1
00:00:00,400 --> 00:00:01,285
[Engine sound]

2
00:00:01,368 --> 00:00:01,919
>> Clear to go.

3
00:00:02,002 --> 00:00:02,803
>> You're clear.

4
00:00:03,203 --> 00:00:04,504
[Music]

5
00:00:05,038 --> 00:00:05,856
>> Nozzle swing.

6
00:00:05,939 --> 00:00:06,590
[Jet revving up]

7
00:00:06,673 --> 00:00:07,457
>> Here we go.

8
00:00:07,541 --> 00:00:07,958
>> Smoke

9
00:00:08,041 --> 00:00:08,809
>> CFO.

10
00:00:08,976 --> 00:00:10,360
>> Good ignition.

11
00:00:10,444 --> 00:00:13,797
[Music]

12
00:00:13,881 --> 00:00:15,799
[Jet taking off]

13
00:00:15,883 --> 00:00:16,533

[Sonic boom]

14
00:00:16,617 --> 00:00:21,405
[Radio chatter]

15
00:00:21,488 --> 00:00:23,674
[Music]

16
00:00:23,757 --> 00:00:25,242
[ER-2 taking off]

17
00:00:25,325 --> 00:00:27,828
>> Forty-seven point
nine altitude.

18
00:00:28,262 --> 00:00:29,213
>> Here we go.

19
00:00:29,296 --> 00:00:31,899
3, 2, 1 release.

20
00:00:32,499 --> 00:00:39,356
[Music]

21
00:00:39,439 --> 00:00:45,245
[747 taking off]

22
00:00:45,779 --> 00:00:47,731
>> 2, 1, 0.

23
00:00:47,814 --> 00:00:50,934
[Rocket blasting off]

24
00:00:51,018 --> 00:00:52,035
>> Still got it.

25
00:00:52,119 --> 00:00:52,836
Awesome.

26
00:00:52,920 --> 00:00:55,589
[Truck driving by]

27
00:00:55,822 --> 00:00:57,241
>> Gonna hold level for a minute
here...

28
00:00:57,324 --> 00:00:58,825
>> NASA 836, we're gonna
hold here.

29
00:00:58,992 --> 00:00:59,743
>> Flight control, do G look
good?.

30
00:00:59,826 --> 00:01:00,644
>> Two Gs.

31
00:01:00,727 --> 00:01:02,129
>> Two Gs, copy.

32
00:01:02,396 --> 00:01:06,116
[Music]

33
00:01:06,199 --> 00:01:08,885
[Camera shutter]

34
00:01:08,969 --> 00:01:14,207
[Music]

35
00:01:21,481 --> 00:01:23,850
>> Whenever a NASA
aircraft leaves the ground,

36
00:01:24,318 --> 00:01:26,236
an entire team of people ensure

37

00:01:26,320 --> 00:01:29,256
that it executes its mission
safely and successfully.

38
00:01:29,790 --> 00:01:32,442
The pilot and mission
controllers sit at the ends

39
00:01:32,526 --> 00:01:36,079
of a complex stream of
data along which dozens

40
00:01:36,163 --> 00:01:39,916
of IT specialists, engineers,
and technicians work to ensure

41
00:01:40,000 --> 00:01:42,085
that each inflight
decision is informed

42
00:01:42,169 --> 00:01:43,854
by accurate information.

43
00:01:43,937 --> 00:01:47,291
And that all test or science
data is successfully gathered

44
00:01:47,374 --> 00:01:48,725
and processed.

45
00:01:48,809 --> 00:01:52,129
At the Armstrong Flight
Research Center, this team makes

46
00:01:52,212 --> 00:01:54,915
up the Mission Information
And Test Systems Directorate

47
00:01:55,248 --> 00:01:59,536
known simply as Code M, a

critical behind the scenes force

48
00:01:59,619 --> 00:02:02,606
that helps Armstrong keep
its reputation as one

49
00:02:02,689 --> 00:02:05,475
of the world's finest
flight research centers.

50
00:02:05,692 --> 00:02:14,751
[Music]

51
00:02:17,087 --> 00:02:21,908
In most cases, new flight
projects first approach the

52
00:02:21,992 --> 00:02:23,777
Mission Integration
Office or MIO.

53
00:02:23,860 --> 00:02:28,115
The MIO is responsible for the
development of partnerships

54
00:02:28,198 --> 00:02:30,167
with key researchers,
mission directorates,

55
00:02:30,250 --> 00:02:32,769
and external stakeholders.

