

# ELEONORA: AN INTERNATIONAL SATELLITE PROJECT FOR THE CANADIAN SATELLITE DESIGN CHALLENGE

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POLYTECHNIQUE  
MONTREAL



# Outline

- Canadian Satellite Design Challenge
- The Team
- Scientific Motivation
- Project Life Cycle
- Conclusions

# The Competition

- 10 universities involved
- Aimed at developing experience in space technologies
- 3 design evaluations + environmental testing phase



## Technical objectives

- Total Mass : 4kg
- Dimensions: 3U Cubesat
- Goal: To have a mission with scientific value
- Prize: Orbital launch provided

# The Team

## Polytechnique Montréal

- 30 students
- 7 engineering disciplines
- 3 graduate students + 1 supervising professor

## University of Bologna

- 4 grad students Masters of Aerospace Engineering
- 1 Bachelor student



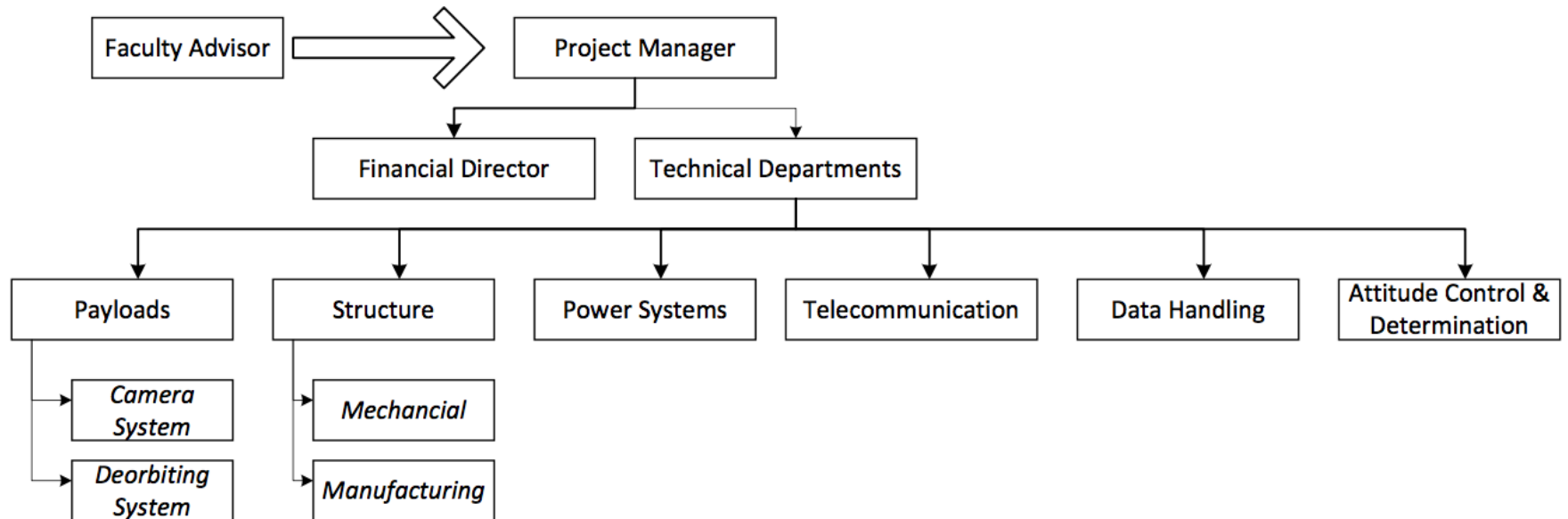
# The Technical Society



## What is it?

- Student Association founded to apply a concrete project
- Large autonomy including fund raising and recruiting (even in other universities)
- All activities are managed by the members
- Polyorbite in particular was founded for space related activities

# The Team



# Scientific Motivations

## Multispectral Imaging of Canadian Arctic

- Support the research of the Laboratory of Geotechnics and Geomorphology of Cold Regions
- Expertise : Periglacial landforms

## Mission Objectives:

- Provide periodic coverage of Bylot and Baffin islands during arctic summer
- Measure the effects of global warming

