Key words: European Extremely Large Telescope, E-ELT

ESOcast Episode 84: The New E-ELT Design Unveiled	
00:00 **[Visual starts]** 1. In 2014, the tip of Cerro Armazones in the heart of Chile's Atacama Desert was removed — in quite a dramatic fashion. The result was a flat plateau, representing the very first stage in ESO's most ambitious project yet — constructing the European Extremely Large Telescope, or E-ELT for short. Now ESO has awarded the biggest contract in ground-based astronomy — to build the E-ELT dome and telescope structure. So it's a good time to take a look at what the E-ELT will be.	Blowing the top of Cerro Armazones Cerro Armazones flyover E-ELT animation
00:49 **ESOcast intro** 2. This is the ESOcast! Cutting-edge science and life behind the scenes at ESO, the European Southern Observatory.	ESOcast introduction
01:08 3. Not far from ESO's Paranal Observatory, Cerro Armazones will be home of the E-ELT, one of the next generation of enormous telescopes.	Road to Cerro Armazones
01:26 **[Narrator]** 4. A main mirror 39 metres across, and a protective dome almost 80 metres high, will make this one of the biggest astronomical projects ever undertaken — truly an extremely large telescope!	Computer animation E-ELT

01:45 **[Narrator]** 5. The E-ELT is, like all big astronomical telescopes, a reflecting telescope — mirrors are key to its operation, and there are five of them in total.	Computer animation on E-ELT
By bouncing the light from one mirror to another, it is possible to make the telescope relatively compact. Without this series of mirrors to fold the light beam, the telescope would be even bigger! The mirrors can also be used to make adjustments that result in the best images possible.	E-ELT mirrors, light-bouncing animation
The main mirror is segmented and is made up of 798 individual elements, which together add up to a reflecting surface 39 metres across.	Computer animation E-ELT, zoom-in M1 mirror
02:33 **[Narrator]** 6. The faint light from distant objects is reflected from the main mirror via the four other mirrors, eventually reaching the focus of the telescope, where sophisticated scientific instruments will be placed.	Computer animation E-ELT, zoom-in M1 mirror
The M4 mirror is particularly special. It is a very thin, flexible mirror that sits at the heart of the E-ELT's adaptive optics capability.	M4 mirror computer graphics
03:01 **[Narrator]** 6. Adaptive optics systems flex and bend the mirror by tiny amounts and with great precision to compensate for the blurring effect of the Earth's atmosphere.	Still image of adaptive mirror unit under test
This will allow the E-ELT to produce images of celestial objects around 15 times sharper than the Hubble Space Telescope.	Computer animation adaptive optics

03:23 **[Narrator]** 7. The E-ELT will be equipped with a suite of world-class scientific instruments as befits the most powerful telescope in the world. Work is already under way to design these devices, which will help to exploit the enormous observational power of the telescope.	Computer graphics of E-ELT instruments
03:48 **[Narrator]** 8. But in the midst of all this magnificent engineering, let's not forget that this is all about the science. As the biggest and most sophisticated telescope ever built the E-ELT will take us into a new era of observational astronomy. Its gigantic primary mirror will do two things that set the E-ELT apart from the current generation of large telescopes. First, it will collect about 15 times more light than any other optical telescope in operation today, enabling scientists to observe much fainter objects than they can now. And second, when coupled with the adaptive optics system, it will produce images that are much sharper and more detailed than currently available.	E-ELT animation
04:50 **[Narrator]** 9. This will enable astronomers to study planets around other stars in unprecedented detail. We will learn about how they form and the conditions on their surfaces. We may even find a planet similar to the Earth, and perhaps hope to find evidence for some form of life on another world. And the distant Universe will be revealed in ways never before possible. The E-ELT will answer important questions about how the Universe as we see it came into being and	Computer animation on exoplanets Computer animation distant galaxies

what the future will hold. It will enable us to study the evolution of galaxies from the earliest times, and will tell us more about some of nature's most violent events, when black holes at the centres of galaxies accrete material and become active galactic nuclei.	 Computer animation early galaxies
05:51 **[Narrator]** 10. ESO has a long and proud history of pushing the boundaries of astronomy — both the engineering and the science. The E-ELT is the next step in ESO's remarkable quest — indeed, humanity's remarkable quest — to unravel the mysteries of the Universe. It's a huge step, but it will certainly not be the last**.**	 Atacama desert timelapse E-ELT animation
06:20 **[Outro]**	ESOcast is produced by ESO, the European Southern Observatory. *ESO builds and operates a suite of the world's most advanced ground-based astronomical telescopes.*