:16,000
that further describes some of the

268
00:10:20,389 --> 00:10:18,240
challenges and the research that we're

269
00:10:23,670 --> 00:10:20,399
doing to address those challenges so

270
00:10:26,230 --> 00:10:23,680
john good ed thanks

271
00:10:28,230 --> 00:10:26,240
good morning and i'm very pleased to

272
00:10:29,990 --> 00:10:28,240
have this opportunity to spend a few

273
00:10:32,630 --> 00:10:30,000
minutes talking with you about what's

274
00:10:34,310 --> 00:10:32,640
next for nasa aeronautics and to

275
00:10:36,310 --> 00:10:34,320
describe how we're working with the

276
00:10:38,470 --> 00:10:36,320
aviation community to address the

277
00:10:40,389 --> 00:10:38,480
challenges of creating the next

278
00:10:42,550 --> 00:10:40,399
generation air transportation system or

279
00:10:44,069 --> 00:10:42,560
next gen as that introduced to you just

280
00:10:47,910 --> 00:10:44,079
a few minutes ago

281
00:10:50,150 --> 00:10:47,920
now chances are those of you here didn't

282
00:10:51,509 --> 00:10:50,160
fly to this site today you didn't have a

283
00:10:54,470 --> 00:10:51,519
personal interaction with the air

284
00:10:57,350 --> 00:10:54,480
transportation system but i expect that

285
00:10:59,910 --> 00:10:57,360
you very likely enjoyed some fresh fruit

286
00:11:01,430 --> 00:10:59,920
over the last day that was not locally

287
00:11:03,030 --> 00:11:01,440
in season

288
00:11:06,310 --> 00:11:03,040

you may have ordered your new 4g

289
00:11:08,550 --> 00:11:06,320
smartphone and had it arrived that next

290
00:11:10,870 --> 00:11:08,560
afternoon on your doorstep

291
00:11:12,630 --> 00:11:10,880
and you also could have sent some

292
00:11:14,710 --> 00:11:12,640
critical overnight package that

293
00:11:17,030 --> 00:11:14,720
absolutely positively needed to be at

294
00:11:19,269 --> 00:11:17,040
that customer meeting the next day

295
00:11:21,430 --> 00:11:19,279
and it was

296
00:11:24,550 --> 00:11:21,440
now these and many other what we now

297
00:11:26,310 --> 00:11:24,560
consider everyday expectations are only

298
00:11:28,550 --> 00:11:26,320
made possible by

299
00:11:30,550 --> 00:11:28,560
a safe reliable robust air

300
00:11:32,470 --> 00:11:30,560
transportation system

301
00:11:35,590 --> 00:11:32,480
and frankly these are all expectations

302
00:11:38,389 --> 00:11:35,600
that 30 years ago we couldn't have had

303
00:11:40,150 --> 00:11:38,399
to the same degree

304
00:11:43,030 --> 00:11:40,160
what will that demand what will our

305
00:11:44,790 --> 00:11:43,040
expectations be 30 years from now

306
00:11:46,389 --> 00:11:44,800
though this is the essential question

307
00:11:47,829 --> 00:11:46,399
that we're asking

308
00:11:50,629 --> 00:11:47,839
and you know that we're working to

309
00:11:52,790 --> 00:11:50,639
answer uh in aeronautics at nasa

310
00:11:54,710 --> 00:11:52,800
so what i'd like to do now is uh you

311
00:11:56,550 --> 00:11:54,720
know set some context for today's air

312
00:11:58,790 --> 00:11:56,560
transport you know air travel the way we

313
00:12:01,190 --> 00:11:58,800

interact with it and it provides some

314
00:12:03,829 --> 00:12:01,200
suggestions for what that 30-year future

315
00:12:07,509 --> 00:12:03,839
may look like so could we please kick

316
00:12:10,470 --> 00:12:09,670
aviation is a global enterprise it's a

317
00:12:12,230 --> 00:12:10,480
very

318
00:12:14,310 --> 00:12:12,240
complex network

319
00:12:16,389 --> 00:12:14,320
again you know covers the you know the

320
00:12:17,829 --> 00:12:16,399
many nations that that we interact with

321
00:12:19,590 --> 00:12:17,839
we trade with

322
00:12:21,670 --> 00:12:19,600
but the complexity is greatest here in

323
00:12:23,430 --> 00:12:21,680
the u.s we manage the largest airspace

324
00:12:25,750 --> 00:12:23,440
in the world and it's growing perhaps

325
00:12:27,350 --> 00:12:25,760
doubling over the next 20 years so what

326
00:12:29,509 --> 00:12:27,360
you're watching here

327
00:12:31,509 --> 00:12:29,519
is an animation of a day in the life of

328
00:12:34,550 --> 00:12:31,519
our air transportation system and it's

329
00:12:37,030 --> 00:12:34,560
displayed using facet it's a future air

330
00:12:39,110 --> 00:12:37,040
transportation management or atm concept

331
00:12:41,509 --> 00:12:39,120
evaluation tool you can see the outline

332
00:12:42,870 --> 00:12:41,519
of the u.s in red blue or the

333
00:12:44,949 --> 00:12:42,880
the sectors

334
00:12:47,030 --> 00:12:44,959
managing by the faa

335
00:12:48,550 --> 00:12:47,040
24-hour clock in the lower right

336
00:12:50,389 --> 00:12:48,560
starting around midnight shows the time

337
00:12:52,550 --> 00:12:50,399
of day and those are real flights again

338
00:12:55,829 --> 00:12:52,560

this is a day in the life

339
00:12:57,430 --> 00:12:55,839
about 5 000 aircraft are in the sky at

340
00:12:59,430 --> 00:12:57,440
peak times today

341
00:13:01,430 --> 00:12:59,440
you can see kind of the tail end of the

342
00:13:03,430 --> 00:13:01,440
red-eye traffic coming in from the west

343
00:13:05,670 --> 00:13:03,440
coast east coast heating up you saw

344
00:13:07,350 --> 00:13:05,680
perhaps the cargo hubs memphis and

345
00:13:09,110 --> 00:13:07,360
louisville getting busy

346
00:13:10,710 --> 00:13:09,120
early in the day

347
00:13:12,949 --> 00:13:10,720
international flights are beginning to

348
00:13:14,949 --> 00:13:12,959
arrive as well as depart you see on on

349
00:13:19,509 --> 00:13:14,959
the east coast

350
00:13:21,990 --> 00:13:19,519
woken up and transportation is

351
00:13:23,829 --> 00:13:22,000
is busily you know creating economic

352
00:13:24,710 --> 00:13:23,839
benefit across the nation

353
00:13:26,069 --> 00:13:24,720
um

354
00:13:27,910 --> 00:13:26,079
the rest of the country follows suit

355
00:13:29,990 --> 00:13:27,920
finally with you know with west coast uh

356
00:13:32,870 --> 00:13:30,000
you know providing that that benefit now

357
00:13:33,750 --> 00:13:32,880
as there's you'll see some spots that

358
00:13:35,990 --> 00:13:33,760
aren't

359
00:13:37,910 --> 00:13:36,000
you know fully utilized frankly there's

360
00:13:40,069 --> 00:13:37,920
special use airspace that we have to

361
00:13:42,069 --> 00:13:40,079
manage around you see a couple triangles

362
00:13:44,150 --> 00:13:42,079
in the southwest corner of the u.s

363
00:13:45,269 --> 00:13:44,160

associated with military controlled

364
00:13:47,590 --> 00:13:45,279
airspace

365
00:13:49,189 --> 00:13:47,600
and air traffic management manages the

366
00:13:51,189 --> 00:13:49,199
interaction these complex flight

367
00:13:54,310 --> 00:13:51,199
patterns you know very structured

368
00:13:56,230 --> 00:13:54,320
airspace with wood rigid waypoints

369
00:13:57,750 --> 00:13:56,240
and you know actually this is all fine

370
00:13:58,550 --> 00:13:57,760
while the weather is good

371
00:14:03,269 --> 00:13:58,560
but

372
00:14:05,189 --> 00:14:03,279
somehow uh weather tends to get in the

373
00:14:07,030 --> 00:14:05,199
way often of our our efficiencies here

374
00:14:09,590 --> 00:14:07,040
you show we show a shot of the northeast

375
00:14:11,910 --> 00:14:09,600
corridor with a severe weather pattern

376
00:14:13,430 --> 00:14:11,920
settling in over new york no longer are

377
00:14:15,430 --> 00:14:13,440
those blue tracks heading into the new

378
00:14:17,910 --> 00:14:15,440
york area able to efficiently make it

379
00:14:20,150 --> 00:14:17,920
into the the city and the the cluster of

380
00:14:22,389 --> 00:14:20,160
airports the metroplex but many holding

381
00:14:24,310 --> 00:14:22,399
patterns and inefficiencies are placed

382
00:14:26,870 --> 00:14:24,320
in that 70 percent of the delays in our

383
00:14:28,710 --> 00:14:26,880
system today are due to weather

384
00:14:31,269 --> 00:14:28,720
currently controllers talk directly to

385
00:14:33,590 --> 00:14:31,279
airplanes and pilots to reduce the

386
00:14:35,750 --> 00:14:33,600
these delays and and re-route traffic

387
00:14:37,990 --> 00:14:35,760
around these hazards but as we look at

388
00:14:40,310 --> 00:14:38,000

next-gen we need better tools to predict

389
00:14:43,509 --> 00:14:40,320
weather and impact that

390
00:14:45,269 --> 00:14:43,519
we need to save the fuel arrival pass

391
00:14:47,670 --> 00:14:45,279
runways are managed

392
00:14:49,590 --> 00:14:47,680
largely by this stair stepping or dive

393
00:14:51,509 --> 00:14:49,600
and drive flight to touchdown that you

394
00:14:53,509 --> 00:14:51,519
see it's waste fuel

395
00:14:55,670 --> 00:14:53,519
we need to develop capabilities that

396
00:14:57,509 --> 00:14:55,680
allow smooth continuous descents to the

397
00:14:59,670 --> 00:14:57,519
aircraft the airplane surface i mean

398
00:15:01,430 --> 00:14:59,680
it's the airport surfaces plus managing

399
00:15:03,430 --> 00:15:01,440
moving movement of the aircraft on the

400
00:15:05,750 --> 00:15:03,440
uh on the airport surface and other area

401
00:15:07,670 --> 00:15:05,760
where inefficiencies are are rampant we

402
00:15:09,990 --> 00:15:07,680
can gain some i many of you have been

403
00:15:11,509 --> 00:15:10,000
stuck in 20 minutes 30 minutes 60 minute

404
00:15:12,470 --> 00:15:11,519
conga lines missing your connection

405
00:15:14,629 --> 00:15:12,480
flights

406
00:15:16,150 --> 00:15:14,639
leads to waste of time and fuel

407
00:15:18,629 --> 00:15:16,160
and emissions and noise for

408
00:15:20,069 --> 00:15:18,639
neighborhoods on airports we need to be

409
00:15:24,389 --> 00:15:20,079
planning our gate departures for

410
00:15:26,550 --> 00:15:24,399
non-stop taxi and smoother operations

411
00:15:28,710 --> 00:15:26,560
but again as we look towards this future

412
00:15:30,629 --> 00:15:28,720
it's not all about the operations

413
00:15:32,790 --> 00:15:30,639

what are those new aircraft designs that

414
00:15:34,389 --> 00:15:32,800
will enable greater mobility and

415
00:15:35,509 --> 00:15:34,399
opportunity for the nation new business

416
00:15:37,829 --> 00:15:35,519
models

417
00:15:39,829 --> 00:15:37,839
uh we can you look at novel approaches

418
00:15:41,749 --> 00:15:39,839
to subsonic flight

419
00:15:43,269 --> 00:15:41,759
supersonic aircraft

420
00:15:45,189 --> 00:15:43,279
can can provide even greater

421
00:15:47,509 --> 00:15:45,199
efficiencies and hypersonic

422
00:15:49,350 --> 00:15:47,519
considerations no less but we also need

423
00:15:51,269 --> 00:15:49,360
to look at innovating our our current

424
00:15:52,870 --> 00:15:51,279
operations and encouraging craft to get

425
00:15:54,790 --> 00:15:52,880
the you know the best

426
00:15:57,350 --> 00:15:54,800
use that we can the greatest efficiency

427
00:15:58,870 --> 00:15:57,360
out of our current configuration

428
00:16:00,550 --> 00:15:58,880
and we have to ask our question can

429
00:16:02,310 --> 00:16:00,560
innovation allow us to utilize our

430
00:16:04,870 --> 00:16:02,320
existing airports and infrastructure for

431
00:16:06,949 --> 00:16:04,880
