



SPARC

Project:
analisi delle minacce e dei rischi legati allo Spazio

Roberto Lupo – Telespazio

Workshop “Il Sistema Galileo ed il suo utilizzo per le Infrastrutture Critiche del Paese”
October 15th 2013, Università Campus Biomedico - Roma



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**SPARC:
SPACE AWARENESS FOR CRITICAL INFRASTRUCTURES - A CIPS
PROJECT**



*"The Prevention, Preparedness and Consequence Management of Terrorism and other Security-related Risks (CIPS) programme is designed to protect **citizens** and **critical infrastructures** from terrorist attacks and **other security incidents**."*

"Aims: operational cooperation and coordination actions (strengthening networking, mutual confidence and understanding, developing contingency plans, exchanging and disseminating information, experiences and best practices)."

(DG Home Affairs)

Focus of the Project: Space Threats



**Space
Weather**



Debris



NEOs

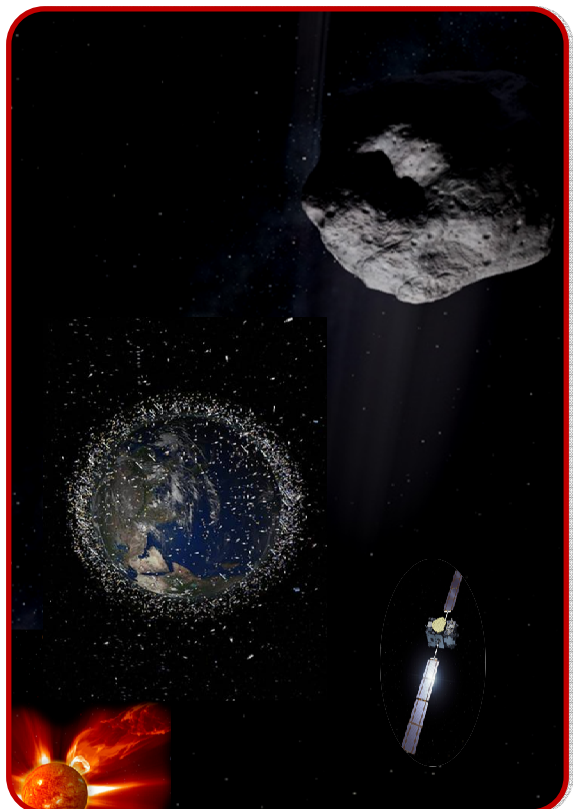


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TWO HOT ISSUES AT EUROPEAN AND WORLDWIDE LEVEL...



Space Threats



Critical infrastructures



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PROJECT TEAM



Prime Contractor - Satellite Systems and Services



Space Debris



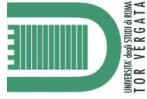
Critical Infrastructures Security - Regulations



Critical Infrastructures – Interdependency model



Near Earth Objects



Space Weather




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“PREQUEL” AND “SEQUEL”



