HEXARION

A MARTIAN COLONY

The Design Process

In search of a sustainable solution for a livable Martian colony, this study aims to provide for an intrinsic way of managing growth and provide for a circular economy that would thrive in the harsh martian environment. The design process is broken down into parts that ultimately prescribe a foundation for an automated development using data and parameters gathered from the surrounding environment.

The Hexarion colony aims to develop a prescriptive system in building a martian infrastructure capable of sustaining life by adapting modularity in automated assemblies. The growth will be based on the inhabitants and other environmental factors and is capable of harnessing its own energy, food, oxygen, and other essential elements for life by dedicating modules focused on these specific aspects. The concept design is adaptable with no fixed developmental growth but would depend on the computational concepts introduced.

À la recherche d'une solution durable pour une colonie martienne vivable, cette étude vise à fournir un moyen intrinsèque de gérer la croissance et de fournir une économie circulaire qui prospérerait dans le rude environnement martien. Le processus de conception est décomposé en parties qui prescrivent en fin de compte une base pour un développement automatisé utilisant des données et des paramètres recueillis dans l'environnement environnant.

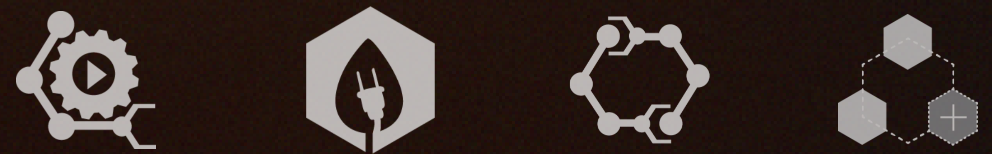
La colonie Hexarion vise à développer un système normatif dans la construction d'une infrastructure martienne capable de maintenir la vie en adaptant la modularité dans les assemblages automatisés. La croissance sera basée sur les habitants et d'autres facteurs environnementaux et est capable d'exploiter sa propre énergie, sa nourriture, son oxygène et d'autres éléments essentiels à la vie en dédiant des modules axés sur ces aspects spécifiques. La conception du concept est adaptable sans croissance dével-oppementale fixe, mais dépendrait des concepts informatiques introduits.

Goals And Values A
Research/Data Gathering B
Human Needs
Site Selection
Architectural Programming
Space Diagram
On-site Resource Utilization
Architectural Concept C
Fabrication Procedures
Modularization
Modular Typologies
Aggregation Rules
Stochastic Aggregation

Hexarion: A Martian Colony

Project Goals & Values, Human Needs, and Site Selection

A.1 GOALS AND VALUES



AUTOMATION — SUSTAINABILITY — SELF ASSEMBLY — MODULARISATION

The infrastructure of the colony needs to minimize the reliance on human labor and must be able to sustainably support life and manage the overall building lifecycle. To be able to achieve this, four goals were identified which will be the guiding principles of the overall design concept. The colony could achieve sustainability by identifying core typological spaces and separating their importance through modularisation. Construction of these infrastructures must implement automated self-assembly with different fitness values that parametrically dictate the growth of the system.

L'infrastructure de la colonie doit minimiser la dépendance à l'égard du travail humain et doit être en mesure de soutenir durablement la vie et de gérer le cycle de vie global du bâtiment. Pour y parvenir, quatre objectifs ont été identifiés qui seront les principes directeurs du concept de design global. La colonie pourrait atteindre la durabilité en identifiant les principaux espaces typologiques et en séparant leur importance grâce à la modularisation. La construction de ces infrastructures doit mettre en œuvre un auto-assemblage automatisé avec différentes valeurs de fitness qui dictent paramétriquement la croissance du système.

B.1 HUMAN NEEDS

B1 HUMAN NEEDS

To support life on Mars, there is a need to identify different basic human needs and how to manage them. Below is an infographic showing the basic needs of one modern human for subsistence per year.

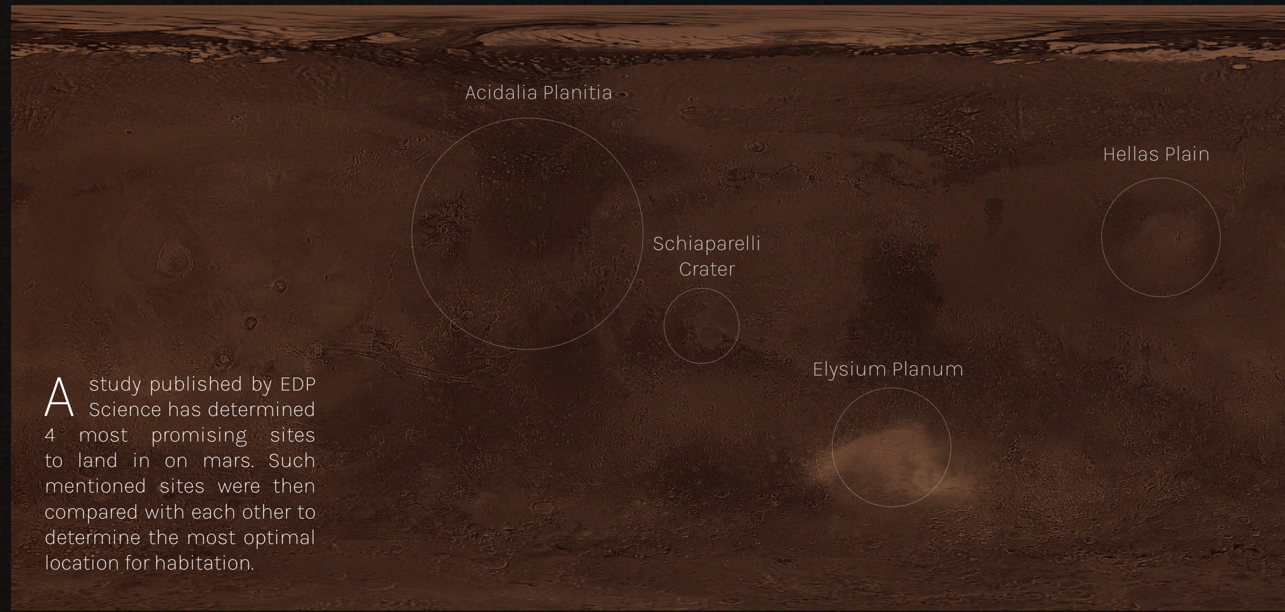
- **730kg** FOOD [1]
- **111 398 kg** WATER [2]
- **200 750 kg** CONVERTED CO2 [3]
- **822 kg** WASTE FACILITY [4]

1. Disposable Food Packets Hydroponic Farming Processed Organic Waste
2. Treated Martian Water Processed Urine
3. Converted CO2
4. Temporary Storage Facility Recycling and Processing Inciniration

B.2 SITE SELECTION

Best Landing Sites by NASA

CIRCRLED BY AREA

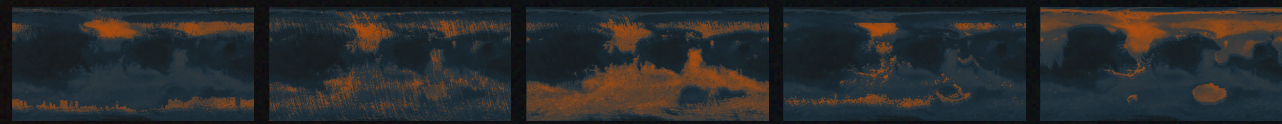


A study published by EDP Science has determined 4 most promising sites to land in on mars. Such mentioned sites were then compared with each other to determine the most optimal location for habitation.

MARTIAN MAP

Mapping of Safe Zones

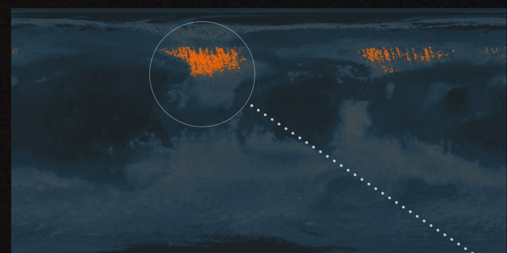
ORANGE MEANS SAFE ZONE



WATER — SILICATES — SPACE DUST — THERMAL — ELEVATION

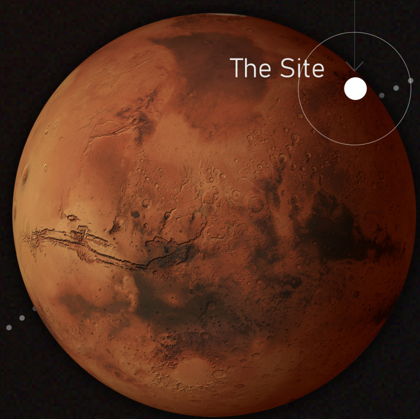
Resultant Map

ORANGE MEANS AREA WHERE SAFE ZONES INTERSECT.



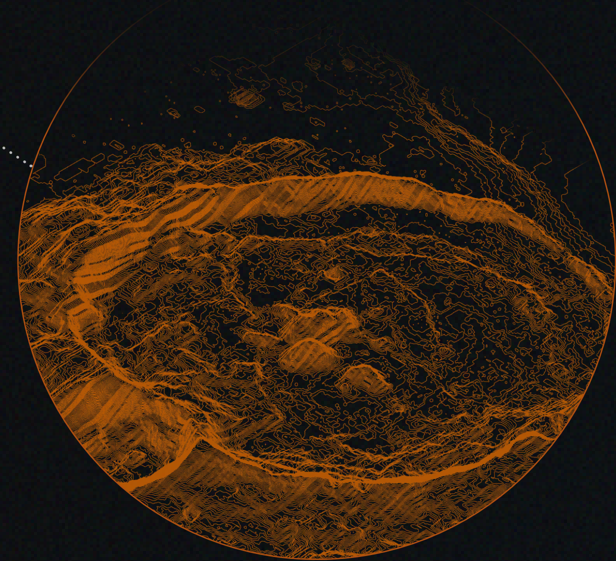
Acidalia Planitia is the chosen location for the project as it is found to have fulfilled the best site requirements among the other 4 sites. Although Elysium Planum has all the requirements within its area, they don't occur at the same location, hence, the aforementioned site was chosen.