56
00:02:32,853 --> 00:02:35,572
They help create
value for our partners

57
00:02:35,656 --> 00:02:37,841
by providing an initial
interface

58
00:02:37,924 --> 00:02:40,644
and a cross functional
integration of processes,

59
00:02:40,727 --> 00:02:42,512
capabilities, and operations.

60
00:02:42,596 --> 00:02:51,688
[Music]

61
00:02:54,324 --> 00:02:55,642
>> There's 10,000 feet.

62
00:02:55,726 --> 00:02:59,146
>> I'm going to go about 100
feet above you if I can here.

63
00:02:59,229 --> 00:03:00,380
>> Okay.

64
00:03:00,464 --> 00:03:02,149
>> Flights of new aircraft or
systems are first simulated

65
00:03:02,232 --> 00:03:05,402
to ensure that any novel
concepts are working

66
00:03:05,485 --> 00:03:06,803
as designed.

67
00:03:06,887 --> 00:03:08,238
Or to conduct trade studies

68
00:03:08,321 --> 00:03:11,608
or to iterate a design
towards optimum performance.

69

00:03:11,691 --> 00:03:15,579
Later when an actual flight is
scheduled, before the aircraft

70
00:03:15,662 --> 00:03:19,015
even revs its engines,
simulation familiarizes the

71
00:03:19,099 --> 00:03:21,768
pilot and mission control team
with the procedures and test

72
00:03:21,852 --> 00:03:24,604
points and prepares them for
unexpected situations.

73
00:03:24,688 --> 00:03:28,775
Engineers and technicians
in Code ME,

74
00:03:28,859 --> 00:03:31,244
the Simulation Engineering
Branch of Code M,

75
00:03:31,328 --> 00:03:34,381
create one of a kind
simulation programs

76
00:03:34,464 --> 00:03:36,149
and hardware subsystem
interfaces

77
00:03:36,233 --> 00:03:39,803
that enable NASA's pilots
and their industry partners

78
00:03:39,886 --> 00:03:42,572
to understand how a new
aircraft or system will handle

79

00:03:42,656 --> 00:03:46,743
or discover the most efficient
ways to hit their data points.

80
00:03:46,827 --> 00:03:50,147
>> Paul, I'm going to light the
burners just for a second here

81
00:03:50,230 --> 00:03:53,250
to see the difference
in the thrust.

82
00:03:53,333 --> 00:03:54,234
>> All right.

83
00:03:54,317 --> 00:03:56,103
Saw the cable tension
go up a little there,

84
00:03:56,186 --> 00:03:57,104
it's into the red.

85
00:03:57,187 --> 00:03:59,139
>> All right.

86
00:03:59,222 --> 00:04:03,543
Coming out of the afterburners
back to full power.

87
00:04:03,627 --> 00:04:07,747
>> Getting some slack
on the rope here.

88
00:04:07,831 --> 00:04:08,849
>> Oh yeah it's amazing.

89
00:04:08,932 --> 00:04:10,300
Now that I'm getting
kind of used to the sim,

90
00:04:10,383 --> 00:04:13,437
I can really feel you back
there and the effects.

91
00:04:13,520 --> 00:04:17,707
>> Code ME provides
high fidelity simulation

92
00:04:17,791 --> 00:04:20,410
of aerospace vehicles
and we do this

93
00:04:20,494 --> 00:04:24,047
from conceptual ideas all the
way through flight testing.

94
00:04:24,131 --> 00:04:26,116
That consists of
batch simulations

95
00:04:26,199 --> 00:04:28,235
that just usually
require a computer monitor

96
00:04:28,318 --> 00:04:32,239
to access, all the way
through piloted simulations.

97
00:04:32,322 --> 00:04:34,441
>> Flaps and gear
and we're at 200 knots.

98
00:04:34,524 --> 00:04:35,842
>> We also have the
ability to connect

99
00:04:35,926 --> 00:04:38,178
into the hardware components,
whether it be flight control

100
00:04:38,261 --> 00:04:41,014
computers, or actuators,
all the way

101
00:04:41,097 --> 00:04:42,582
through plugging full vehicles

102
00:04:42,666 --> 00:04:44,234
in the test bays
out in the hangars.

103
00:04:44,317 --> 00:04:48,772
In addition to simulating
individual aircraft,

104
00:04:48,855 --> 00:04:51,208
we have the ability to fly
remotely augmented vehicles.

