

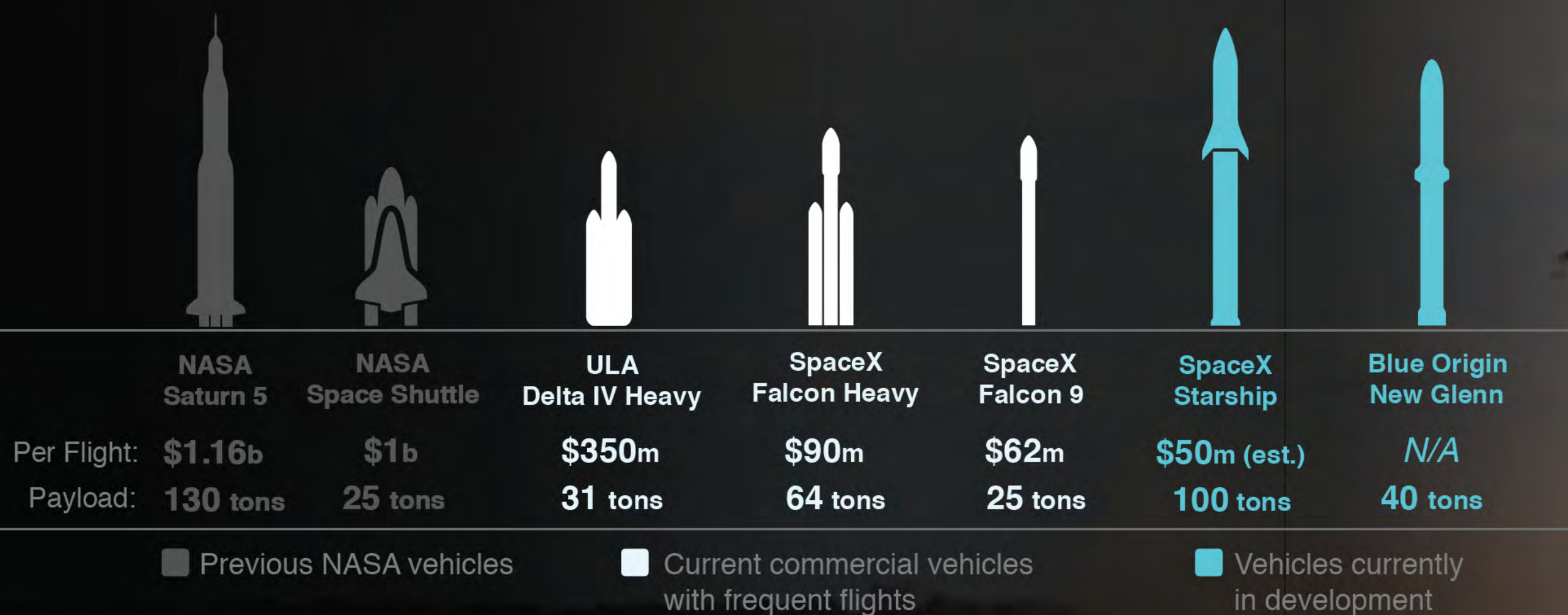
A photograph of an astronaut in a white spacesuit standing on the moon's surface. The astronaut is wearing a helmet with a clear visor and has an American flag patch on the right chest. To the right, the gold thermal insulation of the lunar lander is visible. The lunar surface is dark and rocky, with a white flag planted in the ground to the left of the astronaut. The background is the blackness of space.

LOSTIN

Lostin Labs Overview
Reading Deck • 2019
P1.RD.v35

It's not science fiction anymore. **A new frontier is now *open* for business.**

The commercial space industry has seemingly been a hobby for billionaires since the first space tourist paid \$20 million to fly to the International Space Station back in April 2001. The fledgling industry has been focused on reducing launch costs for years and has now achieved over a **93.8% costs reduction*** in just 16 years. With more competition rapidly coming online over the next two years, mostly driven by SpaceX's successful reuse of its rocket boosters, prices are expected to fall dramatically lower still.