greater benefit civil tilt rotor shows

432
00:16:08,470 --> 00:16:06,959
potential for justice and we need

433
00:16:09,749 --> 00:16:08,480
next-gen to be able to manage these

434
00:16:11,030 --> 00:16:09,759
operations for all these different

435
00:16:13,509 --> 00:16:11,040
aircraft with their different

436
00:16:16,230 --> 00:16:13,519
performance and business objectives

437
00:16:18,069 --> 00:16:16,240
all flying safely and flying efficiently

438
00:16:20,470 --> 00:16:18,079

so to kind of put a wrap on this this

439
00:16:22,069 --> 00:16:20,480
video uh nasa aeronautics is addressing

440
00:16:24,069 --> 00:16:22,079
the you know the great challenges of

441
00:16:26,069 --> 00:16:24,079
transition to next gen

442
00:16:28,389 --> 00:16:26,079
we're partnering with some of the best

443
00:16:30,550 --> 00:16:28,399
innovators both inside and outside of

444
00:16:32,550 --> 00:16:30,560
government and we will lead this global

445
00:16:34,389 --> 00:16:32,560
change to meet the demands of mobility

446
00:16:36,629 --> 00:16:34,399
both now and in the future

447
00:16:39,030 --> 00:16:36,639
but achieving this future requires that

448
00:16:42,310 --> 00:16:39,040
we step up to many technical challenges

449
00:16:44,629 --> 00:16:42,320
so what i want to do now is is start a

450
00:16:46,069 --> 00:16:44,639
new segment where i take a few minutes

451
00:16:48,150 --> 00:16:46,079
to talk to you about what's next for

452
00:16:50,470 --> 00:16:48,160
nasa aeronautics research specifically

453
00:16:51,910 --> 00:16:50,480
in areas of air traffic management so if

454
00:16:54,230 --> 00:16:51,920
we could go to the briefing slide

455
00:16:57,110 --> 00:16:54,240
package please

456
00:16:59,189 --> 00:16:57,120
so my hope is that

457
00:17:01,110 --> 00:16:59,199
i provide a little bit of clarity

458
00:17:04,710 --> 00:17:01,120
that air traffic management plays a big

459
00:17:06,710 --> 00:17:04,720
role in solving aviation challenges but

460
00:17:09,110 --> 00:17:06,720
what exactly are air traffic management

461
00:17:09,990 --> 00:17:09,120
tools and in fact you know what is next

462
00:17:14,230 --> 00:17:10,000
gen

463
00:17:16,470 --> 00:17:14,240

an effort

464
00:17:19,189 --> 00:17:16,480
a multi-agency nationwide i mean

465
00:17:21,510 --> 00:17:19,199
government initiative

466
00:17:24,309 --> 00:17:21,520
that is designed to transform our

467
00:17:26,069 --> 00:17:24,319
current uh air traffic control system

468
00:17:28,230 --> 00:17:26,079
that current system is a radar-based

469
00:17:29,430 --> 00:17:28,240
surveillance and radio voice

470
00:17:31,350 --> 00:17:29,440
communication

471
00:17:33,990 --> 00:17:31,360
system very similar to that which was

472
00:17:36,470 --> 00:17:34,000
put in place back in the 1950s

473
00:17:37,669 --> 00:17:36,480
current system cannot process and cannot

474
00:17:40,070 --> 00:17:37,679
provide the

475
00:17:41,750 --> 00:17:40,080
the flight information in real time

476
00:17:44,070 --> 00:17:41,760
and current flight procedures don't

477
00:17:46,630 --> 00:17:44,080
allow for agility needed in order to

478
00:17:48,470 --> 00:17:46,640
meet the growing and dynamic demand that

479
00:17:50,470 --> 00:17:48,480
we we see our air transportation

480
00:17:52,870 --> 00:17:50,480
requiring our needs and our our economy

481
00:17:56,310 --> 00:17:52,880
requiring

482
00:17:57,830 --> 00:17:56,320
and this current system is we expect to

483
00:17:59,110 --> 00:17:57,840
be replaced by satellite-based

484
00:18:01,029 --> 00:17:59,120
surveillance

485
00:18:02,950 --> 00:18:01,039
with network-enabled information and

486
00:18:05,029 --> 00:18:02,960
data sharing that will allow greater

487
00:18:07,110 --> 00:18:05,039
precision and aircraft position and a

488
00:18:08,150 --> 00:18:07,120

common awareness of all flights in the

489
00:18:10,390 --> 00:18:08,160
system

490
00:18:12,789 --> 00:18:10,400
now nasa aeronautics conducts research

491
00:18:15,510 --> 00:18:12,799
and develops technology that makes use

492
00:18:17,830 --> 00:18:15,520
of this data for the again thousands of

493
00:18:19,669 --> 00:18:17,840
aircraft that are in the air at a given

494
00:18:21,110 --> 00:18:19,679
time they require efficient operations

495
00:18:21,990 --> 00:18:21,120
and flows

496
00:18:22,789 --> 00:18:22,000
um

497
00:18:24,070 --> 00:18:22,799
and

498
00:18:27,270 --> 00:18:24,080
you know it

499
00:18:29,909 --> 00:18:27,280
does a computational analysis in essence

500
00:18:31,750 --> 00:18:29,919
of all that data in order to provide

501
00:18:33,669 --> 00:18:31,760
sequence of these air these fleets of

502
00:18:36,549 --> 00:18:33,679
aircraft for most efficient system

503
00:18:38,630 --> 00:18:36,559
operation and ultimately reducing delay

504
00:18:40,310 --> 00:18:38,640
uh for the flying public

505
00:18:43,110 --> 00:18:40,320
our technology provides more efficient

506
00:18:45,110 --> 00:18:43,120
approaches to manage traffic flow

507
00:18:47,510 --> 00:18:45,120
and it provides options to controllers

508
00:18:49,590 --> 00:18:47,520
and airline operations in order to

509
00:18:51,990 --> 00:18:49,600
support their decisions on how best to

510
00:18:54,390 --> 00:18:52,000
to control the skies and control their

511
00:18:56,310 --> 00:18:54,400
their airlines many respects next gen is

512
00:18:59,830 --> 00:18:56,320
about the users it's about their

513
00:19:00,870 --> 00:18:59,840

operational needs and our tools with the

514
00:19:03,110 --> 00:19:00,880
improvements to the next gen

515
00:19:04,390 --> 00:19:03,120
infrastructure are designed to to

516
00:19:05,669 --> 00:19:04,400
provide that

517
00:19:08,470 --> 00:19:05,679
now again our research invest

518
00:19:10,070 --> 00:19:08,480
investigates gate to gate solutions

519
00:19:11,909 --> 00:19:10,080
so in other words from our departure

520
00:19:14,789 --> 00:19:11,919
gate through the dense metroplex

521
00:19:17,350 --> 00:19:14,799
terminal airspace into the on route

522
00:19:20,390 --> 00:19:17,360
airspace and final approach and landing

523
00:19:22,950 --> 00:19:20,400
and efficient taxis to our arrival gate

524
00:19:24,789 --> 00:19:22,960
this work clearly for sure supports the

525
00:19:26,789 --> 00:19:24,799
faa mission in air transportation

526
00:19:29,350 --> 00:19:26,799
management and also supports the needs

527
00:19:31,110 --> 00:19:29,360
of airline operators and their carriers

528
00:19:32,549 --> 00:19:31,120
i mean our technology solutions examine

529
00:19:33,669 --> 00:19:32,559
not only those solutions that are

530
00:19:36,230 --> 00:19:33,679
implemented

531
00:19:38,230 --> 00:19:36,240
at the centralized ground-based faa

532
00:19:39,990 --> 00:19:38,240
control centers

533
00:19:42,710 --> 00:19:40,000
but also implemented through automation

534
00:19:44,630 --> 00:19:42,720
available in increasing degrees on the

535
00:19:45,830 --> 00:19:44,640
actual flight deck on the aircraft

536
00:19:47,590 --> 00:19:45,840
themselves

537
00:19:49,350 --> 00:19:47,600
this range of control technologies

538
00:19:51,510 --> 00:19:49,360

offers opportunity for

539
00:19:53,830 --> 00:19:51,520
system scalability not currently

540
00:19:55,830 --> 00:19:53,840
available in our fixed ground-based

541
00:19:57,750 --> 00:19:55,840
infrastructure of today

542
00:19:59,430 --> 00:19:57,760
and frankly the overarching goal is to

543
00:20:02,070 --> 00:19:59,440
create decision support tools that

544
00:20:03,590 --> 00:20:02,080
simultaneously save time and reduce

545
00:20:06,549 --> 00:20:03,600
aircraft fuel use

546
00:20:08,470 --> 00:20:06,559
reduce noise and reduce emissions so if

547
00:20:11,110 --> 00:20:08,480
we go to the next slide please this is

548
00:20:12,710 --> 00:20:11,120
just an example a straightforward

549
00:20:15,990 --> 00:20:12,720
graphic of benefits

550
00:20:17,029 --> 00:20:16,000
from such optimization of flow paths

551
00:20:18,630 --> 00:20:17,039
you know coordinated arrival

552
00:20:20,470 --> 00:20:18,640
trajectories that can enable delay

553
00:20:23,430 --> 00:20:20,480
reducing fuel conserving and noise

554
00:20:25,909 --> 00:20:23,440
mitigating operations here you see

555
00:20:27,909 --> 00:20:25,919
some actual flight paths with some new

556
00:20:29,590 --> 00:20:27,919
procedures that we had helped develop in

557
00:20:32,149 --> 00:20:29,600
conjunction with the faa over the san

558
00:20:34,630 --> 00:20:32,159
francisco bay area flights coming into

559
00:20:36,870 --> 00:20:34,640
the airport at san francisco

560
00:20:38,549 --> 00:20:36,880
significantly and you can without

561
00:20:39,990 --> 00:20:38,559
understanding the specific levels of

562
00:20:40,950 --> 00:20:40,000
reduction it's clear to see that the

563
00:20:42,950 --> 00:20:40,960

noise

564
00:20:44,630 --> 00:20:42,960
due to you know proper and efficient

565
00:20:47,029 --> 00:20:44,640
operations and management of these

566
00:20:48,950 --> 00:20:47,039
flight tracks are reducing noise over

567
00:20:49,830 --> 00:20:48,960
neighborhoods centering out over the the

568
00:20:52,070 --> 00:20:49,840
bay

569
00:20:53,350 --> 00:20:52,080
which you know clearly mitigates some of

570
00:20:54,789 --> 00:20:53,360
the concern that many of those

571
00:20:56,070 --> 00:20:54,799
neighborhoods have had for for years

572
00:20:58,870 --> 00:20:56,080
regarding that

573
00:21:01,190 --> 00:20:58,880
that those flow paths

574
00:21:02,630 --> 00:21:01,200
if you go to the next side please

575
00:21:04,470 --> 00:21:02,640
but what i really would like to talk to

576
00:21:06,710 --> 00:21:04,480
you about today more specifically is a

577
00:21:08,310 --> 00:21:06,720
near-term air transportation management

578
00:21:10,149 --> 00:21:08,320
technology demonstration activity that

579
00:21:11,270 --> 00:21:10,159
we're initiating and we're initiating it

580
00:21:13,190 --> 00:21:11,280
now

581
00:21:16,310 --> 00:21:13,200
um it's a

582
00:21:17,750 --> 00:21:16,320
an optimizing arrival of aircraft

583
00:21:19,830 --> 00:21:17,760
demonstration

584
00:21:22,149 --> 00:21:19,840
which is an aggressive technology

585
00:21:23,750 --> 00:21:22,159
acceleration and demonstration activity

586
00:21:26,630 --> 00:21:23,760
that's going to integrate several

587
00:21:28,549 --> 00:21:26,640
research components to safely sustain

588
00:21:30,070 --> 00:21:28,559

peak throughput and provide fuel

589
00:21:32,149 --> 00:21:30,080
efficient operations with improved

590
00:21:33,590 --> 00:21:32,159
aircraft separation

591
00:21:36,390 --> 00:21:33,600
we need to bring together multiple

592
00:21:37,909 --> 00:21:36,400
capabilities both on the ground again

593
00:21:39,510 --> 00:21:37,919
the ground-based

594
00:21:42,230 --> 00:21:39,520
you know control

595
00:21:44,230 --> 00:21:42,240
tools and airborne tools

596
00:21:47,190 --> 00:21:44,240
needed to efficiently achieve and

597
00:21:48,390 --> 00:21:47,200
maintain spacing and reduce delay it was

598
00:21:50,390 --> 00:21:48,400
