



# Innovación Tecnológica: Beneficios para la Humanidad

**Expo-Ciencias Latinoamericana**

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Mission Operations Integration

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Educación e Investigaciones

Experiencia Laboral

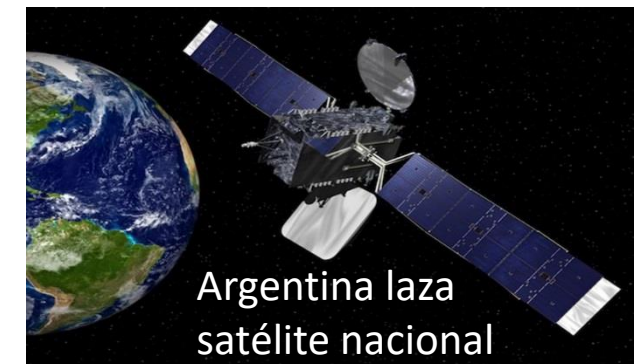
Tecnologías y cómo pueden participar

# Agenda

- Satellite Applications
- Microgravity Countermeasures
- ISS – National Laboratory
- Lunar/Mars Structures
- Analog Missions
- Robotics
- Lifecycle Systems Engineering-HSI
- Planetary Defense
- Paper on SASA



# Satellite Applications







**Table 1**

Satellites and leading institutions in South American countries.

		Dedicated Institution	Satellites	Ground Segment	Launcher/Sounding Rocket	Launch Sites/Integration Facilities
Argentina	Historic	CNIE(1960–1961)	7		20	
	Current (Planned)	CONAE(1991)	2(8)	6(1)	0(1)	1
Bolivia	Historic					
	Current (Planned)	ABE(2010)	1(1)	2	0	0
Brazil	Historic	GOCNAE(1961)	12			
	Current (Planned)	AEB(1994)	3(9)	3	1(1)/6	2/1
Chile	Historic	ACE(2001)				
	Current (Planned)	Consejo de Ministros(2013)	2(1)	1	0	0
Colombia	Historic					
	Current (Planned)	CCE (2006)	1(1)	0	0	0
Ecuador	Historic	CLISREN(1982)				
	Current (Planned)	IEE(2012), EXA(2007, civil)	2	1	0	1
Guayana	Historic	–				
	Current (Planned)	–	0	0	0	0
Paraguay	Historic					
	Current (Planned)	AEP(2014)	0	0	0	0
Peru	Historic					
	Current (Planned)	CONIDA(1974)	4	1	2	1/0
Suriname	Historic	–				
	Current (Planned)	–	0	0	0	0
Uruguay	Historic					
	Current (Planned)	FAU	1	1	0	0
Venezuela	Historic					
	Current (Planned)	ABAE(2005)	2	2	0	0/(1)

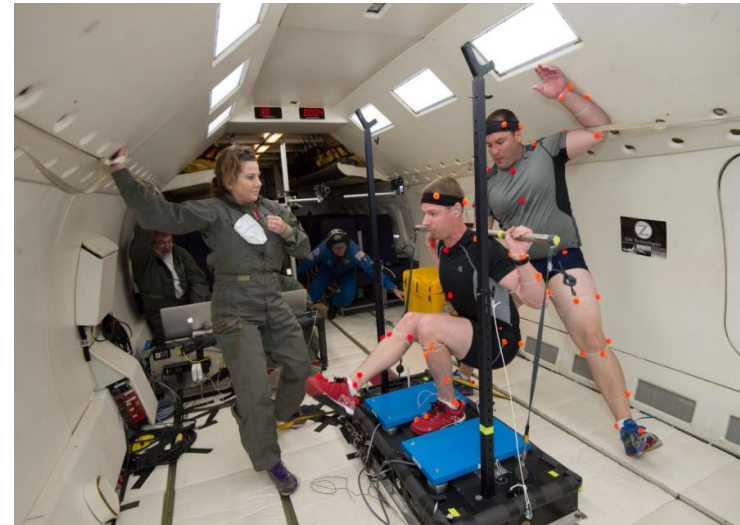
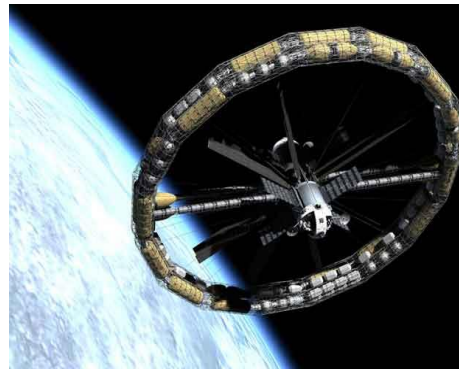
### [Exploring opportunities and challenges for establishing a South American Space Agency](#)