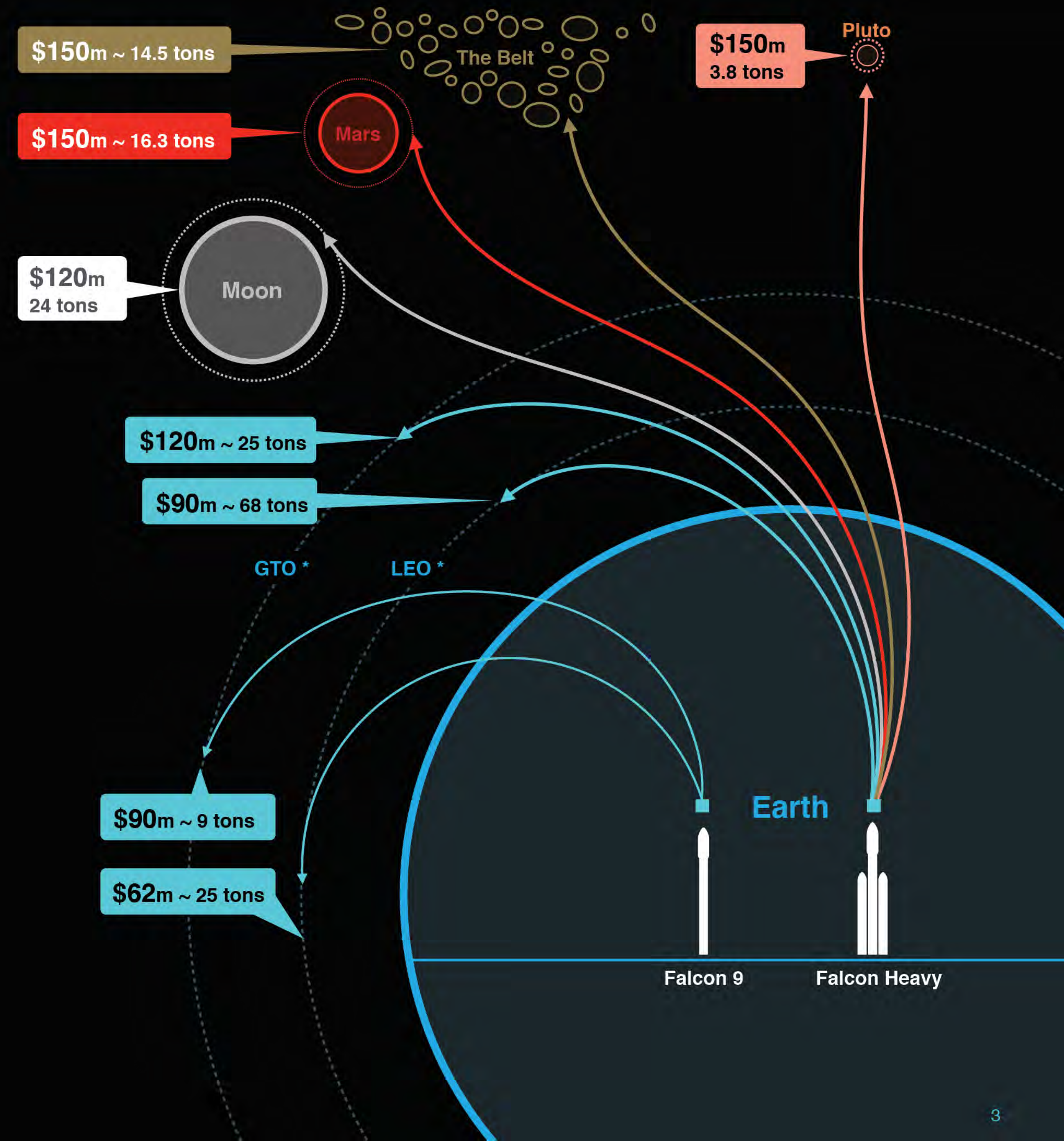
SpaceX Falcon Heavy
 A pair of SpaceX's Falcon Heavy boosters landing simultaneously after successful launch to orbit. Reusable rockets have been a key driver in reduced launch prices.

* [SOURCE] Publicized pricing by SpaceX, spaceflight.com and NASA Space Shuttle operations.

Lifting tons and tons into orbit is no longer a feat for governments. Even lifting tons into deep space or to other bodies is now a reality.

The Falcon Heavy currently has more lift capability than any other operational rocket in the world, with a payload of 140,660 lbs. to low Earth orbit and 37,040 lbs. to a trans-Mars injection. The rocket was designed to meet or exceed all current requirements of human rating. The structural safety margins are 40% above flight loads, higher than the 25% margins of other rockets. Falcon Heavy was designed from the outset to carry humans into space as the Falcon 9 will do this year with NASA astronauts onboard.

With launch prices to any destination in the solar systems around 1/10th the price of a Space Shuttle launch just 8 years ago – **access to space is no longer an issue.**



* [SOURCE] Prices are based on publicized pricing by SpaceX. *LEO is Low Earth Orbit. GTO is Geosynchronous Transfer Orbit.

Even with the lowest launch costs in human history, **you can blast into space for even less with ride sharing services.**

Commercial space companies, such as SpaceX, have driven launch costs dramatically lower in recent years; however, it still presents a large financial commitment for a lot of businesses. New companies in the United States, such as spaceflight.com, offer ride sharing services for businesses that would like to launch payloads into space, but do not need the full capacity of modern rockets. Why pay for the entire FedEx plane when you just need to ship a package?



*Based on NASA Space Shuttle estimated launch costs of \$1 billion per flight and its payload capacity of 25 tons versus public pricing from spaceflight.com for containerized 3U payloads.

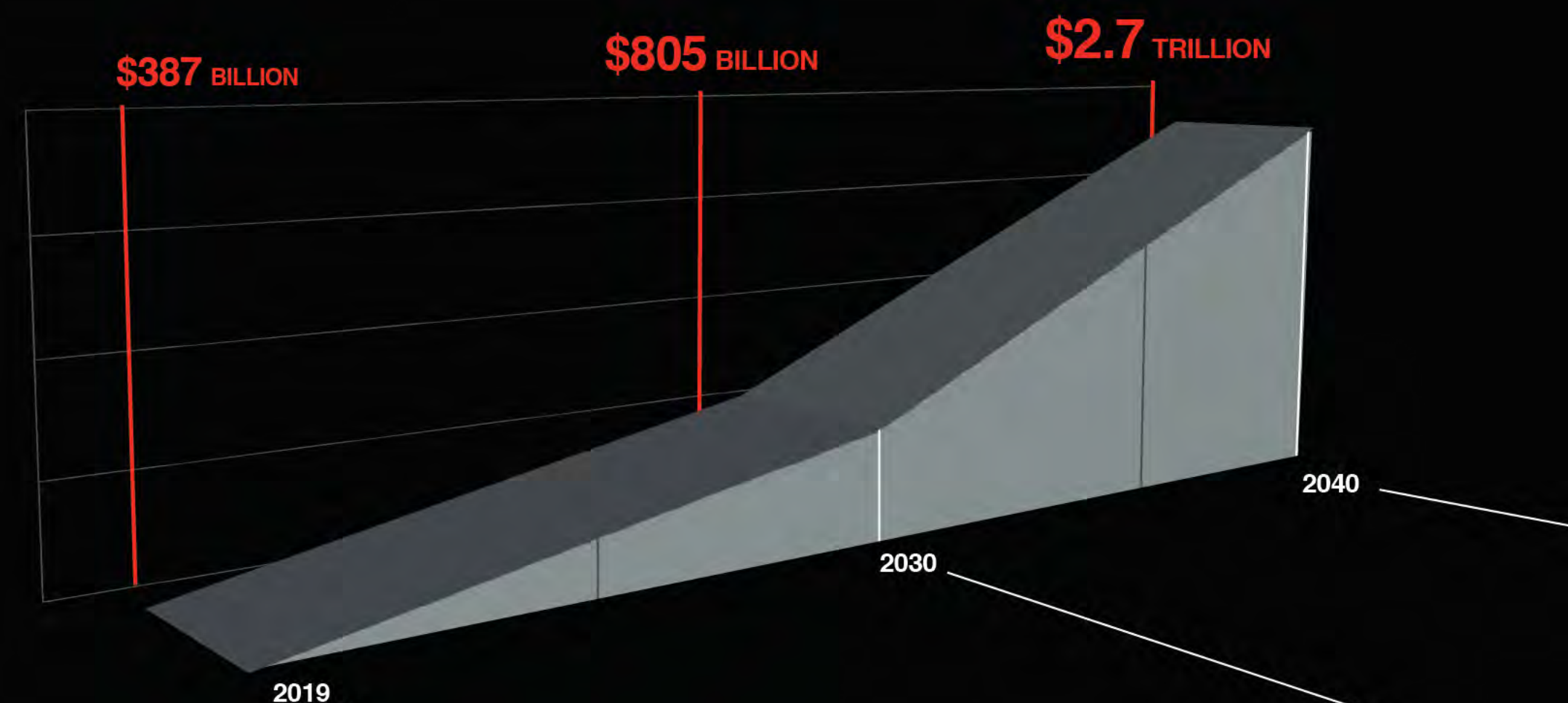
With access to space at historically low prices & dropping, **now is the time** to build the foundations of an entirely new economy.

