Adaptive Problem Solving and Mitigation

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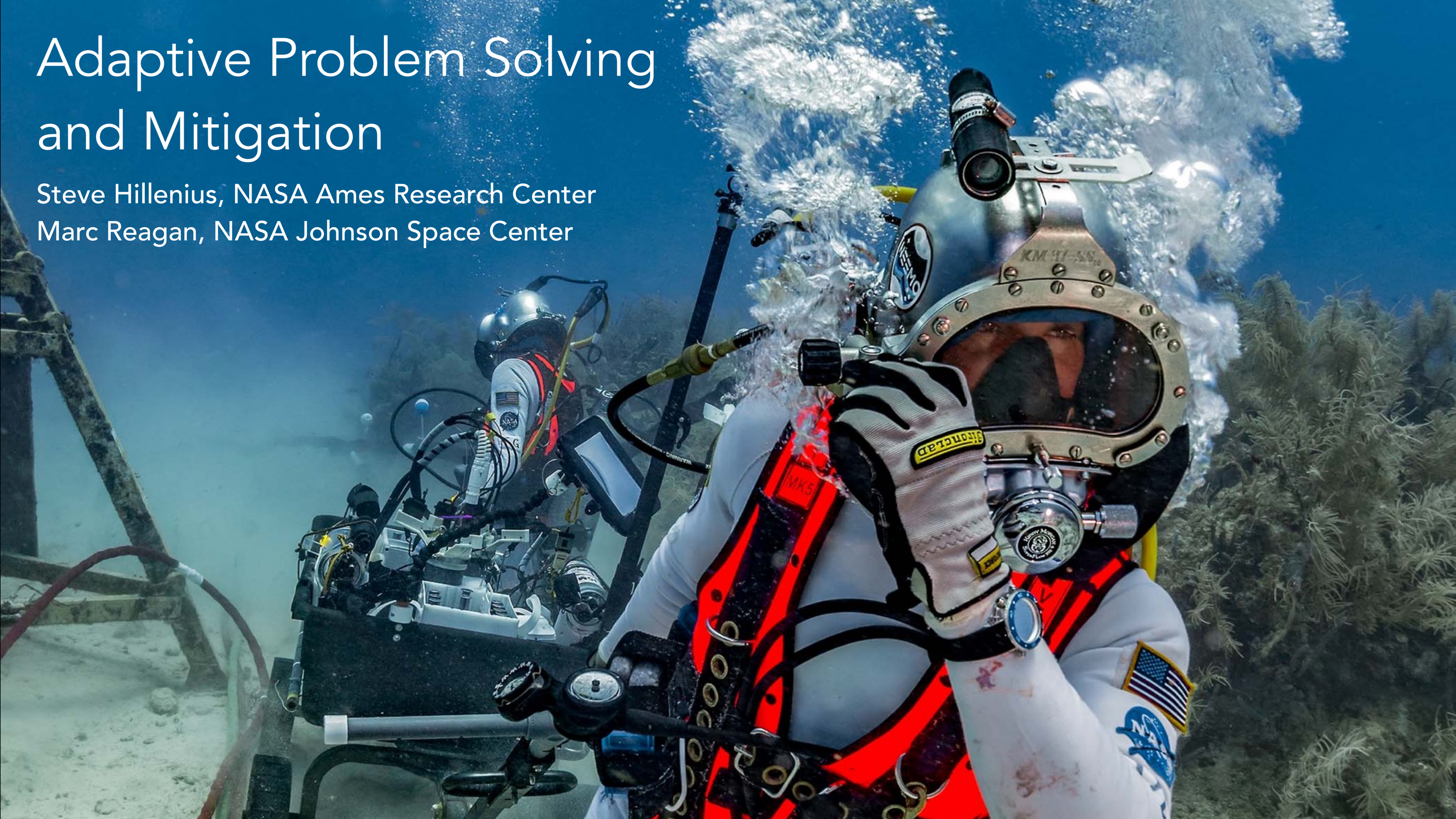


NEEMO Overview

aquarius habitat

NEEMO Overview

LSB (life support buoy)

NEEMO Overview

aquarius interior

NEEMO Overview

MCC interior

Methods of Communication/ Information Transmission

Voice Comm

VCOM

Voxer

Playbook Mission Log

Playbook Timeline

ML Videos and Photos

Video (one-way, no audio)

Daily Plan Review

Daily Planning Conf.