Silva-Martinez, J., Aguilar, A., Sarli, B., Pardo, M., Sorice, A., Genaro, G., Ojeda, O. (2018). "Exploring opportunities and challenges for establishing a South American Space Agency", Acta Astronautica Journal, March 2018, Published by Elsevier.

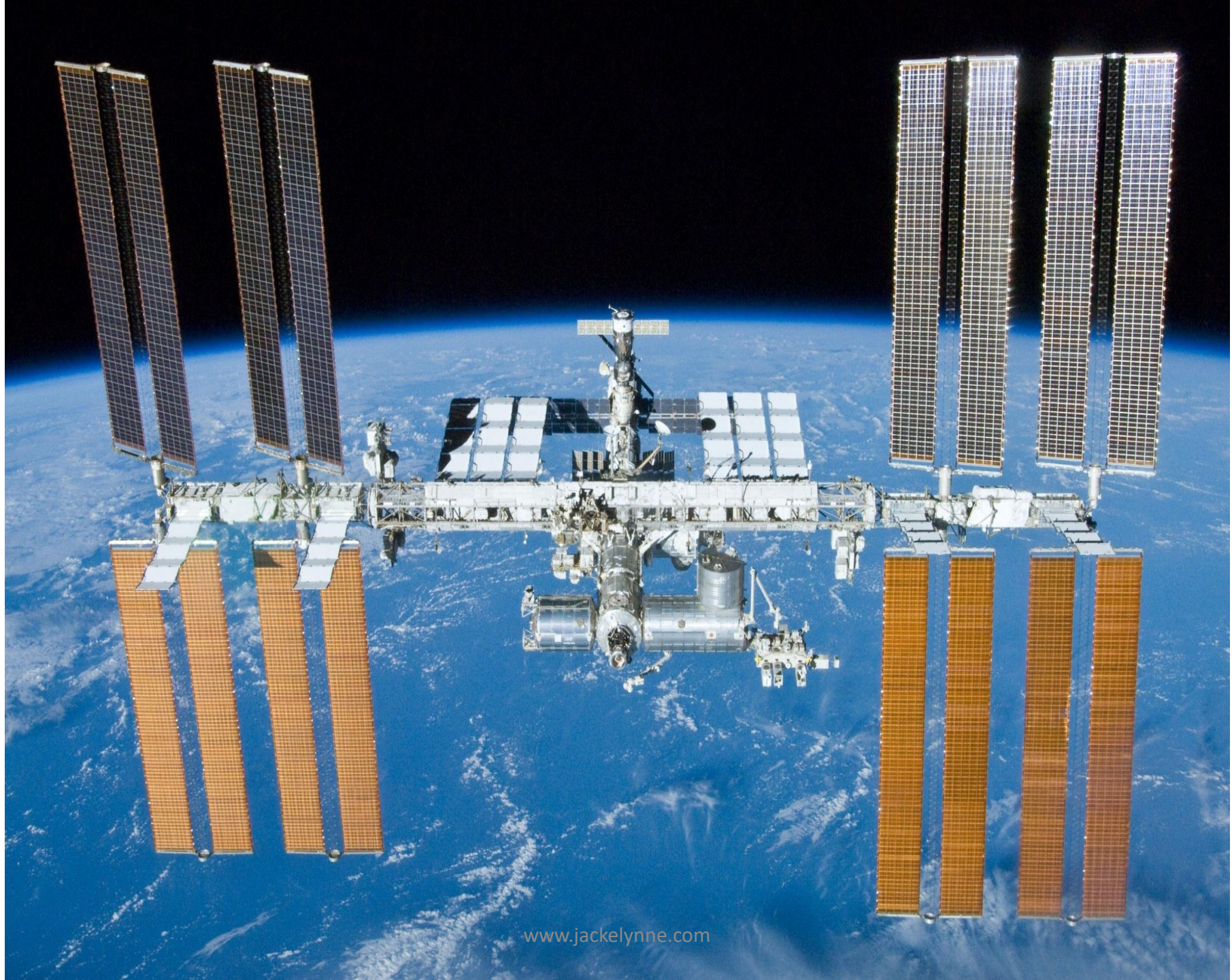


# Microgravity Countermeasures

- Bone-Mechanics  
Crystallization rates for  
subculture of cells
- Bone-loss: Osteoporosis
- Telemedicine
- Artificial Gravity