In 2018, both Goldman Sachs and Morgan Stanley projected a “most likely outcome” of a \$1.1 trillion space economy in the 2040s while another study by Bank of America Merrill Lynch saw the market growing to \$2.7 trillion by the same timeframe.

With the space economy currently worth approximately \$350 billion, this represents slow growth of anywhere between 5-7%. However, we believe that growth will swell as more human spaceflight options become a reality and the cost of spaceflight further falls with new launch vehicles coming online over the next several years.

THE NEW SPACE ECONOMY

Leading investment banks and management consultancies predict the new space economy will be valued from \$1.1 to \$2.7 trillion by 2040. Just over the next 10 years alone, the new space economy is expected to double in size, driven by reusable rockets lowering access costs to space.



* ISOURCE| Various articles and reports by Morgan Stanley, UBS, Deloitte & McKinsey.

Lostin labs is founded upon a tested model for moonshots.
 We generate our own ideas (for you too)
 + incubate and build those ideas into successful businesses.

THE LOSTIN LABS MODEL



CREATE WHAT'S NEXT

We create groundbreaking products and services that serve early adopters, today. Lostin Labs can create proofs of concept to working prototypes to marketable products.



BUILD & OPERATE

We build new businesses that prepare companies for the next wave of change leveraging disruptive technology & new markets.



MONETIZE IP

Monetizing IP generated allows us to capture an ROI on technology that is too early (and scary) for the average organization to operate today.

Lostin labs will be
the most creative
address on Earth.
Think Edison Labs
+ Eames studio
focused on space.

* CHARLES & RAY EAMES PICTURED TOGETHER. THE EAMES STUDIO WAS KNOWN AS THE MOST CREATIVE ADDRESS IN THE WORLD DURING ITS PRIME OF THE 1950S TO 1970S.

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Lostin Labs moonshot services

Lostin Labs puts almost half a century of combined work experience from the worlds top design, engineering and business environments to work for clients. Lostin Labs moonshot services leverage the design, engineering, and business expertise of the Lostin Labs team. Terrestrial and extra-terrestrial moonshot services offered by Lostin Labs align to the strengths of the Lostin Labs team and the larger overall mission of the company.



Product & service innovation

Business model Innovation

TERRESTRIAL

- Designing the earth-to-earth rocket travel experience eco-system
- Creating multi-modal transport experiences
- Testing moon based landing structures & habitats on earth
- 4D printable infrastructures

- Developing new space economy business opportunities for enabling industries such as construction & mining
- Roadmap creation for entering the new space economy
- Creating a mobility ecosystem for multi-modal transportation (including space travel)

EXTRA-TERRESTRIAL

- Designing the in cabin experience for space tourism
- Creating AR/VR experiences to test how we might curb social isolation en-route to Mars
- Creating 3D printed tools & equipment for deep space / off-world usage
- Wayfinding for planetary mobility

- Defining new interplanetary businesses that will be necessary for new habitats & ways of living
- Creating partnership models
- Navigating space laws & policies
- Defining intellectual property, & usage rights in space

“Great things in business are never done by one person. They're done by a team of people.”

-Steve Jobs

The Team

We are a duo of thinkers and do'ers, inspired to create a bold, new world. We have the battle scars of big corporations & startups that have succeeded and failed. We blend deep science and engineering expertise with design and human behavior expertise to iterate on solutions to form the foundations of a world that is yet to come. We are inventors with business sense looking to create sustainable positive change. We bring people together, we spark new ideas, we make things happen.