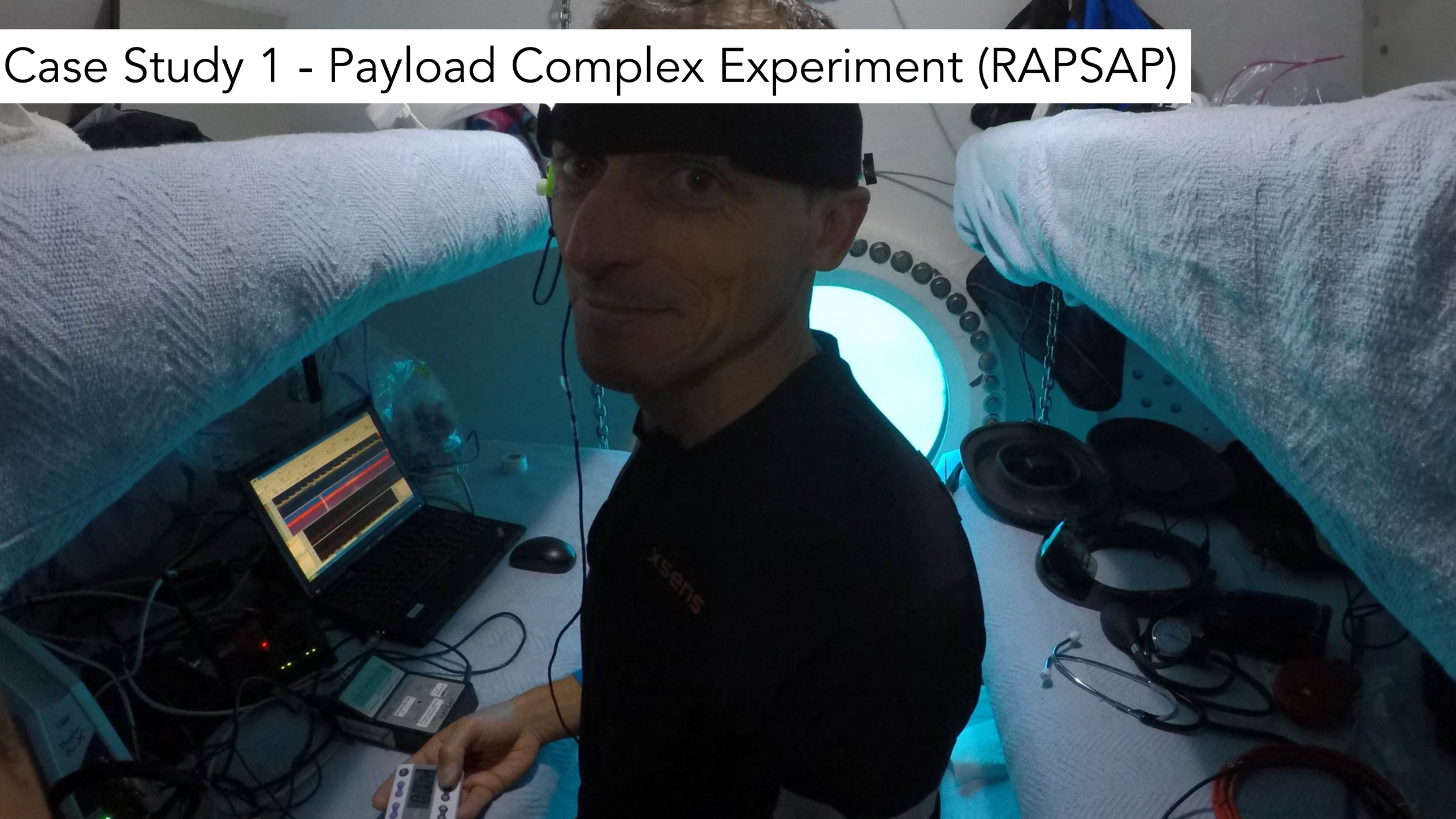
Procedures

Crew Notes

Methods of Communication/ Information Transmission

Types of unexpected problem solving seen on the NEEMO 22 Mission

Case Study 1 - Payload Complex Experiment (RAPSAP)