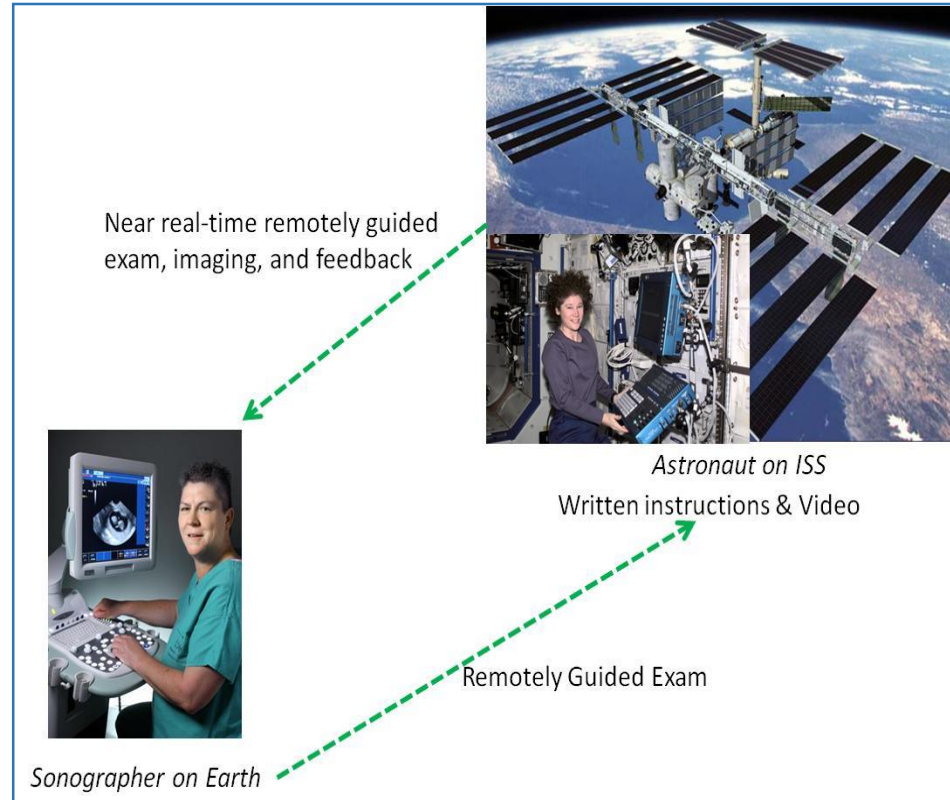








# Telemedicine in Space





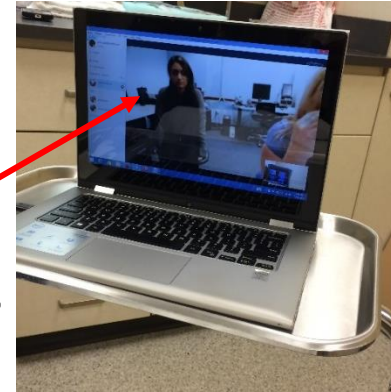
# Telemedicine in Space

Remotely