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Spaceports – Emerging Business Models

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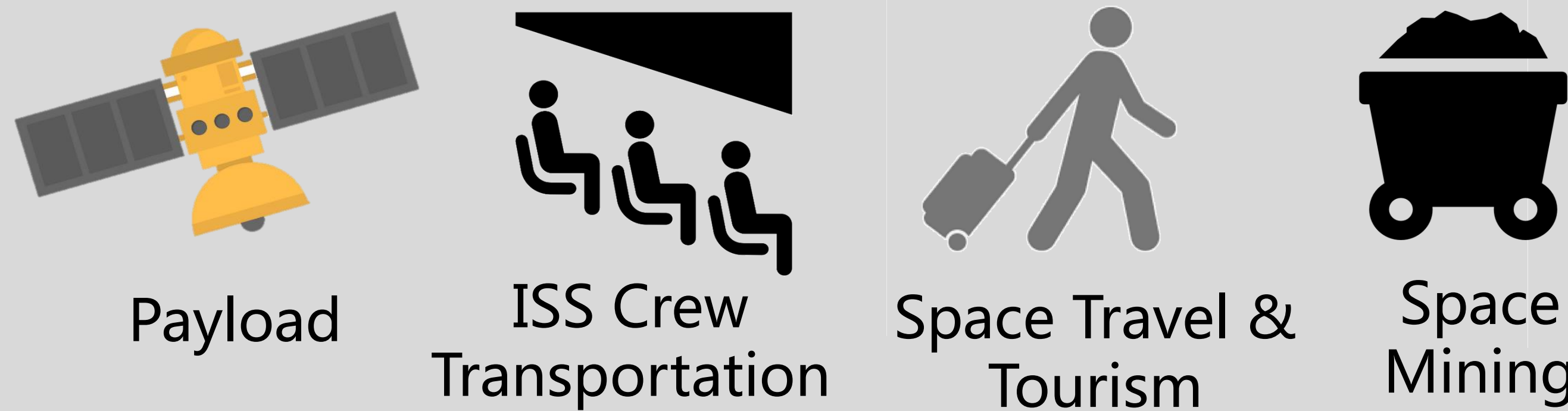
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Spaceports – Emerging Business Models

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Commercial Space Transportation Activities Include