The Site



Acidalia Planitia

The final site is a shallow crater located at the highlighted areas within the boundaries of Acidalia Planitia. This was done to reduce the excavation efforts and structural cost, as well as provide natural protection against the harsh environment.

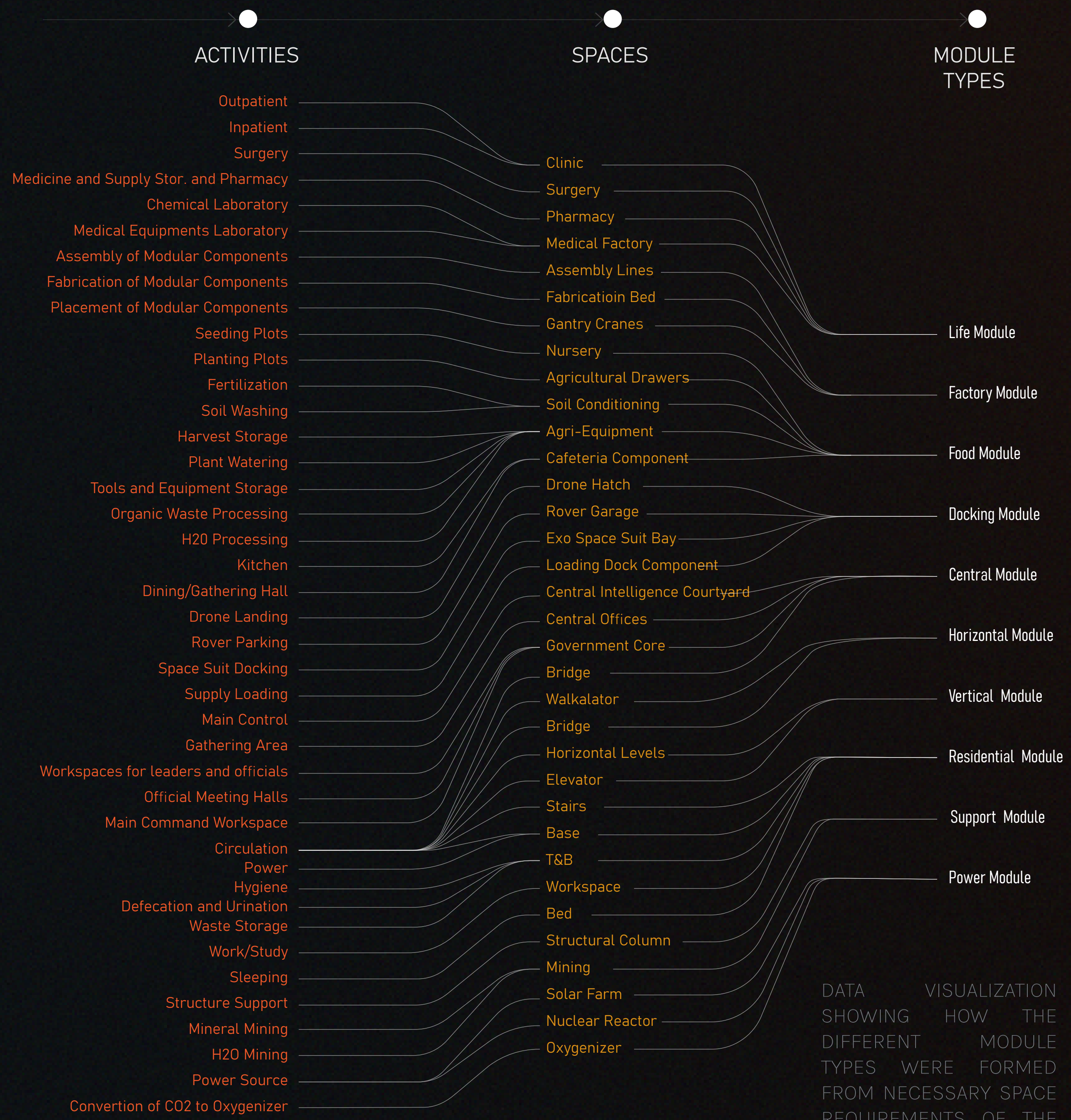


Hexarion: A Martian Colony

Research and Data Gathering: Architectural Programming and Space Diagram

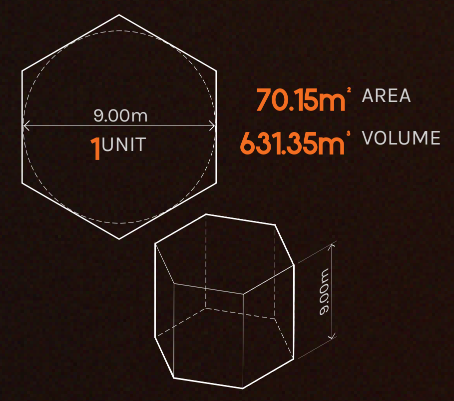
B.3 ARCHITECTURAL PROGRAMMING

Defining the final architectural modules must be derived from analysis of the possible core functions and activities of the inhabitants of the colony, maximizing space use by clustering common activities, and diversifying the modifications allowed per module.

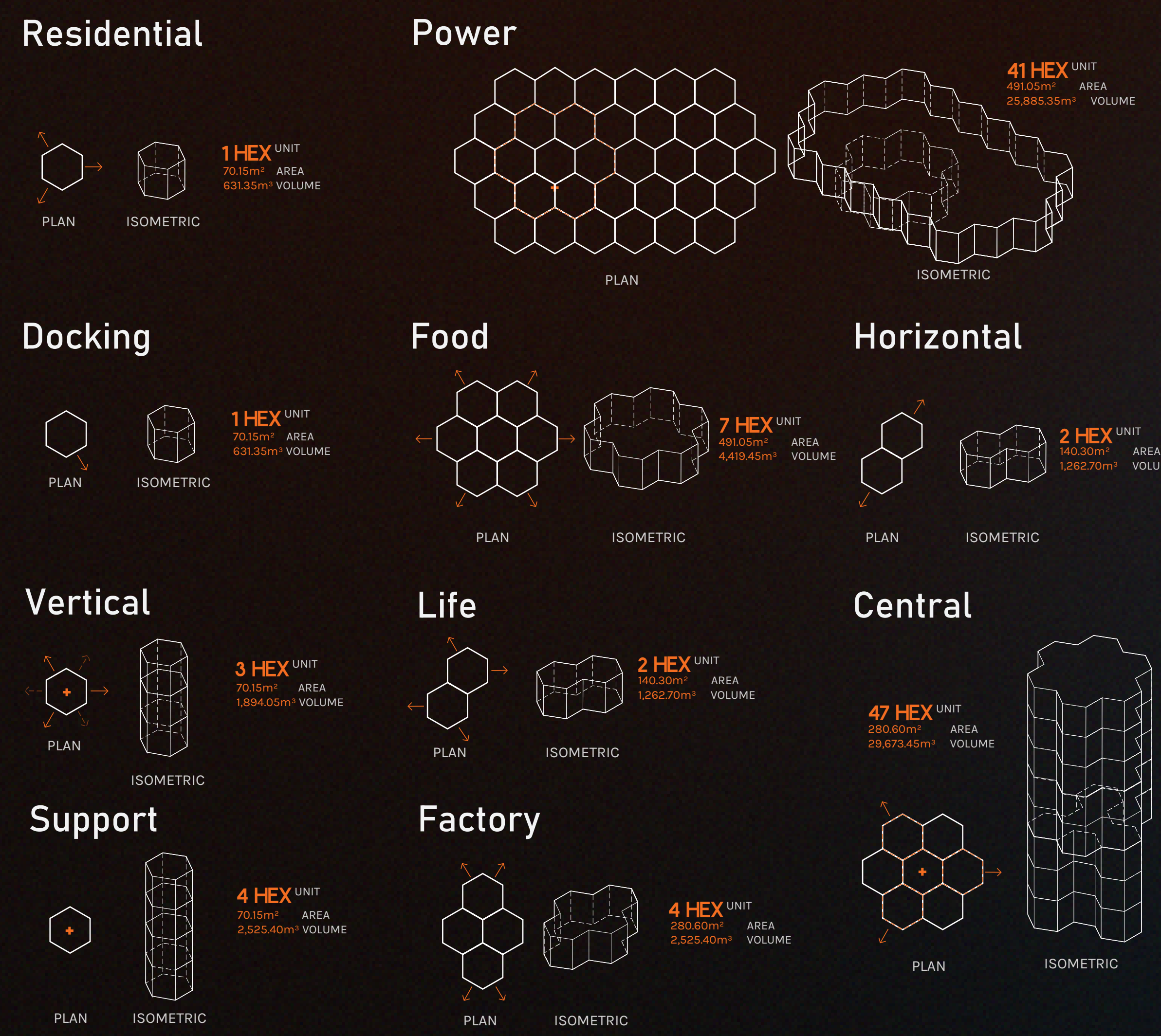


DATA VISUALIZATION SHOWING HOW THE DIFFERENT MODULE TYPES WERE FORMED FROM NECESSARY SPACE REQUIREMENTS OF THE INHABITANTS

B.4 SPACE DIAGRAM



Based on the programming, the modular types are given context by volume and circulation using the hexagonal grid. The hexagon shape was used as a guiding form for the modules due to its inherent structural rigidity forming six triangles and its repeatable tile pattern which is essential in developing modular parts. The hexagon is circumscribed from a circle with a diameter of nine meters and also extruded into a solid with a height of the same nine meters. This ensures that the modular parts will have a uniform connection throughout the proliferation.