 **Role of satellite in Critical Infrastructures Supersystem**

 **Space Awareness for Critical Infrastructures**

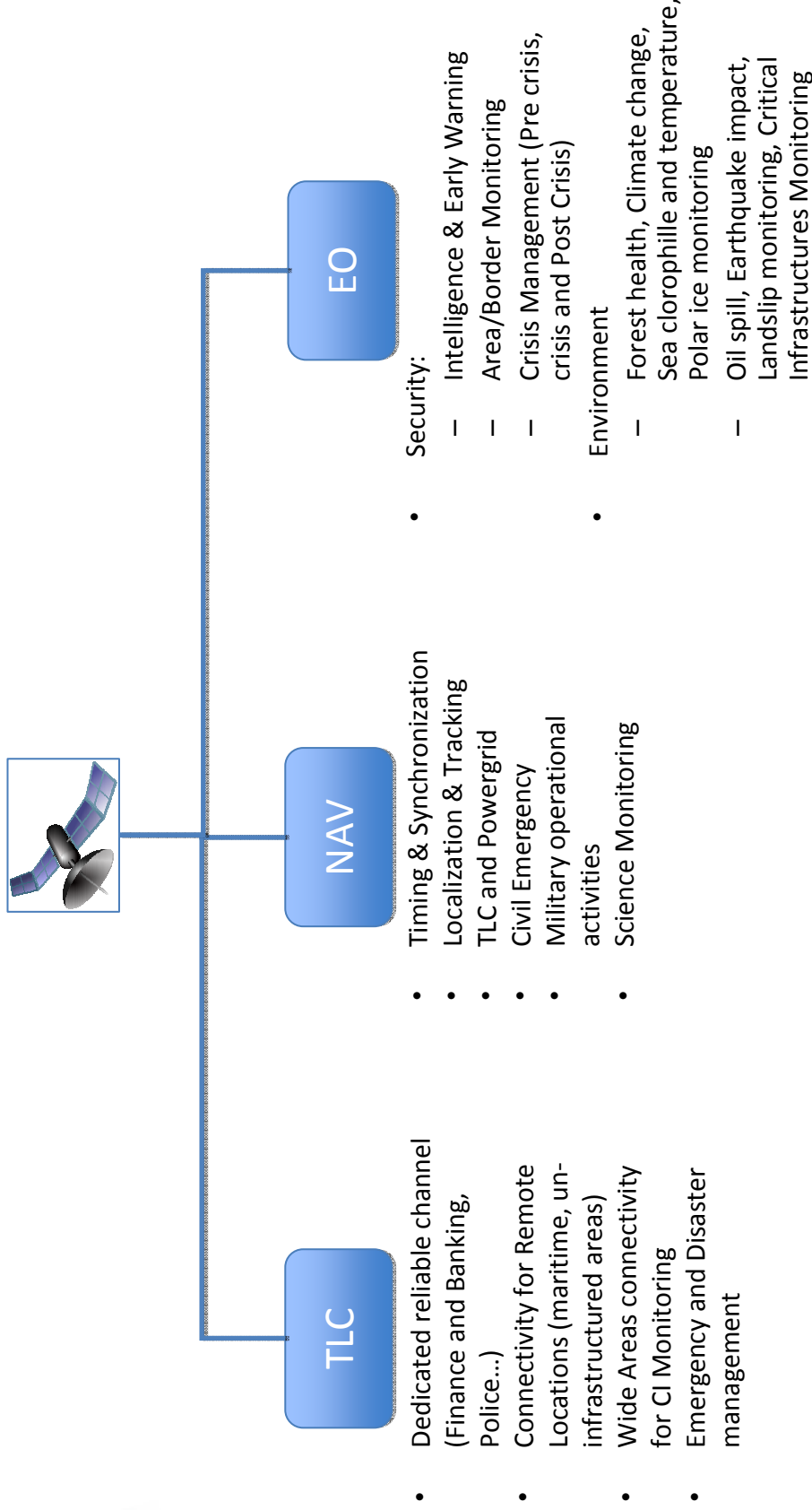
- Robustness of satellite System and Impact of satellite failures on Critical Infrastructures
- Possible Causes of failures incoming from space environment



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MAIN FIELDS OF SATELLITE SERVICES