and the critical challenge would be to

599
00:21:52,789 --> 00:21:50,400
achieve these operational environmental

600
00:21:53,669 --> 00:21:52,799
uh benefits simultaneously

601
00:21:57,110 --> 00:21:53,679
again

602
00:21:59,029 --> 00:21:57,120
fission ops spacing uh and an efficient

603
00:22:01,590 --> 00:21:59,039
and fuel descents

604
00:22:04,630 --> 00:22:01,600
uh again do that all simultaneously but

605
00:22:07,590 --> 00:22:04,640
at the key point at congested airports

606
00:22:09,430 --> 00:22:07,600
many of the capabilities that are

607
00:22:11,190 --> 00:22:09,440
incorporated into this

608
00:22:13,430 --> 00:22:11,200
collections integration of technologies

609
00:22:16,230 --> 00:22:13,440
and demonstration

610
00:22:18,549 --> 00:22:16,240
are available one-off we can have smooth

611
00:22:20,950 --> 00:22:18,559
efficient descents we can do it at times

612
00:22:24,310 --> 00:22:20,960
however that aren't congested or

613
00:22:26,070 --> 00:22:24,320

non-busy airports the key to many of our

614
00:22:28,710 --> 00:22:26,080
our needs for the future are going to be

615
00:22:30,789 --> 00:22:28,720
taking these technologies and being able

616
00:22:32,950 --> 00:22:30,799
to put them together to achieve all of

617
00:22:35,909 --> 00:22:32,960
these benefits when the densities are

618
00:22:38,549 --> 00:22:35,919
high and the traffic demand is high

619
00:22:40,710 --> 00:22:38,559
if we go to the next slide please

620
00:22:42,870 --> 00:22:40,720
so optimizing aircraft the rivals is

621
00:22:45,750 --> 00:22:42,880
going to you know further develop test

622
00:22:47,750 --> 00:22:45,760
and validate tools you know for use at

623
00:22:49,750 --> 00:22:47,760
congested airports to reduce controller

624
00:22:50,789 --> 00:22:49,760
workload and provide you know numerous

625
00:22:52,470 --> 00:22:50,799
benefits

626
00:22:53,669 --> 00:22:52,480
you know the nasa develop technology

627
00:22:56,230 --> 00:22:53,679
that we're going to be integrating for

628
00:22:57,830 --> 00:22:56,240
these optimal arrival solutions or

629
00:23:00,230 --> 00:22:57,840
including advanced traffic management

630
00:23:02,310 --> 00:23:00,240
scheduler where we're actually managing

631
00:23:03,270 --> 00:23:02,320
flows that are in this dense terminal

632
00:23:04,710 --> 00:23:03,280
area

633
00:23:06,390 --> 00:23:04,720
we've been working with the faa for a

634
00:23:08,310 --> 00:23:06,400
number of years to bring capabilities

635
00:23:11,350 --> 00:23:08,320
that begin the process of managing and

636
00:23:14,070 --> 00:23:11,360
organizing flows for efficient rivals at

637
00:23:16,070 --> 00:23:14,080
distances farther out but the the key to

638
00:23:18,470 --> 00:23:16,080

being able to do this well is to be able

639
00:23:20,870 --> 00:23:18,480
to manage these flows and provide these

640
00:23:22,950 --> 00:23:20,880
efficient operations uh in the dense

641
00:23:24,149 --> 00:23:22,960
terminal environment and also to take

642
00:23:25,909 --> 00:23:24,159
advantage of

643
00:23:28,710 --> 00:23:25,919
a capability referred to as flight deck

644
00:23:29,990 --> 00:23:28,720
interval management which is a

645
00:23:35,830 --> 00:23:30,000
technology

646
00:23:38,230 --> 00:23:35,840
of aircraft that can allow the aircraft

647
00:23:41,029 --> 00:23:38,240
to manage a very precise and efficient

648
00:23:43,590 --> 00:23:41,039
uh arrival path to the runway threshold

649
00:23:47,350 --> 00:23:43,600
uh employing a capability referred to as

650
00:23:49,430 --> 00:23:47,360
adsb and uh i'll take a moment uh in uh

651
00:23:51,029 --> 00:23:49,440
in a short while to explain what that

652
00:23:52,710 --> 00:23:51,039
cryptic acronym is

653
00:23:54,630 --> 00:23:52,720
but you know benefits

654
00:23:57,190 --> 00:23:54,640
for this approach going to include

655
00:23:59,190 --> 00:23:57,200
reduced flight delays reduce fuel use

656
00:24:00,549 --> 00:23:59,200
and workload on both you know pilots and

657
00:24:02,950 --> 00:24:00,559
controllers

658
00:24:05,029 --> 00:24:02,960
allowing higher traffic flows that can

659
00:24:07,029 --> 00:24:05,039
meet the increasing demand

660
00:24:09,190 --> 00:24:07,039
uh reducing implementation risk for

661
00:24:11,909 --> 00:24:09,200
partners and you know what what i mean

662
00:24:14,870 --> 00:24:11,919
by that is our job at nasa is

663
00:24:17,110 --> 00:24:14,880

eliminating the greatest extent unknowns

664
00:24:19,750 --> 00:24:17,120
to establishing clear requirements and

665
00:24:21,590 --> 00:24:19,760
defining benefits case these are the

666
00:24:23,750 --> 00:24:21,600
exact the precise things that both our

667
00:24:25,269 --> 00:24:23,760
federal partners the faa and industry

668
00:24:27,750 --> 00:24:25,279
needs to understand

669
00:24:30,870 --> 00:24:27,760
whether they have the opportunity to

670
00:24:32,870 --> 00:24:30,880
apply and to provide benefit from these

671
00:24:35,909 --> 00:24:32,880
capabilities in these new technologies

672
00:24:37,990 --> 00:24:35,919
we increase the technology readiness if

673
00:24:40,070 --> 00:24:38,000
you will the maturity of these through

674
00:24:42,390 --> 00:24:40,080
these series of demos hence reducing

675
00:24:45,269 --> 00:24:42,400
their risk to taking that capability and

676
00:24:46,870 --> 00:24:45,279
bringing it to the field

677
00:24:49,190 --> 00:24:46,880
we're also accelerating development of

678
00:24:51,590 --> 00:24:49,200
air traffic management tools that enable

679
00:24:52,950 --> 00:24:51,600
the overall next-gen objectives but

680
00:24:55,269 --> 00:24:52,960
specifically accelerating the

681
00:24:58,390 --> 00:24:55,279
development of applications that provide

682
00:25:00,950 --> 00:24:58,400
the full benefit of adsb equippage now

683
00:25:02,149 --> 00:25:00,960
adsb is automatic dependent surveillance

684
00:25:04,789 --> 00:25:02,159
broadcast

685
00:25:06,710 --> 00:25:04,799
it's a crucial component of next-gen and

686
00:25:08,549 --> 00:25:06,720
is a satellite-based system that allows

687
00:25:11,669 --> 00:25:08,559
both pilots and controllers to see

688
00:25:15,110 --> 00:25:11,679

radar-like displays of traffic

689
00:25:16,789 --> 00:25:15,120
and update that in next to real time

690
00:25:18,789 --> 00:25:16,799
we talked about the radar-based control

691
00:25:21,909 --> 00:25:18,799
that we currently operate in aircraft

692
00:25:24,149 --> 00:25:21,919
position is uh is updated every 11 to 12

693
00:25:25,909 --> 00:25:24,159
seconds this at nearly full time every

694
00:25:27,110 --> 00:25:25,919
second update provides for much more

695
00:25:29,510 --> 00:25:27,120
precise

696
00:25:31,750 --> 00:25:29,520
measurement of exactly where traffic is

697
00:25:33,029 --> 00:25:31,760
and how we can better plan those

698
00:25:34,789 --> 00:25:33,039
trajectories in order to keep them

699
00:25:36,630 --> 00:25:34,799
safely separated

700
00:25:38,230 --> 00:25:36,640
um you know it also gives pilots access

701
00:25:41,110 --> 00:25:38,240
to better weather information it's more

702
00:25:42,789 --> 00:25:41,120
than just position and velocity

703
00:25:44,870 --> 00:25:42,799
and also other elements of flight

704
00:25:46,310 --> 00:25:44,880
information adsb is going to allow

705
00:25:48,549 --> 00:25:46,320
greater responsibility for safe

706
00:25:49,990 --> 00:25:48,559
separation be managed by the pilot

707
00:25:52,070 --> 00:25:50,000
reducing some of the workload for the

708
00:25:54,390 --> 00:25:52,080
controllers but also providing that much

709
00:25:56,549 --> 00:25:54,400
greater precision in terms of the

710
00:25:59,269 --> 00:25:56,559
position that aircraft to be able to

711
00:26:01,750 --> 00:25:59,279
save time and land

712
00:26:03,590 --> 00:26:01,760
more aircraft with higher throughput

713
00:26:06,390 --> 00:26:03,600

so nasa's developing the applications to

714
00:26:08,310 --> 00:26:06,400
analyze this data provided by adsb

715
00:26:10,390 --> 00:26:08,320
infrastructure and to provide the pilots

716
00:26:12,070 --> 00:26:10,400
and controllers these safe and fuel

717
00:26:13,269 --> 00:26:12,080
efficient routes with with the minimum

718
00:26:15,750 --> 00:26:13,279
delay

719
00:26:17,190 --> 00:26:15,760
good go to the our last slide please

720
00:26:18,310 --> 00:26:17,200
you know and as with all technology

721
00:26:20,230 --> 00:26:18,320
solutions

722
00:26:22,310 --> 00:26:20,240
you know for transition to users and

723
00:26:23,830 --> 00:26:22,320
operators and implementation of the nas

724
00:26:26,310 --> 00:26:23,840
these problems are big and they're

725
00:26:28,630 --> 00:26:26,320
complex and they require collaboration

726
00:26:31,430 --> 00:26:28,640
across multiple organizations both

727
00:26:33,190 --> 00:26:31,440
inside and outside of government the faa

728
00:26:34,390 --> 00:26:33,200
is a critical partner with whom we have

729
00:26:36,870 --> 00:26:34,400
worked

730
00:26:39,110 --> 00:26:36,880
very closely over a number of years but

731
00:26:40,310 --> 00:26:39,120
most closely over the period that it was

732
00:26:43,269 --> 00:26:40,320
talking about since our national

733
00:26:47,430 --> 00:26:45,269
to align our missions across our

734
00:26:49,909 --> 00:26:47,440
agencies and our objectives you know and

735
00:26:51,909 --> 00:26:49,919
striving to make true operational impact

736
00:26:53,430 --> 00:26:51,919
i mean our bottom line goal at nasa and

737
00:26:55,350 --> 00:26:53,440
aeronautics is to is to make a

738
00:26:56,789 --> 00:26:55,360

difference make an impact with our our

739
00:27:00,230 --> 00:26:56,799
investment in in aeronautics

740
00:27:01,990 --> 00:27:00,240
infrastructure and research

741
00:27:03,669 --> 00:27:02,000
but you know we're striving to make that

742
00:27:06,310 --> 00:27:03,679
operational impact and delivering

743
00:27:07,750 --> 00:27:06,320
accelerated uh an aggressive schedule

744
00:27:09,110 --> 00:27:07,760
for these particular demonstration

745
00:27:11,190 --> 00:27:09,120
capabilities and the benefits that i

746
00:27:13,110 --> 00:27:11,200
listed on the last slide

747
00:27:14,630 --> 00:27:13,120
we're setting this up in roughly a

748
00:27:16,870 --> 00:27:14,640
three-year horizon

749
00:27:19,269 --> 00:27:16,880
where we're you know developing

750
00:27:21,430 --> 00:27:19,279
and testing some of the our basic

751
00:27:24,470 --> 00:27:21,440
technologies and tools and algorithms a

752
00:27:26,149 --> 00:27:24,480
lot of that will be done at nasa centers

753
00:27:28,549 --> 00:27:26,159
in that the second year or the middle

754
00:27:29,990 --> 00:27:28,559
part of this demonstration the time

755
00:27:32,789 --> 00:27:30,000
frame we're going to be evaluating

756
00:27:34,389 --> 00:27:32,799
further the benefits and the operational

757
00:27:35,990 --> 00:27:34,399
improvement of these

758
00:27:37,350 --> 00:27:36,000
technologies that we've integrated

759
00:27:39,510 --> 00:27:37,360
through some very sophisticated

