D 7.11 – Animation Works

prepared for

WP 7.1 - Public Engagement

Version: 1.0

Published: 2015-07-31

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Document Change Log:

Version	Date	Author name(s)	Description of Change
1.0	17.07.2017	René Waclavicek	New document

Executive summary

The Newsletter 2 is part of WP7.1 Public Engagement of the EDEN ISS project. An extensive communication campaign comprising a Press Kit and a Press Release was started for the completion of the EDEN ISS MTF to highlight the Flight Readiness for the Antarctic Mission.

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Acronyms

Acronym	Explanation	Acronym	Explanation
MTF	Mobile Test Facility		
FEG	Future Exploration Greenhouse		
FAQ	Frequently Asked Questions		

1 Introduction

1.1 Overall Objectives of the EDEN ISS animation works

To generate communication material such as an updated version of the flyer, photos, images, text and an animation for public outreach and other dissemination activities.

1.2 Purpose and scope of this document

To create an overview of the elements of the three main parts:

1. Press Kit
2. Press Release
3. Flyer Version 2

2 Press Release

On the EDEN ISS website a special button for Press was created.

http://eden-iss.net/index.php/press/

Here one can find the English Press Release.

2.1 Press Release, July 2017 (English Version)

Antarctic Greenhouse

EDEN ISS

Don't miss this opportunity to view the EU-funded mobile greenhouse, capable of growing plants without sunlight and soil!

14 leading European, Canadian and US-American universities, research institutes, corporations and SMEs collaborate to develop and build a facility that can grow healthy fruits and vegetables in a controlled environment.

Aeroponics is used to deliver essential nutrients directly to the exposed root system of plants, and light is provided by artificial LED lighting. The surrounding environment is monitored and controlled, to maintain target temperature, humidity, and carbon dioxide levels, and an advanced ventilation system cleanses the air of fungal spores and bacteria and sterilizes it using UV radiation.

The facility is now complete! Interested persons of the press and public can visit EDEN ISS and see how, cucumbers, radishes, peppers, lettuce, herbs and even strawberries can be grown in enclosed and confined areas.

The EDEN ISS facility will be shipped to Antarctica in Fall 2017, and can be viewed before at the DLR campus in Bremen in August 2017.

In Antarctica, the EDEN ISS test facility will undergo a one-year test campaign, led by DLR scientist Paul Zabel, and will provide fresh food to the over-wintering crew of the **Neumayer III Antarctic station**, operated by the **Alfred Wegener Institute (AWI)**.

The knowledge that will be gained during the test campaign, will pave the way for growing food in space, and in other environments with limited or insufficient resources. The systems and technologies that will be tested in EDEN ISS, can hopefully contribute to short-term and long-term solutions for addressing global food shortages and changing environmental parameters due to climate change, and can potentially create spin-offs for Vertical Farming in cities.

Closed-loop technologies can be used to produce nutritious fruits and vegetables in deserts, arctic regions, or other extreme environments, and will be essential for supporting humankind on the moon and on Mars in the future.

A greenhouse as life support system for living on the moon and Mars

*Track the progress of EDEN ISS on http://eden-iss.net, **Instagram** and **Facebook** using #MadeInAntarctica*
Or come to visit the EDEN ISS greenhouse in person before it embarks on its Antarctic mission.

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Falk Dambowsky, Deutsche Luft- und Raumfahrt, Bremen, Falk.Dambowsky@dlr.de

***The Full Press Kit and images are available at** http://eden-iss.net/index.php/press/*

Upon request, we are happy to provide you with TV-ready b-roll, with topics covering the exterior/interior of the Mobile Test Facility, Future Exploration Greenhouse, and Mission Control

EDEN ISS Mobile Test Facility, Rendering: LSG

EDEN ISS three distinct sections, Rendering: LSG

EDEN ISS external platform, Photo: Alfred-Wegener-Institute

EDEN ISS focuses on ground demonstration of plant cultivation technologies that can be applied to future exploration in space.

EDEN ISS will provide fresh food for the crew at Neumayer III Antarctic station, February thru December 2018.

EDEN ISS is a Mobile Test Facility, designed and constructed by the EDEN ISS team and is comprised of three distinct sections; cold porch/airlock, service section, and Future Exploration Greenhouse.

The Mobile Test Facility will be placed on top of an external platform located approximetely 400m south of Neumayer Station III.