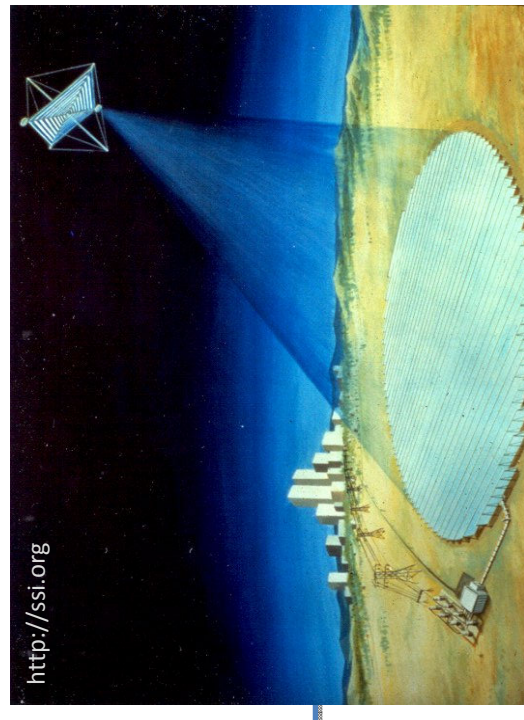
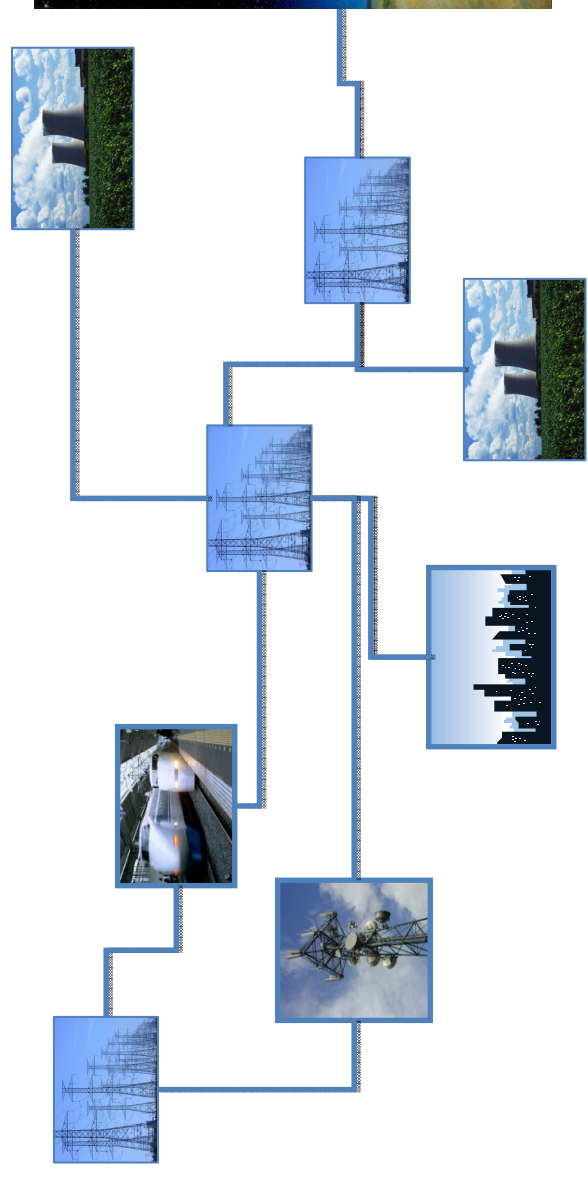


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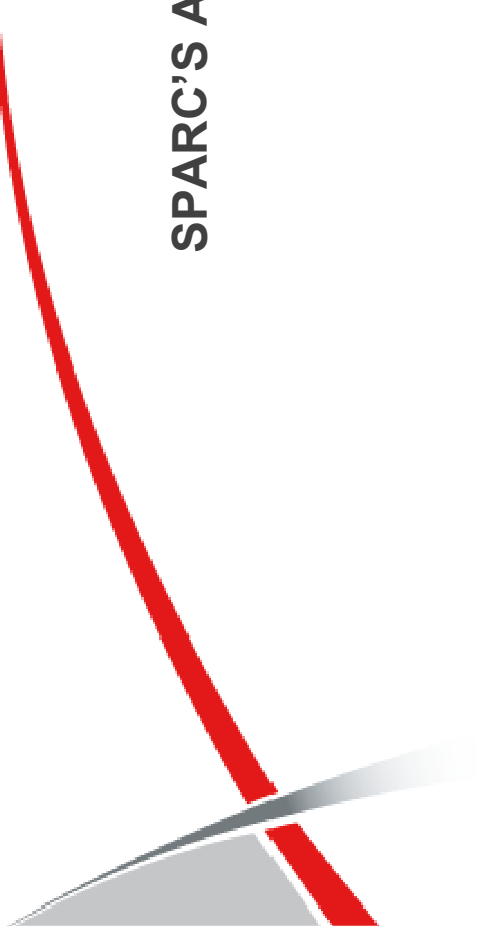