Hexarion: A Martian Colony

Research and Data Gathering: On-site Resource Utilization

B.5

Identification of chemical compositions of raw materials from the sun, atmosphere, and the regolith.

Understanding chemical compositions of minerals and resources and being able to provide different processes to synthesize the raw materials into usable products.

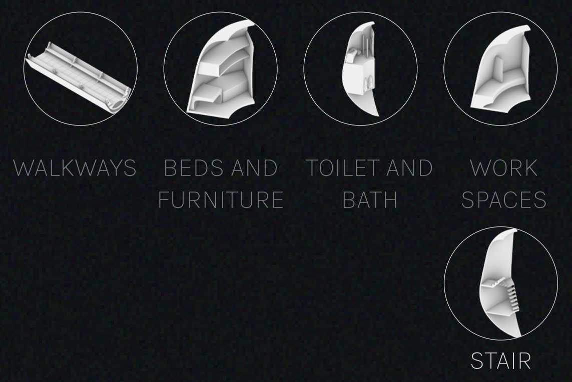
Produced products from the synthesized minerals will become the building block for infrastructure and life for the Martian colony.

B4 MATERIALITY

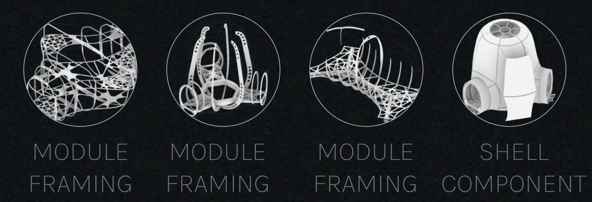
Understanding the ubiquitous resource present in the Martian environment is the first step in creating a sustainable colony. With the use of modern technology in processing and fabrication, the colony can convert raw materials found on Mars into usable materials and resources to build the colony.

Comprendre la ressource omniprésente présente dans l'environnement martien est la première étape pour créer une colonie durable. Grâce à l'utilisation de la technologie moderne dans le traitement et la fabrication, la colonie peut convertir les matières premières trouvées sur Mars en matériaux et ressources utilisables pour construire la colonie.

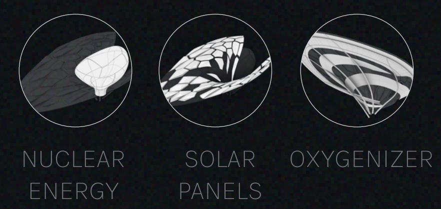
ARCHITECTURAL COMPONENT



STRUCTURAL COMPONENT



SERVICE COMPONENT



C

Hexarion: A Martian Colony

Research and Data Gathering: Fabrication Procedures

C.1 FABRICATION PROCEDURES

Understanding the methods and fabrication procedures ensures the survival of the colony.

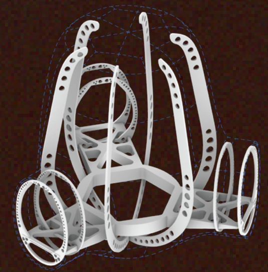
The methods are broken down into three main parts: the structural framing, the 3D printed shell, and the utilities, glass, and textile. The process will be automated by computers and robots, and will be deployed when certain conditions are met such as human population, needs, and materials.

Comprendre les méthodes et les procédures de fabrication assure la survie de la colonie.

Les méthodes se décomposent en trois parties principales : le cadrage structurel, la coque imprimée en 3D et les services publics, le verre et le textile. Le processus sera automatisé par des ordinateurs et des robots, et sera déployé lorsque certaines conditions seront remplies telles que la population humaine, les besoins et les matériaux.

Framing

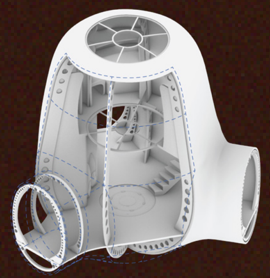
FIRST PROCESS



The structural framing will be made from the metallic alloys farmed from the regolith abundant in the area by using CNC machines and casting processes.

Shell

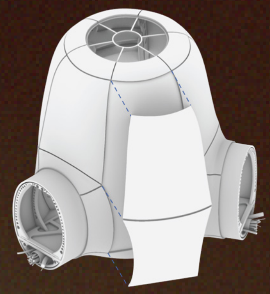
SECOND PROCESS



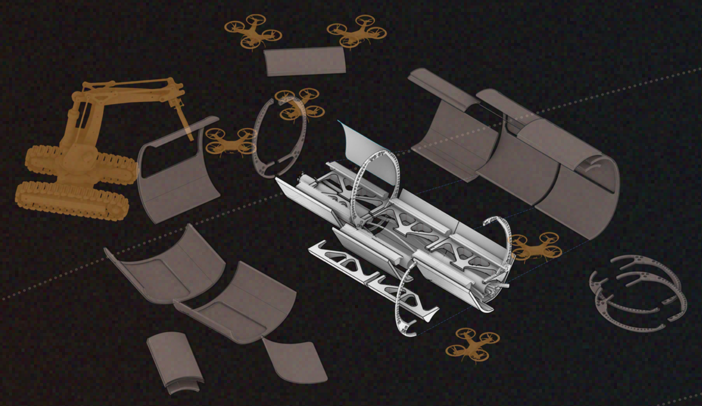
The shell will be built from the collected regolith. It will then be processed through sintering and coagulation to form 3d printing filaments, which will be deployed by 3d-printing drones that are automated on-site.

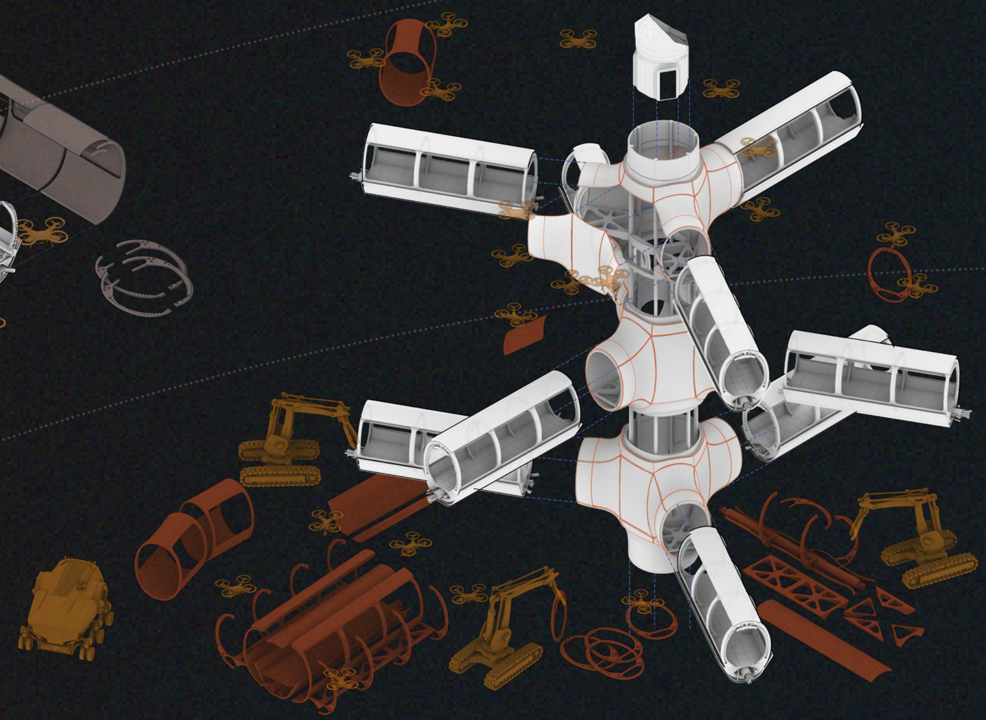
Polymers

LAST PROCESS



Different polymers are created like glass, textiles, and other utility elements by polymer processing machines and are assembled by CNC robotic arms.





C.1.1 AUTOMATED ASSEMBLY

Parameters that govern the automation of the growth of the colony will be implemented by drones, CNC machines, and other robots brought from the mother colony. This minimizes human labor in the development of infrastructure and efficiently helps the colony focus on research, development, and other aspects for growth.

Les paramètres qui régissent l'automatisation de la croissance de la colonie seront mis en œuvre par des drones, des machines CNC et d'autres robots apportés de la colonie mère. Cela minimise le travail humain dans le développement des infrastructures et aide efficacement la colonie à se concentrer sur la recherche, le développement et d'autres aspects de la croissance.

ABOVE. VISUALIZATION SHOWING THE AUTOMATED ASSEMBLY OF THE HORIZONTAL AND VERTICAL MODULE.

LEFT. VISUALIZATION SHOWING THE AUTOMATED ASSEMBLY OF THE CENTER MODULE, LIFE MODULE, AND FACTORY MODULE.