Case Study 2 - Payload Hardware Troubleshooting (miniDNA)

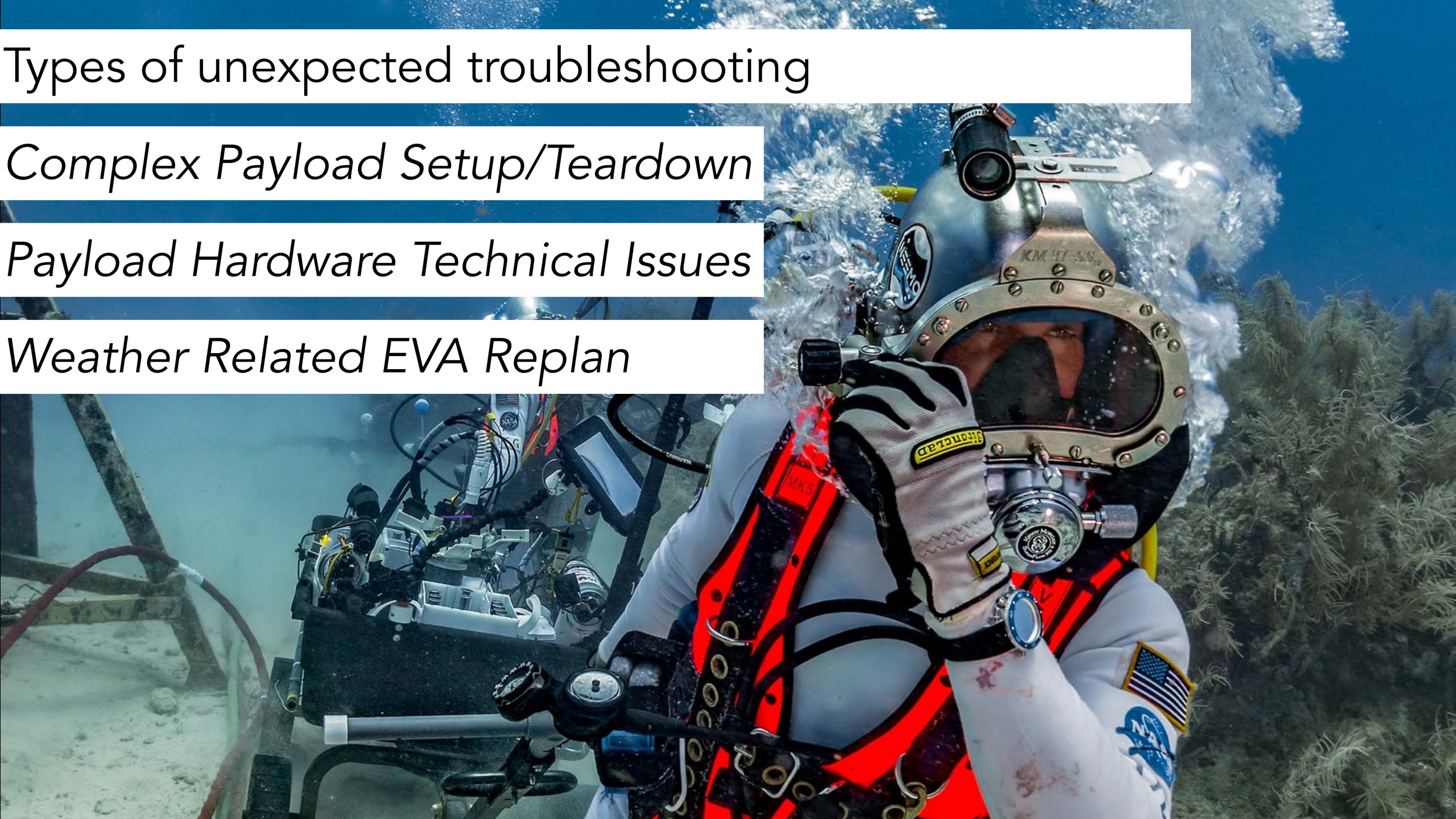
Case Study 3 - Weather Related EVA Replan