EDEN ISS service section, Photo: Bruno Stubenrauch

EDEN ISS experiment prototype for the International Space Station, Photo: Bruno Stubenrauch

EDEN ISS nutrient delivery system, Photo: Bruno Stubenrauch

The service section of the EDEN ISS Mobile Test Facility, houses the main support subsystems, including: thermal, power, air management and nutrient/water subsystems and provides working space for pre- and

Located in the service section, is the International Standard Payload Rack (ISPR) with small greenhouse in preparation of flying the experiment to the International Space Station.

A nutrient delivery subsystem allows different nutrient solutions to be applied directly into the root zone of the growing plants. Access nutrient solution is collected and re-cycled through the system.

post-harvest procedures.

EDEN ISS Future Exploration Greenhouse, Photo: Bruno Stubenrauch

The Future Exploration Greenhouse is the main plant growth area of the EDEN ISS Mobile Test Facility and consists of a highly adaptable multi-shelf growth system.

Plants are grown in 60cmx40cm plastic boxes and the entire Future Exploration Greenhouse offers about 12.5m2 of cultivation area.

EDEN ISS crops, Photo: Bruno Stubenrauch

Pepper, Cucumber, Tomato, Swiss Chard, Radish, Herbs, Spinach, three varieties of Lettuce, and Strawberries are cultivated in the Future Exploration Greenhouse.

EDEN ISS LED light, Photo: Bruno Stubenrauch

The Future Exploration Greenhouse uses LED lights. LED's can be programed to emit different wavelengths; red, blue, magenta (red + blue), and white in color, to effect plant growth.

EDEN ISS atmosphere, Photo: Bruno Stubenrauch

The atmosphere is managed through a centralized system which circulates air through the Future Exploration Greenhouse, through a system of air ducts and louvers.

During the Antarctic mission, samples of all cultivated food will be collected and labeled for research purposes. The quality content of the samples will be compared to the respective growth parameters that were used to cultivate the samples.

EDEN ISS sensing and monitoring, Photo: Bruno Stubenrauch

Thirty cameras and six sensing devices are distributed throughout the Future Exploration Greenhouse to monitor atmospheric conditions, and plant growth. Images and data sets will be transferred to partner institution, DLR in Germany, for study and analysis purposes.

EDEN ISS has developed imagery programs for analyzing plant health and for forecasting harvest time and amount. Images can also be used to detect plant growth, as well as the presence of mold, mildew and disease in the growth environment.

EDEN ISS Mission Control at DLR, Bremen, Photo: Bruno Stubenrauch

The EDEN ISS mission in Antarctica will be monitored and supported from the DLR in Bremen. A special Mission Control Centre was installed to provide efficient communication between the EDEN ISS MTF in Antarctica and project partners in Europe and North America.

2.2 German Press Release for the Austrian Press

Also a German Version was created with quite some Press feed-back.

Weltraum-Gewächshaus EDEN ISS zur Testmission in die Antarktis http://us8.campaign-archive1.com/?u=ef65d6a7a1ac0a3b92059a...

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LIQUIFER SYSTEMS GROUP

PRESSEMITTEILUNG

3.Agust 2017

Ein Weltraum-Gewächshaus für den Testeinsatz in der Antarktis!

Das **österreichische Unternehmen LIQUIFER Systems Group** entwickelt und baut, zusammen mit 13 weiteren führenden europäischen, kanadischen und US-amerikanischen Universitäten, Forschungseinrichtungen und Unternehmen, eine Anlage zum Anbau von Obst und Gemüse unter extremen Umweltbedingungen.

Mittels Aeroponik werden die freiliegenden Wurzeln direkt mit Nährstoffen versorgt, während über LED-Lampen künstliches Licht bereitgestellt wird. Das umgebende Milieu wird dabei ständig überwacht und kontrolliert, um optimale Temperatur-, Feuchtigkeits- und Kohlendioxidverhältnisse zu schaffen. Ein fortschrittliches Belüftungssystem reinigt die Luft von Pilzsporen und sterilisiert mittels UV-Strahlung.

Im mobilen Gewächshaus EDEN ISS wachsen Pflanzen ohne Sonnenlicht und Erde!

Im Herbst 2017 wird **EDEN-ISS in die Antarktis** verschifft und kann noch davor im August im Deutschen Zentrum für Luft- und Raumfahrt in Bremen besichtigt werden.
Interessierte können die EDEN-ISS-Anlage besuchen und sehen, wie Gurken, Radieschen, Paprika, Salat, Kräuter und sogar Erdbeeren in einer abgeschlossenen Umgebung angebaut werden.