Hexarion: A Martian Colony

Architectural Concept: Modularalisation

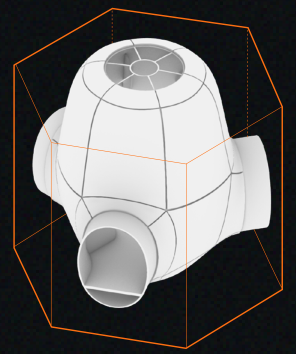
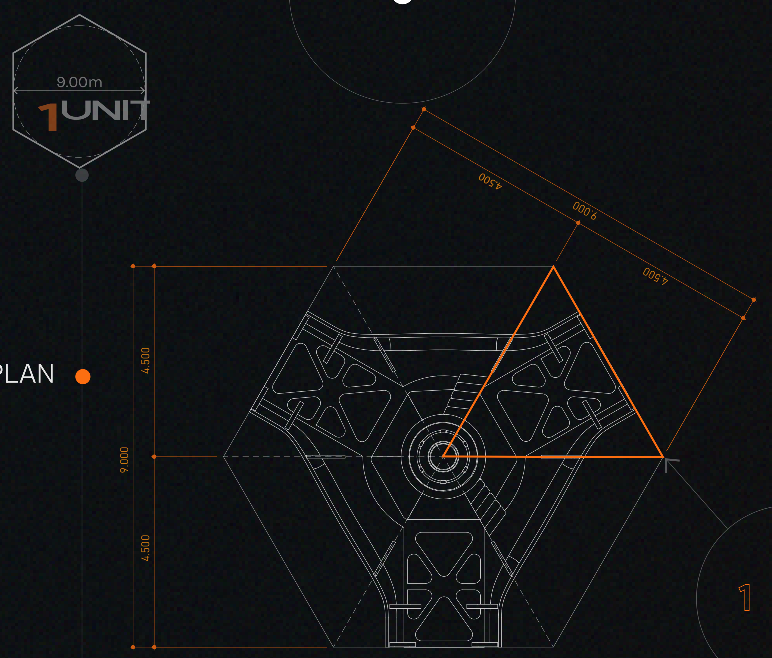


ILLUSTRATION SHOWING THE LEVELS OF MODULARISATION OF THE PROJECT.

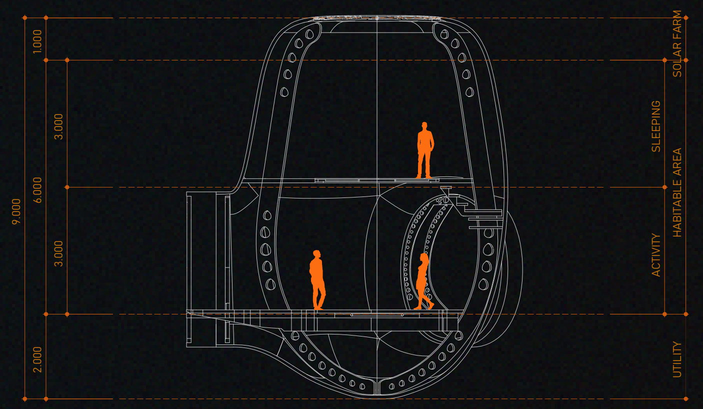
C.2 MODULARISATION

The parts become modular due to the introduction of the hexagon format as guiding principles for the proliferation of the development on the macro scale. The typology of the space for each module can also be modified depending on the usage of the module on a micro-scale. Even each type of module can be different depending on the usage and parameter requirements for each.

Les parties deviennent modulaires en raison de l'introduction du format hexagonal comme principes directeurs pour la prolifération du développement à l'échelle macro. La typologie de l'espace pour chaque module peut également être modifiée en fonction de l'utilisation du module à une micro-échelle. Même chaque type de module peut être différent en fonction de l'utilisation et des exigences de paramètres pour chacun.



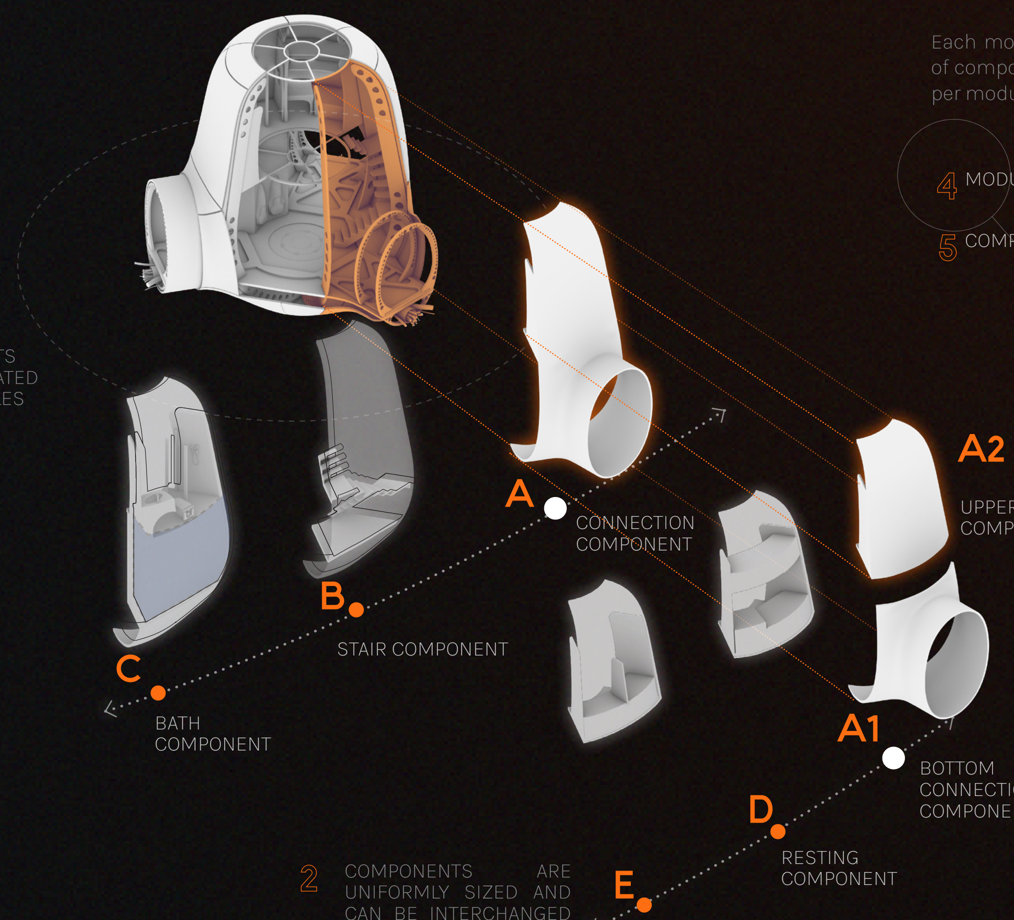
1 COMPONENTS ARE INTEGRATED INTO MODULES



MICRO MODULARISATION

C.2.1 MICRO LEVEL

Modularity is applied on the micro-scale through standardized size for the part components and can be modified to fit the user for the module.

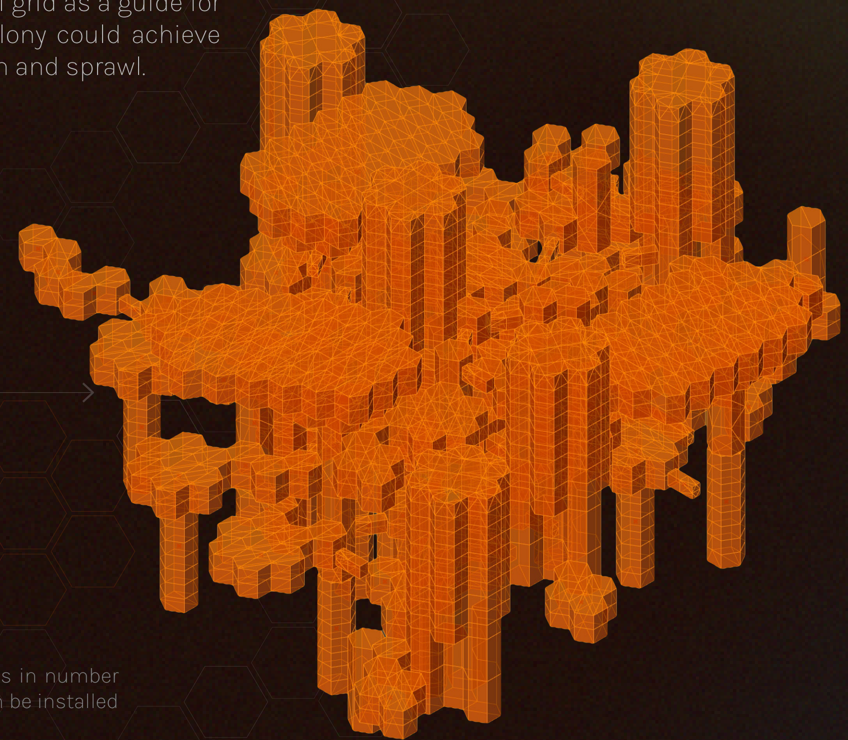


2 COMPONENTS ARE UNIFORMLY SIZED AND CAN BE INTERCHANGED DEPENDING ON THE MODULE USAGE.

MACRO LEVEL OF MODULARISATION

C.2.2 MACRO LEVEL

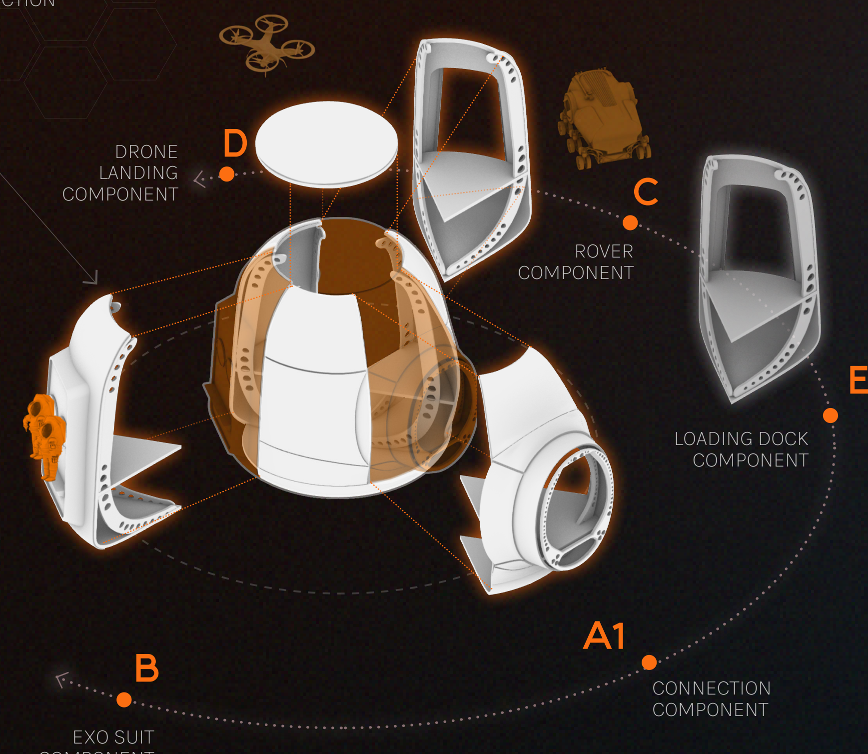
Using the hexagonal grid as a guide for proliferation, the colony could achieve modularity in growth and sprawl.