760
00:27:41,590 --> 00:27:39,520
simulations a number of which will

761
00:27:44,310 --> 00:27:41,600
include human in the loop and we bring

762
00:27:45,750 --> 00:27:44,320
in real pilots active pilots active

763
00:27:48,470 --> 00:27:45,760

controllers to interact with our

764
00:27:50,950 --> 00:27:48,480
technology in our substantial simulator

765
00:27:52,870 --> 00:27:50,960
capabilities that will allow us to uh to

766
00:27:55,350 --> 00:27:52,880
understand how they interact in some of

767
00:27:57,350 --> 00:27:55,360
the true human machine interactions that

768
00:27:59,510 --> 00:27:57,360
are often limiting factors and how well

769
00:28:00,630 --> 00:27:59,520
um technology is accepted and

770
00:28:02,389 --> 00:28:00,640
implemented

771
00:28:03,350 --> 00:28:02,399
and then finally as we go forward in the

772
00:28:05,990 --> 00:28:03,360
last year of this we're going to be

773
00:28:08,549 --> 00:28:06,000
conducting field tests with partners at

774
00:28:10,789 --> 00:28:08,559
real congested airports and and terminal

775
00:28:12,950 --> 00:28:10,799
areas so this addresses the need to meet

776
00:28:14,470 --> 00:28:12,960
a time frame that provides real benefit

777
00:28:17,190 --> 00:28:14,480
for actual users in the relevant

778
00:28:18,870 --> 00:28:17,200
operational environment now we don't

779
00:28:20,470 --> 00:28:18,880
implement these improvements in the nas

780
00:28:21,590 --> 00:28:20,480
i mean that's the responsibility of the

781
00:28:23,590 --> 00:28:21,600
faa

782
00:28:24,950 --> 00:28:23,600
but we will deliver the requirements

783
00:28:27,269 --> 00:28:24,960
we'll deliver the tools and the

784
00:28:29,269 --> 00:28:27,279
validation test data to allow them to

785
00:28:31,430 --> 00:28:29,279
accelerate this operational deployment

786
00:28:33,190 --> 00:28:31,440
again for that national benefit and to

787
00:28:34,950 --> 00:28:33,200
enable the economic

788
00:28:36,710 --> 00:28:34,960

activity and the improvements that ed

789
00:28:37,909 --> 00:28:36,720
referred to in the earliest part of this

790
00:28:39,590 --> 00:28:37,919
pitch

791
00:28:41,669 --> 00:28:39,600
um the community has been showing great

792
00:28:44,070 --> 00:28:41,679
interest and support for our strategic

793
00:28:46,310 --> 00:28:44,080
approach to bring nasa technology to

794
00:28:47,590 --> 00:28:46,320
demonstration and we are very excited

795
00:28:50,470 --> 00:28:47,600
about this opportunity to deliver

796
00:28:51,669 --> 00:28:50,480
tangible benefits for nextgen

797
00:28:54,149 --> 00:28:51,679
so

798
00:28:55,510 --> 00:28:54,159
with that introduction and in sense of

799
00:28:57,350 --> 00:28:55,520
where we're going in air traffic

800
00:28:59,190 --> 00:28:57,360
management let me just switch gears i

801
00:29:01,350 --> 00:28:59,200
want to turn back to ed who's going to

802
00:29:03,269 --> 00:29:01,360
speak about solving aviation challenges

803
00:29:06,149 --> 00:29:03,279
through elements of his integrated

804
00:29:08,389 --> 00:29:06,159
research program thanks john um another

805
00:29:10,470 --> 00:29:08,399
challenge under the what what's next

806
00:29:12,870 --> 00:29:10,480
construct is that aeronautics is

807
00:29:14,389 --> 00:29:12,880
addressing the impact of aviation on our

808
00:29:16,630 --> 00:29:14,399
environment

809
00:29:18,870 --> 00:29:16,640
nasa aeronautics is addressing this

810
00:29:20,230 --> 00:29:18,880
challenge on three fronts as shown on

811
00:29:24,070 --> 00:29:20,240
the next slide

812
00:29:26,870 --> 00:29:24,080
the first is fuel efficiency in 2008 u.s

813
00:29:29,590 --> 00:29:26,880

major commercial carriers burned almost

814
00:29:32,230 --> 00:29:29,600
20 billion gallons of jet fuel the

815
00:29:34,549 --> 00:29:32,240
department of defense used another 4.6

816
00:29:36,230 --> 00:29:34,559
billion gallons of jet fuel

817
00:29:39,110 --> 00:29:36,240
at an average price of around three

818
00:29:41,110 --> 00:29:39,120
dollars a gallon this cost was over 70

819
00:29:44,470 --> 00:29:41,120
billion dollars

820
00:29:46,630 --> 00:29:44,480
so our goal is a 50 reduction in

821
00:29:48,870 --> 00:29:46,640
aircraft fuel burn which of course

822
00:29:50,950 --> 00:29:48,880
doubles the fuel efficiency and makes a

823
00:29:53,990 --> 00:29:50,960
significant impact to

824
00:29:56,070 --> 00:29:54,000
the cost or to the total operating cost

825
00:29:58,630 --> 00:29:56,080
that's associated with fuel

826
00:30:02,630 --> 00:29:58,640
the second area has to do with emissions

827
00:30:05,350 --> 00:30:02,640
40 out of the 50 top u.s airports are in

828
00:30:07,669 --> 00:30:05,360
non-attainment areas or areas that do

829
00:30:10,070 --> 00:30:07,679
not meet the epa local air quality

830
00:30:11,590 --> 00:30:10,080
standards for particulate matter and

831
00:30:13,590 --> 00:30:11,600
ozone

832
00:30:15,830 --> 00:30:13,600
the fuel consumed by u.s commercial

833
00:30:20,549 --> 00:30:15,840
carriers we just talked about and the

834
00:30:24,310 --> 00:30:20,559
dod releases more than 250 million tons

835
00:30:26,630 --> 00:30:24,320
of co2 into our atmosphere each year

836
00:30:29,269 --> 00:30:26,640
so our goal here is a reduction for

837
00:30:32,310 --> 00:30:29,279
landing and takeoff emissions of a 75

838
00:30:34,549 --> 00:30:32,320

percent reduction in those emissions

839
00:30:36,789 --> 00:30:34,559
and the third area is noise aircraft

840
00:30:37,830 --> 00:30:36,799
noise continues to be regarded as the

841
00:30:40,230 --> 00:30:37,840
most con

842
00:30:41,830 --> 00:30:40,240
significant hindrance to our national

843
00:30:44,710 --> 00:30:41,840
airspace

844
00:30:47,110 --> 00:30:44,720
systems capacity expansion and growth

845
00:30:49,510 --> 00:30:47,120
an example of this is when the faa

846
00:30:50,870 --> 00:30:49,520
attempted to reconfigure the new york

847
00:30:53,669 --> 00:30:50,880
airspace

848
00:30:55,590 --> 00:30:53,679
it resulted in 14 lawsuits being filed

849
00:30:58,230 --> 00:30:55,600
against the faa

850
00:31:01,110 --> 00:30:58,240
because of noise issues

851
00:31:04,070 --> 00:31:01,120
since 1980 the faa has invested over 5

852
00:31:05,669 --> 00:31:04,080
billion dollars in various airport noise

853
00:31:07,909 --> 00:31:05,679
reduction programs

854
00:31:11,430 --> 00:31:07,919
our goal here is to reduce the nuisance

855
00:31:14,230 --> 00:31:11,440
community noise by 5 6 around airports

856
00:31:15,590 --> 00:31:14,240
and reduce by two-thirds the area that

857
00:31:18,230 --> 00:31:15,600
that

858
00:31:19,750 --> 00:31:18,240
noise is actually over

859
00:31:21,350 --> 00:31:19,760
and from an integrated systems

860
00:31:24,070 --> 00:31:21,360
perspective we're aiming at meeting

861
00:31:25,830 --> 00:31:24,080
these goals simultaneously that is the

862
00:31:28,149 --> 00:31:25,840
technologies that we're working will

863
00:31:30,310 --> 00:31:28,159

work together to simultaneously meet the

864
00:31:33,830 --> 00:31:30,320
fuel efficiency the emission and the

865
00:31:36,389 --> 00:31:33,840
noise goals in addition we're working at

866
00:31:38,470 --> 00:31:36,399
and assessing the fleetwide impact as

867
00:31:40,950 --> 00:31:38,480
well so that is not just a single

868
00:31:43,590 --> 00:31:40,960
aircraft but assessing the the nation's

869
00:31:45,590 --> 00:31:43,600
fleet that's made up of older vehicles

870
00:31:47,830 --> 00:31:45,600
newer vehicles that we know that are

871
00:31:50,070 --> 00:31:47,840
that are coming into service

872
00:31:52,950 --> 00:31:50,080
vehicles with retrofitted technology as

873
00:31:55,350 --> 00:31:52,960
well as totally new configurations

874
00:31:57,269 --> 00:31:55,360
now the next slide shows how we're

875
00:31:59,669 --> 00:31:57,279
organizing this work it's around three

876
00:32:01,830 --> 00:31:59,679
areas airframe technologies

877
00:32:04,070 --> 00:32:01,840
propulsion technologies and vehicle

878
00:32:05,909 --> 00:32:04,080
systems integration and i'll briefly

879
00:32:08,149 --> 00:32:05,919
discuss each of these

880
00:32:10,630 --> 00:32:08,159
under air frying technologies the first

881
00:32:12,830 --> 00:32:10,640
area is drag reduction here we want to

882
00:32:16,070 --> 00:32:12,840
overcome some of the practical

883
00:32:18,149 --> 00:32:16,080
barriers of cruise rag reduction by

884
00:32:20,389 --> 00:32:18,159
integrating technologies an example of

885
00:32:22,310 --> 00:32:20,399
this is laminar flow control

886
00:32:24,470 --> 00:32:22,320
we know we have some critical barriers

887
00:32:27,110 --> 00:32:24,480
to practice the practical application of

888
00:32:29,430 --> 00:32:27,120

laminar flow such as surface roughness

889
00:32:31,669 --> 00:32:29,440
manufacturing and contamination so we're

890
00:32:33,830 --> 00:32:31,679
working all these areas

891
00:32:36,149 --> 00:32:33,840
the second area is flight dynamics and

892
00:32:38,389 --> 00:32:36,159
control that is evaluating the

893
00:32:40,630 --> 00:32:38,399
performance the stability and control

894
00:32:43,350 --> 00:32:40,640
for advanced configurations through

895
00:32:45,029 --> 00:32:43,360
developing new flight control algorithms

896
00:32:46,950 --> 00:32:45,039
through various kinds of ground and

897
00:32:50,149 --> 00:32:46,960
flight testing and prediction

898
00:32:52,070 --> 00:32:50,159
methodologies for control effectors and

899
00:32:53,990 --> 00:32:52,080
propulsor combinations

900
00:32:56,310 --> 00:32:54,000
here we're conducting wind tunnel tests

901
00:32:59,350 --> 00:32:56,320
and flight experiments that demonstrate

902
00:33:01,430 --> 00:32:59,360
flight control and handling qualities

903
00:33:03,350 --> 00:33:01,440
the third area is airframe noise

904
00:33:05,029 --> 00:33:03,360
reduction now this is the airframe not

905
00:33:06,230 --> 00:33:05,039
the propulsion system the noise

906
00:33:08,549 --> 00:33:06,240
reduction

907
00:33:10,789 --> 00:33:08,559
here we're looking to design quiet flaps

908
00:33:12,789 --> 00:33:10,799
and landing gear that don't have any

909
00:33:16,070 --> 00:33:12,799
performance or weight penalties we're

910
00:33:17,909 --> 00:33:16,080
using aero acoustic methodologies and

911
00:33:20,149 --> 00:33:17,919
high fidelity wind tunnel measurements

912
00:33:23,590 --> 00:33:20,159
to do this then we're validating this

913
00:33:25,590 --> 00:33:23,600

work in with flight flight tests

914
00:33:27,509 --> 00:33:25,600
the fourth area under airframe

915
00:33:30,310 --> 00:33:27,519
technologies is lightweight structures

916
00:33:32,950 --> 00:33:30,320
many of you are familiar with composites

917
00:33:35,110 --> 00:33:32,960
and we have composites actually flying

918
00:33:37,669 --> 00:33:35,120
on aircraft today

919
00:33:39,430 --> 00:33:37,679
now they're primarily used as what we

920
00:33:41,990 --> 00:33:39,440
call black aluminum that is the

921
00:33:43,509 --> 00:33:42,000
underlying structure is still the same

922