1 von 5 07.08.17, 10:43

Das Gewächshaus ist fertiggestellt!

In der Antarktis wird EDEN-ISS während seines **einjährigen Testlaufs** von Paul Zabel, einem Wissenschaftler des DLR, betreut. Dabei wird er die Besatzung der Neumayer III Station, die vom Alfred Wegener Institut betrieben wird, mit frischem Obst und Gemüse versorgen.

Das gewonnene Wissen wird dabei helfen, den Weg für den **Nahrungsmittelanbau in extremen Umgebungen** zu ebnen, ob im **Weltraum** oder in **Regionen mit unzureichenden Ressourcen auf der Erde**. Die Technologien und Systeme, die für EDEN-ISS entwickelt und getestet werden, können lang- und kurzfristig zu globalen Problemlösungen beitragen, und dabei helfen, beispielsweise mittels vertikaler Agrarproduktion in Städten, die Nahrungsmittelversorgung zu verbessern, oder der Klimaveränderung entegegenzuwirken.

Mit Technologie aus Kreislaufsystemen kann Nahrung in Wüsten und arktischen Regionen produziert werden. In der Zukunft wird diese Technologie auch eine essentielle Rolle für das **Leben auf dem Mond und dem Mars** spielen.

EDEN ISS – ein **Gewächshaus als Lebenserhaltungssystem** für das Leben auf dem Mond und dem Mars.

Verfolgen Sie den Fortschritt von EDEN ISS auf Instagram und Facebook unter #MadeInAntarctica

Oder kommen Sie persönlich und besuchen Sie das EDEN-ISS-Gewächshaus bevor es sich auf seine Antarktis-Mission macht.

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Fotos und weitere Presseinformation unter *http://eden-iss.net/index.php/press/*
Auf Anfrage übermitteln wir Ihnen gerne auch den Link zu TV-fähigem Videomaterial (B-roll).
Themenschwerpunkte hierbei sind: Innenansichten und Außenansichten der Mobile Test Facility, Future Exploration Greenhouse und Mission Control

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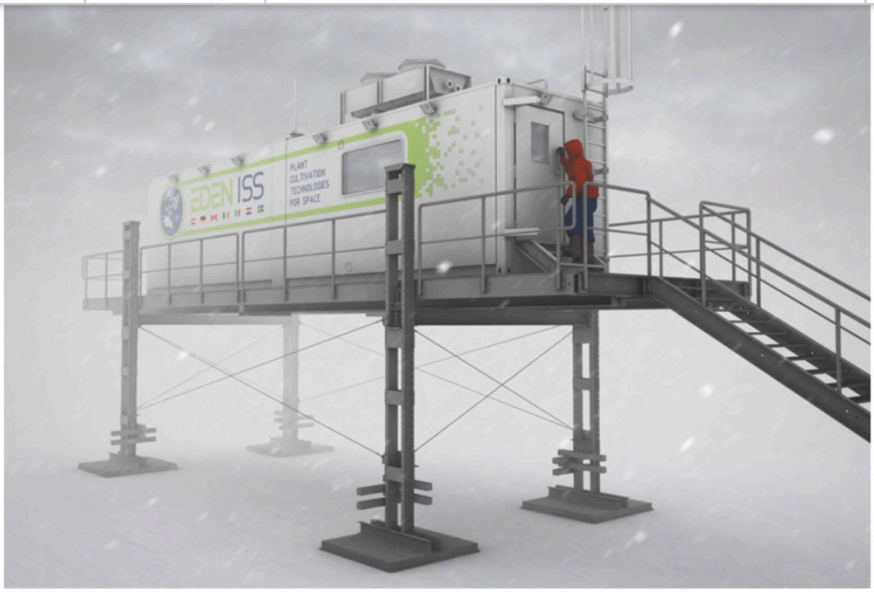
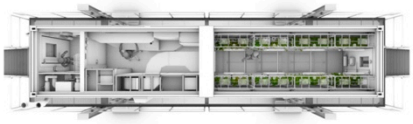
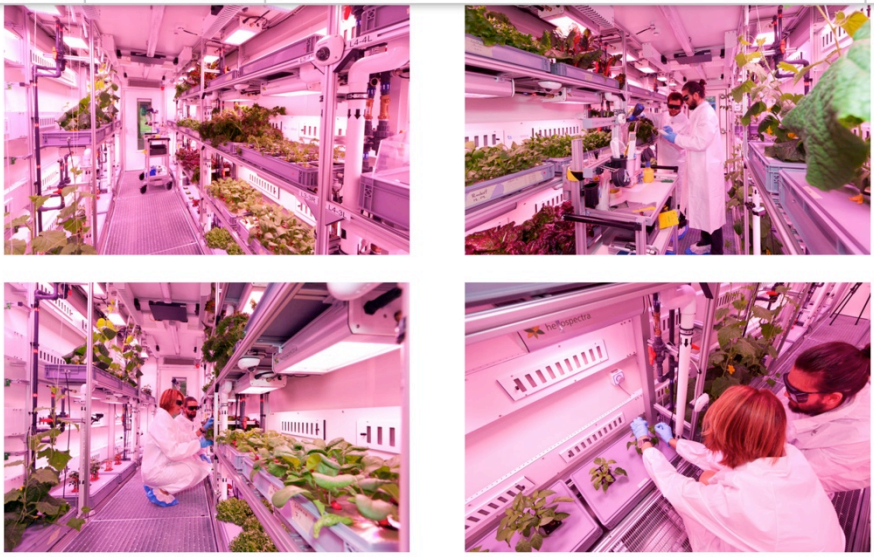
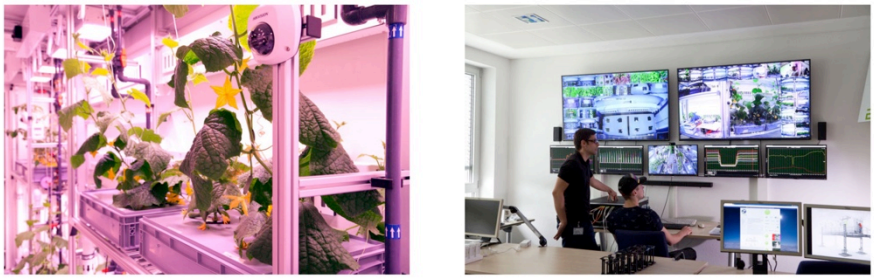