Rakhi Rajani

**PRESIDENT & LEAD SCIENTIST,
LOSTIN LABS UK – LONDON**

QUANTUMBLACK (AI)
MCKINSEY AND COMPANY
INTERCONTINENTAL HOTEL GROUP
HEWLETT PACKARD LABS



20 PUBLICATIONS



10 PATENTS



15 INDUSTRIES

ARCHITECTURE
EMERGING TECH
ENTERTAINMENT
HOSPITALITY
HEALTHCARE
URBAN PLANNING
TRANSPORTATION
TELECOMS



DISCIPLINES

DESIGN
COMPUTER SCIENCE
ENGINEERING
PSYCHOLOGY



Michael McDaniel

**PRESIDENT & LEAD DESIGNER,
LOSTIN LABS TX – AUSTIN**

MCKINSEY & COMPANY
WHITE HOUSE, OBAMA ADMINISTRATION
REACTION HOUSING
FROG DESIGN



3 DESIGN AWARDS



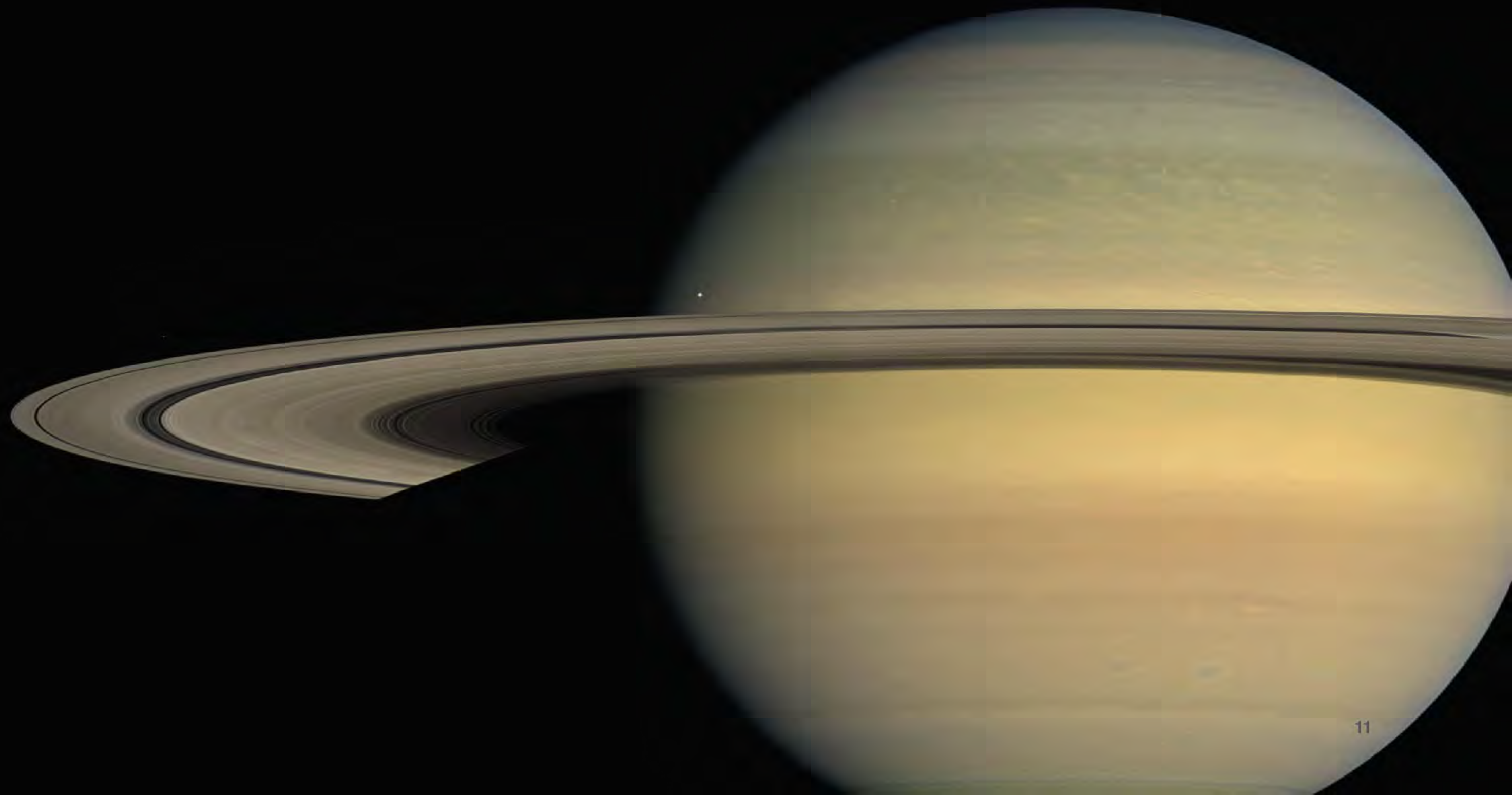
30 SPEAKING GIGS

Our projects contribute to one big thing – **creating a civilization for space.**

We fund & build the innovations that ultimately fuel the new space economy and challenge the world we currently inhabit.

We envision three areas of R&D

- 1 FOUNDATIONAL INDUSTRIES**
Construction and Mining Techniques
- 2 STRUCTURES & HABITATS**
Liveability infrastructure for space exploration
- 3 LARGE BASES & SETTLEMENTS**
Tourism experiences, mobility services and settlements



1 FOUNDATIONAL INFRASTRUCTURE

We envision creating the technology to **print bases for landing**, where natural materials could be **sustainably resourced**.

Just as explorers centuries before built docks and ports for arriving ships in the New World, we could begin by building the basic infrastructure needed in the next 3-5 years. Leveraging existing 3D printing technologies, a significant area of development will be *3D printing landing pads on the Moon for arriving spacecraft*.



PRINTING WITH MELTED ROCK



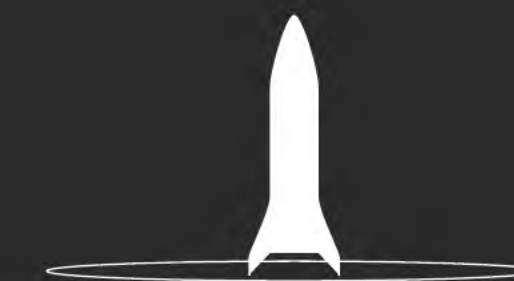
1. Drone Construction Crew drives to site

The delta style Basalt 3D printer is actually 3 separate vehicles that work together as a mobile printer. Drone dozers / loaders follow the printer to location.



2. Delta Basalt printer at construction site

The drone dozers grade the site for pad construction. The printer sets up and is fed feed stock of local rocks and regolith that it melts and prints with on the surface. It prints the landing pad and blast walls from this feedstock.



3. Landing pad complete & leased

With the pad complete, the drone construction crew packs itself up and drives to the next site. The landing pad is now ready to be leased or sold to customers for lunar operations.

2 STRUCTURES & HABITATS

What if you could **inflate** your space ship or surface habitat into **rigid structures** at its destination?