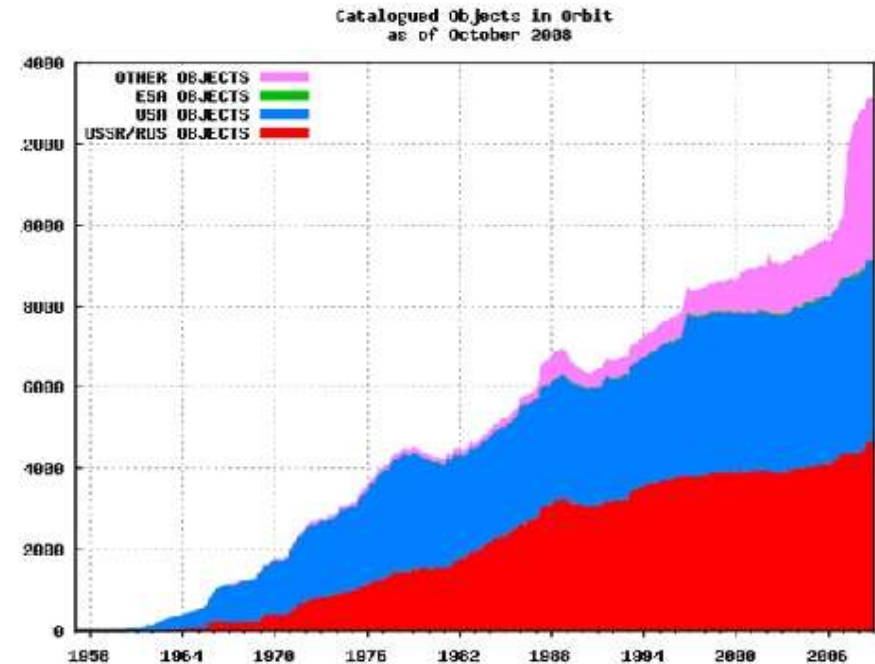
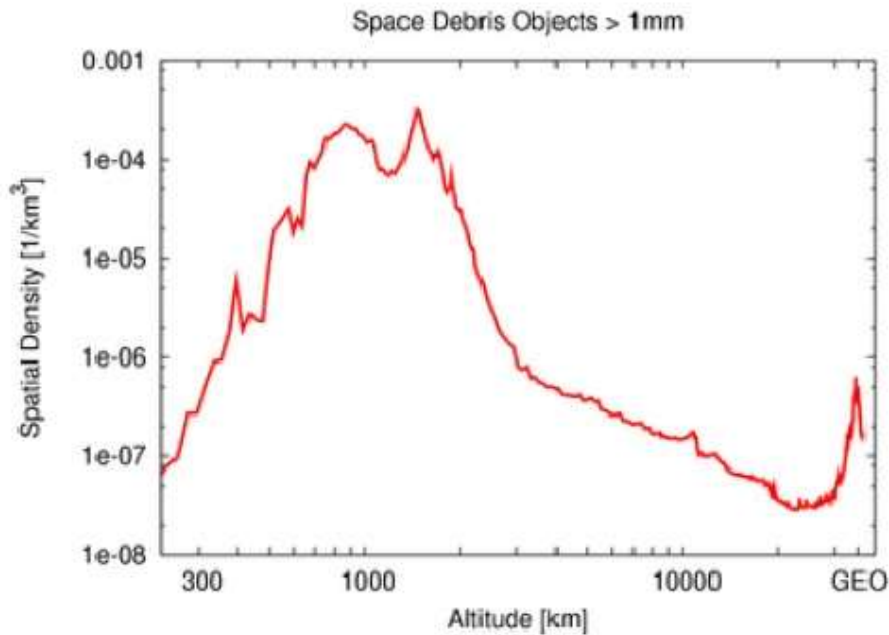
## Partner:

- Prof. Daniel Fortier, UdeM geography department



# Scientific Motivations

- Space Debris Mitigation

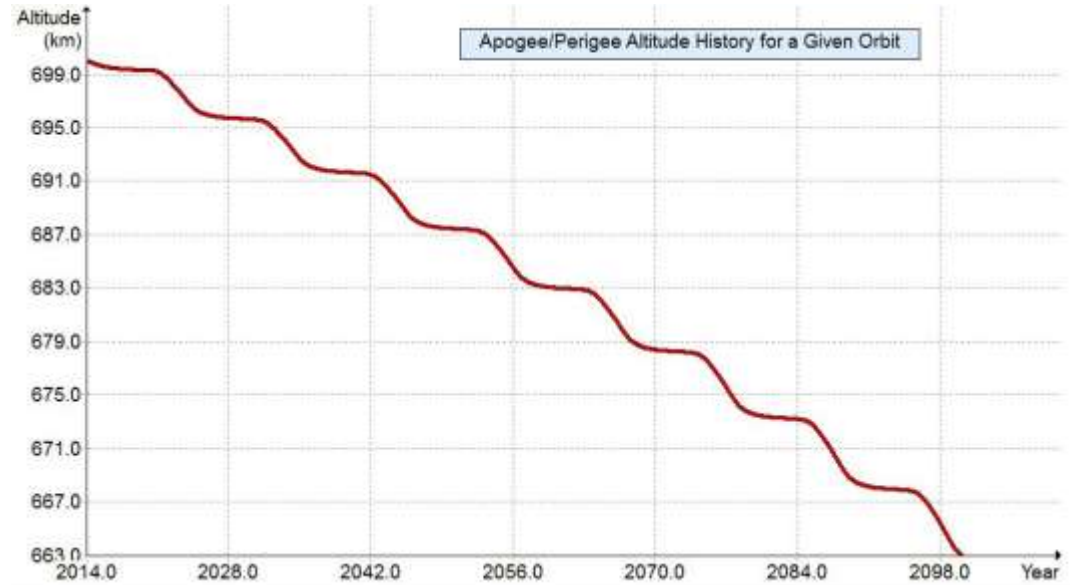


Graphs: J-C. LIOU, *et al.* *Controlling the growth of future LEO debris population with active debris removal.*