Oben: EDEN ISS Mobile Test Facility, Visualisierung: LIQUIFER Systems Group 2017
Mitte links: EDEN ISS Plattform, Aufbau in der Antarktis, Foto: Alfred-Wegener-Institut
Mitte rechts: EDEN ISS Grundriss, Visualisierung: LIQUIFER Systems Group 2017
Unten links: EDEN ISS Laborbereich, Foto: Bruno Stubenrauch
Unten rechts: EDEN ISS Nährmittellösung für Pflanzen des aeroponischen Systems, Foto: Bruno Stubenrauch



Oben links: EDEN ISS Future Exploration Greenhouse, Foto: Bruno Stubenrauch, 2017
Oben rechts: EDEN ISS Pflanzenzucht, Foto: Bruno Stubenrauch, 2017
Unten links: EDEN ISS LED LED Licht, Foto: Bruno Stubenrauch, 2017
Unten rechts: EDEN ISS Atmosphärenmanagement, Photo: Foto: Bruno Stubenrauch, 2017



Links: EDEN ISS Sensoren für das Montioring im Gewächshaus, Foto: Bruno Stubenrauch, 2017
Rechts: EDEN ISS Mission Control bei der DLR, Bremen, Foto: Bruno Stubenrauch, 2017

Consortium members:

Deutsches Zentrum Fuer Luft - Und Raumfahrt Ev (DLR), Germany
LIQUIFER Systems Group (LSG), Austria
Consiglio Nazionale Delle Ricerche (CNR), Italy
University Of Guelph, Canada
Alfred-Wegener-Institut Helmholtz- Zentrum Fuer Polar- Und Meeresforschung (AWI), Germany
Enginsoft Spa (ES), Italy
Airbus Defense and Space, Germany
Thales Alenia Space Italia Spa, Italy
Aero Sekur S.p.A., Italy
Stichting Dienst Landbouwkundig Onderzoek (DLO), the Netherlands
Heliospectra AB, Sweden
Limerick Institute Of Technology (LIT), Ireland
Telespazio SPA, Italy

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2.2.1 Press Response up to date

The following press response has been created from the Austrian Press:

Gurken für Marsianer - Antarktischer Gewächshaus-Test vor Start
https://www.science.apa.at/rubrik/natur_und_technik/Gurken_fuer_Marsianer_-_Antarktischer_Gewaechshaus-Test_vor_Start/SCI_20170808_SCI39391351437507956