00:33:44,870 --> 00:33:43,519
and so we're looking to achieve

923
00:33:47,509 --> 00:33:44,880
additional

924
00:33:49,590 --> 00:33:47,519
weight reduction through light weight

925
00:33:51,110 --> 00:33:49,600
damage tolerance stitched composite

926
00:33:53,029 --> 00:33:51,120
structures

927
00:33:54,230 --> 00:33:53,039
this has the potential for an additional

928
00:33:57,029 --> 00:33:54,240
10 percent

929
00:34:00,630 --> 00:33:57,039
weight reduction and may enable entirely

930
00:34:02,950 --> 00:34:00,640
new classes of vehicles to be developed

931
00:34:05,269 --> 00:34:02,960
we're going to run a video that's an an

932
00:34:07,430 --> 00:34:05,279
excerpt of an interview with don jagli

933
00:34:08,710 --> 00:34:07,440
one of our senior research scientists

934
00:34:10,629 --> 00:34:08,720
where she explained some of the

935
00:34:13,430 --> 00:34:10,639
technologies and the benefits that are

936
00:34:15,909 --> 00:34:13,440
associated with a stitch composite

937
00:34:18,869 --> 00:34:15,919
concept known as perseus that stands for

938
00:34:24,869 --> 00:34:18,879

protruded rod stitch efficient unified

939
00:34:28,790 --> 00:34:26,710
perseus stands for

940
00:34:31,190 --> 00:34:28,800
protruded rod stitched efficient

941
00:34:34,710 --> 00:34:31,200
unitized structure okay

942
00:34:36,550 --> 00:34:34,720
what that means is we have a large panel

943
00:34:38,950 --> 00:34:36,560
this is a perseus panel

944
00:34:40,790 --> 00:34:38,960
and if you look real close in here you

945
00:34:43,349 --> 00:34:40,800
can see stitches

946
00:34:44,950 --> 00:34:43,359
it's all held together by stitches and

947
00:34:47,430 --> 00:34:44,960
what you'll notice when you look at this

948
00:34:49,990 --> 00:34:47,440
panel in rather than a normal aircraft

949
00:34:52,149 --> 00:34:50,000
panel is you don't see any fasteners

950
00:34:53,829 --> 00:34:52,159
in a normal airplane you've got rivets

951
00:34:55,190 --> 00:34:53,839
all over the place holding every part

952
00:34:57,910 --> 00:34:55,200
together

953
00:34:59,750 --> 00:34:57,920
in this case we have no

954
00:35:03,109 --> 00:34:59,760
rivets right everything's held together

955
00:35:05,510 --> 00:35:03,119
by stitches okay now composite materials

956
00:35:07,589 --> 00:35:05,520
have been around for a long time we nasa

957
00:35:09,270 --> 00:35:07,599
have been working with them for 40 years

958
00:35:11,270 --> 00:35:09,280
industries working with them and they're

959
00:35:12,550 --> 00:35:11,280
now getting out into real aircraft

960
00:35:15,510 --> 00:35:12,560
structures

961
00:35:17,190 --> 00:35:15,520
but what's different about perseus is a

962
00:35:19,750 --> 00:35:17,200
couple things first of all is the

963
00:35:22,310 --> 00:35:19,760

stitching composite materials composite

964
00:35:23,349 --> 00:35:22,320
structures are put together using layers

965
00:35:25,030 --> 00:35:23,359
of

966
00:35:27,270 --> 00:35:25,040
graphite epoxy

967
00:35:29,190 --> 00:35:27,280
or carbon epoxy materials

968
00:35:31,589 --> 00:35:29,200
that's all built up into whatever

969
00:35:34,230 --> 00:35:31,599
configuration you're looking for with

970
00:35:37,510 --> 00:35:34,240
perseus what we're trying to do is build

971
00:35:39,750 --> 00:35:37,520
very large unitized structures so we can

972
00:35:41,910 --> 00:35:39,760
get away from all those fasteners by

973
00:35:45,430 --> 00:35:41,920
putting in the the stitches and by

974
00:35:47,349 --> 00:35:45,440
making very large parts so composites

975
00:35:51,829 --> 00:35:47,359
are useful closets are good because

976
00:35:55,670 --> 00:35:53,670
so the next area i'd like to discuss is

977
00:35:57,589 --> 00:35:55,680
related to the propulsion is related to

978
00:35:59,750 --> 00:35:57,599
propulsion technologies or the engines

979
00:36:01,190 --> 00:35:59,760
that go on these aircraft and hopefully

980
00:36:03,589 --> 00:36:01,200
i'm going to be able to do this without

981
00:36:06,150 --> 00:36:03,599
going all techno geek on you and as we

982
00:36:08,310 --> 00:36:06,160
get into some of this uh

983
00:36:10,069 --> 00:36:08,320
kind of complex

984
00:36:12,150 --> 00:36:10,079
subject matter

985
00:36:14,790 --> 00:36:12,160
but we've broken that work down into

986
00:36:16,630 --> 00:36:14,800
three areas the first is uh

987
00:36:19,190 --> 00:36:16,640
low knox fuel

988
00:36:21,990 --> 00:36:19,200

flexible combustor system

989
00:36:25,109 --> 00:36:22,000
and there we're using various uh new

990
00:36:27,270 --> 00:36:25,119
structures new materials and innovative

991
00:36:29,910 --> 00:36:27,280
ways to mix the fuel in the air together

992
00:36:32,310 --> 00:36:29,920
for combustion efficiency and active

993
00:36:34,150 --> 00:36:32,320
combustor control

994
00:36:36,230 --> 00:36:34,160
we're also looking at low noise high

995
00:36:39,430 --> 00:36:36,240
efficiency propulsion system so when i

996
00:36:41,349 --> 00:36:39,440
say that think about the engine fan

997
00:36:44,470 --> 00:36:41,359
here we're working technologies to

998
00:36:46,790 --> 00:36:44,480
reduce the fuel burn as well as the

999
00:36:49,190 --> 00:36:46,800
airport and community noise

1000
00:36:51,910 --> 00:36:49,200
during this work we'll be establishing a

1001
00:36:54,230 --> 00:36:51,920
very robust database to do trade studies

1002
00:36:56,150 --> 00:36:54,240
between fuel burn and noise reduction to

1003
00:36:58,150 --> 00:36:56,160
look at the differences between the do

1004
00:37:00,390 --> 00:36:58,160
two and those trade-offs

1005
00:37:02,710 --> 00:37:00,400
and then the third area is high pressure

1006
00:37:04,310 --> 00:37:02,720
ratio high temperature core so think of

1007
00:37:06,390 --> 00:37:04,320
the compressor

1008
00:37:10,310 --> 00:37:06,400
on the engine in here so we'll be doing

1009
00:37:12,790 --> 00:37:10,320
systems level test validations of

1010
00:37:14,790 --> 00:37:12,800
higher overall pressure ratio com

1011
00:37:17,190 --> 00:37:14,800
compressor technologies

1012
00:37:19,829 --> 00:37:17,200
new materials for high high pressure

1013
00:37:22,230 --> 00:37:19,839

turbine vein applications

1014
00:37:24,470 --> 00:37:22,240
and we have to marry the airframe and

1015
00:37:26,470 --> 00:37:24,480
the propulsion system together so they

1016
00:37:28,310 --> 00:37:26,480
come together in what we call vehicle

1017
00:37:29,990 --> 00:37:28,320
systems integration

1018
00:37:32,230 --> 00:37:30,000
one of the areas that we're looking at

1019
00:37:35,109 --> 00:37:32,240
here has to do with how we do that

1020
00:37:37,990 --> 00:37:35,119
efficiency so how efficiently so how we

1021
00:37:40,390 --> 00:37:38,000
put the engine on the aircraft with zero

1022
00:37:44,390 --> 00:37:40,400
interference drag penalty so you do that

1023
00:37:46,230 --> 00:37:44,400
without uh incurring uh additional drag

1024
00:37:47,829 --> 00:37:46,240
another area that we're working under

1025
00:37:50,310 --> 00:37:47,839
vehicle systems has to do with

1026
00:37:51,670 --> 00:37:50,320
propulsion airframe aero acoustics now

1027
00:37:53,910 --> 00:37:51,680
that's a mouthful

1028
00:37:55,829 --> 00:37:53,920
but basically it's looking at ways to

1029
00:37:57,829 --> 00:37:55,839
marry these two systems the propulsion

1030
00:37:59,430 --> 00:37:57,839
system and the airframe together

1031
00:38:01,589 --> 00:37:59,440
couple these

1032
00:38:04,150 --> 00:38:01,599
with the potential of bringing those

1033
00:38:06,470 --> 00:38:04,160
together without additional noise

1034
00:38:07,349 --> 00:38:06,480
effects so the aero acoustics part of

1035
00:38:09,990 --> 00:38:07,359
this

1036
00:38:11,430 --> 00:38:10,000
pretty complicated we've got a clip that

1037
00:38:13,990 --> 00:38:11,440
another one of our senior research

1038
00:38:16,069 --> 00:38:14,000

scientists russ thomas will be

1039
00:38:18,230 --> 00:38:16,079
explaining some of this work done and

1040
00:38:20,790 --> 00:38:18,240
one in propulsion technologies and

1041
00:38:23,030 --> 00:38:20,800
vehicles technologies together and this

1042
00:38:24,390 --> 00:38:23,040
will focus on some of the unique ground

1043
00:38:25,589 --> 00:38:24,400
test uh

1044
00:38:27,270 --> 00:38:25,599
testing that we're doing on the

1045
00:38:30,950 --> 00:38:27,280
ground-based experimentation that we're

1046
00:38:32,870 --> 00:38:30,960
doing so could we run that clip

1047
00:38:34,069 --> 00:38:32,880
will this work on commercial aircraft as

1048
00:38:36,710 --> 00:38:34,079
well

1049
00:38:38,870 --> 00:38:36,720
or other aircraft uh yes it's very

1050
00:38:40,870 --> 00:38:38,880
relevant to other types of aircraft

1051
00:38:43,190 --> 00:38:40,880
again what we're looking at here is the

1052
00:38:45,750 --> 00:38:43,200
effects the air acoustic effects of

1053
00:38:46,950 --> 00:38:45,760
integrating propulsion and aircraft and

1054
00:38:48,790 --> 00:38:46,960
that's what we call that propulsion

1055
00:38:50,870 --> 00:38:48,800
airframe aero acoustics it's very

1056
00:38:52,390 --> 00:38:50,880
relevant to any type of aircraft that

1057
00:38:54,870 --> 00:38:52,400
you put together because you have to

1058
00:38:56,470 --> 00:38:54,880
integrate engine and airframe to come up

1059
00:38:58,790 --> 00:38:56,480
with the aircraft system what is so

1060
00:39:00,950 --> 00:38:58,800
special about this facility it's the

1061
00:39:02,390 --> 00:39:00,960
boeing company's low-speed aero acoustic

1062
00:39:05,030 --> 00:39:02,400
facility

1063
00:39:06,470 --> 00:39:05,040

and nasa is working with boeing on this

1064
00:39:07,829 --> 00:39:06,480
experiment it's an air acoustic wind

1065
00:39:09,910 --> 00:39:07,839
tunnel which means it's specially

1066
00:39:11,510 --> 00:39:09,920
designed to be able to measure noise

1067
00:39:13,910 --> 00:39:11,520
properly

1068
00:39:15,829 --> 00:39:13,920
for aircraft applications so you can see

1069
00:39:19,190 --> 00:39:15,839
it's a large chamber it's got sound

1070
00:39:22,150 --> 00:39:19,200
proofing material it has a large wind

1071
00:39:24,150 --> 00:39:22,160
tunnel nine feet by 12 feet

1072
00:39:26,390 --> 00:39:24,160
and we can put the airframe and the

1073
00:39:28,310 --> 00:39:26,400
propulsion source here in the wind

1074
00:39:30,230 --> 00:39:28,320
tunnel and it's got all the right

1075
00:39:32,950 --> 00:39:30,240
instrumentation that we need to measure

1076
00:39:35,349 --> 00:39:32,960
sound properly we've got it all here and

1077
00:39:37,270 --> 00:39:35,359
one more important aspect is that this

1078
00:39:39,589 --> 00:39:37,280
airframe can move relative to the

1079
00:39:41,190 --> 00:39:39,599
propulsion source so we can investigate

1080
00:39:43,589 --> 00:39:41,200
all those different

1081
00:39:46,069 --> 00:39:43,599
combinations of the engine and airframe

1082
00:39:49,670 --> 00:39:47,829
so there you can get some sense of the

1083
00:39:51,349 --> 00:39:49,680
work that we're doing to understand the

1084
00:39:54,150 --> 00:39:51,359