Types of unexpected troubleshooting

Complex Payload Setup/Teardown

Payload Hardware Technical Issues

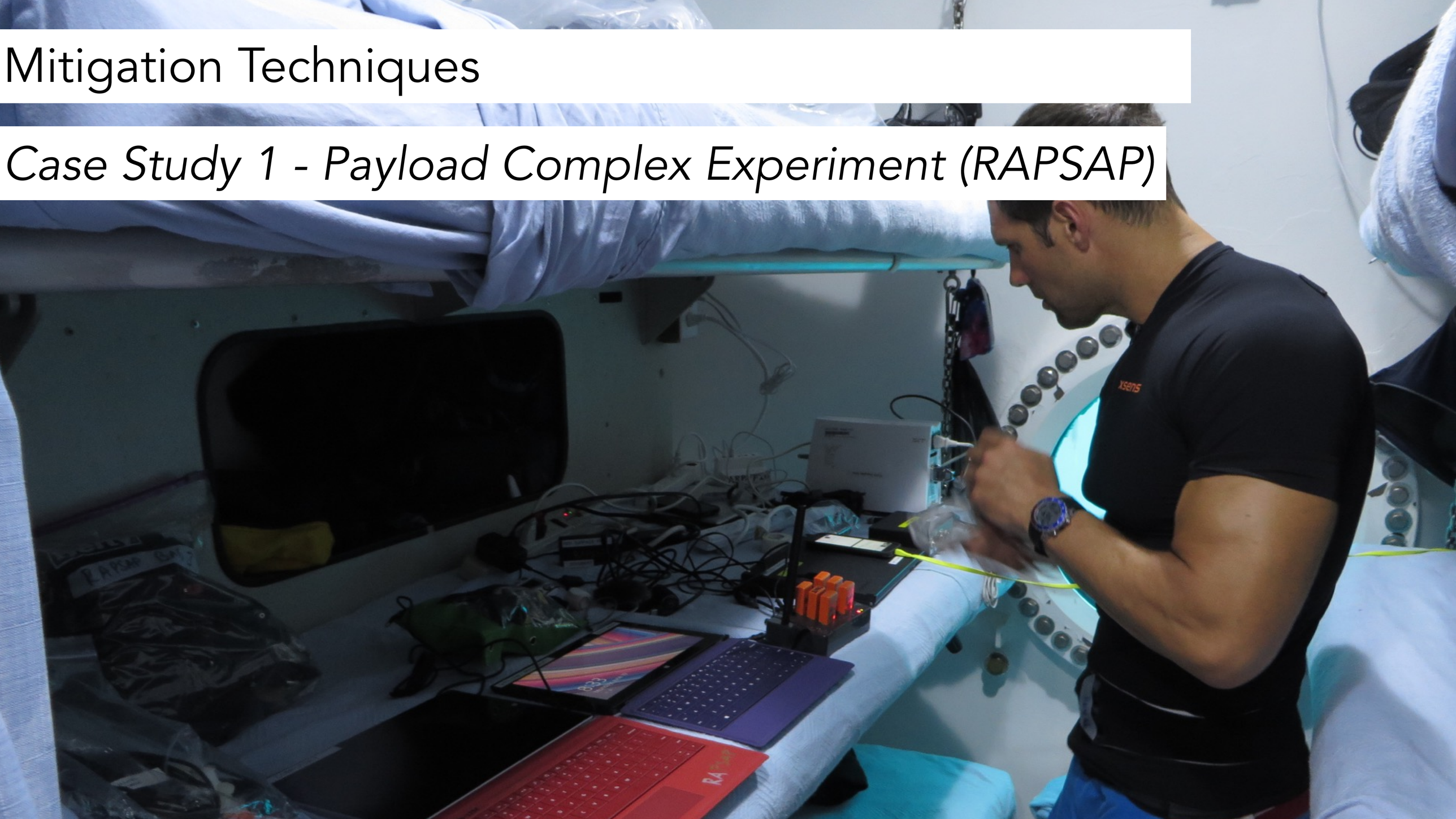