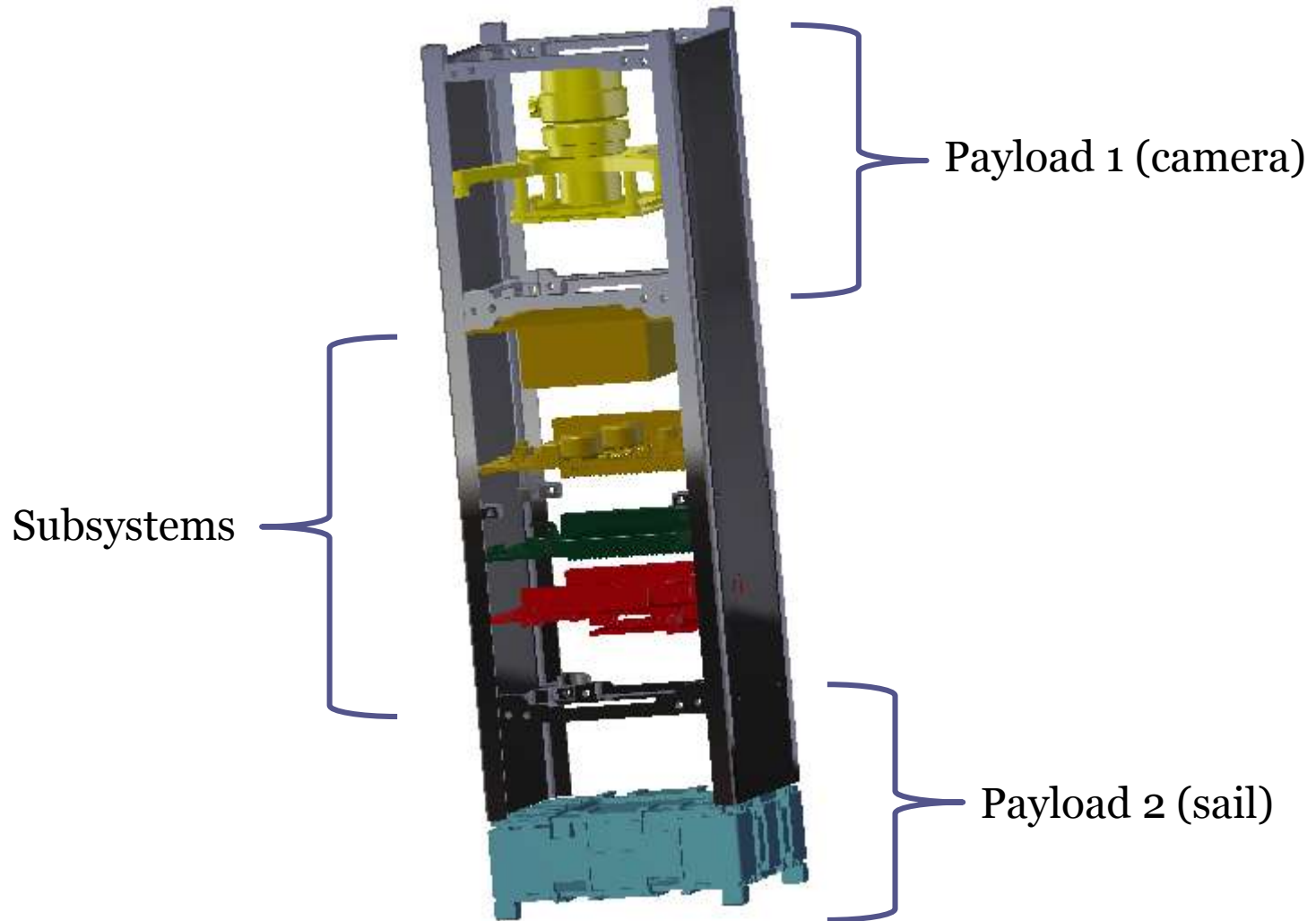
# Scientific Motivations

Without deorbiting system



Expected results

# Satellite Overview



# Payload (EPM)

## Technical details:

Type	CMOS
Mass	300 g
Resolution	Up to 5 Megapixel
Power	3.3V



•Courtesy GOMSPACE

- 1000x1000 km area to scan
- On Board processing data to size the photo to 1.6 MB
- Machine Learning

# Payload (Unibo)

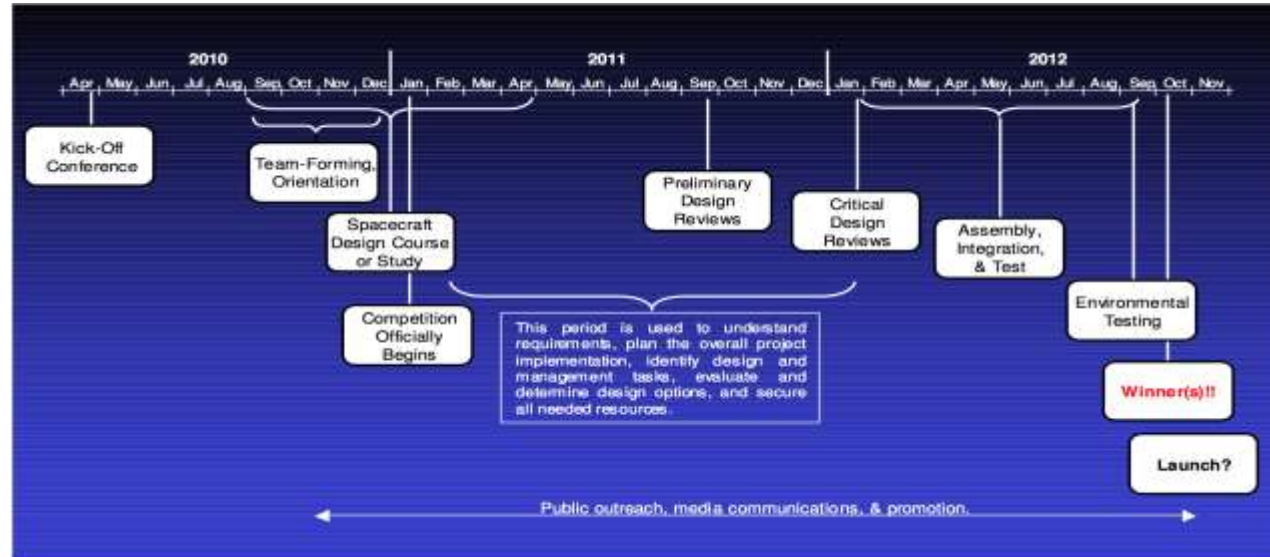
## Technical details:

Size	0.5 CubeSat U
Mass	250 g
Sail area	50 cm x 50 cm
Power (processing and acquisition)	5V output redundancy mechanism



- Innovative memory form material
- Automatic spring release mechanism (no mechanical spars)
- Power input redundancy + two automatic release mechanisms

# Project Lifecycle



- One and half year duration
- Mid term reviews
- Environmental and vibration tests
- Workshops and lectures
- Competition

# International Challenges



- International collaboration
- Voluntary engagement
- Communication difficulties
- Financial resources
- Inexperience

# Main Points (Reviews)



Reviews and lectures at MDA

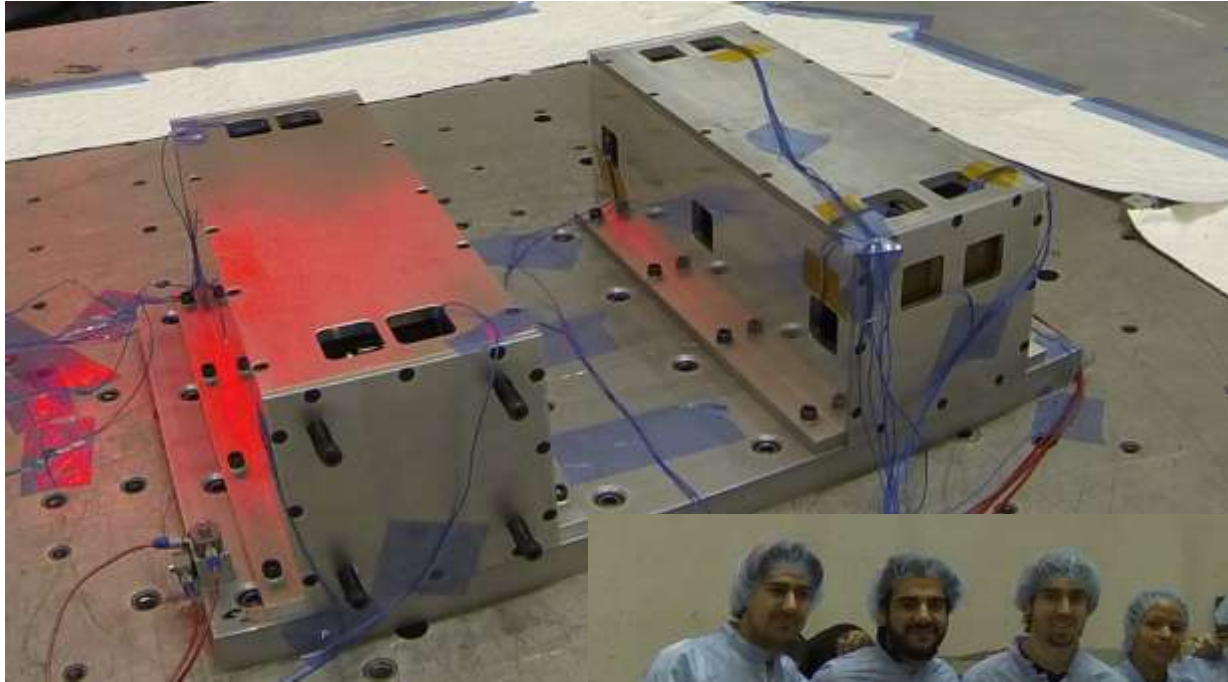


# Main Points (Integration)





# Main Points (Vibrations test)



DAVID FLORIDA LABORATORY,  
CANADIAN SPACE AGENCY



# Conclusion

- A LOT of lessons learned
- Positive scientific results at vibration
- Setting new collaborations
- Winner of third prize ;)

# Thank you for your attention!



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