**Cubesats – Nanotechnology in space – 12/02/16**

Whenever someone says “satellite” people often think of huge and heavy telecommunication satellites with massive solar panels. But with the cost and size of consumer electronics decreasing exponentially; the same is happening for certain satellite technologies. Today nano-technology allows us to develop and build compact satellites the size of a shoebox: so called ‘cubesats’. These satellites open a world of opportunities not only for Space agencies such as ESA but also for universities, their researchers and students. The small size of these satellites reduces not only their production costs but also their launch costs. And so it seems the future favours the small…

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| 10h00'00'' | ESA leader |
| 10h00'00'' | Title: Cubesats – Nanotechnology in space |
| * EXT. Shots of VEGA inaugural flight and launch – Arianne Space, KOUROU, French Guiana – Feb. 13 2012 – ESA * INT. Shots Cubesat preparation in Arianne Space cleanroom – KOUROU, French-Guiana – 2012 – ESA | 13th of February 2012 - the European space agency’s new lightweight launcher Vega made its inaugural flight and joined ESA’s family of launchers. In its payload: 7 cubesats or nanosatellites. It was the first time ESA was launching such small passengers. They had been developed by European Universities, paving the way for a new era in satellite technology.  Today the potential of nanosatellites is clear to all , from big space agencies to university students. As in consumer electronics, nanotechnology is changing the way we think about satellites |
| 10:00:48   * INT. Roger Walker, Testing facility – ESTEC, Noorwijk, The Netherlands – Jan 2016 – Euronews | **ITW Roger Walker, Cubesats Coordinator – ESA**  *Computers have themselves been shrinking over the time, over the years, going from a computer that would be made, decades ago, the size of a room to something that you now see on your mobile phone. And a similar analogy is happening in the space sector. We see that satellite functions have been shrinking from something the size of a washing machine to now something the size of a cubesat, basically a satellite in a shoe box.* |
| 10:01:18   * INT. Prof. Entering an office establishing - Mektory space centre, Tallinn, Estonia – Jan 2016 –Euronews * INT. Students in meeting - Mektory space centre, Tallinn, Estonia – Jan 2016 –Euronews * INT. Student working on cubesats – Mektory space centre, Tallinn – Jan 2016 – Euronews * INT. Students checking satellite design on computer - Mektory space centre, Tallinn, Estonia – Jan 2016 –Euronews * INT. Arianne Space cleanroom, Preparation of the ESTCUBE satellite for launch – KOUROU French-Guiana - Jan 2013 - ESA | Cubesats where first developed by students and professors as a means to acquire experience designing, building and operating space systems. But soon everyone realized their benefits. Cubesats are also relatively low-cost since they normally use available consumer electronics. This basically means that the technology of your mobile phone can be launched into space. And the small size and light weight also dramatically reduce launch costs.  This provides an opportunity for a large amount of experimentation in space with new technologies. Of course cubesats have their limitations. Small size reduces payload possibilities : for instance the size of optical cameras inside a cubesat limits their resolution. But for ESA it is an interesting field.. |
| 10:02:07   * INT. Roger Walker, Testing facility – ESTEC, Noorwijk, The Netherlands – Jan 2016 – Euronews | **ITW Roger Walker, Cubesats Coordinator - ESA** *We see them as complementary, because the possibility to have a constellation of satellites, for instance, this side, could offer advantages in term of remote sensing, for instance. To revisit locations about the Earth on a very frequent basis and get very quick data back on things changing on the ground. Or, for instance, a constellation could be used for sensing the atmosphere and the very rapid changes that take place in the atmosphere or indeed fort he impacts on climate.* |
| 10:02:45   * INT. Scientists at ESTEC talking about QARMAN – ESTEC, Noordwijk, the Netherlands - Jan 2016 – Euronews * Animation two nanosatellites in space – unknown date –ESA * INT. Scientists at ESTEC talking about QARMAN – ESTEC, Noordwijk, the Netherlands - Jan 2016 – Euronews * INT. Scientists at ESTEC and testing calibrating– ESTEC, Noordwijk, the Netherlands - Jan 2016 – Euronews * INT. QARMAN testing and developpement – ESTEC, Noordwijk, the Netherlands - Jan 2016 – Euronews | So today, many missions with nanosatellites are being developed and over a hundred cubesats are launched every year. Their missions range from earth observation, to deep space exploration and ESA even has a dedicated programme using these satellites for technological demonstrations, like the QARMAN cubesat developed to demonstrate technology for re-entry vehicles. Almost anything seems possible - while they still serve their original purpose, they give students the possibility to develop and build satellites for the future. |
| 10:03:17   * INT. Roger Walker, Testing facility – ESTEC, Noorwijk, The Netherlands – Jan 2016 – Euronews | **ITW Roger Walker, Cubesats Coordinator - ESA**  *I think the younger generation now growing up. They will be the one to figure out what to do with this technology in the best way and we will probably see thing we never saw or even thought of before* |
| 10:03:30   * Animation Mektory Space centre cubesat in space – unknown date – Mektory Space centre * INT. Students in meeting - Mektory space centre, Tallinn, Estonia – Jan 2016 –Euronews | With Nano-technology , the satellite technology has gained a valuable asset. And the technology opens up a whole new world of opportunities for the European space agency. As well as giving the opportunity to gain experience to the students today who can become ESA’s experts of tomorrow. |
| 10:03:47 | **B-ROLL**  **ITW Roger Walker, Cubesats Coordinator - ESA**   * **complete satellite functionality in a box** * **Cubesats sizes** * **Cut-aways and illustration shot** * **Advantages (low-cost)** * **Limits of cubesats** * **Cost to launch of a cubesat and comparison to microsatellite** |
| 10:06:15 | * **Shots of young scientist developing and testing cubesat QARMAN at ESTEC (19 shots)**   **ESTEC, Noordwijk, The Netherlands – Jan 2016 - Euronews** |
| 10:09:26 | * **Shots of Mektory Space centre (Tallinn technical university): Students in meetings, working on development of cubesats. Different stages. (15 shots)**   **Tallinn – Jan 2016 - Euronews** |
| 10:12:16 | * **Ariane Space VEGA 1 cleanroom: preparation of cubesat payload. (4 Shots)**   **Ariane Space – Kourou, French Guiana – Jan 2012** |
| 10:13:16 | * **Animation by Mektory space centre of deployment of Estonian cubesat**   **Unknown Date – Tallinn Technical University** |
| 10:13:43 | * **Animation of Estcube in space**   **2012 – Estionian Student Satellite team** |
| 10:14:55 | **END** |