Each module also varies in number of components that can be installed per module unit.

4 MODULE CONNECTION

5 COMPONENTS



Hexarion: A Martian Colony

Architectural Concept: Module Typologies

TABLE SHOWING DETAILS OF INDIVIDUAL AGGREGATE MODULES

ID Code
A unique code assigned to each module for Identification.

Description
A text explaining the function and use of the specific module.

Components
Lists down major architectural spaces for the module.

Ratio
These ratios were determined from architectural programming research and govern the quantity of each module with respect to the residential pod. This controls the amount of each module the colony will make in proportion to control scale.

Connection Rule
Each Component part is assigned a code to map the aggregation rule and determine how each module will be connected.

CEN MOD

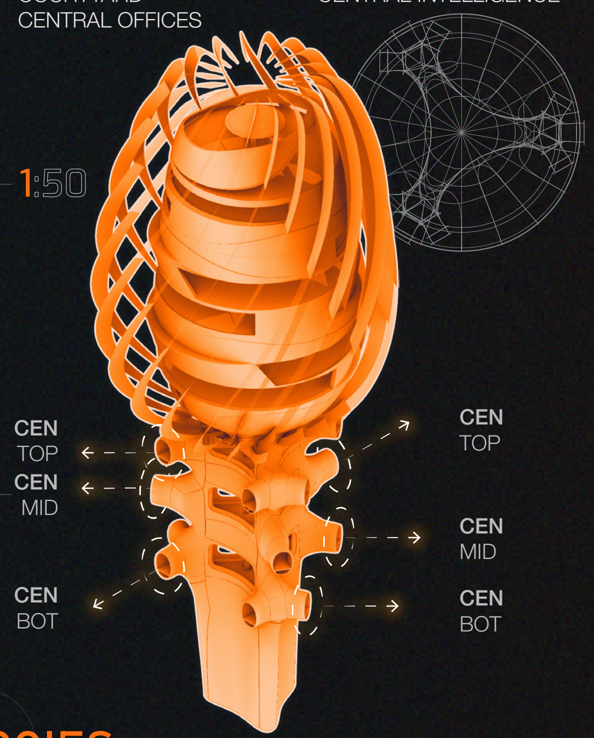
CENTER MODULE

This module is the central structure of the colony which would house the government spaces,offices, scientific research and central intelligence of the whole colony.

BRIDGE
COURTYARD
CENTRAL OFFICES

GOVERNMENT CORE
CENTRAL INTELLIGENCE

1:50



C.3 MODULE TYPOLOGIES

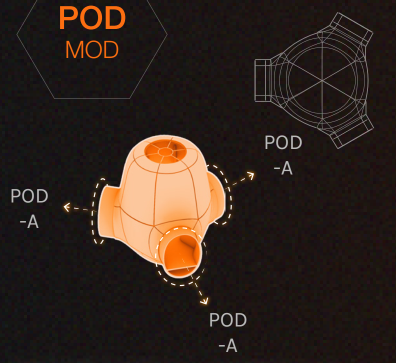
These modules are the different parts for the colony aggregation. Each module would serve a vital role in the overall infrastructure and ecosystem of the colony and have proportional quantities in reference to the core module of the residential pod.

As the colony grows, system automations are in play to dictate how the modules will be connected in proportion to the decisions and needs of the colony.

La colonie doit également être en mesure d'identifier comment les différents modules doivent être connectés. L'analyse de la matrice spatiale et des contiguïtés dicte la façon dont les modules se connectent et les informations seront envoyées pour l'automatisation et la fabrication. Les diagrammes montrent les différents types de connexion autorisés pour l'agrégation et comment ceux-ci affectent la croissance de la colonie.

Les règles de connexion sont formatées de manière à montrer la connexion entre les différentes parties d'un module à l'autre.

POD MOD



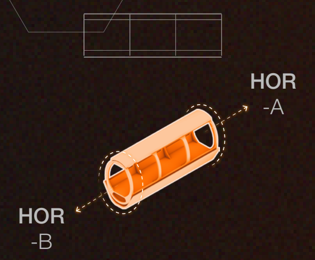
RESIDENTIAL MODULE

This module is the core facility of the colony and could house a maximum of 3 three people at a time. All aggregation conditions would be based from this core module.

SLEEPING POD
HYGIENE POD
STUDY/ WORKING AREA
STAIR COMPONENT
WASTE POD

1:∞

HOR MOD



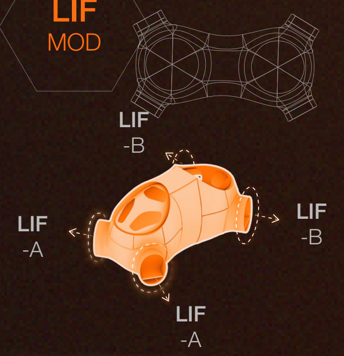
HORIZONTAL MODULE

This module would create horizontal circulations between different modules and serve as the bridge and transition space between them.

BRIDGE
WALKALATOR

3:1

LIF MOD



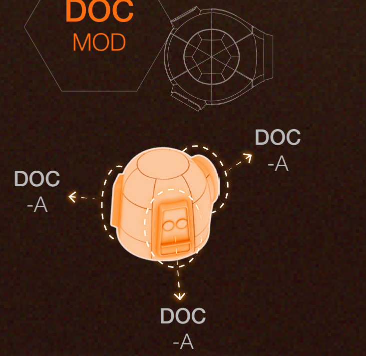
LIFE MODULE

This module holds all necessary components for life and medical support. All medical liquids and equipment for survival will also be created in this module.

CLINIC
SURGERY
PHARMACY
MEDICAL FACTORY

1:2

DOC MOD



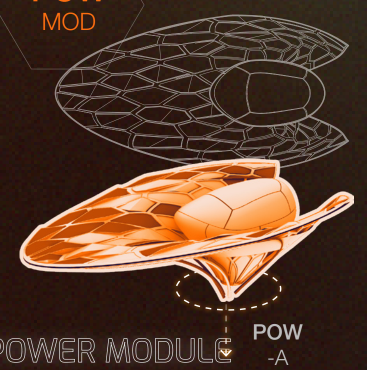
DOCKING MODULE

This module will serve as the docking bay for the rovers, drones, and spacesuits. This has an air hatch and pressurized body to contain the atmosphere inside and enable access outside.

DRONE HATCH
ROVER GARAGE
EXO SPACE SUIT BAY
LOADING DOCK

1:5

POW MOD



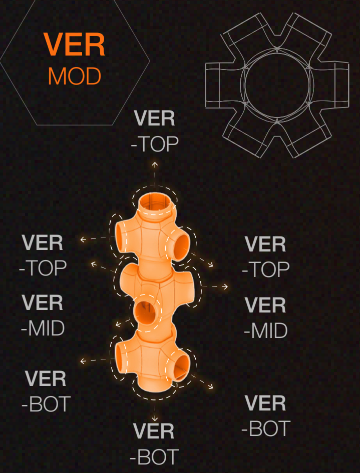
POWER MODULE

This will serve as the main power source for the colony. Solar panels and oxygenizers are built on the voronoi frame and the central core houses a nuclear reactor that would provide electricity for the colony.

SOLAR FARM
NUCLEAR REACTOR
OXYGENIZER

1:20

VER MOD



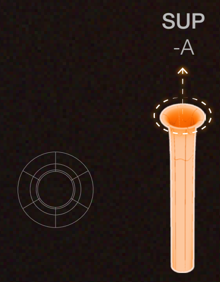
VERTICAL MODULE

This module would create vertical circulations and would allow for multilevel development of the aggregation of the colony.

ASSEMBLY LINES
FABRICATION BED
GANTRY CRANES

1: 8

SUP MOD1



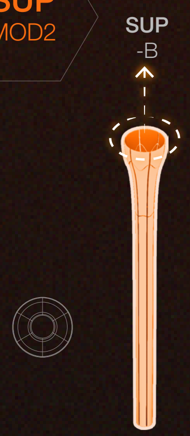
SUPPORT MODULE 1

This large column module will serve as support for the food modules and other large form factor modules requiring support at higher levels.

STRUCTURAL COLUMN
H^2O MINING RIG
MINERAL MINING COMPONENTS

1: VERTICAL MODULE

SUP MOD2



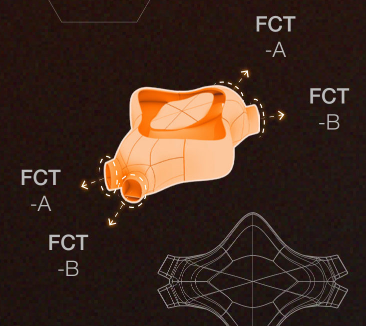
SUPPORT MODULE 2

This slender column module will serve as support for the vertical modules and other small form factor modules.

