ANNEX A: SPACE FOR INFRASTRUCTURE - HEALTH

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1. INTRODUCTION

This document lists the use cases to be used as part of the "Space for Infrastructure –Health" thematic area within the umbrella of the "Space for Infrastructure" thematic call for proposals.

The use cases presented result from the cooperation between the European Space Agency (ESA) and key stakeholders of the health sector. It aims at developing sustainable services leveraging space assets to address the needs for modern day health infrastructure.

2. ANNEX A: SPACE FOR INFRASTRUCTURE – HEALTH USE CASES

2.1. Plug & Play UK

Plug & Play UK support leading corporations to explore and build innovation ecosystems in the UK and internationally. Through open innovation principles they expose their partners to the best most applicable startups and scale-ups with the goal to bring new technologies and business models into production.

2.2. Use Cases

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ESA invites applications which address needs within the health infrastructure sector which use at least one (or more) space asset(s). The following areas are of key interest to the agency and the partners included within the Space for Infrastructure – Health thematic call for proposals. Please note that applications do not need to address a use case can still be accepted to the call.

These 5 key areas of interest are:

2.2.1. Use Case 1: Hospital Workflow & the Digitisation of Health Information Systems

As population demographics are leading to an average older population, health services are seeing higher pressures on cost and patient experience, putting a strain health services. Many (both public and private) health service providers are facing the issue in which an efficient and effective digital health system is required to run a modern health service. To help alleviate this pressure, many health providers are currently in the process of upgrading their health information systems to ensure a smooth patient experience.

2.2.2. Use Case 2: AI & Big Data

Large datasets on a wide variety of health indicators are becoming increasingly common. This ranges from EO datasets such as air pollution (CO_2, NOx, etc…), urban heat mapping and weather forecasting to more granular data sets such as patient health data (weight, other risk factors, previous medical history, etc…).

One need is to provide both a prediction service so that health authorities can measure risk factors such as health pollution and can then estimate the impact this will have on health infrastructure such as hospitals. I.e. Measuring air quality and detecting spikes in air pollution can alert health authorities to a possible increase of breathing-related admissions to health centres.

Another use case in this category is the support of other health services. For example, an AI-enabled app can be used to provide tailored support to patients based on the previous health records and lifestyle (activity tracking).

2.2.3. Use Case 3: Telemedicine & Care Management

Communication between different health providers is usually very inefficient due to a lack of common systems across the patient pathway. This causes delays and provides inefficiencies in many different areas. For example:

- Patient discharging planning from the hospital setting.

- Accessing remote locations in rural areas is difficult or time consuming and therefore inefficient for health providers. Today, many rural areas have a disproportionately high elderly population who need additional care or health services.

- Provision of specialist healthcare to remote locations is difficult due to the location of specialist healthcare personnel in central hospitals.

- Ensuring adherence to medication is essential for a patient's health journey. Deviating for a prescribed path can be disastrous for a patient's health.

- Regulatory issues regarding data protection laws such as GDPR are paramount in protecting patient confidentiality. Therefore, a robust security system is required.

2.2.4. Use Case 4: AR/VR within the Health Sector

The use of 5g technologies (using SatCom) can be used for a variety of uses within the health sector. The first use case is that of using AR/VR in an operation theatre. This can be used in two ways. The first is to provide the surgical team with supplemental information which can be used to monitor the patient's status. The second form is to use VR for both operational procedures when the surgeon is not present (i.e. telemedicine) but VR can also be used in medical training.

2.2.5. Use Case 5: Physical Health Infrastructure Management

Physical infrastructure is always in need of maintenance. More so health infrastructure where the safety of both staff and patient is paramount. This is to help prevent major failures but also to reduce costs and improve efficiencies in regular day-to day maintenance of facilities, in-turn meaning that a larger proportion of the budget can be spent on patient-facing health services.

2.3. Use of Space Assets

Satellite technology and data have a significant part to play in the development of potential services. This section lists (and applications are not limited to) the following examples.

Satellite Communications can enable new solutions in the following areas:

- Providing ubiquitous connectivity in disaster response situations in which terrestrial cellular mobile networks have been knocked out.
- Enable real-time, long range communications. This could possibly be used in providing remote operations.
- Development and optimization of innovative imaging devices for intraoperative use improving tele-expertise and remote training through visual technology.
- Bring about the next stage of the digitalisation of health services. I.e. For use in remote locations.
- Enable a greater range of tele-medicine applications.
- Promoting wider access to quality healthcare.

Satellite navigation and timing services (GNSS) is pivotal to providing services to emergency response vehicles such as tracking and routing to emergency locations. In addition, the resilience of navigation services in emergency situations due to jamming and spoofing must be robust when dealing with life-critical services in a crisis. Thirdly, GNSS is pivotal in the use of UAVs/drones. These UAVs could be used for both drug/transplant organ delivery but also for situational awareness in disaster situations. Finally, positioning services are useful in geo-locating and geo-fencing health infrastructure assets. This is especially important to avoid events such as theft or tampering with medical equipment. Timing services offered by GNSS can be used for the synchronisation of infrastructure equipment but can also enable the time stamping of medical records to ensure transparent traceability.

Satellite Earth Observation (SatEO) services offer the monitoring of the Earth on a regional level. SatEO can possibly enable the following applications:

- Situational awareness in the planning of disaster relief efforts.
- Proactive monitoring of the environment to ensure that disease outbreaks are avoided.
- Air quality monitoring and the mapping of this onto health services.

Provide the data required for physical infrastructure monitoring such as hospitals and other health buildings.