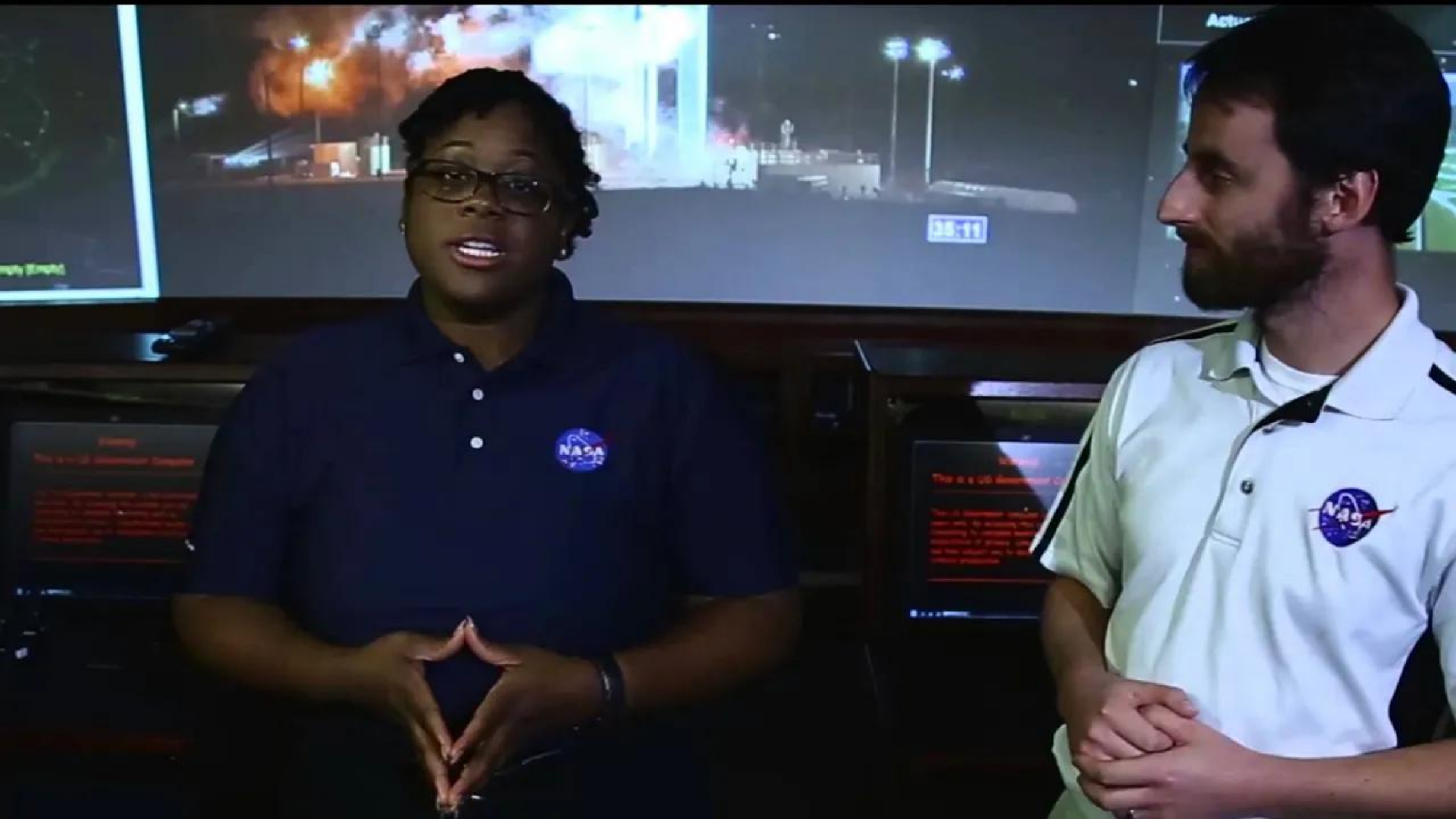
NASA
NASA

1
00:00:09,410 --> 00:00:14,490
How would you move a pet to its new home?
Well, that depends on what kind of pet it

2
00:00:14,490 --> 00:00:23,360
is, how big it is and how far you have to
travel. Most importantly you'll want to

3
00:00:23,360 --> 00:00:28,610
keep it safe, secure and healthy during the
trip home,

4
00:00:28,610 --> 00:00:32,410
still, it would be best not to overdo
things.