placement of the

1085
00:39:56,550 --> 00:39:54,160
propulsion system on the airframe

1086
00:39:58,550 --> 00:39:56,560
we're also using systems analysis uh

1087
00:40:01,109 --> 00:39:58,560
doing using this to support decision

1088
00:40:03,270 --> 00:40:01,119

making and uh guide our portfolios by

1089
00:40:05,030 --> 00:40:03,280
identifying and prioritizing the various

1090
00:40:06,230 --> 00:40:05,040
technologies and configurations that

1091
00:40:08,470 --> 00:40:06,240
we're working

1092
00:40:10,230 --> 00:40:08,480
uh that are capable of achieving these

1093
00:40:12,470 --> 00:40:10,240
uh the performance goals that we've

1094
00:40:15,270 --> 00:40:12,480
talked about

1095
00:40:17,589 --> 00:40:15,280
and finally we're working and looking at

1096
00:40:19,109 --> 00:40:17,599
advanced vehicle concepts so new

1097
00:40:21,430 --> 00:40:19,119
vehicles

1098
00:40:24,069 --> 00:40:21,440
to identify and create a robust set of

1099
00:40:26,230 --> 00:40:24,079
configurations and technologies to

1100
00:40:28,550 --> 00:40:26,240
enable the simultaneous achievement of

1101
00:40:30,550 --> 00:40:28,560
these performance goals one of the key

1102
00:40:33,589 --> 00:40:30,560
elements that we're using here is part

1103
00:40:35,589 --> 00:40:33,599
of a nasa research announcement studies

1104
00:40:37,829 --> 00:40:35,599
that were competitively awarded and are

1105
00:40:40,550 --> 00:40:37,839
being performed at lockheed martin

1106
00:40:43,030 --> 00:40:40,560
northrop grumman and at boeing in these

1107
00:40:45,990 --> 00:40:43,040
studies the contract awardees are

1108
00:40:48,230 --> 00:40:46,000
providing detailed analysis and testing

1109
00:40:49,990 --> 00:40:48,240
and assessment programs of their

1110
00:40:52,230 --> 00:40:50,000
preferred subsonic transport

1111
00:40:54,390 --> 00:40:52,240
configurations that they feel will

1112
00:40:55,910 --> 00:40:54,400
simultaneously meet these

1113
00:40:57,990 --> 00:40:55,920

goals that we've been discussing this

1114
00:41:00,150 --> 00:40:58,000
morning so what we'd like to do is

1115
00:41:02,390 --> 00:41:00,160
complete conclude this part of the

1116
00:41:04,790 --> 00:41:02,400
challenge discussion with a video clip

1117
00:41:07,510 --> 00:41:04,800
of some ground and flight testing of a

1118
00:41:10,069 --> 00:41:07,520
scaled model of an x-48b

1119
00:41:12,230 --> 00:41:10,079
a remotely piloted aircraft the video

1120
00:41:14,390 --> 00:41:12,240
will open with a very short shot of some

1121
00:41:17,430 --> 00:41:14,400
flow visualization that was taken during

1122
00:41:19,910 --> 00:41:17,440
some low-speed wind tunnel testing

1123
00:41:21,990 --> 00:41:19,920
at nasa langley then we'll transition to

1124
00:41:23,430 --> 00:41:22,000
dryden flight research center and take

1125
00:41:25,670 --> 00:41:23,440
you through a flight as part of the

1126
00:41:27,750 --> 00:41:25,680
phase one flight test campaign

1127
00:41:30,150 --> 00:41:27,760
now this flight campaign is a joint

1128
00:41:33,349 --> 00:41:30,160
undertaking between nasa the department

1129
00:41:34,870 --> 00:41:33,359
of defense and boeing and the model that

1130
00:41:36,950 --> 00:41:34,880
you're seeing that you'll see in this

1131
00:41:41,910 --> 00:41:36,960
video was actually built by cranfield

1132
00:41:47,109 --> 00:41:43,750
so this is the first part this is doing

1133
00:41:49,109 --> 00:41:47,119
some very simple flow visualization up

1134
00:41:50,230 --> 00:41:49,119
at fairly high angles of attack to see

1135
00:41:54,630 --> 00:41:50,240
how the

1136
00:41:56,550 --> 00:41:54,640
goes over the upper part of the wing

1137
00:41:59,990 --> 00:41:56,560
now we're transitioning out to dryden

1138
00:42:02,550 --> 00:42:00,000

this shows the rollout of the vehicle

1139
00:42:04,710 --> 00:42:02,560
this vehicle is 21 feet

1140
00:42:08,230 --> 00:42:04,720
has a 21 foot wingspan and weighs close

1141
00:42:10,470 --> 00:42:08,240
to 400 pounds empty and about 525 pounds

1142
00:42:13,270 --> 00:42:10,480
full of fuel you see the ground support

1143
00:42:14,309 --> 00:42:13,280
station here this is actually the uh the

1144
00:42:16,309 --> 00:42:14,319
pilot

1145
00:42:19,750 --> 00:42:16,319
and you see the view out of the nose

1146
00:42:22,230 --> 00:42:19,760
camera you can see on his screen there

1147
00:42:26,630 --> 00:42:22,240
this vehicle is built from composite

1148
00:42:31,270 --> 00:42:29,430
skyway 48 tower

1149
00:42:33,109 --> 00:42:31,280
can hear some of the researchers and the

1150
00:42:35,030 --> 00:42:33,119
discussion going on in the background of

1151
00:42:36,390 --> 00:42:35,040
hitting the test points

1152
00:42:39,109 --> 00:42:36,400
it's about an eight and a half percent

1153
00:42:45,670 --> 00:42:39,119
scale model of uh what could be a 240

1154
00:42:51,349 --> 00:42:47,990
the three engines provide around 160

1155
00:42:52,790 --> 00:42:51,359
pounds of thrust can fly about 140 miles

1156
00:42:54,870 --> 00:42:52,800
an hour

1157
00:42:56,950 --> 00:42:54,880
has a service ceiling i think of around

1158
00:42:59,030 --> 00:42:56,960
10 000 feet

1159
00:43:03,510 --> 00:42:59,040
during most of the flight testing we got

1160
00:43:06,069 --> 00:43:03,520
up to around 7 500 feet go 77 only 228

1161
00:43:10,870 --> 00:43:08,069
the first flight of this vehicle was in

1162
00:43:13,910 --> 00:43:10,880
july of 2007

1163
00:43:18,870 --> 00:43:13,920

lasted around 30 minutes uh we finished

1164
00:43:23,349 --> 00:43:21,829
for this phase one

1165
00:43:26,230 --> 00:43:23,359
you can see it i mean it looks and

1166
00:43:28,069 --> 00:43:26,240
performs very much like a real aircraft

1167
00:43:34,150 --> 00:43:28,079
there here you can see it coming in for

1168
00:43:37,510 --> 00:43:35,910
so right now we're reconfiguring the

1169
00:43:39,430 --> 00:43:37,520
vehicle

1170
00:43:41,750 --> 00:43:39,440
removing the three engines replacing

1171
00:43:43,829 --> 00:43:41,760
those with two engines which will

1172
00:43:46,069 --> 00:43:43,839
increase our actual flight time and data

1173
00:43:49,829 --> 00:43:46,079
acquisition time give us a little higher

1174
00:43:52,230 --> 00:43:49,839
performance and moving the vertical

1175
00:43:54,470 --> 00:43:52,240
aerodynamic surfaces inboard for a

1176
00:43:57,670 --> 00:43:54,480
little more noise shielding so this will

1177
00:43:59,829 --> 00:43:57,680
give us a noise benefit as well

1178
00:44:02,550 --> 00:43:59,839
we hope to start that

1179
00:44:04,150 --> 00:44:02,560
that additional testing next year

1180
00:44:06,309 --> 00:44:04,160
so with that that concludes the

1181
00:44:08,470 --> 00:44:06,319
environmental portion of

1182
00:44:09,750 --> 00:44:08,480
the challenge that we wanted to discuss

1183
00:44:11,030 --> 00:44:09,760
so i'm going to kick it back over to

1184
00:44:14,470 --> 00:44:11,040
john for some

1185
00:44:16,150 --> 00:44:14,480
concluding remarks thanks ed

1186
00:44:18,309 --> 00:44:16,160
so

1187
00:44:20,829 --> 00:44:18,319
what's next for nasa aeronautics i think

1188
00:44:24,630 --> 00:44:20,839

ed and i have spent a few minutes

1189
00:44:27,270 --> 00:44:24,640
describing the national agenda that we

1190
00:44:29,990 --> 00:44:27,280
subscribed to and have been working to

1191
00:44:31,589 --> 00:44:30,000
help build and satisfy

1192
00:44:33,670 --> 00:44:31,599
you heard about the the global

1193
00:44:35,349 --> 00:44:33,680
complexities of this air transportation

1194
00:44:37,190 --> 00:44:35,359
system and the aircraft that fly within

1195
00:44:39,349 --> 00:44:37,200
it and and our efforts in trying to

1196
00:44:41,589 --> 00:44:39,359
improve that make that better

1197
00:44:43,349 --> 00:44:41,599
technical challenges that make that

1198
00:44:44,790 --> 00:44:43,359
difficult and a very challenging and

1199
00:44:46,390 --> 00:44:44,800
complex problem

1200
00:44:49,270 --> 00:44:46,400
talked about our portfolio of r d

1201
00:44:50,470 --> 00:44:49,280
programs uh and the missions that they

1202
00:44:52,309 --> 00:44:50,480
achieve

1203
00:44:53,750 --> 00:44:52,319
and we also took some time to describe a

1204
00:44:55,589 --> 00:44:53,760
couple of the exciting initiatives that

1205
00:44:57,750 --> 00:44:55,599
we believe can change the the future of

1206
00:45:00,309 --> 00:44:57,760
aviation and make an impact on this next

1207
00:45:02,630 --> 00:45:00,319
generation air transportation system

1208
00:45:04,230 --> 00:45:02,640
so it's kind of a final wrap up here we

1209
00:45:06,470 --> 00:45:04,240
hope that now perhaps you two can share

1210
00:45:09,430 --> 00:45:06,480
some of that excitement that uh

1211
00:45:11,270 --> 00:45:09,440
that we feel as we embark on on our

1212
00:45:13,270 --> 00:45:11,280
overall mission our agenda

1213
00:45:15,670 --> 00:45:13,280

uh and looking to create aeronautics

1214
00:45:17,670 --> 00:45:15,680
breakthroughs for the future so now with

1215
00:45:20,069 --> 00:45:17,680
that i believe we now have time some

1216
00:45:21,750 --> 00:45:20,079
questions uh beth would you like to

1217
00:45:23,270 --> 00:45:21,760
right thank you ed and john we do have

1218
00:45:24,870 --> 00:45:23,280
time for questions

1219
00:45:26,710 --> 00:45:24,880
if you'll wait for the microphone and

1220
00:45:28,150 --> 00:45:26,720
give us your name and affiliation that

1221
00:45:31,430 --> 00:45:28,160
would be great

1222
00:45:35,349 --> 00:45:33,030
sure uh pete crow saint harbor

1223
00:45:37,270 --> 00:45:35,359
productions um i've got a series of

1224
00:45:38,950 --> 00:45:37,280
questions about um

1225
00:45:43,109 --> 00:45:38,960
first of all what's the relationship

1226
00:45:45,670 --> 00:45:43,119
between the faa and nasa and if you

1227
00:45:48,309 --> 00:45:45,680
are also putting dod in this mix

1228
00:45:50,150 --> 00:45:48,319
duties responsibilities and so forth

1229
00:45:52,150 --> 00:45:50,160
between what you're doing and

1230
00:45:53,990 --> 00:45:52,160
both of you gentlemen okay let me kick

1231
00:45:56,069 --> 00:45:54,000
off and then ed can provide perspective

1232
00:45:58,710 --> 00:45:56,079
as well um

1233
00:46:00,550 --> 00:45:58,720
from the perspective of the

1234
00:46:03,030 --> 00:46:00,560
the transition

1235
00:46:04,950 --> 00:46:03,040
to next gen

1236
00:46:07,109 --> 00:46:04,960
there is an organization we didn't

1237
00:46:09,430 --> 00:46:07,119
mention specifically but the joint

1238
00:46:11,670 --> 00:46:09,440

planning and development office which is

1239
00:46:13,589 --> 00:46:11,680
a collection of federal partners that

1240
00:46:15,030 --> 00:46:13,599
are looking to help plan

1241
00:46:21,109 --> 00:46:15,040
the

1242
00:46:24,150 --> 00:46:21,119
an actual work plan to to enable uh

1243
00:46:25,910 --> 00:46:24,160
transition to that new system nextgen as

1244
00:46:27,190 --> 00:46:25,920
part of that department of

1245
00:46:31,349 --> 00:46:27,200
transportation

1246
00:46:33,670 --> 00:46:31,359
faa dod dhs nasa

1247