105
00:04:51,291 --> 00:04:53,410
So a pilot sitting in one

106
00:04:53,493 --> 00:04:55,946
of our labs can fly an
uninhabited vehicle.

107
00:04:56,029 --> 00:04:58,415
Or conversely a pilot on
an airplane can be looking

108
00:04:58,498 --> 00:05:00,183
at a display that's driven

109
00:05:00,267 --> 00:05:03,670
with algorithms
running here in our labs.

110
00:05:03,753 --> 00:05:07,674
We also have the ability to

take our sim lab and connect it

111
00:05:07,757 --> 00:05:09,676
as a component of a live,

112
00:05:09,759 --> 00:05:11,011
virtual constructive
environment.

113
00:05:11,094 --> 00:05:13,480
Our simulated aircraft are
now part of a simulation

114
00:05:13,563 --> 00:05:17,868
that combines real and simulated
aircraft in a larger airspace

115
00:05:17,951 --> 00:05:19,169
like we do with UAS
in the NAS.

116
00:05:19,252 --> 00:05:28,395
[Music]

117
00:05:29,229 --> 00:05:31,047
If you want to build
a simulation,

118
00:05:31,131 --> 00:05:34,334
you have your basic
aircraft dynamics model,

119
00:05:34,417 --> 00:05:36,102
big mass properties type stuff.

120
00:05:36,186 --> 00:05:38,104
So that's one model
that you have to start

121

00:05:38,188 --> 00:05:39,306
assembling with other things.

122
00:05:39,389 --> 00:05:41,741
You have to assemble it with
an aerodynamics model.

123
00:05:41,825 --> 00:05:44,110
You have to assemble it with
a propulsion, an engine model,

124
00:05:44,194 --> 00:05:47,013
a set of guidance laws, and
a couple of other models.

125
00:05:47,097 --> 00:05:50,834
And you just have to assemble
all these things together.

126
00:05:50,917 --> 00:05:53,637
Once you build a simulation,
it's used quite a bit

127
00:05:53,720 --> 00:05:56,206
for training the pilots,
practicing maneuvers --

128
00:05:56,289 --> 00:05:58,508
>> I'm getting a little dynamic
here.

129
00:05:58,592 --> 00:06:00,777
>> Okay. I'll try
to be stable up here

130
00:06:00,860 --> 00:06:03,413
to give you a stable
platform to work off of.

131
00:06:03,496 --> 00:06:05,682

>> Because you have a
nice high fidelity sim,

132
00:06:05,765 --> 00:06:07,067
you know how long
each maneuver takes.

133
00:06:07,150 --> 00:06:09,469
You know how long it takes
in between maneuvers.

134
00:06:09,553 --> 00:06:12,305
So it allows you to optimize
the available flight time

135
00:06:12,389 --> 00:06:14,407
which is very expensive.

136
00:06:14,491 --> 00:06:16,576
Be it a center stick or
a side stick controller

137
00:06:16,660 --> 00:06:20,714
or a yolk type controller, that
would be modeled and simulated

138
00:06:20,797 --> 00:06:23,250
to behave just like the
stick in the actual airplane.

139
00:06:23,333 --> 00:06:25,468
You could actually
have force feedback

140
00:06:25,552 --> 00:06:27,137
so that it mimics
the actual forces

141
00:06:27,220 --> 00:06:30,740
that a pilot would

feel in the airplane.

142
00:06:30,824 --> 00:06:32,509
Data that we typically
collect looks like flight data

143
00:06:32,592 --> 00:06:35,211
and that data is used
to verify whether

144
00:06:35,295 --> 00:06:37,847
or not the control algorithms
were implemented correctly.

145
00:06:37,931 --> 00:06:41,534
The flip side of that is if
there's an anomaly in flight

146
00:06:41,618 --> 00:06:45,505
after the plane goes
into operational status,

147
00:06:45,589 --> 00:06:48,608
we would use the simulation
to research and investigate

148
00:06:48,692 --> 00:06:53,647
and understand what might have
caused that anomalous behavior.

149
00:06:53,730 --> 00:06:56,583
And that's something you only
get with a high fidelity sim.

150
00:06:56,666 --> 00:06:59,803
It's not like the simulations
that you get, you know,

151
00:06:59,886 --> 00:07:01,605
from X-Plane or something

like that.

