1
00:00:01,276 --> 00:00:02,366
>> Rob Navias: And welcome back

2
00:00:02,366 --> 00:00:04,566
with us inside the International
Space Station Flight

3
00:00:04,566 --> 00:00:05,356
Control Room.

4
00:00:05,706 --> 00:00:08,096
As you've been watching,
Karen Nyberg

5
00:00:08,096 --> 00:00:09,656
and Chris Cassidy
have been working

6
00:00:09,966 --> 00:00:13,226
with the SPHERES satellites
on a dry run for competition

7
00:00:13,226 --> 00:00:14,996
with students at MIT next week.

8
00:00:15,386 --> 00:00:17,566
A different sort of
satellite is closing

9
00:00:17,566 --> 00:00:20,026
in on the International
Space Station in the form

10
00:00:20,026 --> 00:00:23,306
of a Japanese cargo ship called
the H-II Transfer Vehicle

11
00:00:23,596 --> 00:00:28,406
or the HTV-4, a big cargo ship

due to arrive on Friday morning.

12
00:00:28,406 --> 00:00:31,156
And with us today here in
the ISS Flight Control Room

13
00:00:31,396 --> 00:00:34,696
to talk a little bit
about HTV, its operation

14
00:00:34,696 --> 00:00:37,566
and upcoming activities, is
the NASA Lead Flight Director

15
00:00:37,566 --> 00:00:39,316
for HTV-4, Ed Van Cise.

16
00:00:39,316 --> 00:00:40,456
Ed, thanks for joining us.

17
00:00:40,526 --> 00:00:42,346
>> Ed Van Cise: Good morning
and very excited to be here

18
00:00:42,466 --> 00:00:47,246
and we've been working on
HTV-4 since HTV-3 departed just

19
00:00:47,246 --> 00:00:49,796
about a year ago so it's very
exciting to be this close

20
00:00:49,796 --> 00:00:52,126
to being able to reach
out and grab it on Friday.

21
00:00:52,996 --> 00:00:55,976
>> Rob Navias: Ed, launch
on Saturday was flawless.

22
00:00:55,976 --> 00:00:58,016
Can you give us sort
of a synopsis

23
00:00:58,016 --> 00:01:00,946
of the last several days of
activities and preparations

24
00:01:00,946 --> 00:01:04,066
by the crew on board
between now and Friday

25
00:01:04,516 --> 00:01:06,186
for the capture of
the spacecraft?

26
00:01:06,416 --> 00:01:07,416
>> Ed Van Cise: Absolutely.

27
00:01:07,416 --> 00:01:08,846
Like you said, it
was a flawless launch

28
00:01:08,846 --> 00:01:10,576
and the vehicle is
performing very well.

29
00:01:11,056 --> 00:01:13,956
It is a longer rendezvous
profile

30
00:01:13,956 --> 00:01:15,156
than some folks might be used

31
00:01:15,156 --> 00:01:18,886
to when they've recently been
watching things like progresses

32
00:01:18,886 --> 00:01:22,006

that are arriving and only four
orbits and then Dragon shows

33
00:01:22,006 --> 00:01:24,246
up just a day or
two after launch.

34
00:01:24,246 --> 00:01:27,436
So it might seem a little out
of place that HTV takes six

35
00:01:27,436 --> 00:01:28,566
or seven days to arrive.

36
00:01:29,046 --> 00:01:31,976
Of course, we take
advantage of that timeframe.

37
00:01:31,976 --> 00:01:35,016
We do a lot of the crew training
either the week before launch

38
00:01:35,016 --> 00:01:37,386
or even while HTV is on its way

39
00:01:37,386 --> 00:01:39,726
so it's still fresh
in the crews' mind.

40
00:01:39,726 --> 00:01:42,436
Just this week, we put
them through their paces

41
00:01:42,436 --> 00:01:46,096
in flying the Canadarm2 to
get them ready for capture.

42
00:01:46,516 --> 00:01:49,806
But as far as HTV itself,
there have been a couple

43
00:01:49,806 --> 00:01:52,436
of very minor things that the
team has been working through.