5
00:00:32,410 --> 00:00:37,580
But what if your pet is a little bit  bigger!

6
00:00:37,580 --> 00:00:44,540
NASA's Launch Services Program must answer
the same sort of questions before every launch.

7
00:00:44,540 --> 00:00:46,079
Hi, I'm Martha Vreeland,

8
00:00:46,079 --> 00:00:51,980
and I work in the Launch Services Program
or LSP for short. Today, I'm going to show

9
00:00:51,980 --> 00:00:56,719
you how NASA resolves many challenges when
preparing to launch one of our spacecraft

10
00:00:56,719 --> 00:01:01,190
to its new home safely, securely and in perfect
condition.

11
00:01:01,190 --> 00:01:06,430

NASA's spacecraft, like your pet, can be
as small as these Cubesats, which are only

12
00:01:06,430 --> 00:01:10,399
slightly bigger than a Rubic's cube and
weighs less than three pounds.

13
00:01:10,399 --> 00:01:17,319
Hundreds of these nano satellites could fit
onto a single Pegasus launch vehicle, one

14
00:01:17,319 --> 00:01:20,360
of the smallest rockets in NASA's fleet.

15
00:01:20,360 --> 00:01:26,630
Or they can be a large spacecraft, like this
Tracking and Data Relay Satellite.

16
00:01:26,630 --> 00:01:31,720
Getting ready for a NASA mission takes a lot
more than just selecting the right launch

17
00:01:31,720 --> 00:01:35,090
vehicle to carry the spacecraft to its destination.

18
00:01:35,090 --> 00:01:41,250
To help explain how the Launch Services Program
matches the spacecraft with the right launch

19
00:01:41,250 --> 00:01:44,720
vehicle I've asked my friend to show you
around.

20
00:01:44,720 --> 00:01:48,950
Hi, I'm Joshua. I'm an educator for NASA
at the Kennedy Space Center.

21
00:01:48,950 --> 00:01:52,489
Just like it's necessary to plan and make
decisions on how to properly transport and

22
00:01:52,489 --> 00:01:57,530
care for a new pet, NASA and the scientists
who design and develop spacecraft must also

23
00:01:57,530 --> 00:02:02,250
make important decisions to make sure that
the satellite and the rocket are compatible.

24
00:02:02,250 --> 00:02:06,390
It typically takes 3 or 4 years, and maybe
up to ten years, of careful planning and engineering

25
00:02:06,390 --> 00:02:07,550
before launch.

26
00:02:07,550 --> 00:02:11,790
Here's someone from LSP that knows what
it takes to do this awesome job. Hi, Elaina!

27
00:02:11,790 --> 00:02:12,750
Hi, Josh.

28
00:02:12,750 --> 00:02:17,510
Hi there. I'm Elaina McGhee, and I work
in the Launch Services Program as an Engineering

29
00:02:17,510 --> 00:02:21,560
Project Manager.
NASA Science missions are typically chosen

30
00:02:21,560 --> 00:02:26,860
using two primary methods. The first is a
directed mission. NASA Headquarters determines

31
00:02:26,860 --> 00:02:31,610
specific goals and requirements for a mission
and then directs a particular NASA Center

32

00:02:31,610 --> 00:02:35,890
to implement the mission.
The second way that NASA chooses science missions

33
00:02:35,890 --> 00:02:41,160
is through a competitive peer review process
known as Announcement of Opportunity, or AO.