Guided Breast Sonography

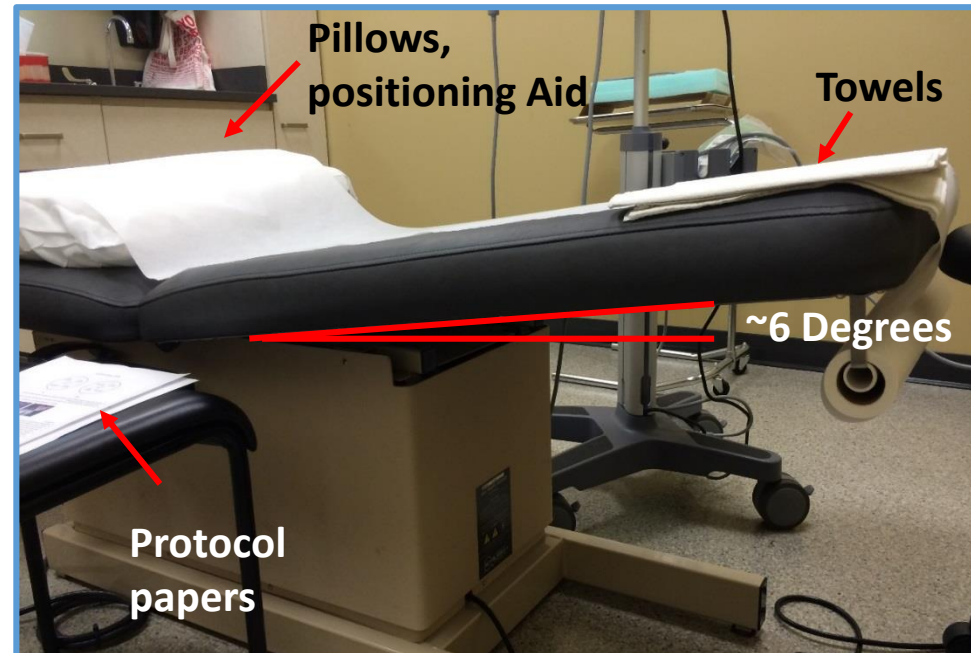
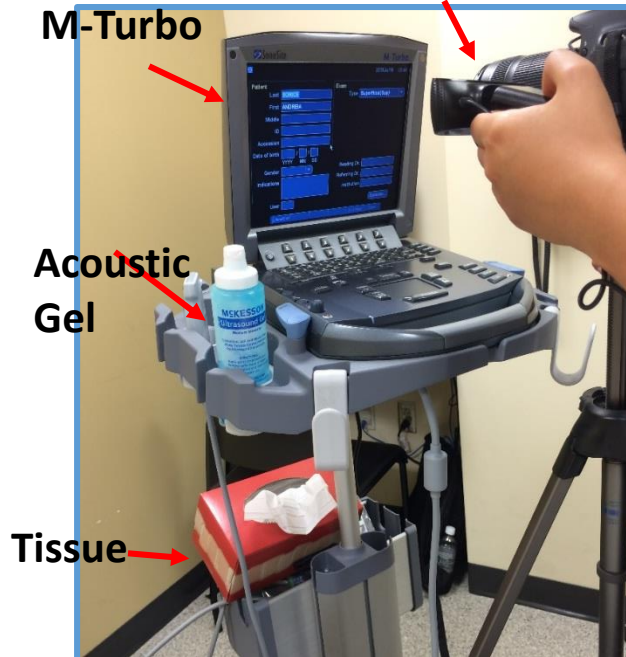
Ultrasound Machine, Sonosite M-Turbo