44
00:01:52,436 --> 00:01:55,886
One of them has to do
with the latching valves,

45
00:01:55,976 --> 00:02:00,006
the propulsion system
on one of the strings

46
00:02:00,006 --> 00:02:04,916
of its propulsion system
and well, basically what

47
00:02:04,916 --> 00:02:09,406
that is a sensor issue
that they've seen very,

48
00:02:09,406 --> 00:02:12,226
very sporadically
and not very often

49
00:02:12,226 --> 00:02:14,296
where it will indicate
one position

50
00:02:14,296 --> 00:02:15,456
where the valve is physically

51
00:02:15,486 --> 00:02:17,746
in a different position,
open versus closed.

52
00:02:17,746 --> 00:02:22,666
So it's actually been a good
test of the integrated training

53
00:02:22,666 --> 00:02:24,596
that we've done to get
ready for this mission.

54
00:02:24,596 --> 00:02:28,556
We go through a lot of different
simulated cases on being ready

55
00:02:28,556 --> 00:02:30,116
to handle situations like this.

56
00:02:30,116 --> 00:02:32,956
The Japanese team has done a
very good job investigating what

57
00:02:32,956 --> 00:02:36,046
might be wrong and coming up
with workarounds and, in fact,

58
00:02:36,136 --> 00:02:37,096
right before this interview,

59
00:02:37,096 --> 00:02:38,746
we just finished
meeting this morning

60
00:02:38,746 --> 00:02:41,916
to make sure we had a good plan
in place for rendezvous day

61
00:02:41,916 --> 00:02:45,726
so if you hear us on
rendezvous and approach talking

62
00:02:45,726 --> 00:02:47,236
about the prop system
a little bit more

63
00:02:47,236 --> 00:02:49,046

than what you might
otherwise have expected,

64
00:02:49,046 --> 00:02:49,926
that's just because we want

65
00:02:49,926 --> 00:02:53,616
to make sure we have all the
right checks and things in place

66
00:02:53,696 --> 00:02:55,636
in case the next
failure happens.

67
00:02:55,636 --> 00:02:58,306
And that's what we always worry
about and we focus our training

68
00:02:58,306 --> 00:03:01,686
on is, okay, the system is
designed to handle one problem

69
00:03:01,686 --> 00:03:04,056
such as this and we want
to make sure we're ready

70
00:03:04,056 --> 00:03:06,146
for the second problem.

71
00:03:06,326 --> 00:03:08,506
All that to say, though, that
the vehicle is very robust

72
00:03:08,506 --> 00:03:10,506
and it's very, very --

73
00:03:11,326 --> 00:03:13,816
performing very well
in its flight.

74
00:03:13,816 --> 00:03:16,896
It's been doing a whole bunch
of rendezvous burns to get us

75
00:03:16,896 --> 00:03:21,226
to this point to show up
on Friday for the ISS.

76
00:03:21,746 --> 00:03:23,676
>> Rob Navias: I think our
viewers would be interested

77
00:03:23,676 --> 00:03:27,386
in finding out why the six
days and it could be two.

78
00:03:27,386 --> 00:03:28,286
It could be seven.

79
00:03:28,286 --> 00:03:29,056
It could be longer.

80
00:03:29,226 --> 00:03:31,326
Why was six days for
this rendezvous chosen?

81
00:03:32,106 --> 00:03:32,406
>> Ed Van Cise: Right.

82
00:03:32,406 --> 00:03:35,326
So the unique thing
about HTV and some

83
00:03:35,326 --> 00:03:39,246
of our other vehicles is that
the vehicle has the capability

84
00:03:39,246 --> 00:03:41,196
to launch pretty much

at any time as long

85
00:03:41,196 --> 00:03:44,556
as the orbit path is flying
overhead of the launch site.

86
00:03:44,976 --> 00:03:48,536
So, the -- instead of, let's
say for example, the Progress

87
00:03:48,536 --> 00:03:50,356
or the Soyuz four orbit
rendezvous, the --

88
00:03:50,486 --> 00:03:53,766
not only does the orbit path
have to be over the launch site,

89
00:03:53,766 --> 00:03:56,196
but the ISS has to be in a
very specific place so that

90
00:03:56,256 --> 00:03:57,806
that shortened rendezvous
can occur

91
00:03:58,206 --> 00:03:59,806
and that all the
timing works out.

