

# **Crew Resource Management Training for Suborbital Spaceflight Operations**

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## **Abstract**

Crew resource management (CRM) is the effective management and use of all available resources to achieve safe and efficient flight operations. CRM has been incorporated into commercial & military flight operations since the 1970s, demonstrating its viability a method of mitigating risk. CRM applied to flight operations reduces the probability of human error, thus adapting the principles of CRM for the dynamic nature of suborbital astronautics may diminish the likelihood of mishaps in the emerging commercial spaceflight industry.

## **Research & Applications**

CRM emphasizes the necessity to recognize the inherent conditions which are causal to human errors in complex systems. Human factors studies have identified numerous threats to flight safety, including but not limited to undesirable behaviors, deviance from procedures, decision making skills, organizational deficiencies, and communication within structured work groups.

Development and application of CRM has contributed to the steady decline of fatal accidents in commercial and military aviation. Regulatory agencies have mandated the inclusion of CRM, citing its effectiveness. At this time, there no requirements directing CRM be apart of commercial astronautics.

Implementing CRM training into suborbital spaceflight operations is not dependent on the availability of spacecraft operators or vehicles. Rather, incorporating CRM practices early may result in safer institutions preceding commercial offerings. Developing industry standards regarding the training, selection, simulation, physiological requirements, and potential certification of suborbital operators will help to define and tailor the CRM training that will be necessary.

CRM training adapted for suborbital operations ought to be developed to provide operators and crews with applicable countermeasures to mitigate the propensity of human error, specifically those related to the operations in the near-space environment. This would include topics associated operating in both hypergravity & microgravity, as well as organizational practices associated with flight test operators. CRM will be of particular importance when researchers are to be flown and integrated into crews with astronaut pilots.

Although the current regulatory environment in which commercial spaceflight operates intentionally unfettered, adopting standards of practice may help to establish a culture of safety by suborbital flight operators and participating institutions.

## **Conclusions**

As evidenced by the improved safety in commercial aviation following the implementation of CRM training, the emerging commercial spaceflight industry should adopt similar standards. Although significant differences exist between the roles and operating environments, positive application of CRM principles to suborbital spaceflight training will result in fewer mishaps and allow for increased opportunities to conduct suborbital science campaigns.

## **References**

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