Camera for Storage data

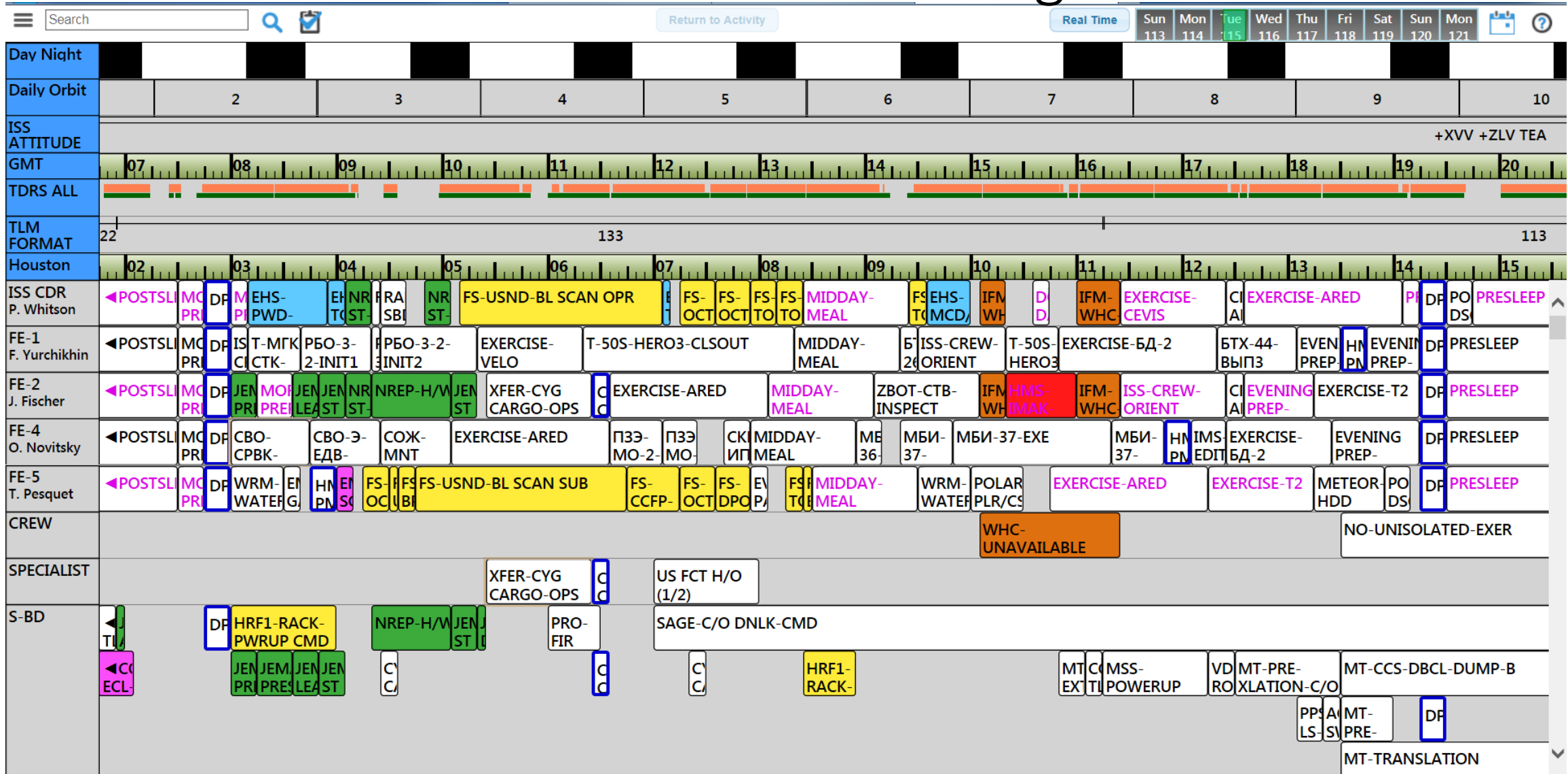
Remote Sonographer



Linear Array Probe



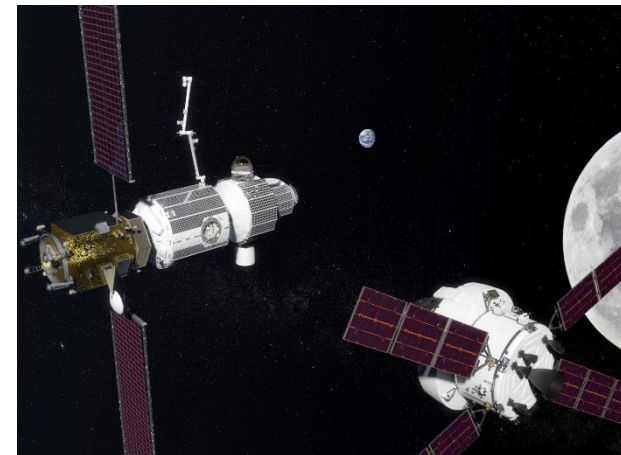
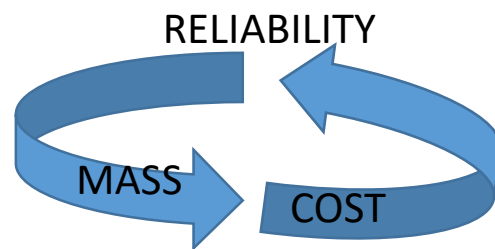
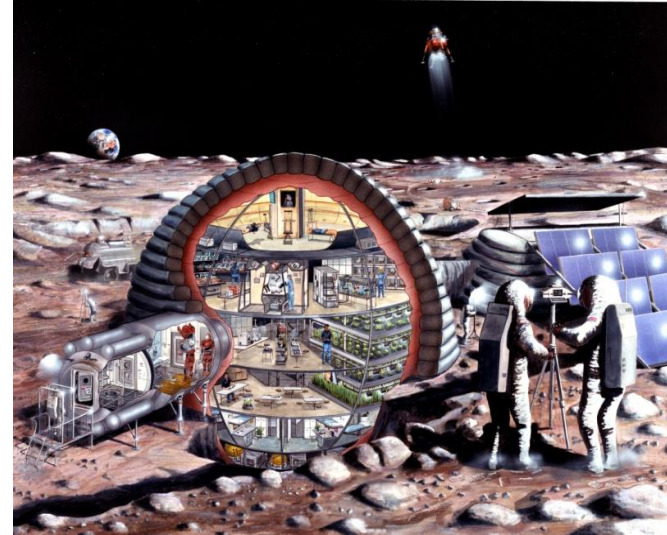
# Crew Autonomous Scheduling Test





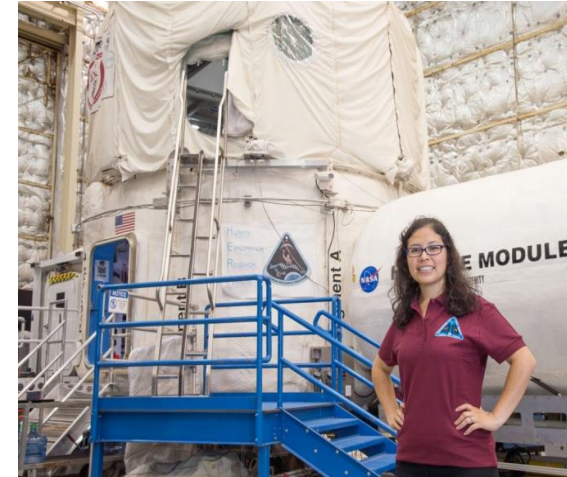
# Lunar/Mars Structures & Architectures

- Risk quantification
- Trade analyses of exploration architectures
- Reliability analysis
- Proposed base concepts
- Psychological aspects