POSSIBLE NEXT SCENARIO (SCI-FI?): POWER

- ☀ Green Energy (No CO2)
- ☀ Growing Demand
- ☀ Power Sources independency



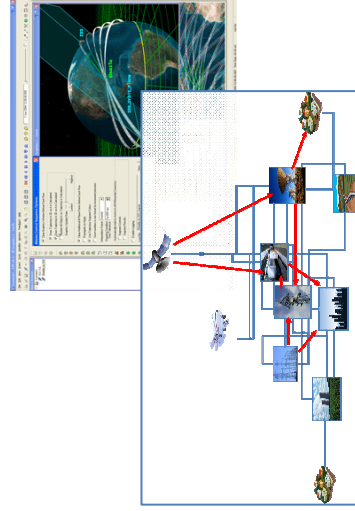
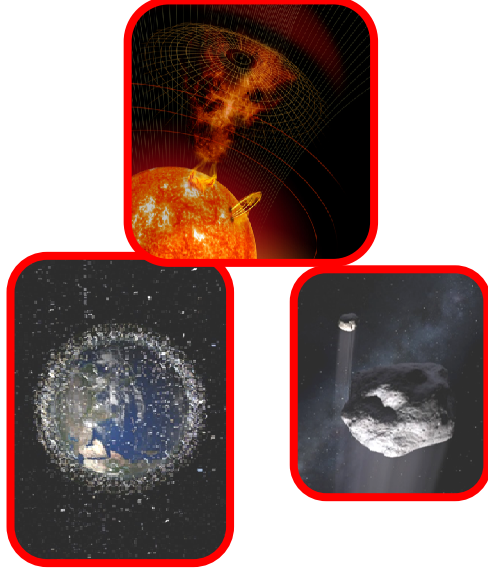
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SPARC'S AIMS [1]



- analyze space phenomena, like **Space Weather**, **Space Debris** and **Near Earth Object**, as threats for Critical Infrastructures and identify and classify and quantify possible space hazards.




- analyze their **impact Directly** on Space Infrastructures, and indirectly, through satellite **failures propagating** at ground level.

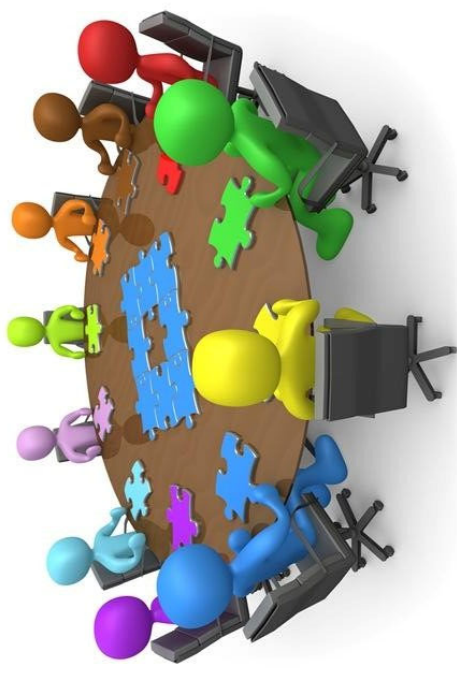
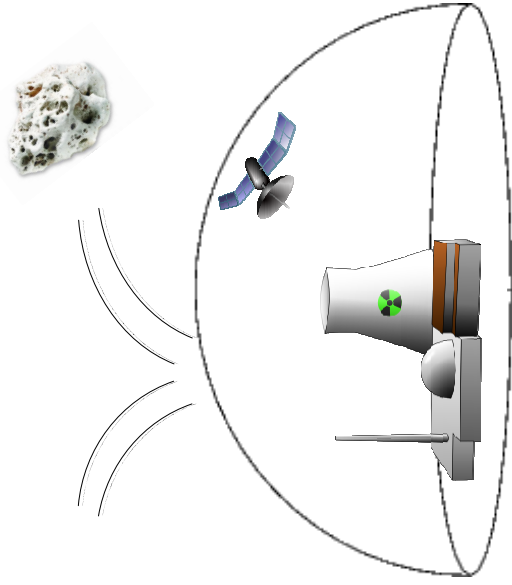