152
00:07:01,688 --> 00:07:04,407
One of the projects
we're starting to work

153
00:07:04,491 --> 00:07:07,510
on is getting a Mars airspace up
and running and setting things

154
00:07:07,594 --> 00:07:09,980
up so we can fly
multiple Mars flyers.

155
00:07:10,063 --> 00:07:12,082
So we can start exploring
aircraft on Mars

156
00:07:12,165 --> 00:07:14,934
to see how well they fly.

157
00:07:15,018 --> 00:07:23,159
[Music]

158
00:07:25,028 --> 00:07:26,780
>> Ready to send check.

159
00:07:26,863 --> 00:07:28,715
>> Sending check command now.

160
00:07:28,798 --> 00:07:29,182
>> Send arm.

161
00:07:29,265 --> 00:07:30,400
>> Arming now.

162
00:07:30,483 --> 00:07:31,434
>> All right.

163
00:07:31,518 --> 00:07:32,102
Send terminate.

164
00:07:32,185 --> 00:07:35,205
>> And terminating now.

165
00:07:35,288 --> 00:07:37,507
And we have a good
arm-term cycle.

166
00:07:37,590 --> 00:07:39,909
>> Well before the
research flight phase,

167
00:07:39,993 --> 00:07:42,312
the Range Engineering
Branch, Code MC, engineers

168
00:07:42,395 --> 00:07:45,315
and software developers
build, integrate,

169
00:07:45,398 --> 00:07:46,883
and verify range assets.

170
00:07:46,966 --> 00:07:49,269
This is how they ensure the
aircraft telemetry can be

171
00:07:49,352 --> 00:07:53,673
received and processed for
control room display monitoring,

172
00:07:53,757 --> 00:07:55,075
that aircraft position
can be tracked

173
00:07:55,158 --> 00:07:56,276
for situational awareness,

174
00:07:56,359 --> 00:07:57,110
>> All right.

175
00:07:57,193 --> 00:07:59,846
This is TD on Data 2,
I'll go ahead

176
00:07:59,929 --> 00:08:02,415
and check everybody for their
control room display status

177
00:08:02,499 --> 00:08:03,083
now that we have both
engines up.

178
00:08:03,166 --> 00:08:04,300
>> Heard you loud and clear.

179
00:08:04,384 --> 00:08:09,506
>> and that control room voice
communications are working.

180
00:08:09,589 --> 00:08:14,144
For unmanned aircraft Code MC
verifies uplinks for command

181
00:08:14,227 --> 00:08:17,714
and control and flight
termination systems.

182
00:08:17,797 --> 00:08:19,115
>> We're gonna arm...
and terminate.

183
00:08:19,199 --> 00:08:23,370
>> We are primarily dedicated
towards looking at all the data

184

00:08:23,453 --> 00:08:27,774
that comes from the moment it
leaves the airplane all the way

185
00:08:27,857 --> 00:08:31,911
to the ground and into
the researchers' hands.

186
00:08:31,995 --> 00:08:33,880
Code MC is made up
of two groups,

187
00:08:33,963 --> 00:08:35,215
a software engineering team

188
00:08:35,298 --> 00:08:37,434
and then the hardware
engineering team.

189
00:08:37,517 --> 00:08:39,135
For the hardware team, we
work with the project to see

190
00:08:39,219 --> 00:08:42,172
if our current assets
can meet their needs.

191
00:08:42,255 --> 00:08:46,543
If it doesn't then we
have to go figure out

192
00:08:46,626 --> 00:08:50,880
and engineer the best way
to meet the project needs

193
00:08:50,964 --> 00:08:54,100
which could be figuring out
a new transmitter scheme,

194
00:08:54,184 --> 00:08:56,886

or new transmitter hardware.

195
00:08:58,188 --> 00:09:00,874
In a supersonic aircraft,
for example,

196
00:09:00,957 --> 00:09:02,976
they might need different
hardware

197
00:09:03,059 --> 00:09:05,612
that would be specialized
to be able

198
00:09:05,695 --> 00:09:07,897
to handle supersonic
environments.

199
00:09:10,550 --> 00:09:12,235
We utilize telemetry assets.

200
00:09:12,318 --> 00:09:13,670
Telemetry is the
data that's going

201
00:09:13,753 --> 00:09:15,071
from the airplane to the ground.

202
00:09:15,155 --> 00:09:17,874
We do a little bit of command
and control transmissions

203
00:09:17,957 --> 00:09:21,611
which is the controlling
of the airplane going

204
00:09:21,694 --> 00:09:23,313
from the ground up
to the airplane.