00:46:37,510 --> 00:46:33,680
department of commerce no stp so from

1248
00:46:39,510 --> 00:46:37,520
the perspective of coordinating our uh

1249
00:46:42,309 --> 00:46:39,520
our overall national objectives and

1250
00:46:43,510 --> 00:46:42,319
agenda has been a very productive

1251
00:46:45,109 --> 00:46:43,520
relationship

1252
00:46:46,790 --> 00:46:45,119
in the program that i oversee the

1253
00:46:48,550 --> 00:46:46,800
aerospace system program with the air

1254
00:46:50,470 --> 00:46:48,560
transportation management technologies

1255
00:46:51,910 --> 00:46:50,480
we have some very specific relationships

1256
00:46:55,670 --> 00:46:51,920
with the faa

1257
00:46:59,990 --> 00:46:55,680
that we call research transition teams

1258
00:47:02,069 --> 00:47:00,000
whereby we look to bring some of our

1259
00:47:04,790 --> 00:47:02,079
researchers together with faa

1260
00:47:07,270 --> 00:47:04,800
stakeholders at earlier stages around

1261
00:47:09,510 --> 00:47:07,280
particular areas of our technology

1262
00:47:11,829 --> 00:47:09,520
development

1263
00:47:14,550 --> 00:47:11,839

in order to make sure that they know

1264
00:47:16,390 --> 00:47:14,560
what's coming what the maturity is and

1265
00:47:18,309 --> 00:47:16,400
how it has the opportunity to fit into

1266
00:47:21,109 --> 00:47:18,319
their overall roadmap and implementation

1267
00:47:23,510 --> 00:47:21,119
plans so we have a variety of

1268
00:47:25,030 --> 00:47:23,520
interactions and connections we've been

1269
00:47:26,309 --> 00:47:25,040
doing many of these things for for a

1270
00:47:28,790 --> 00:47:26,319
number of years

1271
00:47:30,870 --> 00:47:28,800
um and we think that uh we've got a

1272
00:47:33,349 --> 00:47:30,880
robust way to make sure that our work

1273
00:47:35,270 --> 00:47:33,359
has value and return and um and has a

1274
00:47:36,710 --> 00:47:35,280
transition path into the system sorry ed

1275
00:47:38,150 --> 00:47:36,720
if you wanted to mention another yeah

1276
00:47:40,710 --> 00:47:38,160
another way that we're working with the

1277
00:47:42,710 --> 00:47:40,720
faa is to ensure that the technologies

1278
00:47:45,670 --> 00:47:42,720
and the concepts that we're working at a

1279
00:47:47,829 --> 00:47:45,680
research level are certifiable so that

1280
00:47:49,990 --> 00:47:47,839
we make sure that eventually that they

1281
00:47:52,309 --> 00:47:50,000
can be actually integrated into a

1282
00:47:54,230 --> 00:47:52,319
configuration we do that on a lot of

1283
00:47:55,990 --> 00:47:54,240
different fronts we work very closely

1284
00:47:58,950 --> 00:47:56,000
with the partners

1285
00:48:02,230 --> 00:47:58,960
an example of this is we just kicked off

1286
00:48:05,030 --> 00:48:02,240
the faa just kicked off

1287
00:48:07,589 --> 00:48:05,040
aviation rule making councils

1288
00:48:09,750 --> 00:48:07,599

that is focused on the integration of

1289
00:48:12,630 --> 00:48:09,760
unmanned aircraft into the national

1290
00:48:14,790 --> 00:48:12,640
airspace system this is made up of

1291
00:48:16,790 --> 00:48:14,800
federal partners so government agencies

1292
00:48:18,230 --> 00:48:16,800
as well as industry partners both from

1293
00:48:20,230 --> 00:48:18,240
particular industries as well as

1294
00:48:22,630 --> 00:48:20,240
industry associations

1295
00:48:25,190 --> 00:48:22,640
looking at the various barriers of

1296
00:48:27,990 --> 00:48:25,200
various issues that need to be addressed

1297
00:48:30,710 --> 00:48:28,000
and so that will help guide our research

1298
00:48:33,030 --> 00:48:30,720
in this area as well as making sure that

1299
00:48:34,470 --> 00:48:33,040
there's not any unnecessary duplication

1300
00:48:36,390 --> 00:48:34,480
of effort among the

1301
00:48:37,990 --> 00:48:36,400
federal partners and that are that are

1302
00:48:40,710 --> 00:48:38,000
working these areas

1303
00:48:43,109 --> 00:48:40,720
so our association with the faa is very

1304
00:48:45,589 --> 00:48:43,119
we work with them very closely the from

1305
00:48:47,349 --> 00:48:45,599
a research perspective from a rule

1306
00:48:48,390 --> 00:48:47,359
making perspective a certification

1307
00:48:50,069 --> 00:48:48,400
perspective

1308
00:48:53,349 --> 00:48:50,079
so we're working very closely together

1309
00:48:56,630 --> 00:48:53,359
it's really a hand in glove relationship

1310
00:48:59,910 --> 00:48:58,230
i'm jim siegel i'm

1311
00:49:02,470 --> 00:48:59,920
with the celebration independent

1312
00:49:05,510 --> 00:49:02,480
newspaper celebration is disease planned

1313
00:49:07,589 --> 00:49:05,520

community outside orlando

1314
00:49:10,150 --> 00:49:07,599
i have a question about vehicle

1315
00:49:12,630 --> 00:49:10,160
configuration it seems to me that from

1316
00:49:15,270 --> 00:49:12,640
my perspective as an air traveler

1317
00:49:16,870 --> 00:49:15,280
the last significant change that

1318
00:49:18,630 --> 00:49:16,880
occurred in

1319
00:49:20,950 --> 00:49:18,640
vehicle configuration aircraft

1320
00:49:23,670 --> 00:49:20,960
configuration was the concord

1321
00:49:25,430 --> 00:49:23,680
supersonic flight and so on i think that

1322
00:49:27,109 --> 00:49:25,440
might have been in the 80s i'm not sure

1323
00:49:29,349 --> 00:49:27,119
but in any case the concord has just

1324
00:49:31,589 --> 00:49:29,359
gone out of use so it seems to me as an

1325
00:49:33,750 --> 00:49:31,599
air traveler that there hasn't been much

1326
00:49:37,030 --> 00:49:33,760
advancement in terms of vehicle

1327
00:49:40,069 --> 00:49:37,040
configuration uh in the last

1328
00:49:42,829 --> 00:49:40,079
well a couple of decades anyway

1329
00:49:45,349 --> 00:49:42,839
what do you think is responsible for

1330
00:49:47,109 --> 00:49:45,359
that so i i can give you a little

1331
00:49:49,829 --> 00:49:47,119
anecdote relative to that back in the

1332
00:49:52,790 --> 00:49:49,839
90s nasa was working a program called

1333
00:49:55,349 --> 00:49:52,800
advanced subsonic transports

1334
00:49:57,829 --> 00:49:55,359
and i remember sitting in director of

1335
00:49:59,750 --> 00:49:57,839
engineering's office at a major

1336
00:50:01,990 --> 00:49:59,760
aircraft manufacturer and talking about

1337
00:50:03,430 --> 00:50:02,000
this really cool high lift system that

1338
00:50:05,750 --> 00:50:03,440

we were working

1339
00:50:07,829 --> 00:50:05,760
and how it worked and how it increased

1340
00:50:09,670 --> 00:50:07,839
the the stall margins of the aircraft

1341
00:50:11,510 --> 00:50:09,680
and things like that and and that we

1342
00:50:13,190 --> 00:50:11,520
were working to reduce the risk

1343
00:50:14,710 --> 00:50:13,200
associated with that and

1344
00:50:15,670 --> 00:50:14,720
he looked me right in the eye and he

1345
00:50:17,750 --> 00:50:15,680
said

1346
00:50:19,990 --> 00:50:17,760
we don't take any risk

1347
00:50:22,230 --> 00:50:20,000
on any of our configurations

1348
00:50:23,670 --> 00:50:22,240
and when they launch a new configuration

1349
00:50:24,829 --> 00:50:23,680
they're putting they're putting the

1350
00:50:28,309 --> 00:50:24,839
entire

1351
00:50:30,309 --> 00:50:28,319
um company at risk when they do that and

1352
00:50:32,870 --> 00:50:30,319
so they're going to do this in a very

1353
00:50:35,829 --> 00:50:32,880
very safe manner making sure that there

1354
00:50:37,510 --> 00:50:35,839
are no technology risks associated with

1355
00:50:39,430 --> 00:50:37,520
the work that they're doing

1356
00:50:42,470 --> 00:50:39,440
so that's why we're working closely with

1357
00:50:44,710 --> 00:50:42,480
them now with these manufacturers in

1358
00:50:46,390 --> 00:50:44,720
their advanced configurations and the

1359
00:50:48,630 --> 00:50:46,400
work that they're doing to develop the

1360
00:50:50,390 --> 00:50:48,640
advanced configurations to make sure

1361
00:50:52,870 --> 00:50:50,400
that we're addressing those risks up

1362
00:50:55,589 --> 00:50:52,880
front and making sure that we're doing

1363
00:50:57,829 --> 00:50:55,599

that in a way that they accept not just

1364
00:50:59,829 --> 00:50:57,839
in nasa's way but in a way that they

1365
00:51:01,589 --> 00:50:59,839
understand and they can accept the data

1366
00:51:04,069 --> 00:51:01,599
and understand the data that they're

1367
00:51:06,390 --> 00:51:04,079
working with so that's why we still see

1368
00:51:09,670 --> 00:51:06,400
tube and wing aircraft

1369
00:51:12,470 --> 00:51:09,680
it's just a very risky from an economic

1370
00:51:14,870 --> 00:51:12,480
standpoint a very risky undertaking to

1371
00:51:16,470 --> 00:51:14,880
launch something new what you see is

1372
00:51:18,710 --> 00:51:16,480
often new technologies and new

1373
00:51:20,470 --> 00:51:18,720
configurations first being adopted by

1374
00:51:24,390 --> 00:51:20,480
the department of defense

1375
00:51:26,950 --> 00:51:24,400
because they will often have a less risk

1376
00:51:28,950 --> 00:51:26,960
averse posture and be able to adopt some

1377
00:51:30,950 --> 00:51:28,960
of those technologies so when you think

1378
00:51:33,670 --> 00:51:30,960
about supercritical wings when you think

1379
00:51:36,069 --> 00:51:33,680
about area rule ruling some of the

1380
00:51:39,270 --> 00:51:36,079
innovations in engines we first saw

1381
00:51:42,790 --> 00:51:39,280
those in dod aircraft

1382
00:51:45,430 --> 00:51:42,800
and another brief expansion on its point

1383
00:51:47,990 --> 00:51:45,440
from the integration of new aircraft

1384
00:51:51,109 --> 00:51:48,000
into the air transportation system it's

1385
00:51:54,230 --> 00:51:51,119
critical to make sure that any new

1386
00:51:55,750 --> 00:51:54,240
flight concepts vehicle concepts

1387
00:51:58,630 --> 00:51:55,760
can actually

1388
00:52:00,150 --> 00:51:58,640

operate effectively for the the air

1389
00:52:02,230 --> 00:52:00,160
carriers that would be buying these

1390
00:52:05,190 --> 00:52:02,240
aircraft

1391
00:52:07,510 --> 00:52:05,200
you know in the current system so from a

1392
00:52:09,670 --> 00:52:07,520
supersonic perspective or a very high

1393
00:52:11,670 --> 00:52:09,680
speed perspective if you're taking these

1394
00:52:12,870 --> 00:52:11,680
high performance aircraft and having to

1395
00:52:15,190 --> 00:52:12,880
stick them

1396
00:52:17,109 --> 00:52:15,200
in flight paths and trajectories behind

1397
00:52:20,470 --> 00:52:17,119
slower aircraft

1398
00:52:23,190 --> 00:52:20,480
there is no business case for a carrier

1399
00:52:25,190 --> 00:52:23,200
to buy that aircraft because it the

1400
00:52:27,750 --> 00:52:25,200
system does not allow them to take

1401
00:52:29,270 --> 00:52:27,760
advantage of its capabilities so we need

1402
00:52:30,230 --> 00:52:29,280
to make sure that all of those things

1403
00:52:32,790 --> 00:52:30,240
are

1404
00:52:35,910 --> 00:52:32,800
incorporated in um in a national

1405
00:52:37,910 --> 00:52:35,920
decision to to consider uh aviation

1406
00:52:39,910 --> 00:52:37,920
advancements because again it all has to

1407
00:52:41,349 --> 00:52:39,920