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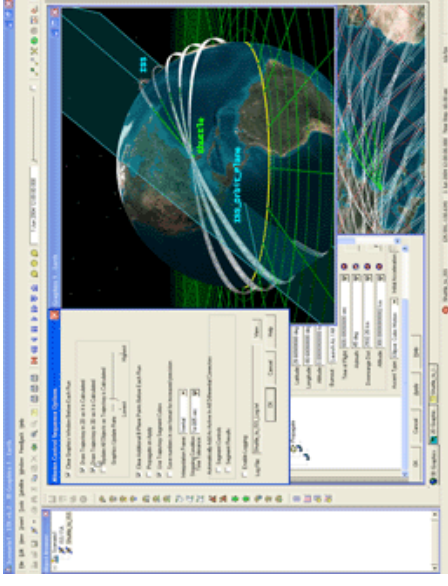
SPARC'S AIMS [2]

 share good practice to prevent or mitigate failures incoming from space threats and possible **guidelines** to improve these practices, contributing to build a **network of experts** from different fields for Critical Infrastructures Protection and Security.

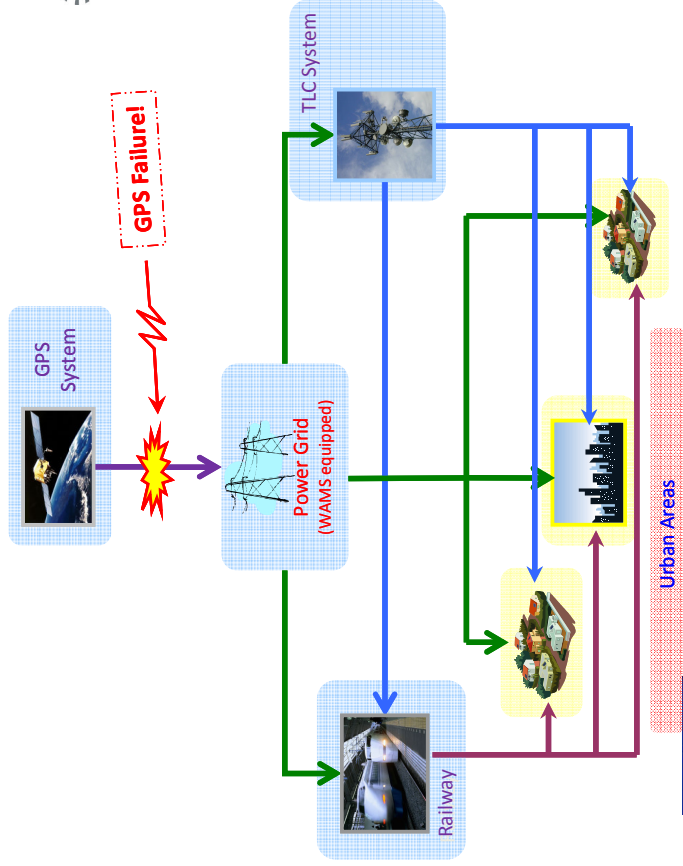


 Make **hidden stakeholders** aware to Space Threats and define Guidelines and Concepts for **New Prevention and Mitigation Services**

SPARC – Simulation tools

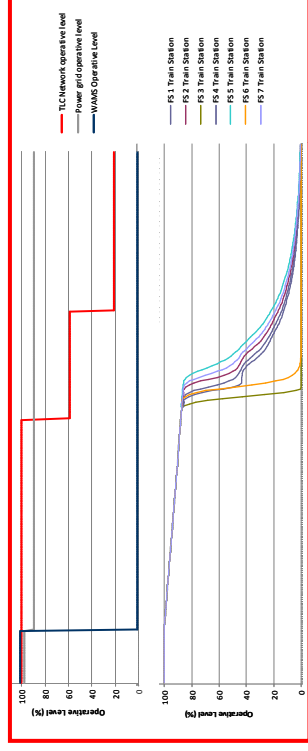


Thanks to **Satellites Simulation tools** (Like STK-SEET), it is possible to assess satellite exposure to space Weather and other threats (i.e. satellite damaging probability due to a Debris Impact).