Gewächshaus in der Antarktis simuliert Landwirtschaft im All

http://derstandard.at/2000062404683/Gewaechshaus-in-der-Antarktis-simuliert-Landwirtschaft-im-All

Wie in ewigem Eis und Polarnacht ein Garten Eden entsteht
https://kurier.at/wissen/gewaechshaus-eden-iss-praesentiert-wie-in-ewigem-eis-und-polarnacht-ein-garten-eden-entsteht/273.871.545

3 Press Kit

The Press Kit can be downloaded with all it's components under http://eden-iss.net/index.php/press/

The Press Kit contains:

Information Letter **ENGLISH** **DEUTSCH** **ITALIANO**
The informration letter was created in the three main languages of the project.

Introduction to Project Partners
Press & Publications
Frequently Asked Questions (FAQ)
EDEN ISS project images
EDEN ISS project logo
EDEN ISS project flyer

The project team also prepared TV-video material for broadcasting stations.
The text on the website reads as follows:
Upon request, we are happy to provide you with TV-ready b-roll, with topics covering the exterior/interior of the Mobile Test Facility, Future Exploration Greenhouse, and Mission Control

3.1 Press Kit summary

A summary is given directly on the website:

EDEN ISS – growing food for space exploration

EDEN ISS focuses on the 'Ground Demonstration of Plant Cultivation Technologies and Operation in Space' and the enhancement of those technologies, 'For Safe Food Production on-board the International Space Station (ISS) and Future Human Space Exploration Vehicles and Planetary Outposts.'

Fresh vegetables for astronauts in space

Project Introduction

Sustained human presence in space requires the development of new technologies to maintain environmental control, manage waste, provide water, oxygen and food and to keep astronauts healthy and psychologically fit. Space cannot provide these survival-critical elements, found in abundance here on fertile Earth.

A closed loop system can be engineered however, to make continuous use of all generated material as feedback material within the same artificial environment. A bio-regenerative life support system, using higher plants including vascular (flowering) plants as work horses, can be advantageously employed for the production of food and oxygen, the reduction of carbon dioxide, and for water recycling and waste management. The presence of fresh crops in controlled-environments can also have a positive impact on the psychological well-being of the crew.

A greenhouse as life support system for living on the moon and Mars

Before use in space, technologies are being tested on Earth under extreme conditions, including the Antarctic

EDEN ISS is developing a Mobile Test Facility (MTF) for the production of food and resources in a closed environment. The facility is built to provide fresh produce for the crew at the Neumayer III Antarctic station and serves as an analogue environment for testing plant cultivation under extreme environmental and logistical conditions; in preparation for spaceflight-ready systems and technologies for controlled-plant growth in space and on-board the ISS.

Novel nutrition supply for aeroponic plants, special LED lighting systems, effective mould control, and enhanced-remote-diagnosis through visual monitoring are the innovative developments of project EDEN ISS

EDEN ISS is developing an advanced nutrient delivery system, a high-performance LED lighting system, a bio-detection and decontamination system, imaging systems for monitoring plant health and technologies for ensuring food quality and safety within the MTF. The EDEN ISS consortium has designed and is testing essential Controlled Environment Agriculture (CEA) technologies and is using a cultivation strategy that utilises the International Standard Payload Rack (ISPR), with compatible dimensions for spaceflight-ready payloads. A Future Exploration Greenhouse (FEG) has been designed and built, to test a large-scale production system.

A greenhouse for planetary space exploration and for preparing a plant-growth experiment on the International Space Station

The EDEN ISS MTF, will be used to study the mass flow relationships for the ISPR demonstrator and FEG. In addition to technology development and validation, food safety and plant handling procedures are being developed. These are integral aspects of the interaction between the crew and plants within closed environments.

In December 2017, the EDEN ISS Mobile Test Facility will commence a one-year deployment phase in Antarctica at the highly-isolated Neumayer Station III, operated by the Alfred Wegener Institute. It is foreseen that the container-sized greenhouse of the EDEN ISS project will provide year-round fresh food supplementation for the Neumayer Station III crew.

For one year, fresh tomato, bell pepper, lettuce and chard will be grown in the EDEN ISS greenhouse for the Neumayer Station III crew in Antarctica

Fourteen international organizations, including universities, research institutes, corporations and small businesses have come together to develop systems that will help to sustain humans in space.