work together so just additional

1408
00:52:44,710 --> 00:52:41,359
perspective

1409
00:52:49,030 --> 00:52:46,870
uh jim siegel again from the celebration

1410
00:52:51,270 --> 00:52:49,040
independent newspaper i have a question

1411
00:52:53,349 --> 00:52:51,280
about the air traffic control system you

1412
00:52:57,270 --> 00:52:53,359
were talking a little bit about that and

1413
00:52:59,750 --> 00:52:57,280

about the the new system called

1414
00:53:01,349 --> 00:52:59,760
adsb

1415
00:53:03,670 --> 00:53:01,359
okay so

1416
00:53:05,190 --> 00:53:03,680
every once in a while i'll see stories

1417
00:53:09,109 --> 00:53:05,200
or

1418
00:53:10,870 --> 00:53:09,119
nature of the current air traffic

1419
00:53:11,670 --> 00:53:10,880
control system

1420
00:53:13,510 --> 00:53:11,680
uh

1421
00:53:16,390 --> 00:53:13,520
some people some critics have said it's

1422
00:53:17,190 --> 00:53:16,400
kind of antiquated needs to be updated

1423
00:53:21,910 --> 00:53:17,200
so

1424
00:53:24,230 --> 00:53:21,920
is uh adsb kind of the next step in

1425
00:53:25,829 --> 00:53:24,240
modernizing the air transportation

1426
00:53:28,470 --> 00:53:25,839
system are there kind of steps in

1427
00:53:30,309 --> 00:53:28,480
between that and when do you think that

1428
00:53:33,270 --> 00:53:30,319
adsb would be

1429
00:53:35,349 --> 00:53:33,280
fully implemented in the united states a

1430
00:53:37,349 --> 00:53:35,359
satellite-based system as opposed to the

1431
00:53:38,230 --> 00:53:37,359
radar-based system that we have today

1432
00:53:42,470 --> 00:53:38,240
okay

1433
00:53:44,950 --> 00:53:42,480
the faa certainly considers adsb to be a

1434
00:53:46,950 --> 00:53:44,960
a critical next step

1435
00:53:50,870 --> 00:53:46,960
to enable next gen

1436
00:53:53,109 --> 00:53:50,880
so much so that they have a

1437
00:53:56,790 --> 00:53:53,119
a subscription mandate if you will an

1438
00:54:00,069 --> 00:53:56,800

equippage mandate of in 2020 for

1439
00:54:03,750 --> 00:54:00,079
carriers to have certain adsb capability

1440
00:54:10,309 --> 00:54:07,670
the key element i believe is is that it

1441
00:54:12,630 --> 00:54:10,319
provides a it gets away from some of the

1442
00:54:14,630 --> 00:54:12,640
fixed based surveillance infrastructure

1443
00:54:15,910 --> 00:54:14,640
that we have now again had since the 50s

1444
00:54:18,230 --> 00:54:15,920
with radar

1445
00:54:19,589 --> 00:54:18,240
it improves the performance of that

1446
00:54:21,270 --> 00:54:19,599
it also

1447
00:54:22,870 --> 00:54:21,280
because we

1448
00:54:24,470 --> 00:54:22,880
are bringing

1449
00:54:26,710 --> 00:54:24,480
elements of this technology

1450
00:54:28,069 --> 00:54:26,720
and our ability to surveil positions of

1451
00:54:29,990 --> 00:54:28,079
aircraft

1452
00:54:32,309 --> 00:54:30,000
some of that capabilities actually done

1453
00:54:35,030 --> 00:54:32,319
on the flight deck i mean of these

1454
00:54:38,069 --> 00:54:35,040
aircraft they can self-separate

1455
00:54:39,109 --> 00:54:38,079
it it enhances a scalability to the

1456
00:54:41,510 --> 00:54:39,119
system

1457
00:54:43,750 --> 00:54:41,520
implying that you you come up with a new

1458
00:54:45,670 --> 00:54:43,760
aircraft and you're bringing some of the

1459
00:54:47,430 --> 00:54:45,680
necessary surveillance infrastructure

1460
00:54:49,750 --> 00:54:47,440
with you in order to be able to safely

1461
00:54:52,309 --> 00:54:49,760
navigate the system so there's many many

1462
00:54:53,750 --> 00:54:52,319
benefits i know faa and that the joint

1463
00:54:56,630 --> 00:54:53,760

planning development office consider

1464
00:54:59,510 --> 00:54:56,640
that to be a critical first step but

1465
00:55:01,750 --> 00:54:59,520
next gen is very very complex

1466
00:55:04,549 --> 00:55:01,760
and this new system we're going to

1467
00:55:07,990 --> 00:55:04,559
there is no one thing that we can say

1468
00:55:10,870 --> 00:55:08,000
incorporates all of next-gen nor is

1469
00:55:12,789 --> 00:55:10,880
there one big system that you develop

1470
00:55:15,030 --> 00:55:12,799
and throw the switch as you transition

1471
00:55:16,789 --> 00:55:15,040
from old to new there are going to be a

1472
00:55:18,950 --> 00:55:16,799
series of steps that we're going to take

1473
00:55:21,349 --> 00:55:18,960
in implementing capability

1474
00:55:23,910 --> 00:55:21,359
adsb is going to be one of them uh other

1475
00:55:26,230 --> 00:55:23,920
elements of data sharing with net

1476
00:55:28,549 --> 00:55:26,240
enabled uh information exchanges are

1477
00:55:31,030 --> 00:55:28,559
going to be another key part but

1478
00:55:33,910 --> 00:55:31,040
certainly adsb is um is very very

1479
00:55:36,789 --> 00:55:33,920
important and ed yeah john mentioned the

1480
00:55:39,030 --> 00:55:36,799
adsb and the first step of this is adsb

1481
00:55:41,190 --> 00:55:39,040
out where the aircraft will actually be

1482
00:55:43,910 --> 00:55:41,200
broadcasting their position

1483
00:55:46,309 --> 00:55:43,920
so if you think about how a radar works

1484
00:55:48,710 --> 00:55:46,319
you know in the in the time that it

1485
00:55:50,630 --> 00:55:48,720
takes to make a radar sweep that a high

1486
00:55:53,510 --> 00:55:50,640
performance aircraft can maybe travel a

1487
00:55:55,430 --> 00:55:53,520
mile a mile and a half so that requires

1488
00:55:56,950 --> 00:55:55,440

a lot of separation

1489
00:56:00,069 --> 00:55:56,960
because you don't know exactly where

1490
00:56:02,630 --> 00:56:00,079
those aircraft are so with adsb they'll

1491
00:56:04,470 --> 00:56:02,640
be even for the controller he'll have a

1492
00:56:06,789 --> 00:56:04,480
much more precise location of the

1493
00:56:08,870 --> 00:56:06,799
aircraft so then as the system is a

1494
00:56:11,190 --> 00:56:08,880
demand on the system expands there are

1495
00:56:13,349 --> 00:56:11,200
more aircraft in the air then it gives

1496
00:56:14,950 --> 00:56:13,359
you that scalability that john alluded

1497
00:56:17,990 --> 00:56:14,960
to or that's one of the elements of the

1498
00:56:20,630 --> 00:56:18,000
scalability being able to have more

1499
00:56:21,910 --> 00:56:20,640
aircraft safely in a given area of

1500
00:56:24,230 --> 00:56:21,920
airspace

1501
00:56:25,990 --> 00:56:24,240
without these large buffers that we have

1502
00:56:27,670 --> 00:56:26,000
to have right now with the radar based

1503
00:56:31,589 --> 00:56:27,680
system

1504
00:56:33,349 --> 00:56:31,599
okay we've got time for maybe one more

1505
00:56:35,270 --> 00:56:33,359
uh pete crow again

1506
00:56:36,710 --> 00:56:35,280
what roles do you foresee that the

1507
00:56:39,190 --> 00:56:36,720
unmanned uh

1508
00:56:42,829 --> 00:56:39,200
aircraft will ultimately be performing

1509
00:56:45,109 --> 00:56:42,839
in over the american airspace

1510
00:56:48,069 --> 00:56:45,119
well i personally think it's going to

1511
00:56:50,309 --> 00:56:48,079
change our society but let's

1512
00:56:52,549 --> 00:56:50,319
that's my personal bias but let's start

1513
00:56:55,670 --> 00:56:52,559

with this some simple things

1514
00:56:57,910 --> 00:56:55,680
so an aquaintest of mine was actually um

1515
00:56:59,829 --> 00:56:57,920
associated with an air taxi service down

1516
00:57:03,829 --> 00:56:59,839
here in florida

1517
00:57:06,390 --> 00:57:03,839
and they were flying four-place jets

1518
00:57:08,230 --> 00:57:06,400
and it was you know taxi on demand so

1519
00:57:11,990 --> 00:57:08,240
you call them up if you wanted to fly

1520
00:57:14,150 --> 00:57:12,000
from orlando to tampa at 1 15 this

1521
00:57:16,470 --> 00:57:14,160
afternoon they could do that for you

1522
00:57:19,990 --> 00:57:16,480
however it was a commercial operation so

1523
00:57:20,789 --> 00:57:20,000
you had to have a pilot and a co-pilot

1524
00:57:22,549 --> 00:57:20,799
now

1525
00:57:24,150 --> 00:57:22,559
if you had three passengers they had to

1526
00:57:26,309 --> 00:57:24,160
send two jets

1527
00:57:28,390 --> 00:57:26,319
and that kind of ate into some of their

1528
00:57:30,390 --> 00:57:28,400
some of their profits so not you know i

1529
00:57:32,390 --> 00:57:30,400
certainly don't totally understand

1530
00:57:33,670 --> 00:57:32,400
their business model but it had an

1531
00:57:35,910 --> 00:57:33,680
effect so

1532
00:57:37,190 --> 00:57:35,920
one of the first things we may be able

1533
00:57:38,630 --> 00:57:37,200
to see

1534
00:57:39,430 --> 00:57:38,640
at some level

1535
00:57:42,549 --> 00:57:39,440
is

1536
00:57:44,150 --> 00:57:42,559
perhaps the ability to have a virtual

1537
00:57:45,829 --> 00:57:44,160
co-pilot

1538
00:57:48,230 --> 00:57:45,839

so that would be a very simple thing to

1539
00:57:49,750 --> 00:57:48,240
do the technology is there

1540
00:57:51,510 --> 00:57:49,760
we'll probably see

1541
00:57:54,549 --> 00:57:51,520
cargo

1542
00:57:55,750 --> 00:57:54,559
that is carried in unmanned vehicles

1543
00:57:57,829 --> 00:57:55,760
and that would be a fairly

1544
00:57:59,670 --> 00:57:57,839
straightforward easy thing to do it's

1545
00:58:02,710 --> 00:57:59,680
the technology is there we have to prove

1546
00:58:04,630 --> 00:58:02,720
the technology make sure that it's safe

1547
00:58:06,470 --> 00:58:04,640
and then from my perspective i believe

1548
00:58:09,109 --> 00:58:06,480
the sky's the limit i mean it's really

1549
00:58:10,950 --> 00:58:09,119
going to change the way that we look at

1550
00:58:12,710 --> 00:58:10,960
air travel that we look at air

1551
00:58:16,470 --> 00:58:12,720
transportation and the effect that it

1552
00:58:18,710 --> 00:58:16,480
has on our culture and on our economy i

1553
00:58:21,190 --> 00:58:18,720
mean right now the department of defense

1554
00:58:23,589 --> 00:58:21,200
is using aircraft in the middle east

1555
00:58:26,150 --> 00:58:23,599
they're being piloted with operators and

1556
00:58:28,309 --> 00:58:26,160
pilots that are in nevada

1557
00:58:30,470 --> 00:58:28,319
and they're doing this very safely of

1558
00:58:34,069 --> 00:58:30,480
course they own the airspace it's not a

1559
00:58:36,470 --> 00:58:34,079
heterogeneous airspace that they have to

1560
00:58:38,950 --> 00:58:36,480
mix unmanned and manned vehicles

1561
00:58:41,829 --> 00:58:38,960
but it's being done so the technology is

1562
00:58:44,870 --> 00:58:41,839
there it's up to us to prove

1563
00:58:47,750 --> 00:58:44,880

to the american public and to

1564
00:58:49,190 --> 00:58:47,760
the rule makers relative to the airspace

1565
00:58:51,990 --> 00:58:49,200
and those who are stewards of our

1566
00:58:54,069 --> 00:58:52,000
airspace that this is a safe thing to do

1567
00:58:55,750 --> 00:58:54,079
and that we can do that without

1568
00:58:58,789 --> 00:58:55,760
impacting the safety of the national

1569
00:59:02,150 --> 00:59:00,789
all right we're out of time

1570
00:59:03,990 --> 00:59:02,160
we'll have to call it a briefing it's

1571
00:59:05,349 --> 00:59:04,000
been a pleasure sharing aeronautics with