205
00:09:23,396 --> 00:09:26,182
Those are only used with
unmanned airplane assets.

206
00:09:26,266 --> 00:09:32,005
Then we also have radar which
is a way of tracking a vehicle.

207
00:09:32,088 --> 00:09:36,676
We have flight termination
systems which are only utilized

208
00:09:36,760 --> 00:09:39,012
with unmanned vehicles and
those are, in the event,

209
00:09:39,095 --> 00:09:43,867
that something bad is happening
with the aircraft we can bring

210
00:09:43,950 --> 00:09:45,435
it in a controlled decent

211
00:09:45,518 --> 00:09:47,137
to the ground before
it does something bad.

212
00:09:47,220 --> 00:09:50,340
We also provide the
communications

213
00:09:50,423 --> 00:09:53,176
from the ground here in the
control room all the way

214
00:09:53,259 --> 00:09:55,645
to both the aircraft,
the flight crew,

215

00:09:55,728 --> 00:09:58,548
and the ground crew
on the ground.

216
00:09:58,631 --> 00:09:59,749
>> NASA six two.

217
00:09:59,833 --> 00:10:01,768
>> On the software engineering
side, what we do is ensure

218
00:10:01,851 --> 00:10:03,069
that the data that
they're sending

219
00:10:03,153 --> 00:10:05,939
down from the aircraft
can be displayed

220
00:10:06,022 --> 00:10:08,575
in the control room correctly.

221
00:10:08,658 --> 00:10:10,610
There are sensors on the
aircraft and when each

222
00:10:10,693 --> 00:10:13,346
of those sensors move
that data is telemetered

223
00:10:13,429 --> 00:10:14,380
down to the control room.

224
00:10:14,464 --> 00:10:17,534
Everything's coming
down in like 1s and 0s.

225
00:10:17,617 --> 00:10:18,868
And we work as translators.

226
00:10:18,952 --> 00:10:21,671
So we take that data, we
translate it and we put

227
00:10:21,754 --> 00:10:23,873
that into a readable format

228
00:10:23,957 --> 00:10:25,008
that can be displayed
in the control room.

229
00:10:25,091 --> 00:10:28,344
They want to see maybe
specific items on their display.

230
00:10:28,428 --> 00:10:32,682
They also want to see where the
aircraft is, where it's located.

231
00:10:32,765 --> 00:10:34,234
We have a couple of
different little applications

232
00:10:34,317 --> 00:10:36,135
that were designed
and developed here.

233
00:10:36,219 --> 00:10:37,704
There's one called CISBoomDA.

234
00:10:37,787 --> 00:10:41,941
That is Cockpit Interactive
Sonic Boom Display Avionics.

235
00:10:42,025 --> 00:10:44,944
That's one used specifically
for supersonic flights.

236
00:10:45,028 --> 00:10:47,447

It shows us where all the booms
are going to hit on the ground.

237
00:10:47,530 --> 00:10:50,216
I just like to see new
technologies being tested

238
00:10:50,300 --> 00:10:55,505
and then eventually incorporated
into the public world.

239
00:10:55,588 --> 00:11:04,647
[Music]

240
00:11:04,731 --> 00:11:08,718
[Jet engine revving up]

241
00:11:10,153 --> 00:11:12,071
>> Slaving is routed
for Guy.

242
00:11:12,155 --> 00:11:17,160
>> We're high...

243
00:11:25,485 --> 00:11:26,502
>> Got him.

244
00:11:26,586 --> 00:11:29,439
>> And brake release.

245
00:11:29,522 --> 00:11:38,665
[Music]

246
00:11:44,554 --> 00:11:48,725
>> And the squawk is
a little off,

247
00:11:48,808 --> 00:11:51,411
if you have to use it,

by about 5 degrees.

248
00:11:51,494 --> 00:11:53,413
Don't know.

249
00:11:53,496 --> 00:11:59,235
[Music]

250
00:11:59,319 --> 00:12:00,370
>> Tracking the aircraft
while it's

251
00:12:00,453 --> 00:12:03,640
in flight is the
responsibility of MR,

252
00:12:03,723 --> 00:12:05,041
the Range Operations Branch.