We want to develop RIC (Rigid Inflatable Composite) structures for space based construction. While inflatable habitats and ships are not a new concept thanks to lots of research by NASA and others, we have a novel concept to make inexpensive rigid structures from inflatable composite structures. When combined with the same 3D printing technology discussed to construct landing pads, RIC structures could be used to construct large domes over craters very rapidly. This technology could allow entire bases or villages to be packed onto a single rocket flight. The same technology could also be applied in orbit or deep space to construct large ships or stations.

A BOUNCY HOUSE FOR OTHER WORLDS



1. Drone unrolls pre-preg composite structure

At the construction site, the buildings are unrolled in their intended locations similar to the setup of "bouncy houses" for children's birthday parties here on Earth.



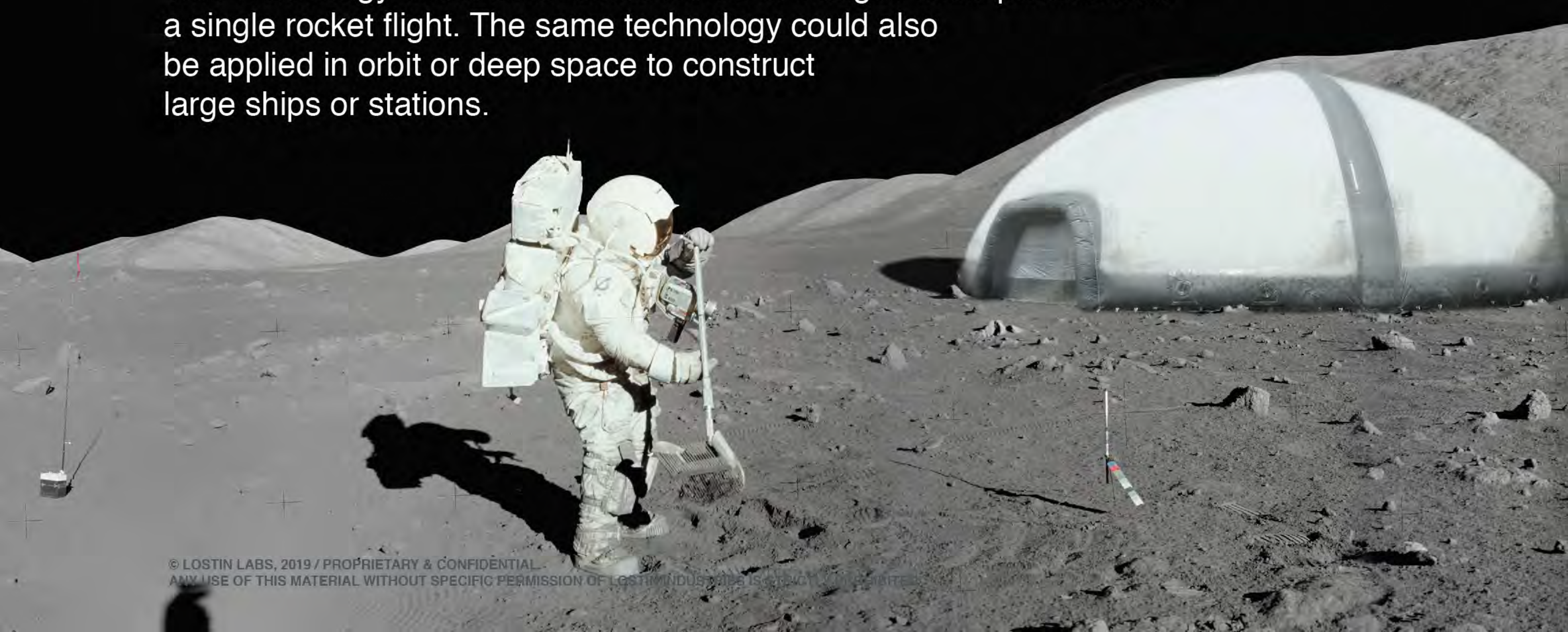
2. Drone inflates structure with a heated gas

Once unrolled, heated gas is allowed to fill the pre-preg composite structure inflating it and setting the thermo resins.



3. Outfitting the rigid shell

Once the resins cure fully inside the structure, it can be outfitted with airlocks and interior fittings. The rigid structures can then be covered with regolith or 3D printed over for added protection as needed.



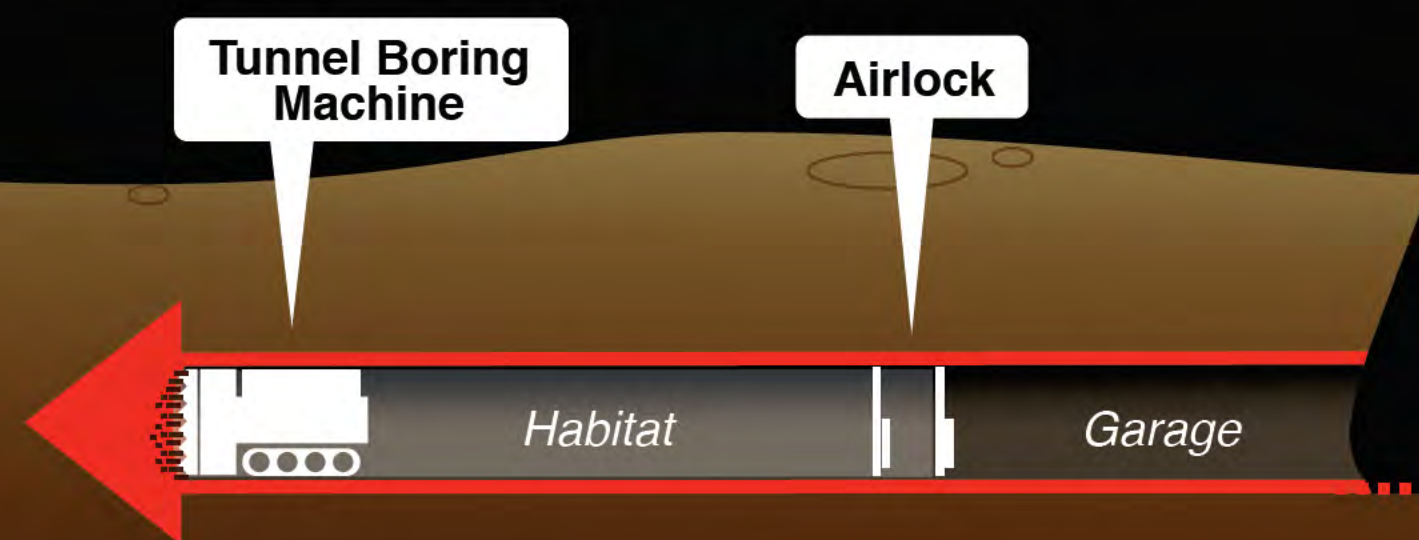
3 LARGE BASES & SETTLEMENTS

Tunnel boring machines will be the all-in-one, **mobile city builders** of 21st century construction.