STRUCTURAL COLUMN
H2O MINING RIG
MINERAL MINING COMPONENTS

1: FOOD MODULE

FCT MOD



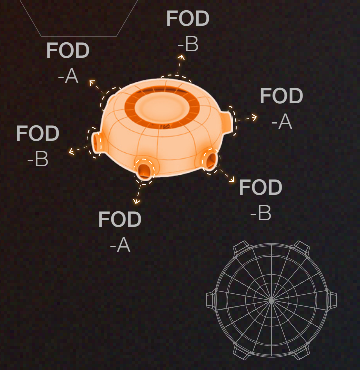
FACTORY MODULE

This module holds all fabrication, machining, creation, and assembly of mechanical equipment that would help build the colony.

ASSEMBLY LINES
FABRICATION BED
GANTRY CRANES

1:8

FOD MOD



FOOD MODULE

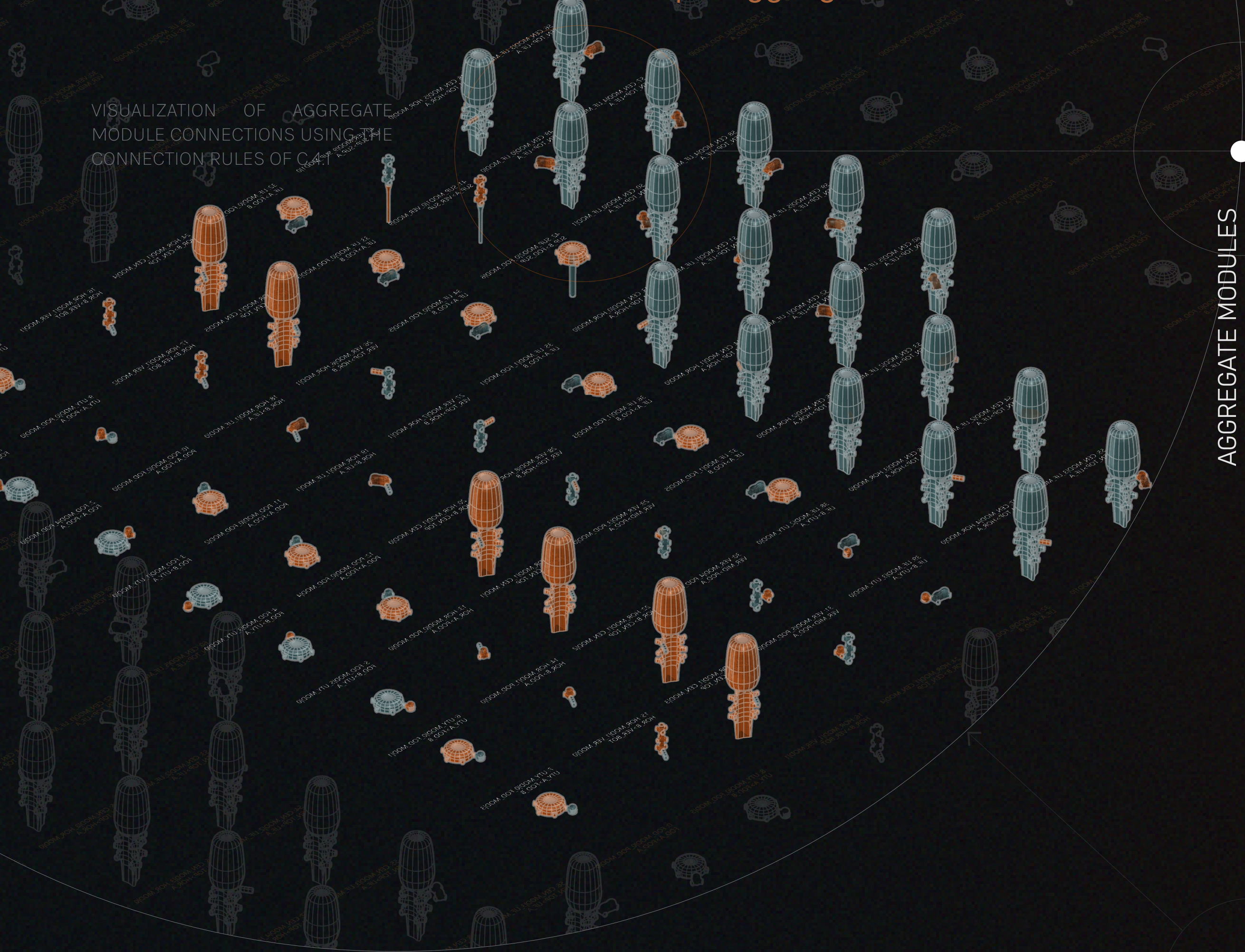
This module houses the food production facilities of the colony. Each module is sustainable to hold plan life and produce food for 20 -25 people per year.

SEEDLING NURSERY
AGRICULTURAL DRAWERS
FERTILIZING PODS
AGRI-EQUIPMENT

1:10

Hexarion: A Martian Colony

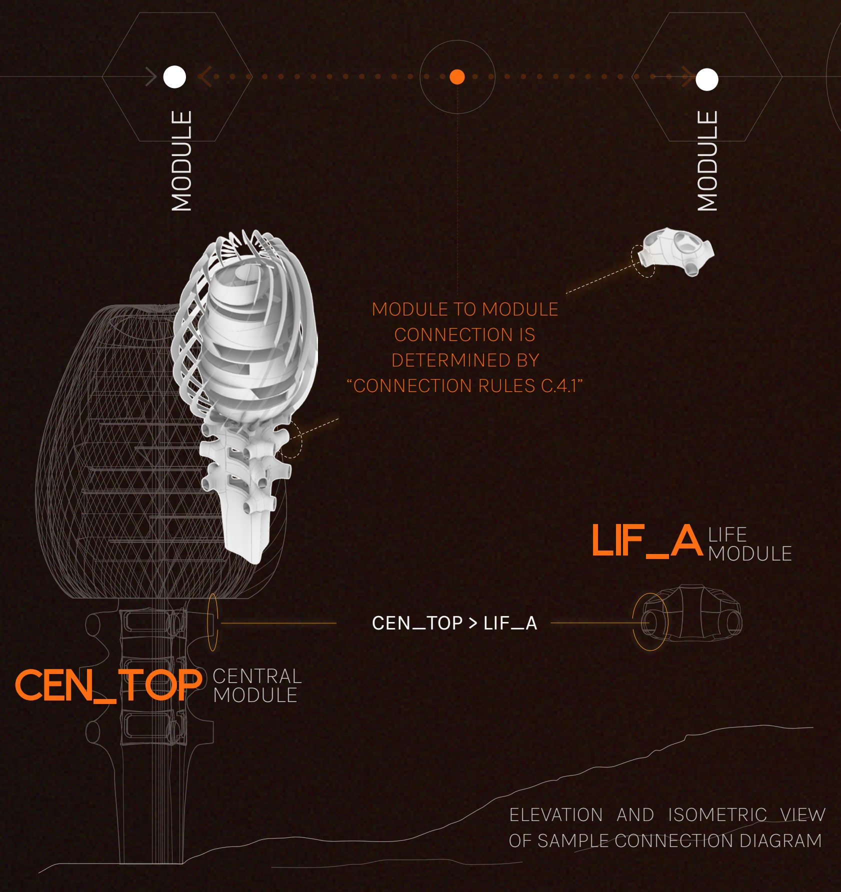
Architectural Concept: Aggregation Rules



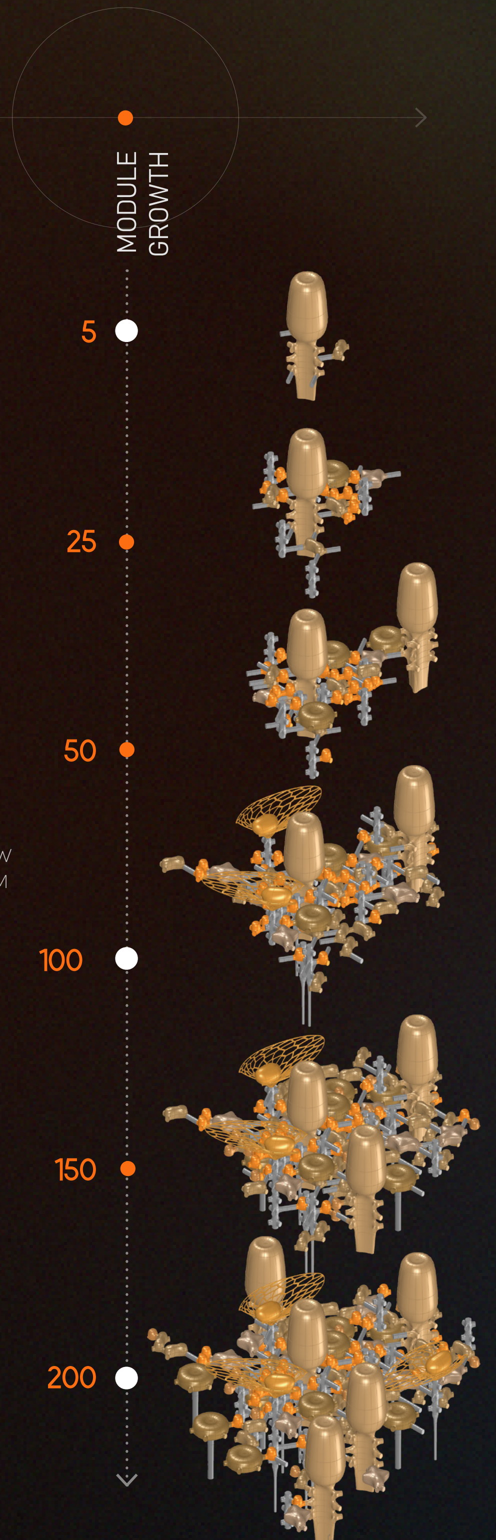
AGGREGATE MODULES VISUALIZER

103 TOTAL MODULE CONNECTION RULES

- 11 CENTRAL MODULE CONNECTION
- 12 FOOD MODULE CONNECTION
- 7 DOCKING MODULE CONNECTION
- 10 RESIDENTIAL MODULE CONNECTION
- 25 HORIZONTAL MODULE CONNECTION
- 14 VERTICAL MODULE CONNECTION
- 7 FACTORY MODULE CONNECTION
- 13 LIFE MODULE CONNECTION
- 3 SUPPORT MODULE CONNECTION
- 1 POWER MODULE CONNECTION



ELEVATION AND ISOMETRIC VIEW OF SAMPLE CONNECTION DIAGRAM



ABOVE. VISUALIZATION SHOWING THE ADDITIVE GROWTH PATTERN OF THE AGGREGATE MODULES USING THE ASSIGNED RULES. NUMBER VALUES SHOW NUMBER OF TOTAL MODULES FROM 5 - 200.