253
00:12:05,124 --> 00:12:07,810
From working with
the U.S. Air Force

254
00:12:07,894 --> 00:12:10,980
which controls Edwards Airspace,
to scheduling flights,

255
00:12:11,064 --> 00:12:14,767
to keeping radar dishes locked
on a supersonic airplane,

256
00:12:14,851 --> 00:12:17,403
to tracking that airplane
with long range optics,

257
00:12:17,487 --> 00:12:19,939
Code MR is responsible
for getting the data

258

00:12:20,023 --> 00:12:22,208
from the airplane to the ground.

259
00:12:22,292 --> 00:12:25,812
This branch operates the
telemetry tracking systems,

260
00:12:25,895 --> 00:12:29,782
space positioning systems,
audio communication systems,

261
00:12:29,866 --> 00:12:33,703
video systems, mission control
center, and mobile systems.

262
00:12:33,786 --> 00:12:38,041
>> The easiest way to describe
what Range Operations does is

263
00:12:38,124 --> 00:12:44,480
we're the group that enables
the flight testing to happen

264
00:12:44,564 --> 00:12:46,916
so that the project gets
the data that they want.

265
00:12:47,000 --> 00:12:49,969
We're the ones that collect
the data from the airplane,

266
00:12:50,053 --> 00:12:52,472
break it back out into
its individual parameters,

267
00:12:52,555 --> 00:12:54,040
and display it in
the control room

268
00:12:54,123 --> 00:12:58,544

so that the engineers can see
what the airplane is doing.

269
00:12:58,628 --> 00:13:02,382
We work very closely with MC so
that we understand the systems

270
00:13:02,465 --> 00:13:06,402
so that when it gets turned
over to us, Range Operations,

271
00:13:06,486 --> 00:13:10,740
we know how the system
is supposed to operate.

272
00:13:10,823 --> 00:13:12,275
>> Locked on radar, right?

273
00:13:12,358 --> 00:13:14,744
>> We have two instrumentation
radars.

274
00:13:14,827 --> 00:13:18,147
What those are used for
is to track the airplane

275
00:13:18,231 --> 00:13:20,616
within the restricted area.

276
00:13:20,700 --> 00:13:22,802
I also have telemetry dishes.

277
00:13:22,885 --> 00:13:24,270
We have three fixed dishes.

278
00:13:24,354 --> 00:13:28,374
They're used to acquire
the data from the airplane.

279

00:13:28,458 --> 00:13:31,644
What happens is on the airplane
you have individual parameters.

280
00:13:31,728 --> 00:13:35,581
They take all of those
put them into one stream

281
00:13:35,665 --> 00:13:37,283
and then it's transmitted
down to the ground.

282
00:13:37,367 --> 00:13:41,471
The telemetry antenna
acquires that signal

283
00:13:41,554 --> 00:13:43,272
and then sends it through fiber.

284
00:13:43,356 --> 00:13:46,943
We have the TRAPS system which
is the Telemetry Radar

285
00:13:47,026 --> 00:13:50,046
Acquisition And Processing
System which is what breaks the

286
00:13:50,129 --> 00:13:52,215
parameters out individually and
then displays them

287
00:13:52,298 --> 00:13:55,001
in the control room
on the displays.

288
00:13:55,084 --> 00:13:59,706
When a F15 or an F18 is
going out and doing a test,

289
00:13:59,789 --> 00:14:02,909

there's a lot of stuff that goes
on the airplane side to lead

290
00:14:02,992 --> 00:14:06,679
up to the flight as well as
all of the expendables, gas,

291
00:14:06,763 --> 00:14:09,248
hydraulic oil, that the
airplane has to expend.

292
00:14:09,332 --> 00:14:11,567
So we don't want to be the cause

293
00:14:11,651 --> 00:14:13,736
of them not getting the
data that they want.

294
00:14:13,820 --> 00:14:15,004
So we make sure that all

295
00:14:15,088 --> 00:14:18,274
of our equipment is
operating correctly,

296
00:14:18,357 --> 00:14:20,810
do maintenance on
all of our systems,

297
00:14:20,893 --> 00:14:24,397
and that we don't cause a
problem for the project.

298
00:14:28,384 --> 00:14:29,969
>> All right.

299
00:14:30,053 --> 00:14:31,070
There you go.

300

00:14:31,154 --> 00:14:40,296
[Music]

301
00:14:45,985 --> 00:14:49,138
>> After a flight, the data
arrives

302
00:14:49,222 --> 00:14:52,575
at the Information
Services Branch or Code MI

303
00:14:52,658 --> 00:14:55,845
which provides information
technology solutions

304
00:14:55,928 --> 00:14:56,846
for NASA's workforce.