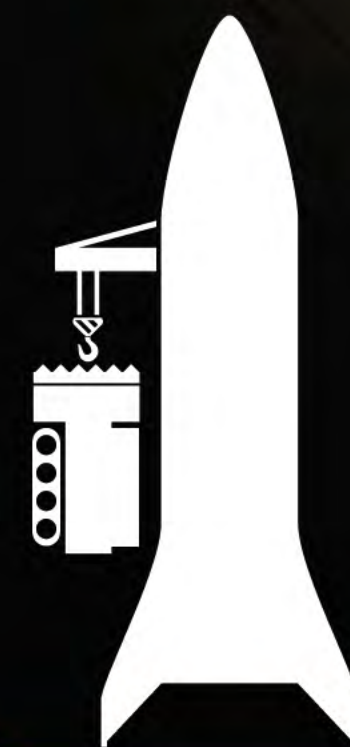
Mass optimized, tunnel boring machines will be one of the most valuable pieces of heavy equipment to own and operate as an off-world construction company. For the price of just one launch to its destination, a tunnel boring machine will be capable of boring miles and miles of radiation resistant, pressurized habitats with minimal materials. Any exposed cliff side or crater wall in a structural sound rock body could have habitats, equipment garages, or mechanical shelters burrowed into it.

We want to develop the construction methods & the building systems to outfit these bored habitats. From prefabricated airlocks to interior fittings within a bored habitat, Lostin Labs will be the design & construction company to plan, build, and outfit base

BORING HABITATS FROM ROCK

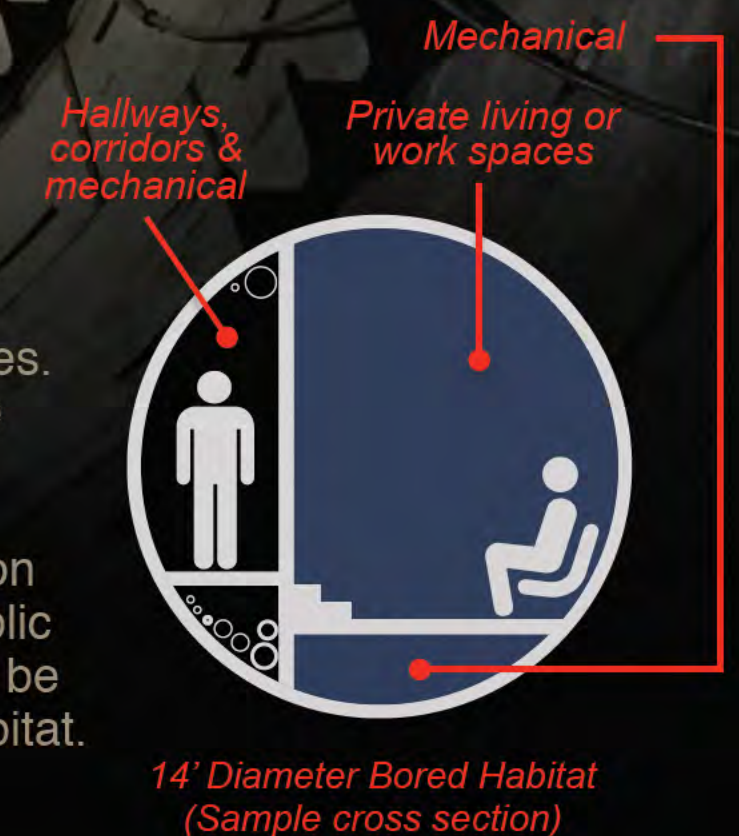


Mass optimized tunnel boring machines use exposed crater or canyon walls as a starting point for the habitats. Excavated material from the tunnels are compressed into bricks for surface buildings and pavers for roadways or landing pads.



A Bored Habitat

Currently, The Boring Company is using 14' (4.26m) diameter tunnel boring machines. A 14' diameter tunnel would create a single level pressurized habitat that could run for miles and interconnect with other tunnels to form larger settlements. The cross section of a tunnel habitat (at right) shows how public right of ways and private living areas could be divided from the same 14' bored tunnel habitat.



The Boring Company

Recently, Elon Musk's The Boring Company completed this demonstration tunnel under L.A. to test transportation schemes. The company also recently announced that they will be selling bricks compressed from excavated material from their tunnel building for construction purposes as a price competitive material.

There are four ways to **get involved.**

Our goal is simple: pull humanity forward into a brighter future by building the new foundations needed for this new space frontier, today. We were not founded by a billionaire and are well aware of the financial realities involved with any space based endeavour. Those financial realities combined with our mission means we must build a base of support that goes beyond venture capital. This support platform for Lostin Labs ensures diversity is not excluded from cutting edge science & design.



CONSULTING

We bring our lab methodology to your organisation to generate, build and kick start the ideas that the organisation might otherwise strangle.



INVESTMENT

Direct investments in Lostin Labs for the development of the components of the new space economy.



SPONSORSHIP

Our goals are ambitious and Lostin Lab's team is comprised of the world's top talent. This requires access to fabrication gear, advanced equipment & emerging technologies to move at speed.



DEV PARTNERSHIPS

We are collecting the absolute most brilliant minds across disciplines & industries to achieve new breakthroughs in commercial space. We bring this talent to our partners' space related needs as well – researching & developing their needed space technologies.