The EDEN ISS consortium is comprised of leading European, Canadian and American experts in the domain of human spaceflight and CEA. The EDEN ISS scientific advisory board consists of the top scientists in the field of CEA from Russia, USA, Japan, Italy and Germany.

14 leading European, Canadian and US-American universities, research institutes, corporations and SMEs collaborate to develop project EDEN ISS

The consortium is led by the German Aerospace Center (DLR) Institute of Space Systems in Bremen, Germany and includes the following partners:

DLR Institute of Aerospace Medicine in Cologne, Germany

LIQUIFER Systems Group, Austria

National Research Council, Italy

University of Guelph, Canada

Alfred Wegener Institute for Polar and Marine Research, Germany

Enginsoft S.p.A., Italy

Airbus Defense and Space, Germany

Thales Alenia Space Italia S.p.A., Italy

Arescosmo S.p.A., Italy

Wageningen University and Research, the Netherlands

Heliospectra AB, Sweden

Limerick Institute of Technology, Ireland

Telespazio S.p.A., Italy

University of Florida, United States of America

Design Overview

EDEN ISS MTF consists of two shipping containers that are subdivided into three distinct sections.

- Future Exploration Greenhouse (FEG)
- Service section
- Cold porch/airlock

The facility will be operated by a crew-member, with a large emphasis on remote monitoring and operations.

The EDEN ISS double-container comprises 3 parts: the future exploration greenhouse, the service section and the airlock

The Future Exploration Greenhouse (FEG) is the main plant growth area of the Mobile Test Facility and consists of a highly adaptable multi-shelf growth system and is capable of maintaining a number of different environmental settings.

The service section houses the main support subsystems, including; thermal, power, air management and nutrient/water subsystems and provides working space for pre- and post-harvest procedures. The full rack ISPR plant growth demonstrator is integrated within the service section.

The cold porch/airlock is a small buffer room to limit the entry of cold air into the FEG when the main access door of the facility is in use. This section is also used for storage purposes.

Objectives

Six objectives are defined for the validation of key technologies for space greenhouses under mission relevant conditions, with representative mass flows:

1 Manufacture of a space analogue mobile test facility

2 Integration and test of an International Standard Payload Rack plant cultivation system and Future Exploration Greenhouse

3 Adaptation, integration, fine-tuning and demonstration of key plant cultivation technologies

4 Development and demonstration of operational techniques and processes for higher plant cultivation to provide safe, high-quality food

5 Study of microbial behaviour and countermeasures within plant cultivation chambers

6 Actively advance knowledge related to human spaceflight and transform research results into terrestrial applications

Project Status

The critical design review of the EDEN ISS MTF was completed in March 2016 and was followed by hardware development and testing phases. Between late 2016 and early 2017, subsystems were installed and tested in the MTF. The greenhouse has been powered-up to support Heliospectra plant-growth LED lamps to be tested in different wavelengths; blue, red, red+blue (pink), and white; and the thermal rack and atmosphere management rack have been integrated and used to control the greenhouse climate.

Also, late last year, was the test campaign at Wageningen University and Research in the Netherlands to investigate the decontamination system intended for use in the container. Afterwards, an initial microbiological analysis of the decontamination system performance was provided by partners Airbus Defense and Space in Ottobrunn, Germany based on a small-scale experiment using the equipment. A large-scale experiment was completed in November 2016 at the Wageningen University and Research. In all, nearly 300 test plants and 300 samples were inoculated with microorganisms for these tests.

Currently, the long-term integrated testing campaign is underway at DLR in Bremen.

In October, the facility will be transported to Antarctica by ship via Cape Town, South Africa. The MTF will be placed on top of an external platform located approximately 400 m south from Neumayer Station III. The Alfred-Wegener-Institute for Polar and Marine Research, has already built the platform in Antarctica in preparation for the arrival of the EDEN ISS MTF. A detailed scientific campaign will be conducted throughout the expedition and numerous samples will be returned to European laboratories for further research.

EDEN ISS is a 4-year project extending from March 2015 to December 2018.

4 EDEN ISS – Frequently Asked Questions (FAQ)

One of the Press Kit Highlights is a special Chapter for FAQ was created.

4.1 What is the EDEN ISS project trying to achieve?

The goal of the project, is to bring technologies closer to flight-readiness for building sustainable bases on the Moon and on Mars. A greenhouse is foreseen, for use by astronauts, to cultivate their own fresh fruits and vegetables beyond terrestrial grounds.