305
00:14:56,929 --> 00:14:59,315
Everything from desktops
to internet connections.

306
00:14:59,398 --> 00:15:03,770
Code MI also manages
Armstrong's data center

307
00:15:03,853 --> 00:15:06,506
and network infrastructure
ensuring the right data is

308
00:15:06,589 --> 00:15:09,208
available to the
appropriate users.

309
00:15:09,292 --> 00:15:10,610
From routine e-mail

310
00:15:10,693 --> 00:15:12,311
to specialized mission
specific flight data.

311
00:15:12,395 --> 00:15:18,668
Finally MI provides multimedia
services from graphic artists,

312
00:15:18,751 --> 00:15:22,038
photographers, and
videographers, to web and repro.

313
00:15:22,121 --> 00:15:25,241
These skilled individuals
ensure effective communication

314
00:15:25,324 --> 00:15:28,344
of the many activities and
accomplishments of the Center.

315
00:15:28,427 --> 00:15:32,949
These services include airborne
photography and videography,

316
00:15:33,032 --> 00:15:35,334
specialty services driven by
the demands of flight research.

317
00:15:35,418 --> 00:15:39,839
The multimedia products help
make this information accessible

318
00:15:39,922 --> 00:15:42,708
to engineers, researchers,
partners, and stakeholders

319
00:15:42,792 --> 00:15:47,980
around the Center, around the
agency, and out in the public.

320
00:15:48,064 --> 00:15:50,967
>> MI is really more
the behind the scenes.

321
00:15:51,050 --> 00:15:52,034
We're infrastructure.

322
00:15:52,118 --> 00:15:54,737
We're basically data plumbers.

323
00:15:54,821 --> 00:15:56,005
Instead of water,
we're moving 1s and 0s.

324
00:15:56,088 --> 00:16:00,143
So when you need a new service
we help provide that to you.

325
00:16:00,226 --> 00:16:01,611
It could be something as
simple as a network drop.

326
00:16:01,694 --> 00:16:03,679
It could be a whole
configuration

327
00:16:03,763 --> 00:16:05,615
in our data center.

328
00:16:05,698 --> 00:16:07,967
So basically we provide
all the support

329
00:16:08,050 --> 00:16:10,336
that helps those different
branches work together.

330
00:16:10,419 --> 00:16:13,039
A lot of what IT is
is infrastructure.

331
00:16:13,122 --> 00:16:15,408

You have that in your home
the things that you can't see.

332
00:16:15,491 --> 00:16:16,375
It could be plumbing.

333
00:16:16,459 --> 00:16:18,144
It could be cabling
for your electricity.

334
00:16:18,227 --> 00:16:19,145
Anything that you don't see

335
00:16:19,228 --> 00:16:20,813
but you certainly see
it when it doesn't work.

336
00:16:20,897 --> 00:16:23,583
So our job is to make it so that
you don't have a failure.

337
00:16:23,666 --> 00:16:25,001
So it's always there 24/7.

338
00:16:25,084 --> 00:16:28,538
It's constantly running and
so we have a team of people

339
00:16:28,621 --> 00:16:31,607
to ensure that those services
are delivered all the time.

340
00:16:31,691 --> 00:16:35,244
You're going to get a
desk phone, a VOIP phone.

341
00:16:35,328 --> 00:16:37,713
You're going to have some
sort of desktop computer.

342
00:16:37,797 --> 00:16:39,448
It could be a laptop,
could be a work station,

343
00:16:39,532 --> 00:16:41,601
and a local help desk to
provide computer support.

344
00:16:41,684 --> 00:16:44,704
And those are all very
visible but they're, perhaps,

345
00:16:44,787 --> 00:16:47,173
not the most important
resource or infrastructure

346
00:16:47,256 --> 00:16:49,642
that we bring to the Center.

347
00:16:49,725 --> 00:16:52,478
Some of those would really be
our network operations center,

348
00:16:52,562 --> 00:16:54,080
our data center or
obviously the network

349
00:16:54,163 --> 00:16:58,067
and all the infrastructure
that ties all that together.

350
00:16:58,150 --> 00:16:59,769
The Network Operations
Center or the NoC,

351
00:16:59,852 --> 00:17:02,772
it's a very valuable
part to any network.