L  S T I N

W W W · L O S T I N · S P A C E

Appendix

Supplemental materials on other technologies + operations.



Lunar Landing Pads

Off-world construction startup plan.

The off-world construction industry will get started with **Landing Pads.**

Just as explorers centuries before built docks and ports for arriving ships in the New World, we will begin with the basic infrastructure needed in the next 3-5 years. Leveraging existing 3D printing technologies, Lostin's first major program for development will be *3D printing landing pads on the Moon for arriving spacecraft.*



PRINTING WITH MELTED ROCK



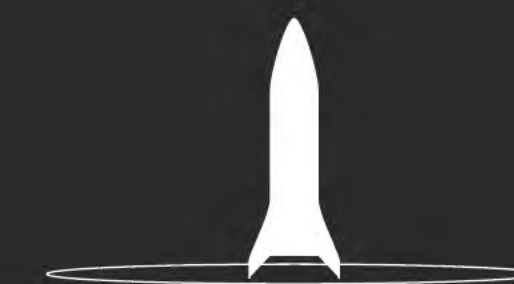
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3. Landing pad complete & leased

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3D printing landing pads with in-situ resources (melting rock).

Our printer design uses a mobile, delta style 3D printer with an innovative print head design to create multiple, large diameter landing pads on the lunar surface. The same mobility platform used for our lunar drone dozer is used to move the three mobile platforms used by the landing pad printer. By designing and building the construction systems that create a solid foundation on the Moon to support rocket launches and landings, we will have the materials and knowledge to expand into habitat construction rapidly thereafter.

1. Lunar Bulldozer

The drone dozers grade the site for pad construction. During printing operations, the dozer feeds the printer by pushing regolith and small rocks onto the printer's feeding conveyor.

2. Feedstock system

Regolith and small rocks are pushed onto the conveyor by the drone dozers. The conveyor system uses screens to filter out large rocks before feeding material into the rock crusher. From the crusher, feedstock is moved into the hopper on the printhead when the printhead assembly is docked at the tower for reloading.

3. Cabled printer system

The printer uses a "Spiderman camera" style design for the hopper & printhead assembly. This cabling system connects all 3 towers/rovers together to form a large, delta style printer using cabling to print landing pads, blast walls, and other large structures. This creates a printer with a very large build area, yet a minimal launch mass.

4. Hopper & Print head assembly

The Hopper is at the top of the printer assembly and stores a large amount of feedstock for printing. The printhead assembly uses microwaves to melt feedstock into molten rock at 1800°C / 3272°F for printing. The smart printhead uses a sensor system to make adjustments on the fly for consistent layer heights & better print quality.

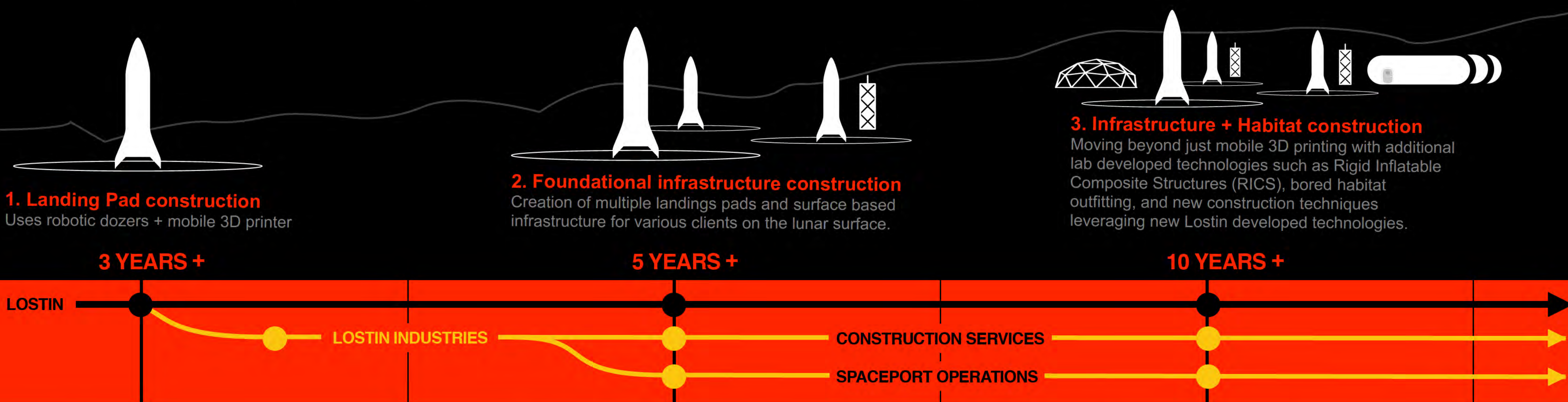
5. Mobile printer towers

The mobile towers are rovers with identical z-axis structures. The rover platform is shared with the drone the dozers and can remotely operated in the same way. The towers anchor themselves to the surface in the correct locations before printing.



Our off-world business roadmap.

We have an ambitious, yet flexible roadmap that is anchored in the real world. By leveraging existing technology as a foundation, we have greatly de-risked printer development. Our 3 year plus development timeline from seed funding (standing start) to printing the first landing pad on the lunar surface is mainly dependent on launch/landing services via a commercial transportation company such as SpaceX, Blue Origin or others. Once our initial equipment is operational on the lunar surface, we will capture first mover advantage with exclusive construction services for clients on a per contract basis. Leveraging our first mover advantage in off-world construction, we will quickly build a highly defensible position by operating our own landing pads and infrastructure for lease on the lunar surface much like Earth-based airport operators lease gates at airports. With client demand, our lunar focused construction technology can quickly be adapted to other worlds/environments such as Mars or other planetary bodies.