92
00:04:00,296 --> 00:04:04,196
With HTV, it has the
capability to do a wide variety

93
00:04:04,196 --> 00:04:08,216
of maneuvers on orbit, both
changing its orbital plane

94
00:04:08,516 --> 00:04:10,516
and then also changing

its altitude of course.

95
00:04:10,546 --> 00:04:15,196
And that capability allows it to
launch pretty much at any point

96
00:04:15,196 --> 00:04:15,976
and we call it phasing

97
00:04:16,736 --> 00:04:20,136
with respect to ISS, so we don't
require the Space Station to be

98
00:04:20,136 --> 00:04:21,236
at a certain point in the orbit.

99
00:04:21,906 --> 00:04:24,606
But when you set
something up like that,

100
00:04:24,876 --> 00:04:28,806
you go from a trajectory
that has just a small number

101
00:04:28,806 --> 00:04:32,286
of very large burns to get
you to that final destination

102
00:04:32,286 --> 00:04:37,046
to a trajectory that has a lot
more smaller magnitude burns

103
00:04:37,346 --> 00:04:39,396
and so that's why you're
seeing a six-day rendezvous

104
00:04:39,396 --> 00:04:39,916
in this case.

105

00:04:40,346 --> 00:04:43,606
And before we locked in
the final launch time

106
00:04:43,656 --> 00:04:48,476
for last Saturday's launch, we
could have actually launched

107
00:04:48,476 --> 00:04:50,286
on Saturday or Sunday
and still rendezvoused

108
00:04:50,286 --> 00:04:51,476
for a Friday capture.

109
00:04:51,476 --> 00:04:53,986
But once we picked the exact
launch time, then it was set

110
00:04:53,986 --> 00:04:56,336
up to be a very specific
Friday capture.

111
00:04:56,336 --> 00:04:59,806
So, yes, it's a longer profile,
but it actually provides a lot

112
00:04:59,806 --> 00:05:03,176
of flexibility for the Space
Station Program to be able

113
00:05:03,176 --> 00:05:05,426
to do the launch and
the capture operations.

114
00:05:05,896 --> 00:05:08,086
>> Rob Navias: And one of
our social media questions

115
00:05:08,186 --> 00:05:11,296

that we received from,
atirisspace blog,

116
00:05:11,596 --> 00:05:15,836
actually asks why did the HTV
actually lap the International

117
00:05:15,836 --> 00:05:16,736
Space Station?

118
00:05:17,236 --> 00:05:18,926
It's all about Johannes
Kepler, I guess.

119
00:05:19,356 --> 00:05:19,516
>> Ed Van Cise: Yeah.

120
00:05:19,516 --> 00:05:20,316
Exactly right.

121
00:05:20,506 --> 00:05:23,506
It all has to come back
to the phasing and because

122
00:05:23,506 --> 00:05:28,676
of when we launched and the
altitude of HTV relative to ISS,

123
00:05:28,736 --> 00:05:34,116
the lower you are, the faster
you go and thus, HTV went around

124
00:05:34,116 --> 00:05:35,796
and did a lap around us.

125
00:05:35,796 --> 00:05:38,416
And that all is being
set up so that on,

126

00:05:38,526 --> 00:05:42,246
actually it will be late
Thursday night here in Huston,

127
00:05:42,246 --> 00:05:46,446
HTV will show up on the same
velocity vector, same altitude

128
00:05:46,446 --> 00:05:49,066
as the Space Station, just
a few kilometers behind us

129
00:05:49,256 --> 00:05:51,736
and then we'll go into what
we call integrated operations

130
00:05:51,736 --> 00:05:54,616
where it will make its
big maneuvers to come

131
00:05:54,736 --> 00:05:57,416
up underneath us on
the R-bar, if you will.

132
00:05:57,716 --> 00:06:00,106
And it will look very similar
to what the shuttle did

133
00:06:00,106 --> 00:06:03,976
when it did its rendezvous
profile except HTV will stop

134
00:06:04,126 --> 00:06:06,826
underneath ISS instead
of doing the --

135
00:06:06,826 --> 00:06:08,416
going out in front
like Space Station,

136

00:06:08,416 --> 00:06:09,426
or like the Space Shuttle did.