C.4 AGGREGATION RULES

The colony must also be able to identify how the different modules must be connected. Analysis of space matrix and adjacencies dictate how the modules connect and the information will be sent for automation and fabrication. The diagrams show the different connection types allowable for the aggregation and how these affect the growth of the colony.

The connection rules are formatted in a way that shows the connection between different parts of a module to the other.

La colonie doit également être en mesure d'identifier comment les différents modules doivent être connectés. L'analyse de la matrice spatiale et des contiguïtés dicte la façon dont les modules se connectent et les informations seront envoyées pour l'automatisation et la fabrication. Les diagrammes montrent les différents types de connexion autorisés pour l'agrégation et comment ceux-ci affectent la croissance de la colonie.

Les règles de connexion sont formatées de manière à montrer la connexion entre les différentes parties d'un module à l'autre.

C.4.1 CONNECTION RULES

The connection rules are determined by these syntaxes. ModuleConnection_Part1 > ModuleConnection_Part2. These rules are guides for the proliferation of the colony.

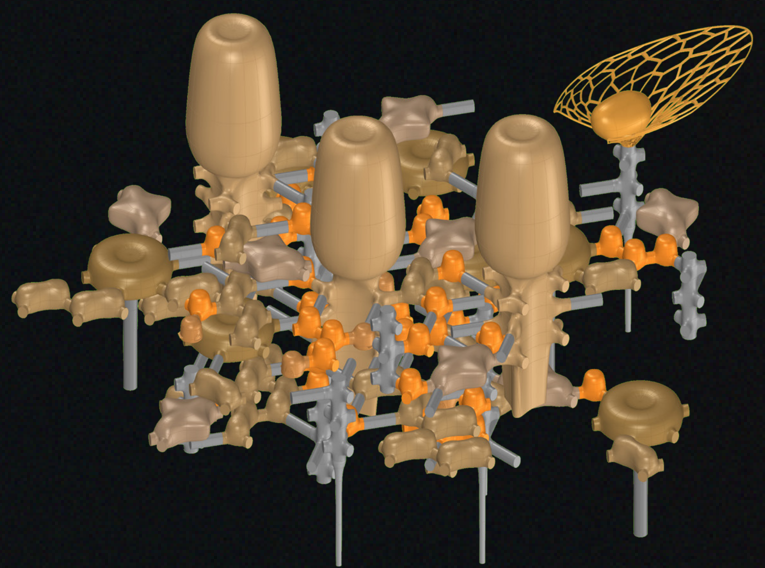
Les règles de connexion sont déterminées par ces syntaxes. ModuleConnection_Part1 > ModuleConnection_Part2. Ces règles sont des guides pour la prolifération de la colonie.

CEN_TOP>POD_A	FOD_B>LIF_A	HOR_A>HOR_B	HOR_B>CEN_MID	FCT_B>HOR_B
CEN_TOP>HOR_A	FOD_B>LIF_B	HOR_A>VER_TOP	HOR_B>CEN_BOT	FCT_B>FOD_B
CEN_TOP>HOR_B	DOC_A>FOD_B	HOR_A>VER_MID	VER_TOP>POD_A	LIF_A>FOD_B
CEN_TOP>LIF_A	DOC_A>POD_A	HOR_A>VER_BOT	VER_TOP>HOR_A	LIF_A>DOC_A
CEN_MID>POD_A	DOC_A>HOR_B	HOR_A>LIF_A	VER_TOP>HOR_B	LIF_A>POD_A
CEN_MID>HOR_A	DOC_A>VER_MID	HOR_A>LIF_B	VER_MID>POD_A	LIF_A>HOR_A
CEN_MID>HOR_B	DOC_A>FCT_B	HOR_A>FCT_A	VER_MID>HOR_A	LIF_A>HOR_B
CEN_BOT>POD_A	DOC_A>FCT_A	HOR_A>FCT_B	VER_MID>HOR_B	LIF_A>LIF_B
CEN_BOT>HOR_A	DOC_A>LIF_B	HOR_A>CEN_TOP	VER_BOT>POD_A	LIF_A>CEN_TOP
CEN_BOT>HOR_B	POD_A>POD_A	HOR_A>CEN_MID	VER_BOT>HOR_A	LIF_B>FOD_B
CEN_BOT>FCT_A	POD_A>FOD_A	HOR_A>CEN_BOT	VER_BOT>HOR_B	LIF_B>DOC_A
FOD_A>POD_A	POD_A>FOD_B	HOR_B>FOD_B	VER_BOT>FOD_A	LIF_B>POD_A
FOD_A>HOR_A	POD_A>DOC_A	HOR_B>POD_A	VER_BOT>FCT_A	LIF_B>HOR_A
FOD_A>LIF_A	POD_A>HOR_A	HOR_B>VER_TOP	VER_BOT>LIF_B	LIF_B>HOR_B
FOD_A>LIF_B	POD_A>HOR_B	HOR_B>VER_MID	VER_SUP>SUP_A	LIF_B>LIF_A
FOD_A>FCT_A	POD_A>FCT_A	HOR_B>VER_BOT	VER_POW>POW_A	SUP_A>VER_SUP
FOD_A>FCT_B	POD_A>FCT_B	HOR_B>LIF_A	FCT_A>POD_A	FOD_SUP>SUP_B
FOD_B>DOC_A	POD_A>VER_TOP	HOR_B>LIF_B	FCT_A>HOR_A	SUP_B>FOD_SUP
FOD_B>POD_A	POD_A>VER_BOT	HOR_B>FCT_A	FCT_A>HOR_B	POW_A>VER_POW
FOD_B>HOR_B	HOR_A>FOD_A	HOR_B>FCT_B	FCT_B>POD_A	
FOD_B>FCT_B	HOR_A>POD_A	HOR_B>CEN_TOP	FCT_B>HOR_A	

C

Hexarion: A Martian Colony

Architectural Concept: Stochastic Aggregation



MIN

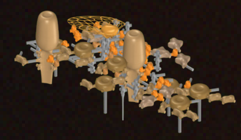
OTHER ITERATIONS

ITERATION

MIN.

RES MOD:	45
HOR MOD:	75
VER MOD:	14
LIF MOD:	33
CEN MOD:	3
FOD MOD:	7
DOC MOD:	25
FAC MOD:	8
SUP1 MOD:	6
SUP2 MOD:	4
POW MOD:	2

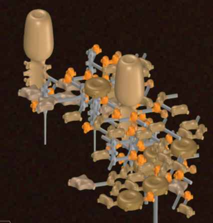
POP:222



01

RES MOD:	45	DOC MOD:	35
HOR MOD:	79	FACMOD:	6
VER MOD:	14	SUP1 MOD:	6
LIF MOD:	31	SUP2 MOD:	3
CEN MOD:	3	POW MOD:	2
FOD MOD:	6		

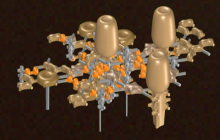
POP:230



02

RES MOD:	45	DOC MOD:	35
HOR MOD:	76	FACMOD:	7
VER MOD:	13	SUP1 MOD:	5
LIF MOD:	38	SUP2 MOD:	2
CEN MOD:	2	POW MOD:	0
FOD MOD:	6		

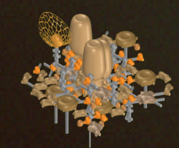
POP:229



03

RES MOD:	45	DOC MOD:	45
HOR MOD:	79	FACMOD:	7
VER MOD:	14	SUP1 MOD:	3
LIF MOD:	35	SUP2 MOD:	1
CEN MOD:	3	POW MOD:	0
FOD MOD:	5		

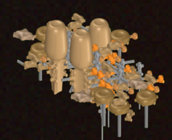
POP:237



04

RES MOD:	45	DOC MOD:	40
HOR MOD:	79	FACMOD:	7
VER MOD:	14	SUP1 MOD:	2
LIF MOD:	31	SUP2 MOD:	4
CEN MOD:	3	POW MOD:	2
FOD MOD:	7		

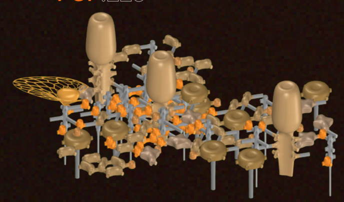
POP:234



05

RES MOD:	45	DOC MOD:	90
HOR MOD:	80	FACMOD:	8
VER MOD:	15	SUP1 MOD:	9
LIF MOD:	40	SUP2 MOD:	5
CEN MOD:	3	POW MOD:	0
FOD MOD:	9		

