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Role of operation centres in the future exploration programme.

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In the Apollo programme, the role of ground operations was at the minimum due to limited communication means. The absence of support to the astronaut limited the science return of the missions by imposing very coarse operations. The Space Shuttle era saw the implementation of the Tracking and Data Relay Satellite Systems which since 1983 leads to unprecedented ground monitoring and commanding capabilities and presently allows ground operation centres to conduct experiments on the ISS either independently or in support of the crew.

These aspects of telescience on the ISS are currently exercised in Europe by the USOC's (User support and Operation Centres) and a few examples of the successes of this concept on external payloads will be described.

The extension of this telescience aspect to robotic exploration brings some of the advantages of manned flight to automatic missions. The advantages of testing dedicated exploration operation centres during automatic missions are of different orders: direct science enhancement, increase of the exploration manned base, direct involvement of scientists in exploration operations and finally training for the operations of the manned flights. Examples in the current and near future Mars missions will be shown.

In the final stage of exploration: manned flight, the role of ground support will increase crew efficiency and limit the dangers of astronaut exhaustion. The necessary infrastructure to fulfil this role will be described.