Weather Related EVA Replan



Mitigation Techniques

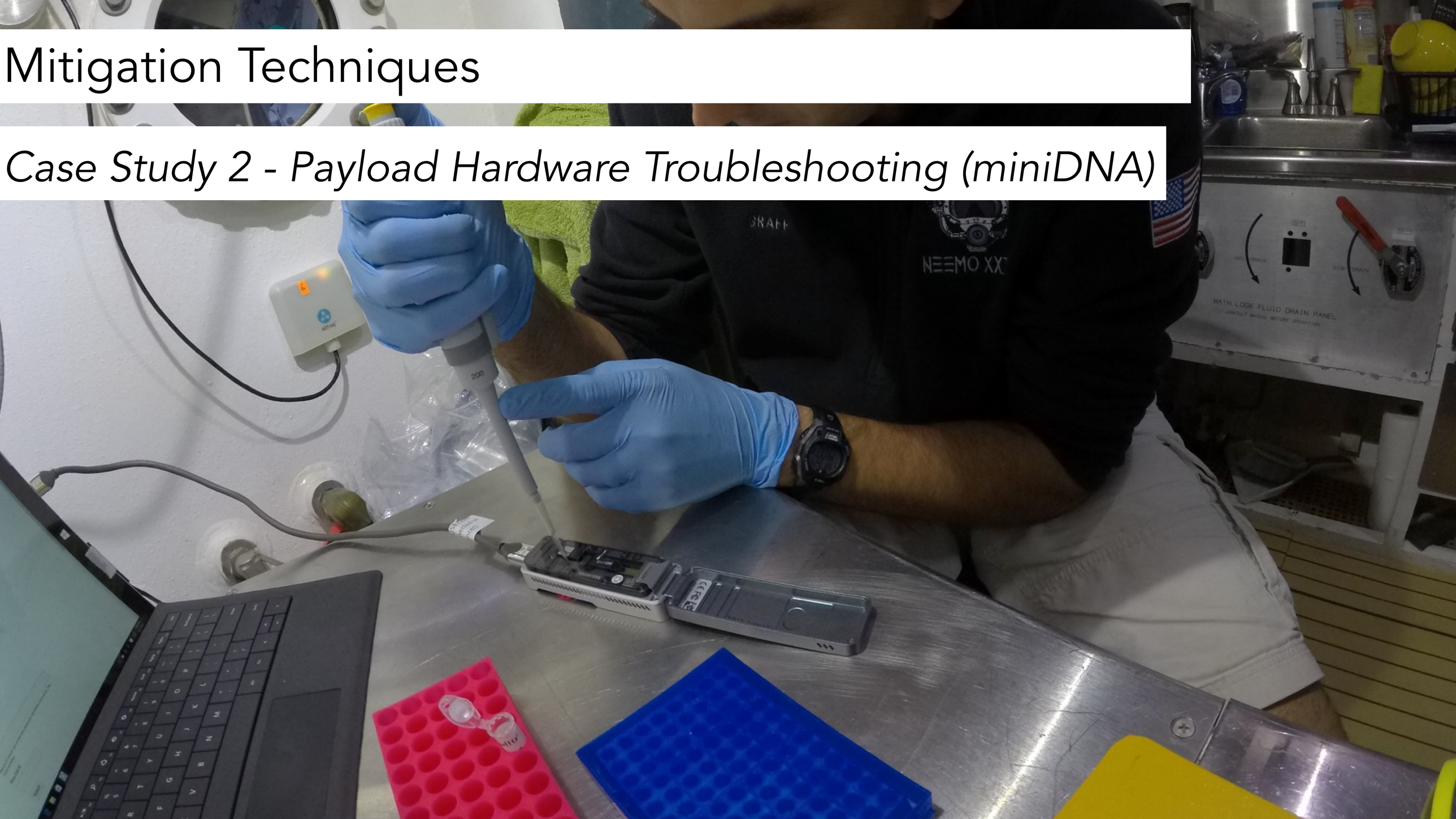
Mitigation Techniques

Case Study 1 - Payload Complex Experiment (RAPSAP)