137
00:06:10,256 --> 00:06:12,856
>> Rob Navias: And on
Friday morning, it will come

138
00:06:12,856 --> 00:06:14,856
up from underneath
the Space Station

139
00:06:14,856 --> 00:06:18,256
and the Cupola will be a
very busy venue with Cassidy

140
00:06:18,256 --> 00:06:21,806
and Nyberg, along with Luca
Parmitano monitoring systems

141
00:06:21,806 --> 00:06:22,936
and operating the robot arm.

142
00:06:23,156 --> 00:06:24,826
How cramped will all of that be

143
00:06:24,826 --> 00:06:27,926
and how carefully choreographed
does all of that activity

144
00:06:28,076 --> 00:06:30,756
to reach out and actually
grapple the spacecraft

145
00:06:30,756 --> 00:06:33,456
and then carefully install
it onto the Harmony node?

146
00:06:33,456 --> 00:06:35,556
>> Ed Van Cise: Yeah,
the cupola,

147
00:06:35,556 --> 00:06:38,576
everybody's favorite place
to be on the Space Station,

148
00:06:38,576 --> 00:06:40,666
and then I know everybody has
seen pictures of what it's

149
00:06:40,666 --> 00:06:43,106
like inside and, like you
said, it's a small place.

150
00:06:43,836 --> 00:06:47,646
They do train, of course, here
in Huston to do these operations

151
00:06:47,646 --> 00:06:49,256
in mock-ups of the cupola,

152
00:06:49,256 --> 00:06:51,006
but nothing beats doing
it in the real thing.

153
00:06:51,106 --> 00:06:54,166
So these last couple weeks
we have been doing training

154
00:06:54,166 --> 00:06:55,846
in the cupola to make
sure they understood

155
00:06:56,726 --> 00:06:59,736
where their body placement
will be for best having access

156
00:06:59,816 --> 00:07:02,686
to the different pieces,
parts of this orchestra.

157
00:07:03,276 --> 00:07:05,526
Really, there are
three separate roles

158
00:07:05,526 --> 00:07:07,946
that all these crewmembers are
playing and so you've got Karen

159
00:07:07,946 --> 00:07:10,076
who has got to fly the
robot arm and so she needs

160
00:07:10,076 --> 00:07:11,046
to be in a certain place.

161
00:07:11,046 --> 00:07:13,496
You've got Chris
who is helping her,

162
00:07:13,496 --> 00:07:17,086
monitoring the robotic system
so he needs to be able to see

163
00:07:17,086 --> 00:07:20,696
that information and then Luca
will also be monitoring the HTV

164
00:07:20,696 --> 00:07:24,186
systems and there's a separate
command panel to send commands

165
00:07:24,186 --> 00:07:25,446
to the HTV so he
needs to be positioned

166
00:07:25,446 --> 00:07:27,116
to be able to take care of that.

167
00:07:27,116 --> 00:07:30,496

So, having that all
laid out in the cupola

168
00:07:30,616 --> 00:07:31,676
and doing real training

169
00:07:31,676 --> 00:07:34,926
in the real vehicle this week
has been really influential

170
00:07:34,926 --> 00:07:36,386
in making sure everybody knows

171
00:07:36,386 --> 00:07:38,256
where to be and get
the job done.

172
00:07:39,066 --> 00:07:41,356
>> Rob Navias: Well, Ed,
appreciate your insight

173
00:07:41,356 --> 00:07:42,496
and we'll look forward
to working

174
00:07:42,496 --> 00:07:43,876
with you on Friday morning.

175
00:07:44,106 --> 00:07:47,196
We'll have live coverage
twice on Friday morning,

176
00:07:47,286 --> 00:07:49,986
starting at 5:00 a.m.
Central time, 6:00 Eastern,

177
00:07:50,206 --> 00:07:52,846
of the rendezvous and
grapple of the HTV-4.

178
00:07:53,116 --> 00:07:55,986
We'll come back on the air
at 8:00 a.m. Central time,

179
00:07:55,986 --> 00:07:58,586
9:00 a.m. Eastern time, for
the actual installation work

180
00:07:58,906 --> 00:08:01,056
that will take almost
two hours to complete

181
00:08:01,056 --> 00:08:03,136
and we're looking forward
to that and the arrival

182
00:08:03,136 --> 00:08:05,716
of a new ship at the
International Space Station.