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Through **Interdependency simulation software (CISIA)** it is possible to assess failure propagation through a network of systems, highlighting 2nd and 3rd level impacts coming from events like Space Weather, at both operative and economic level



DISSEMINATION [2]



SPARC

1st SPARC workshop

Space Threats
and Critical Infrastructures.
towards a common outlook

26th March 2013 – Polo Tecnologico Di Navacchio – Pisa - Italy

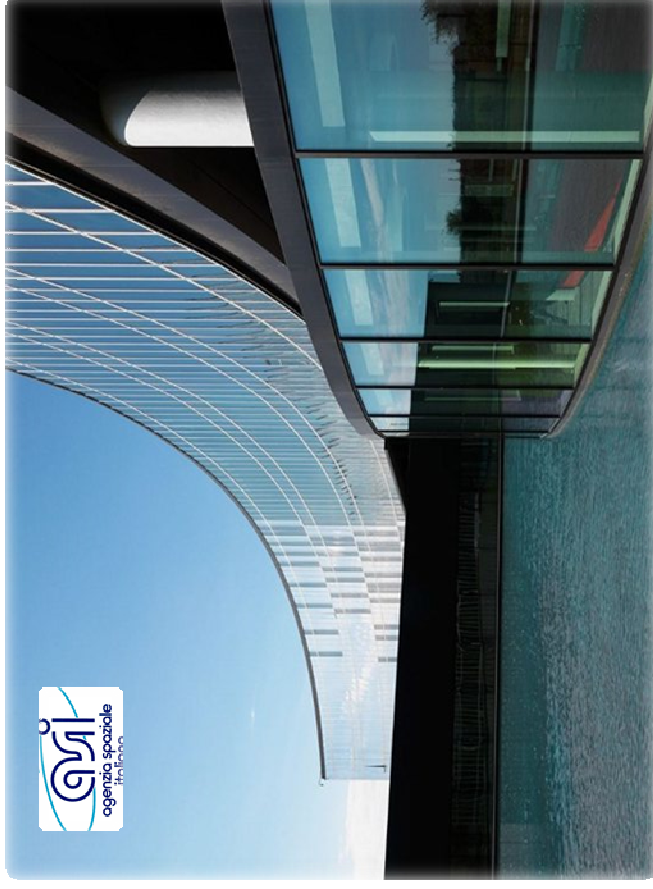
Workshop Agenda	
9.00	Registration F. Bernardi - SpaceDyS E. Epifoni - Polo Tecnologico Navacchio A. Pieroni - Provincia di Pisa R. Lupo - Telespazio
9.30	Welcome Session R. Lupo - Telespazio
9.45	SPARC project F. Bernardi - SpaceDyS
Session I: Space & Ground Critical Infrastructures: Policies, Interdependencies, Regulations	
10.00	The EC approach to Critical Infrastructure: Protection N. Mitchison - European Joint Research Centre (JRC)
10.15	Critical Infrastructures: Interdependencies R. Setola - Itiel
10.30	The role of Satellite in Critical Infrastructures R. Lupo - Telespazio
10.50	Space & Ground Critical Infrastructures: Regulations M. Martins - Itrust consulting
11.15	Coffee break M. Martins - Itrust consulting
Session II: Space Threats: Near Earth Objects, Debris, Space Weather	
11.55	Space Threats - Priorities of the Italian Space Agency C. Porelli - ASI
12.20	Solar Activity and Space Weather Awareness F. Bertelli - Tor Vergata
12.45	Toscana Spazio - The Space Consortium in Tuscany M. Luise - Toscana Spazio
12.55	Lunch M. Luise - Toscana Spazio
14.05	Space Threats - Impact of Near Earth Objects: consequences and mitigation actions F. Bernardi - SpaceDyS
14.30	Space Debris Threats A. Rossi - IFAC-ONR
Session III: Direct Experiences: Space Threats and Space Services for Critical Infrastructures	
14.55	Effects of debris impacts on satellite components J. Hugler - Fraunhofer EMU
15.20	Coffee Break T. Roman - Telespazio
15.40	GNDSS Service for Power Grid A. Ceccarelli - Telespazio
16.05	Satellite Telecommunication Services for Critical Infrastructures A. Ceccarelli - Telespazio
16.30	Final Discussion
17.00	Conclusion - End of workshop



DISSEMINATION [2]