34
00:02:41,160 --> 00:02:47,850
AO proposals are typically put together by
a team of skilled people at NASA Centers,

35
00:02:47,850 --> 00:02:53,020
other government agencies, educational institutions,
and small industry.

36
00:02:53,020 --> 00:02:59,120
A scientist called the Principal Investigator
or PI, leads the AO team and is responsible

37
00:02:59,120 --> 00:03:04,540
for developing the objectives and scientific
devices for the mission.

38
00:03:04,540 --> 00:03:10,850
LSP also provides spacecraft customers with
early analyses and various web-based tools

39
00:03:10,850 --> 00:03:16,240
that supply mission designers with performance
data for commonly used orbits.

40
00:03:16,240 --> 00:03:20,650
Once the AO proposal mission has been selected,
LSP assigns a core Mission Integration Team,

41
00:03:20,650 --> 00:03:25,750
or MIT, with the responsibility of managing
all integration and vehicle engineering aspects

42

00:03:25,750 --> 00:03:28,370
of the assigned mission.

43
00:03:28,370 --> 00:03:33,160
The LSP mission Manager and MIT must analyze
the details of how the rocket/satellite system

44
00:03:33,160 --> 00:03:38,180
works together while minimizing costs associated
with additional development products and mission

45
00:03:38,180 --> 00:03:38,290
risks.

46
00:03:38,290 --> 00:03:43,180
It is important that the spacecraft design
and vehicle selection stay within the budget

47
00:03:43,180 --> 00:03:45,069
given in the AO.

48
00:03:45,069 --> 00:03:50,709
Throughout this phase, the LSP Mission Integration
Team (MIT) assists the Spacecraft Project

49
00:03:50,709 --> 00:03:57,540
with the development of the Interface Requirements
Document, or IRD, The IRD is a major deliverable

50
00:03:57,540 --> 00:04:04,290
that defines the spacecraft size, orbital
requirements, target launch data and science

51
00:04:04,290 --> 00:04:09,010
window, and any unique spacecraft design considerations.

52
00:04:09,010 --> 00:04:13,709
All of this special knowledge provided by
experts in LSP is considered in determining

53
00:04:13,709 --> 00:04:19,239
the most capable and cost effective vehicle.
Think about it, why would you buy a 100 gallon

54
00:04:19,239 --> 00:04:22,660
aquarium when a fishbowl would do?

55
00:04:22,660 --> 00:04:23,849
Thanks, Elaina!

56
00:04:23,849 --> 00:04:29,180
NASA's Soil Moisture Active Passive or SMAP
mission will collect data from every place

57
00:04:29,180 --> 00:04:36,060
on Earth, revealing the amount of soil moisture,
and whether it is frozen or solid. This information

58
00:04:36,060 --> 00:04:41,380
will lead to improved flood prediction, drought
monitoring, and enhanced weather and climate

59
00:04:41,380 --> 00:04:46,940
forecasts. This particular spacecraft was
too large for some of the smaller vehicles

60
00:04:46,940 --> 00:04:53,150
but wasn't large enough to pay for a heavy
lift vehicle. The Delta II hadn't flown

61
00:04:53,150 --> 00:05:00,120
for three years, but fortunately there were
a few critical parts still available. LSP

62
00:05:00,120 --> 00:05:05,250
worked with ULS to assemble these parts and
prepare this vehicle in order to launch the

63
00:05:05,250 --> 00:05:10,680

SMAP Mission. This was the perfect solution for this mid-sized spacecraft.

64
00:05:10,680 --> 00:05:17,910
If someday you'd like to join NASA on this adventure of exploration it is important to

65
00:05:17,910 --> 00:05:24,980
learn all you can about science, technology, engineering and mathematics while you are

66
00:05:24,980 --> 00:05:32,960
in school. LSP is dedicated to furthering NASA's mission of exploring the unknown