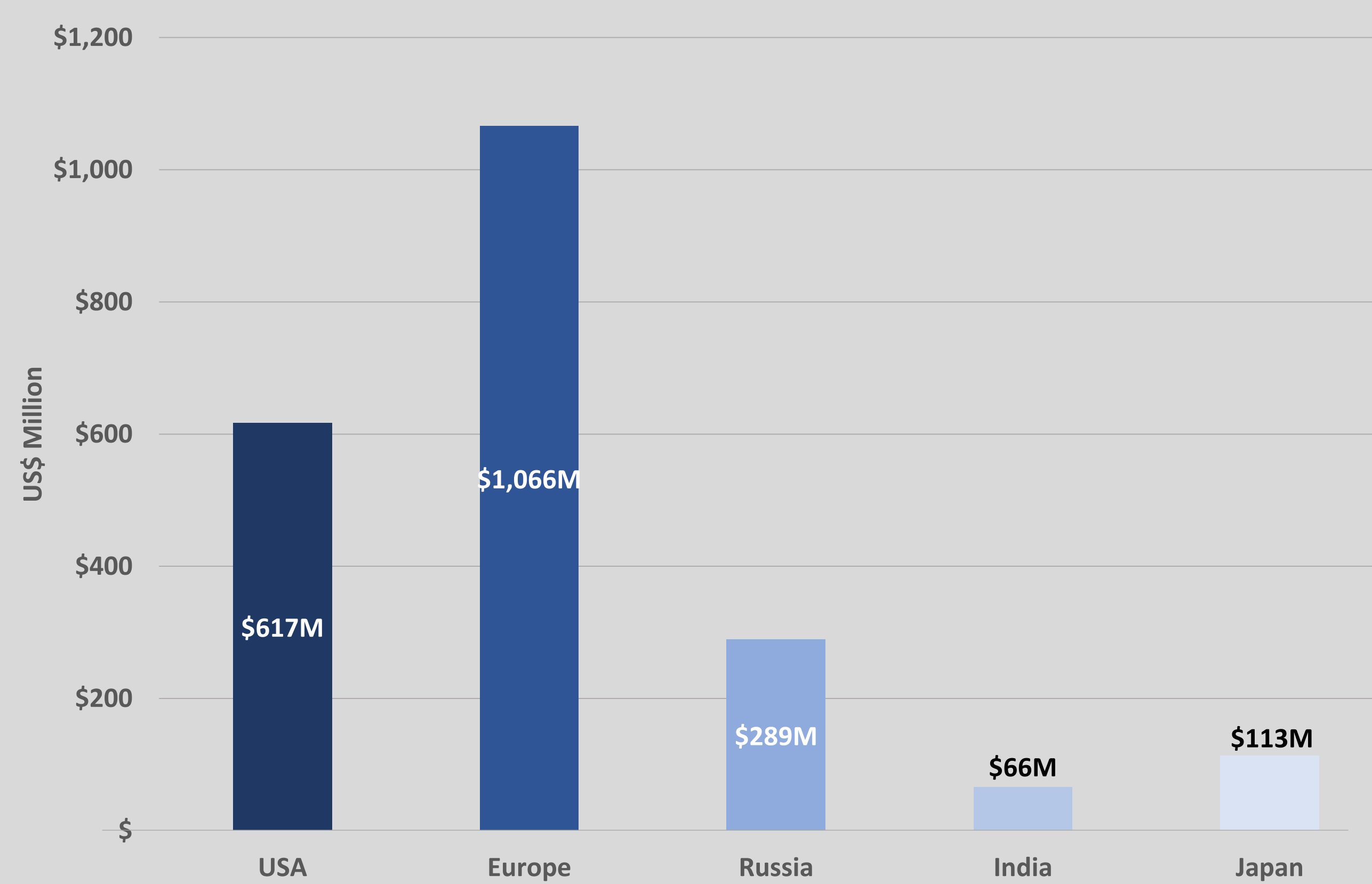


Spaceport Infrastructure Requirements

- Launch pads & landing pad
- Runways($\geq 12,000$ ft), taxiway & ramp area
- Mission control centers
- Air control towers
- Hanger storage facilities
- Processing facilities
- Propellant storage facilities
- Oxidizer storage areas
- Fuel loading areas
- Ground support facilities
- Payload processing facilities
- Passenger facilities
- Emergency facilities



2015 Estimated Revenue for Commercial Launches



Commercial/ Government Launch Sites



Launch Concepts



Takeoff: Vertical, rocket powered; capsule separation
Landing: Reusable rocket vertical return; capsule free flight; floats down with parachutes
Suborbital/ Orbital: Suborbital
Manned/ Unmanned: Both



Takeoff: Vertical takeoff and landing, rocket powered; capsule separation
Landing: Reusable rocket vertical return; capsule vertical return
Suborbital/ Orbital: Orbital
Manned/ Unmanned: Both



Takeoff: Horizontal, jet powered with integrated rocket in single stage-to-space
Landing: Glide or jet powered
Suborbital/ Orbital: Suborbital
Manned/ Unmanned: Manned



Takeoff: Horizontal, Rocket powered ignition on ground and rocket power throughout flight
Landing: Glide
Suborbital/ Orbital: Suborbital
Manned/ Unmanned: Manned



Takeoff: Horizontal, jet powered carrier aircraft (spacecraft - rocket powered)
Landing: Glide or expendable
Suborbital/ Orbital: Both
Manned/ Unmanned: Both

Business Models

Airports to air and space ports

e.g. Cecil Spaceport, Mojave Air and Space Port

Greenfield spaceport

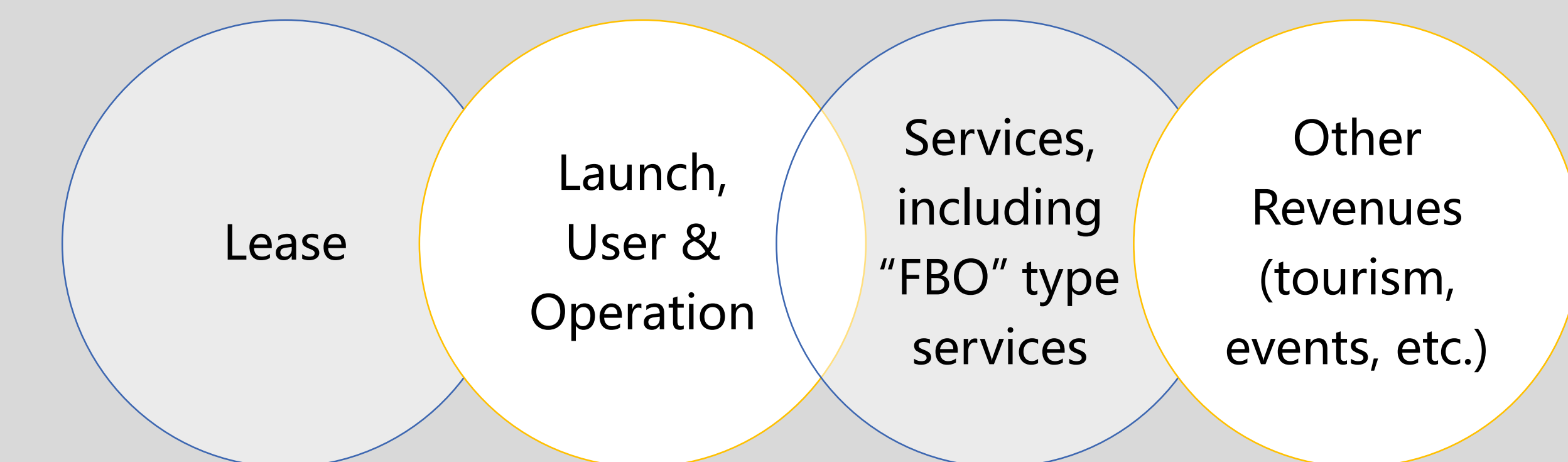
e.g. Spaceport America; Blue Origin-West Texas

National space and military bases

e.g. Wallops Flight Center/Mid-Atlantic Regional Spaceport (MARS)

Business model drivers are many and inter-related.

Revenue Sources



Challenges

Infrastructure

- Time and capital requirements for spaceport infrastructure development

Licensing Application

- Time and financial requirements for spaceport licensing application

Competiveness

- Spaceports highly competitive

Anchor tenant/Purpose

- Loss of anchor tenant or lack of focus/purpose

New Mode of Transportation

Progress

- Both private investors and government entities are increasingly looking to commercial space transportation as the new 6th mode of transportation