- Final Workshop: “Space Threats and Critical Infrastructures: Risks and Countermeasures”
17th January 2014 – Rome – ASI Headquarters

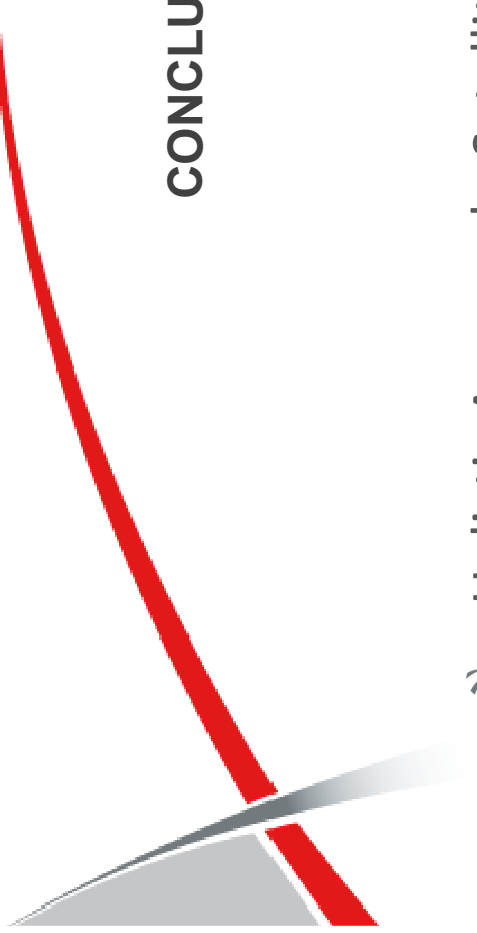


**Hidden stakeholders
are Welcome!**



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CONCLUSIONS

- ☀ Holistic Approach: Satellites services feed Ground Critical Infrastructures. A threat for satellites is a threat for the whole supersystem
- ☀ Hidden Stakeholders: CI owners not directly exposed to Space Threats, but potentially involved
- ☀ Space threats shall be investigated, together with CI supersystem:

Know more to better Protect!





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SPARC Project Website: www.sparc-project.eu



BACKUP SLIDES

SOURCES OF FAILURES FOR SATELLITES?

- ☀ Jamming – Cyber attack - Cyberterrorism
- ☀ Laser – Rockets – Conventional High tech War
- ☀ Space Environment:
 - ☀ Debris
 - ☀ Natural Objects
 - ☀ Space Weather



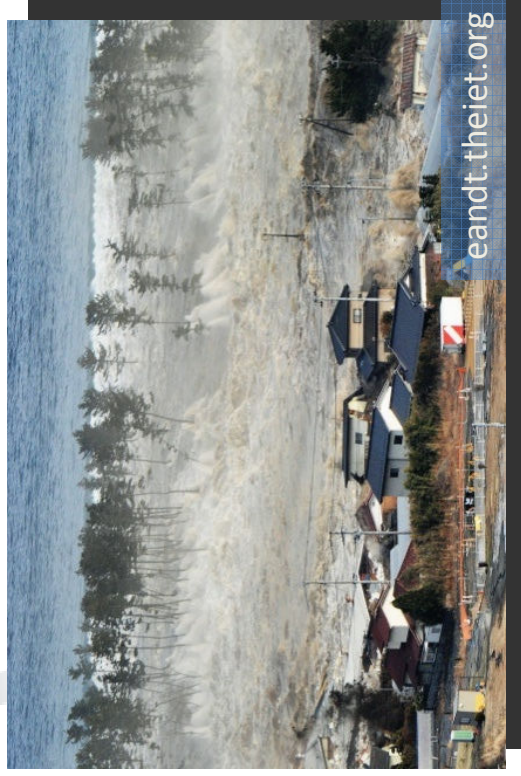
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SPACE ENVIRONMENT