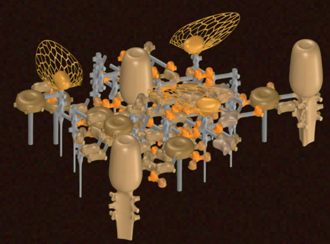
POP:304



06

RES MOD:	46	DOC MOD:	90
HOR MOD:	80	FACMOD:	8
VER MOD:	15	SUP1 MOD:	9
LIF MOD:	40	SUP2 MOD:	8
CEN MOD:	3	POW MOD:	2
FOD MOD:	9		

POP:310



07

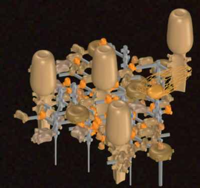
RES MOD:	45	DOC MOD:	90
HOR MOD:	80	FACMOD:	8
VER MOD:	16	SUP1 MOD:	11
LIF MOD:	41	SUP2 MOD:	7
CEN MOD:	3	POW MOD:	6
FOD MOD:	8		

POP:315

08

RES MOD:	45	DOC MOD:	90
HOR MOD:	80	FACMOD:	8
VER MOD:	16	SUP1 MOD:	11
LIF MOD:	41	SUP2 MOD:	6
CEN MOD:	3	POW MOD:	6
FOD MOD:	8		

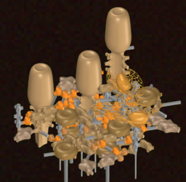
POP:313



09

RES MOD:	45	DOC MOD:	90
HOR MOD:	80	FACMOD:	8
VER MOD:	16	SUP1 MOD:	8
LIF MOD:	40	SUP2 MOD:	6
CEN MOD:	3	POW MOD:	2
FOD MOD:	8		

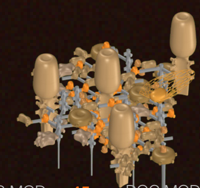
POP:307



10

RES MOD:	45	DOC MOD:	90
HOR MOD:	80	FACMOD:	8
VER MOD:	15	SUP1 MOD:	9
LIF MOD:	40	SUP2 MOD:	5
CEN MOD:	4	POW MOD:	2
FOD MOD:	8		

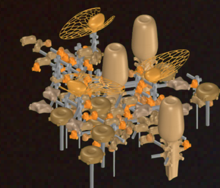
POP:306



11

RES MOD:	45	DOC MOD:	90
HOR MOD:	80	FACMOD:	9
VER MOD:	15	SUP1 MOD:	7
LIF MOD:	40	SUP2 MOD:	5
CEN MOD:	3	POW MOD:	4
FOD MOD:	8		

POP:306



12

RES MOD:	45	DOC MOD:	90
HOR MOD:	80	FACMOD:	8
VER MOD:	15	SUP1 MOD:	10
LIF MOD:	40	SUP2 MOD:	6
CEN MOD:	3	POW MOD:	4
FOD MOD:	8		

POP:309

C.5 STOCHASTIC AGGREGATION

The colony could only achieve sustainability by controlling the random proliferation growth of the modules and this could be achieved by dictating the allowable quantity of each module which is based on the ratios provided. Other factors must be taken into account for the iterations of the colony like radiation, terrain topology, and environment to name a few. These iterations will be analyzed to produce the best fitness value to be implemented for the location of the colony.

La colonie ne pouvait atteindre la durabilité qu'en contrôlant la croissance de prolifération aléatoire des modules et cela pourrait être réalisé en dictant la quantité admissible de chaque module, qui est basée sur les ratios fournis. D'autres facteurs doivent être pris en compte pour les itérations de la colonie comme le rayonnement, la topologie du terrain et l'environnement pour n'en nommer que quelques-uns. Ces itérations seront analysées pour produire la meilleure valeur de fitness à mettre en oeuvre pour l'emplacement de la colonie.

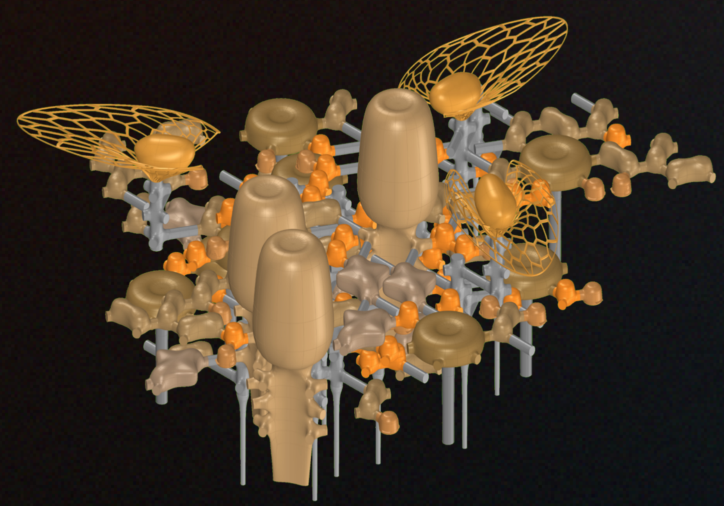
MAX

ITERATION

MAX

RES MOD:	46
HOR MOD:	80
VER MOD:	15
LIF MOD:	40
CEN MOD:	3
FOD MOD:	9
DOC MOD:	100
FAC MOD:	9
SUP1 MOD:	12
SUP2 MOD:	7
POW MOD:	6

POP:327



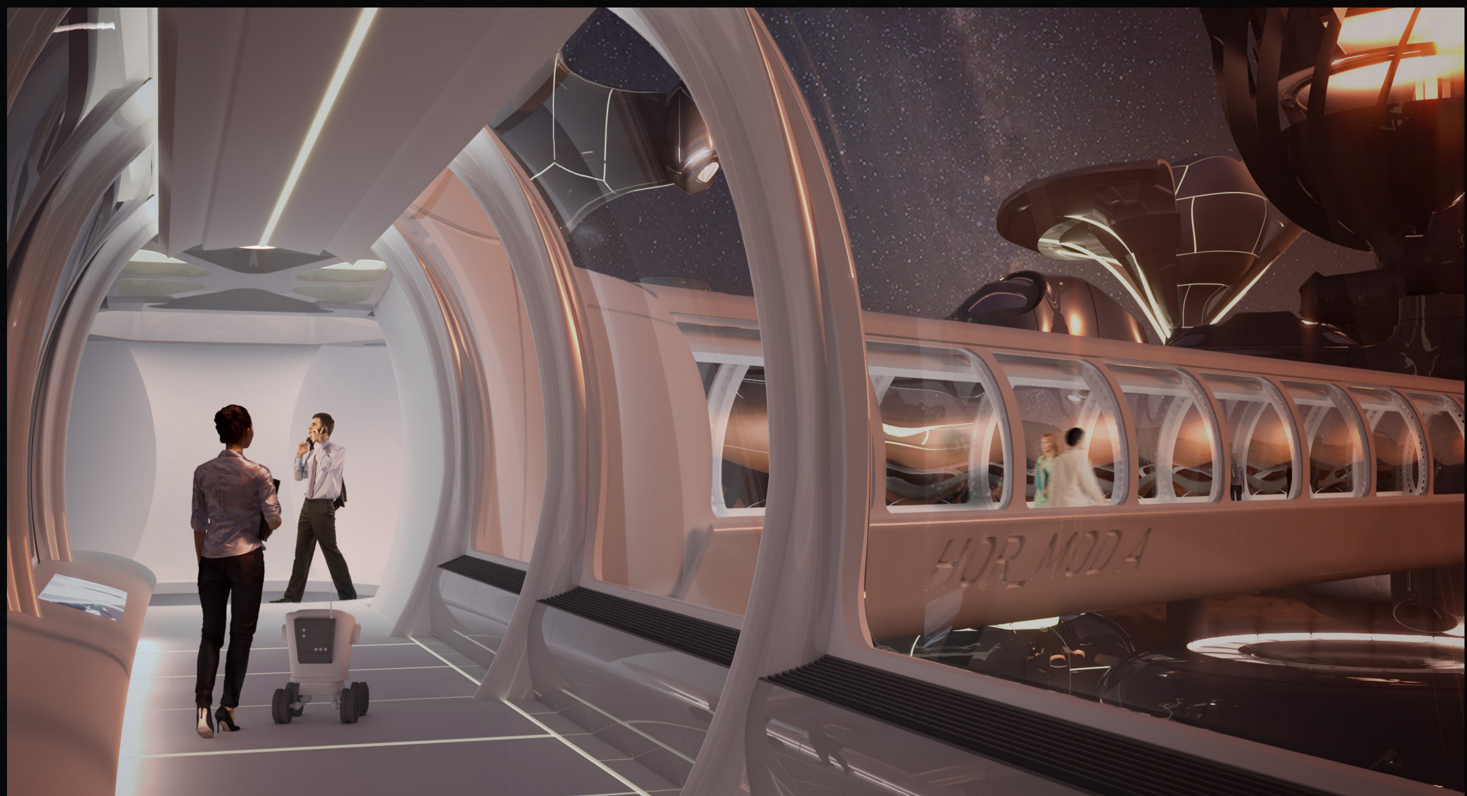
HEXARION

A MARTIAN COLONY

CEN_MOD

LEFT TOP MAGE
INTERIOR PERSPECTIVE SHOWING CENTRAL MODULE.

HOR_MOD



RIGHT IMAGE SHOWING WALKWAYS AT HORIZONTAL MODULE "HOR MOD" AND HOW IT CONNECTS TO OTHER MODULES.

FOD_MOD

LIF_MOD

RIGHT TOP IMAGE
PERSPECTIVE SHOWING HYDROPONIC COMPONENTS INSIDE FOOD MODULE.

RIGHT CENTER IMAGE
SHOWS INTERIOR PERSPECTIVE OF LIFE MODULE.

RIGHT BOTTOM IMAGE
INTERIOR PERSPECTIVE SHOWING LIFE MODULE.