The cultivation system being built in EDEN ISS, is unlike systems used today in greenhouse horticulture. The main reason is based on the 'closed' aspect of the system, meaning that all resources needed to grow the plants are coming from within the facility itself, including air, nutrients, water and energy.

4.2 Why is the EDEN ISS Mobile Test Facility going to Antarctica? How will it serve the Neumayer III Station?

Antarctica is an extreme harsh environment and is hostile to human beings. It is cold, far from civilization and isolated. The EDEN ISS project can be compared to the ISS and other space missions because the equipment and scientific payloads are similar in which to face harsh environments and limited resources.

When the two container EDEN ISS system can function properly in the extreme Antarctic climate, it will provide researchers with knowledge supporting sustainable farming practices that are not necessarily dependent on 'arable land,' as is largely the case today. When the EDEN ISS greenhouse supports the growth of safe and quality food in Antarctica, it will be a pointer towards what is also possible in the future. Not only, does the human race come closer to living on a planetary body other than Earth, but also, the increasing population of the world can be fed right here on Earth.

The EDEN ISS greenhouse will serve crew members of the Neumayer III Station, providing them with fresh vegetables and greens. Because missions of this type normally do not support the provision of fresh food, the EDEN ISS team expects that this improvement in diet and food variety will also positively support their psychological well-being.

4.3 What kinds of plants will be cultivated in EDEN ISS?

EDEN ISS focuses on the cultivation of fresh vegetables with high water content, which cannot be stored for a long period without compromising the quality. More than 15 different crop species are selected for the experiment campaign in Antarctica. There are three tall growing plants (tomato, pepper and cucumber), three different types of lettuce (two green, one red leaf), radish, spinach, a variety of herbs (basil, chives, parsley, mint, coriander) and strawberry. Seeds from a number of add-on crops, crops that are not part of the current production plan, will be taken to Antarctica as well. Among those are cabbage, cauliflower and red beet.

4.4 What do plants need to grow well in a semi-closed loop greenhouse?

Optimal light and temperature are essential for plant growth in a semi-closed loop greenhouse, as is the control of nutrients and humidity.

Light is the primary requirement of plants and is essential for the photosynthesis process, in which plants use light energy and CO2 to make sugar, the building material for plant growth and fruit production. Light must be uniformly distributed over the plants, so that all plants grow equally.

A temperature between 20-25°C is ideal for supporting plant physiological processes like photosynthesis, enzymatic processes, water transport and transpiration. Heat in a semi-closed loop system is generated mostly by the light source.

In a semi-closed greenhouse, it is important to monitor and control humidity. Plants transpire large amounts of water, as they absorb light and heat from the atmosphere. When possible, reclaimed water should be recycled to conserve the (often) limited amount of water within the system.

A nutrient solution is of utmost importance. Its distribution must be finely balanced to minimize recycling of excessive applications.

4.5 How will the plants be cared for?

Plants are grown in trays, fixed in a covering on the surface of the trays. The root systems of the plants are exposed under the tray.

An aeroponic system is used to supply plants with essential nutrients, using a spray system of application directly at the roots. Excessive nutrient solution is drained for re-use.

Grow trays are stored as shelves in the semi-closed greenhouse, under a light source of LEDs. The LEDs provide a mixture of light colors essential for plant growth. Temperature is controlled and based on a day/night regime, with a slightly higher day temperature.

In Antarctica, the plants will be cared for by a crew member. For extraterrestrial applications however, a big component of operations, is the control of scientific payloads in space, directly from Earth. When processes are well-designed, when all tasks are defined and assigned to a responsible party, when procedures are in place, and the right tools are available, many missions can be carried out from a great distance. Plant samples generated by the EDEN ISS project in Antarctica will be shipped to partner institutions in the European Union for research and analysis purposes.

4.6 Is the food that is grown in semi-closed loop systems safe to eat?

Partners within the EDEN-ISS consortium, CNR and Limerick Institute of Technology, work to ensure that the food produced in the EDEN ISS project is of high organoleptic and nutritional quality and is safe to consume.

The microbial load (including E. Coli and Salmonella) of different plants and surfaces within the greenhouse will be monitored. Using an *electronic Nose* (E-Nose), based on Metal-Oxide-Semiconductor(MOS) Sensor-Technology, measurements will be made accessing the health of the system. If contamination is discovered, a decontamination agent will be applied to the greenhouse as a countermeasure, by a process of micro-fogging (droplet size approx. 2-5 µm).