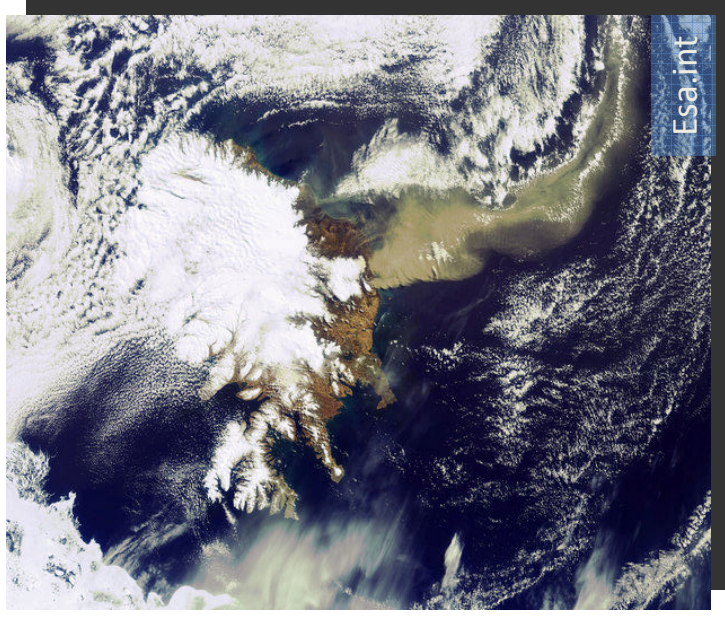
<BACKUP SLIDES>

Rare events?



Tsunami

- 🌀 Indian Ocean (26th December 2004)
- 🌀 Fukushima (11th March 2011)



Iceland Volcano Eyjafjöll (14th april 2010)



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SPACE ENVIRONMENT

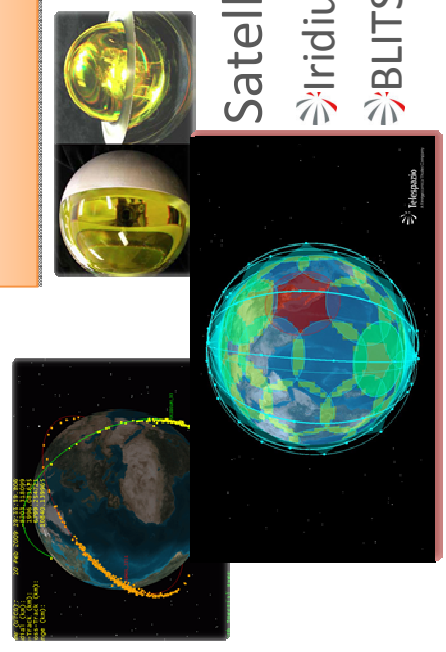
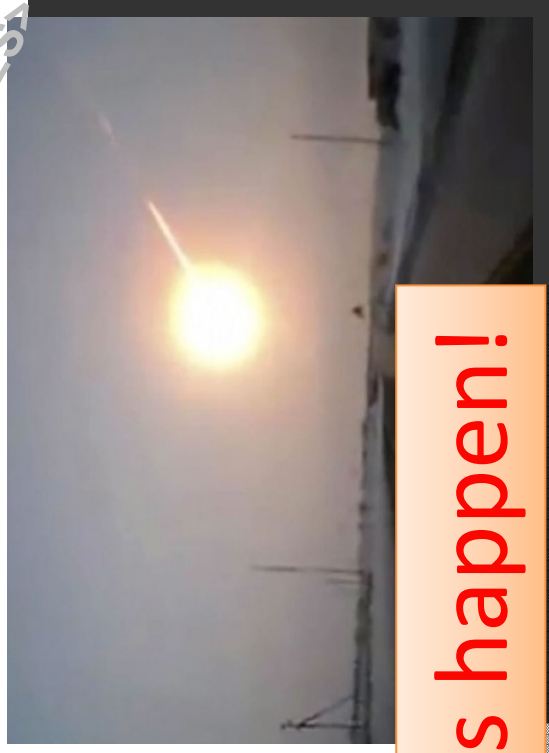


BACKUP SLIDES

Meteor impact:

- Tunguska (30 June 1908)
- Chelyabinsk (15 February 2013)

Rare events happen!



Satellite vs Debris Collision:

- Iridium33 vs Cosmos2251 Wreck (10 February 2009)
- BLITS vs FENGYUAN 1C fragment (22 January 2013)



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