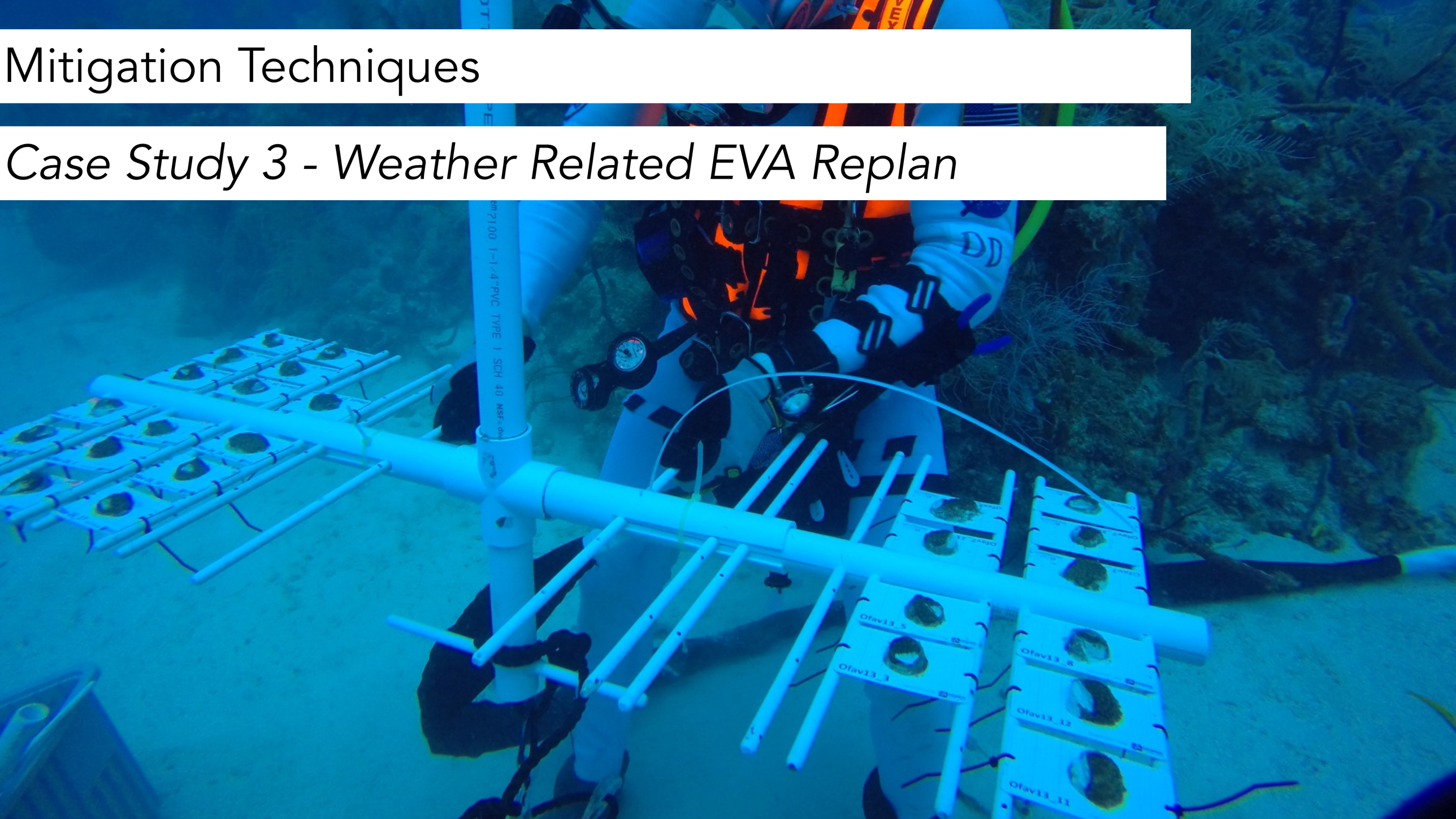
Mitigation Techniques

Case Study 2 - Payload Hardware Troubleshooting (miniDNA)



