

*First Workshop on*

# **Innovative System Concepts**

21 February 2006  
Noordwijk, The Netherlands

**Organised by the ESA  
Advanced Concepts Team**



**European Space Agency  
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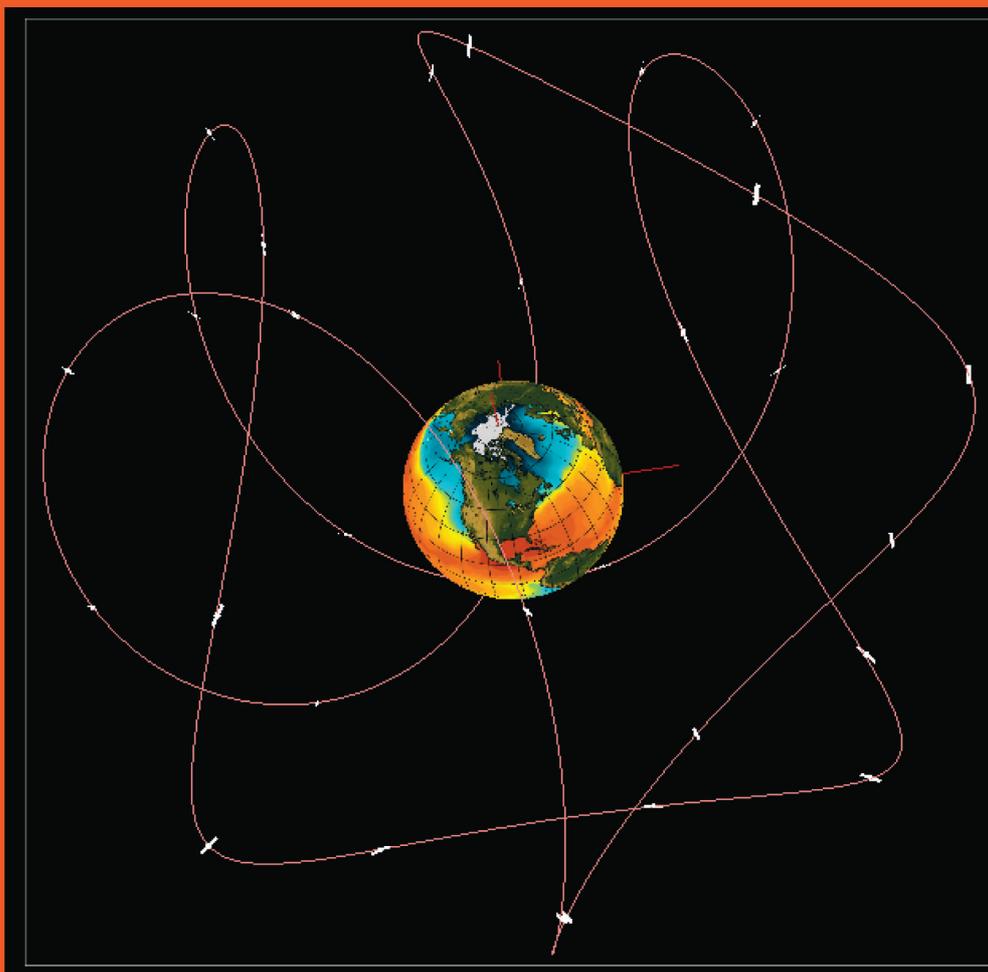
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# **Acta Futura** - Issue 2

*Special Issue on Innovative System Concepts*

*Editor: Dr. Dario Izzo*

Acta Futura: From ESA's Advanced Concepts Team



**Advanced Concepts Team**

<http://www.esa.int/act>

## Foreword

New ideas are often slow to penetrate mainstream space science. They usually require lengthy gestation periods to become accepted as practical tools in the design of real missions. For example, discussions in scientific literature on subjects such as formation flying or electric propulsion took place years before their implementation as methods to augment capabilities and lower costs. It must therefore be possible to sift through the vast body of emerging research with a critical eye, to find the ideas that will one day take their places in space mission design. The role of ESA's Advanced Concepts Team (ACT) is to identify and nurture such ideas, to identify new useful concepts, and help them to become widely spread in our community.

With this purpose in mind, the ACT organised the 1st Workshop on Innovative System Concepts, on the 21st of February 2006 at the European Space and Technology Centre in Noordwijk, The Netherlands. Invited speakers discussed ways of using spindly tethers that pull electrical power out of magnetic fields to explore the moons and planets of the outer Solar System, where little is available. Some of the missions considered used advanced propulsion options to send spacecraft to deflect dangerous asteroids or to go beyond the Solar System boundaries. Some speakers showed how a swarm of tiny satellites in formation could synthesise large structures such as telescopes and sails. Others proposed to code primitive goal-oriented instincts into the control system of each satellite of a group, to guide it to complete simple tasks while remaining unaware of contributing to a more complex undertaking. The workshop audience also learned how advances in constellation design theory now allow consideration of constellations of satellites that behave like rigid objects in space, seemingly mocking Kepler's Laws.

Some aspects of the ideas presented during the workshop are also, or also have been, the subject of studies under ESA's Ariadna programme. The main purpose of Ariadna is to enhance cooperation and facilitate research partnerships between ESA and investigators in universities and research groups.

While envisaged to give neither a definitive nor comprehensive blueprint of the future, the workshop has surely invigorated the debate on new ideas for space engineering. This second issue of *Acta Futura* offers a compilation of papers written by the speakers of the Workshop on Innovative System Concepts. Each one of the papers contains an original contribution to some advanced research area discussed at the workshop, and was agreed to have the potential to be, one day, part of the common background of space engineers. By pulling the right threads, the convoluted web of current research may be unravelled to help point the way toward ESA's objectives.

Please note: This issue of *Acta Futura* is published in the form of an ESA special publication and should be referenced as such.

More publications and studies are available from the ACT website.

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