1. Landing Pad construction

Uses robotic dozers + mobile 3D printer

3 YEARS +

LOSTIN

LOSTIN INDUSTRIES

CONSTRUCTION SERVICES

SPACEPORT OPERATIONS

1. Lunar construction company

Given the use of in-situ resources and solar power, once the initial landing pads are printed, the printer can be hired by customers to construct landing pads and infrastructure. The printers should have an operational life span of over 7 years allowing for ample revenue generation.

2. Foundational infrastructure construction

Creation of multiple landings pads and surface based infrastructure for various clients on the lunar surface.

5 YEARS +

2. Lunar spaceport operator

New landing pads are leased for exclusive and non-exclusive usage by various clients (commercial & governmental) for lunar missions similar to airport operations on Earth. Lostin owned and built infrastructure near the landing pads can also be monetized via lease agreements or sold to new owners.

3. Infrastructure + Habitat construction

Moving beyond just mobile 3D printing with additional lab developed technologies such as Rigid Inflatable Composite Structures (RICS), bored habitat outfitting, and new construction techniques leveraging new Lostin developed technologies.

10 YEARS +

3. Off-world development

With enhanced technology development by Lostin, plus years of experience building on the lunar surface, Lostin Industries will plan and design new developments off-world for exclusive and non-exclusive usage for various clients (commercial & governmental).

Lostin Industries Series SEED

Our Series SEED establishes Lostin with physical space, equipment, development budgets and a world class team to get started immediately on development of off-world construction equipment. The SEED funding provides an operating runway of 3 years outside of the planned revenue generating activities. Our approach + the grant program will allow us to achieve amazing results in the most agile and nimble way possible. Additional funds may be needed in a future round for launch & landing services to get production ready construction equipment to the Lunar surface initially.



Startup costs Physical workspace, equipment, networking and other one time capital expenses.	\$3,690,000	£2,820,000
OpEx x 36 months 24 FTEs, physical work space, travel budgets, legal & accounting services, etc.	\$18,810,000	£14,360,000
Lunar 3D Printer Prototypes Rapid prototyping and development of the Mk 1 Lunar 3D printer.	\$4,500,000	£3,440,000
Lunar 3D Printer Model 1 Production model Lunar 3D printer for deployment to the Lunar surface.	\$3,000,000	£2,300,000
Series SEED	\$30,000,000	£22,920,000

Female Grant Funding

Lostin grant program for the top female scientists, engineers, & designers.



The work of diverse **female scientists** has taken men to the moon.

In 1958, Mary Jackson became NASA's first black female engineer and pioneered the math that sent men to space – yet she was the ‘unknown’ brains behind much of NASA's innovation. Since then we have seen numerous women pioneer scientific discovery for space. Lostin celebrates and supports diverse talent to build the foundation for a life off-world.

The Lostin Grant Program gives the top female scientists, engineers, & designers an alternative to academic research avenues to develop the needed advanced technology for commercial space.

Lostin Grant Program:

Our aim is to empower female scientists to create the pillars of an entirely new economy. The grant program brings cutting edge academic and commercial scientific research into the product development process. We know we need to innovate and experiment which requires a mix of industry and speciality knowledge (For instance, material scientists and aerospace engineers working with architects, or designers, with physicists).



LIVING EXPENSES



EQUIPMENT & LAB



RECIPIENTS PER CLASS

HOW IT WORKS

Grant recipients are full-time Lostin staff, on short term contracts, and are a part of the core team. Recipients receive a salary commensurate with experience, living expenses and equipment. Inventors will be named on patents and acknowledged with a monetary reward for patents filed, but Lostin will retain IP generated. Incubated grantee ideas/businesses may retain IP, but exchange equity instead. The goal is to create a win-win situation for everyone involved.

Grants are issued for 3 months, 6 months, or 1 year. At the end of their grant, a review is held by Lostin staff & the grant recipient maybe invited to:

- 1 Continue as a grantee to complete or evolve their development work.
- 2 Convert to a Lostin full-time employee (FTE).
- 3 If a new business is created, to join the venture as a co-founder.
- 4 Incubate their own startup at Lostin.

Lostin Grant Program

The grant program allows the top female scientists, engineers, and designers the opportunity to work alongside some of the top innovators in the world to build the needed technology for the commercial space industry. This grant program allows Lostin to access the foremost thought leaders and experts in the world for their given area of expertise while keeping the company nimble without bloated overhead over time. For grantees, it is a chance to build and profit from their ideas in ways that corporate interests or academics simply do not allow.



<p>Living Stipend Equivalent to one year salary to cover housing, food, clothing, and general living expenses. This is the max stipend across recipients for budgeting purposes. Individuals could be lower depending on experience.</p>	\$145,000	£110,000	<p>x24 Recipients per year/class at Lostin</p>	\$200,000	£155,000	
<p>Special Equipment Given the level and depth of expertise of each recipient, an amount is budgeted for specialty equipment and/or material needs. This is an average amount accounted for each recipient, but individual allotments may be higher or lower.</p>	\$45,000	£35,000		\$4,800,000 Annually per class	£3,750,000 Annually per class	
<p>Employee Equipment The same budget allowance for full time employees is also used for grant recipients. This covers laptops, monitors, tablets, phone (if needed) and any annual software licenses.</p>	\$5,000	£5,000		<p>Operating Costs Annual operating costs for the grant program including overhead.</p>	<p>\$200,000 Annual OpEx</p>	<p>£153,055 Annual OpEx</p>
<p>Moving Allowance Given the level of experts we will be attracting to Lostin Labs for just a 1 year commitment, we will offer a small moving allowance for each recipient to account for relocation costs.</p>	\$5,000	£155,000				
<p>Funding per female recipient</p>			<p>Program annually</p>			
<p>\$200,000 / £305,000</p>			<p>\$5,000,000 / £3,903,055</p>			

Lostin's talent model

The heart & soul of Lostin is creation – creation of new technologies, products and businesses to solve the hardest problems in the commercial space industry. We have assembled an extremely experienced and talented team to build what comes after rocket travel to a given destination – construction. We will develop the off-world construction equipment + companies that will build humanity's future beyond Earth. In conjunction with client work, we will be incubating and building our own off-world construction startups within Lostin.