Mitigation Techniques

Case Study 3 - Weather Related EVA Replan

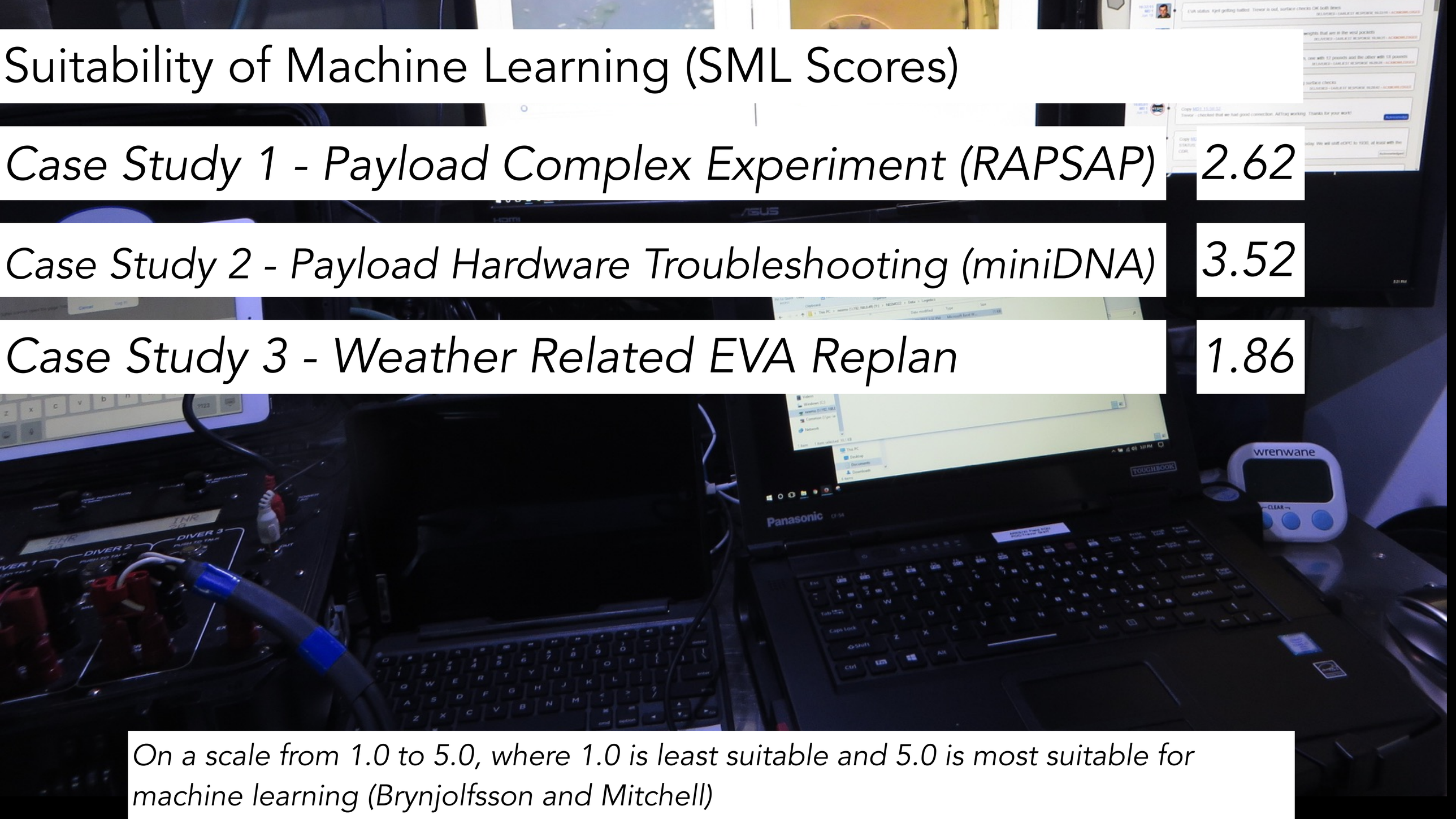


How this can relate back to guidelines for automation

What Machine Learning Can Do (Brynjolfsson and Mitchell)

Suitability of Machine Learning (SML Scores)

Case Study 1 - Payload Complex Experiment (RAPSAP)	*2.62*
Case Study 2 - Payload Hardware Troubleshooting (miniDNA)	*3.52*
Case Study 3 - Weather Related EVA Replan	*1.86*



On a scale from 1.0 to 5.0, where 1.0 is least suitable and 5.0 is most suitable for machine learning (Brynjolfsson and Mitchell)

How this can relate back to guidelines for automation

Automation would have been able to assist in some of the troubleshooting seen on the mission

Human autonomy teaming needed for other tasks

Large open ended solutions such as the EVA replan are difficult to automate with an optimal solution for a mission

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