352

00:17:02,855 --> 00:17:04,340
What you're doing there is
you're monitoring the health

353
00:17:04,423 --> 00:17:06,742
and status of your
entire network.

354
00:17:06,826 --> 00:17:10,179
You're not only looking for bad
guys or trouble that's happening

355
00:17:10,263 --> 00:17:11,480
but you're really
monitoring to make sure

356
00:17:11,564 --> 00:17:13,749
that there's nothing amiss

357
00:17:13,833 --> 00:17:17,737
and that all the infrastructure
is working as desired.

358
00:17:17,820 --> 00:17:20,806
[Music]

359
00:17:20,890 --> 00:17:23,175
During a mission
the data would flow

360
00:17:23,259 --> 00:17:25,244
through all the different
consoles in the control room

361
00:17:25,328 --> 00:17:27,813
then eventually,
it could be mission data,

362
00:17:27,897 --> 00:17:29,982
it could be telemetry data, it

will get sent back over here

363
00:17:30,066 --> 00:17:34,670
to our data center and we will
do the post flight processing

364
00:17:34,754 --> 00:17:36,405
into the flight data
archive system.

365
00:17:36,489 --> 00:17:39,475
And then that data is available
for researchers and scientists

366
00:17:39,558 --> 00:17:43,713
to review here or later on as
their mission needs require.

367
00:17:43,796 --> 00:17:48,267
[Music]

368
00:17:48,351 --> 00:17:51,637
Another big facet of information
technology or Code MI

369
00:17:51,721 --> 00:17:55,074
over here is what we have
over in photo and graphics,

370
00:17:55,157 --> 00:17:57,677
video, and the repro shop.

371
00:17:57,760 --> 00:18:01,747
[Music]

372
00:18:01,831 --> 00:18:03,516
They make a coordinated
effort to help our customers.

373

00:18:03,599 --> 00:18:07,403
The videographers here provide
live video support for the chase

374
00:18:07,486 --> 00:18:10,406
and that's sent down
to the mission control room.

375
00:18:10,489 --> 00:18:13,342
In addition to supporting
specific missions

376
00:18:13,426 --> 00:18:15,945
and flight operations, our
job extends beyond that.

377
00:18:16,028 --> 00:18:18,614
We support the entire Center

378
00:18:18,698 --> 00:18:21,067
with connected technology
every day to make sure

379
00:18:21,150 --> 00:18:22,601
that you can do your job.

380
00:18:22,685 --> 00:18:31,827
[Music]

381
00:18:38,617 --> 00:18:40,369
>> If you think of Code M
overall

382
00:18:40,453 --> 00:18:42,338
as an underlying
IT infrastructure

383
00:18:42,421 --> 00:18:47,076
with two highly specialized
IT systems sitting

384
00:18:47,159 --> 00:18:49,912
on top of it, the range
and simulation,

385
00:18:49,996 --> 00:18:51,614
we basically provide
all that connectivity

386
00:18:51,697 --> 00:18:54,500
to the virtual world whereas
the range provides connectivity

387
00:18:54,583 --> 00:18:56,736
to the physical airspace.

388
00:18:56,819 --> 00:18:59,805
And of course, IT provides all
the connections underneath.

389
00:18:59,889 --> 00:19:02,575
>> My favorite part
is being able

390
00:19:02,658 --> 00:19:06,412
to see new technologies
being tested on aircrafts.

391
00:19:06,495 --> 00:19:09,548
It's really amazing to
see something in the paper

392
00:19:09,632 --> 00:19:11,300
or in news or something,
you look

393
00:19:11,384 --> 00:19:14,670
and you see that's the project
I got to work on and I got

394
00:19:14,754 --> 00:19:16,739
to see it from beginning to end.

395
00:19:16,822 --> 00:19:19,608
>> We have not only the assets

396
00:19:19,692 --> 00:19:22,345
to provide our industry
partners with the data they want

397
00:19:22,428 --> 00:19:25,514
but we have the expertise
that goes behind it.

398
00:19:25,598 --> 00:19:26,916
>> So please come fly with us.

399
00:19:26,999 --> 00:19:28,467
We'll treat your data
like it's our very own.

400
00:19:28,551 --> 00:19:37,693
[Music]

401
00:19:40,930 --> 00:19:42,581
>> A strong team with
an important role,

402
00:19:42,665 --> 00:19:46,168
the Mission Information And Test
Systems Directorate helps

403
00:19:46,252 --> 00:19:49,438
separate the real from the
imagined through flight.