# Analog Missions

- MDRS
- MOONWalk
- HERA
- NEEMO
- HI-SEAS
- Antarctic Stations



<http://www.nasa.gov/analogs>



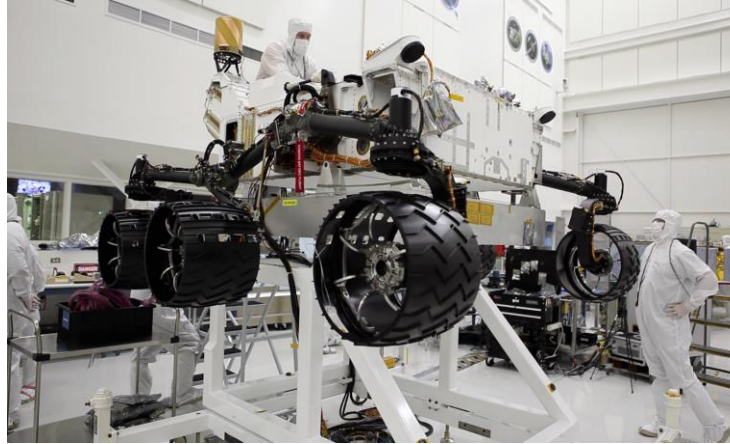
# Mockup Evaluations

- EVA suits
- Crew survivability
- Usability tests
- Human-in-the-loop tests



# Robotics

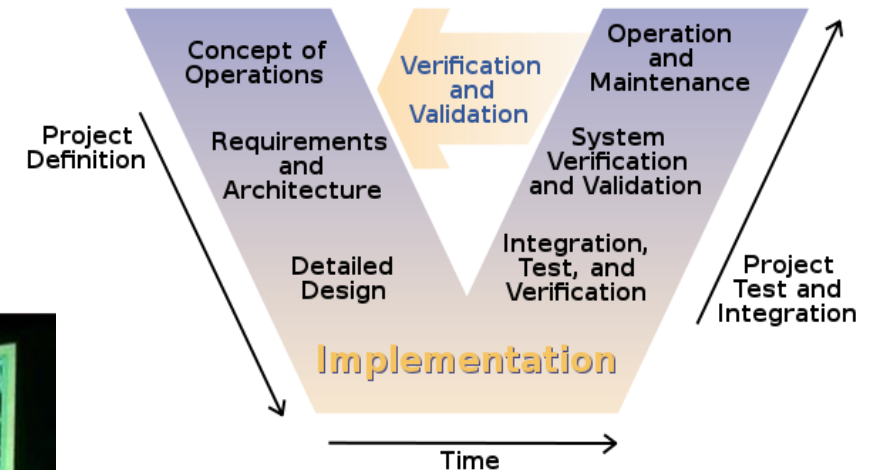
- Exploration missions to deep-space
- ISS Robotic Arms
- UAVs
- Planetary geology
- Microbiology
- Human in the loop





# Lifecycle Systems Engineering

- Collaborative Aerospace Program (SoS)
- Human Factors in Aerospace Systems
- Human Systems Integration
  - Human-computer integration
  - Human-in-the-loop evaluations
  - Human-centric design



**Technical + Management to include human considerations  
to minimize human error at the operational level**

# Getting more attention!

- Lunar Orbital Platform - Gateway
- Artificial Gravity
- Planetary Defense
  - Detection
  - Deflection
  - Evacuation & Rescue
  - Outreach & Education
  - Global Collaboration







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**Keep Exploring!**  
**¡ Sigan Explorando!**

**Thank you!**  
**¡ Gracias !**

# BACK UP SLIDES













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ISS RET 17 PREA +127:03:49:27  
SPOUR 455 RET +381:12:56:58  
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CYONES DA 6 RET +00:07:23:35

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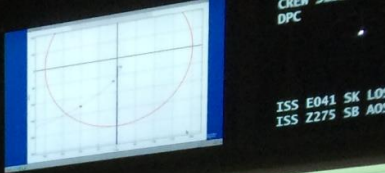
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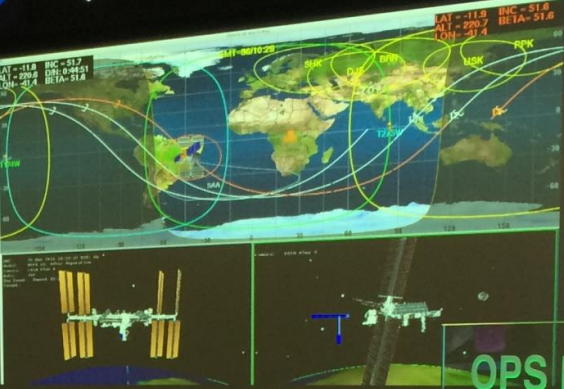
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# MISSION CONTROL CENTER



ISS E041 SK L05  
ISS Z275 SB A05



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14274	086:10:27:16	Ku_Comm_Unit1_Stop_Dump_of_Recor
14273	086:10:27:09	2016:086:10:11:36_2016:086:10:12
14272	086:10:27:01	2016:086:10:11:36_2016:086:10:12
14271	086:10:26:52	2016:086:10:11:36_2016:086:10:12
14270	086:10:26:44	2016:086:10:11:36_2016:086:10:12
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14266	086:10:26:12	2016:086:10:11:36_2016:086:10:12
14265	086:10:26:04	2016:086:10:11:36_2016:086:10:12
14264	086:10:25:56	2016:086:10:11:36_2016:086:10:12
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14218	086:10:20:00	Flight 048

SPARTAN

PAO

IBO

OPS PLANNER