4.7 What are the applications for EDEN ISS, here on Earth?

The technologies that EDEN ISS develops for space missions, can also be used on Earth. Knowledge generated by the project will help Earth-based greenhouse systems to optimize plant-environment interactions, the level and cost of production and quality of food that is being produced. Solutions

developed within the project could also support a reduction in pesticide use in closed environment agriculture. Positive changes to food growth on Earth can have a global impact and help in fighting against malnutrition and environmentally damaging farming practices.

4.8 How will EDEN ISS be integrated for use on the International Space Station (ISS)?

The Future Exploration Greenhouse (FEG) is the main plant growth area of the EDEN ISS project and has a cultivation area of around 12.5 m^2.

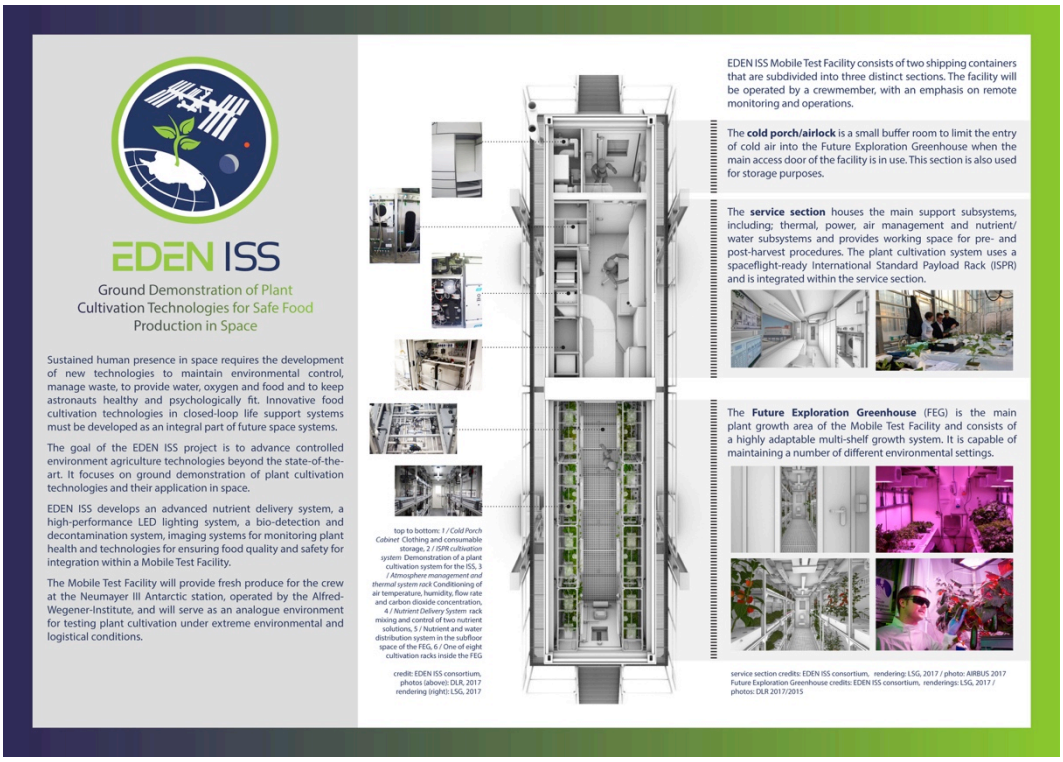
To prove that the EDEN ISS system can be implemented in space, we target experimentation on the ISS with a single International Standard Payload Rack (ISPR) subsystem.

The ISPR, located separately from the main plant growth area, in the service section of the Mobile Test Facility, is intended as a demonstrator of safe food complement production in a confined environment operating in microgravity conditions. This experiment is envisioned either as a complete higher plants cultivation system or as a demonstrator of key subsystems, depending on launch opportunities. A large difference in growing food on earth, as compared to inside a space-bound closed environment greenhouse, is the amount of space that is available to cultivate crops. The available space in the ISPR is 0.5-2.0m^2, whereas equivalent research on earth would use areas of 100-200 m^2.

5 Project Flyer

An updated version of the project flyer with an Antarctic Mission timeline has been produced.

Front side of the Flyer



Back side of the Flyer

6 Summary

An extensive Press Kit with a variety of project information is ready to communicate the EDEN ISS project around the globe.