1
00:00:00,500 --> 00:00:02,802
Two search projects,

2
00:00:02,835 --> 00:00:05,571
one in Arizona,

3
00:00:05,604 --> 00:00:08,775
the other in Hawaii,

4
00:00:08,808 --> 00:00:13,446
account for about 90% of all
near-Earth object discoveries.

5
00:00:13,479 --> 00:00:15,648
[wind]

6
00:00:15,681 --> 00:00:18,017
- Catalina Sky Survey and
other survey programs

7
00:00:18,050 --> 00:00:19,886
are really sort of the
start of the whole

8
00:00:19,919 --> 00:00:22,755
planetary protection ecosystem.

9
00:00:22,788 --> 00:00:24,290
It starts with discovery,

10
00:00:24,323 --> 00:00:26,793
goes onto followup and
characterization,

11
00:00:26,826 --> 00:00:28,694
impact risk analysis

12
00:00:28,727 --> 00:00:31,697

mitigation studies, but
you can't followup

13
00:00:31,730 --> 00:00:33,666
and you can't
characterize

14
00:00:33,699 --> 00:00:37,136
and you can't calculate
the impact risk

15
00:00:37,169 --> 00:00:38,805
of something you
don't discover.

16
00:00:39,772 --> 00:00:41,207
In order to find a
near earth asteroid,

17
00:00:41,240 --> 00:00:43,743
we take four images
of a patch of sky

18
00:00:43,776 --> 00:00:45,812
separated by about
five minutes.

19
00:00:45,845 --> 00:00:47,146
- And we take those
four images

20
00:00:47,179 --> 00:00:48,948
and we blink
them really fast

21
00:00:48,981 --> 00:00:51,851
and it creates this little
animation so we can see

22
00:00:51,884 --> 00:00:53,853

that the stars in the
background are static

23
00:00:53,886 --> 00:00:54,821
as they should be

24
00:00:54,854 --> 00:00:56,722
and if there's anything
that's moving,

25
00:00:56,755 --> 00:00:57,790
it'll pop out.

26
00:00:57,823 --> 00:00:59,892
- [Eric] And our software
compares those images

27
00:00:59,925 --> 00:01:02,495
and identifies things that are
not moving, which are stars,

28
00:01:02,528 --> 00:01:03,696
and removes those.

29
00:01:03,729 --> 00:01:06,699
Identifies things that are
transient from frame to frame

30
00:01:06,732 --> 00:01:08,735
and tries to
link those up.

31
00:01:14,473 --> 00:01:16,476
- We've probably seen about
a million asteroids

32
00:01:16,509 --> 00:01:20,313
in the last seven years that
PanSTARRS has been operating.

33
00:01:20,346 --> 00:01:23,149
It's like picking a needle
out of a haystack.

34
00:01:23,182 --> 00:01:25,618
We're looking
for distinctive motion

35
00:01:25,651 --> 00:01:28,387
and when we see distinctive
motion in asteroids

36
00:01:28,420 --> 00:01:31,424
we report them to the
Minor Planet Center.

37
00:01:31,457 --> 00:01:33,359
The Minor Planet Center
is the sort of

38
00:01:33,392 --> 00:01:36,696
world clearing house for
near earth asteroids.

39
00:01:38,564 --> 00:01:40,099
The Center for
NEO Studies,

40
00:01:40,132 --> 00:01:43,269
takes the observations
from the Minor Planet Center

41
00:01:43,302 --> 00:01:45,771
and computes the
high precision orbits

42
00:01:45,804 --> 00:01:48,441
that we use to
make predictions.

43
00:01:48,474 --> 00:01:52,011
CNEOS is also kind of an
early warning system

44
00:01:52,044 --> 00:01:53,946
for newly discovered
asteroids.

45
00:01:53,979 --> 00:01:55,148
We take the
early data

46
00:01:55,181 --> 00:01:57,016
and we compute
whether or not

47
00:01:57,049 --> 00:01:58,851
that asteroid
could hit the earth.

48
00:01:58,884 --> 00:02:00,052
If there's a chance,

49
00:02:00,085 --> 00:02:01,587
we'll send out
an early warning,

50
00:02:01,620 --> 00:02:03,689
an alert, for
follow-up observation,

51
00:02:03,722 --> 00:02:05,424
so that we can
get more data

52
00:02:05,457 --> 00:02:06,893
and then we would
know perhaps,

53

00:02:06,926 --> 00:02:08,928
whether it can hit
the earth or not.

54
00:02:12,798 --> 00:02:14,634
- Asteroid impacts
are a fact of life.

55
00:02:14,667 --> 00:02:16,536
The earth has
been impacted by asteroids

56
00:02:16,569 --> 00:02:18,571
continually through
its history.

57
00:02:18,604 --> 00:02:21,240
- We saw in 2013 in Russia

58
00:02:21,273 --> 00:02:24,777
a fairly small, by the standards
of what we're finding,

59
00:02:24,810 --> 00:02:26,479
asteroid did hit
the earth.

60
00:02:26,512 --> 00:02:28,581
I feel a little bit like a
guardian of the planet

61
00:02:28,614 --> 00:02:31,751
and doing my bit to try
to protect people.

62
00:02:31,784 --> 00:02:33,686
It is a long
term process,

63
00:02:33,719 --> 00:02:36,122

it's going take many,
many years to find all

64
00:02:36,155 --> 00:02:38,491
of the dangerous asteroids.