Commercial Human Spaceflight

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National Research Council
Committee on Human Spaceflight
Meeting

April 22, 2013

Federal Aviation Administration

Space Shuttle Retirement

Recent Presidential Commissions on Space

- Commission on the Future of the United States Aerospace Industry (Walker Commission) - 2002
- Aldridge Commission - 2004
- Augustine Committee - 2009

All called for increased reliance on private industry.

National Space Policy

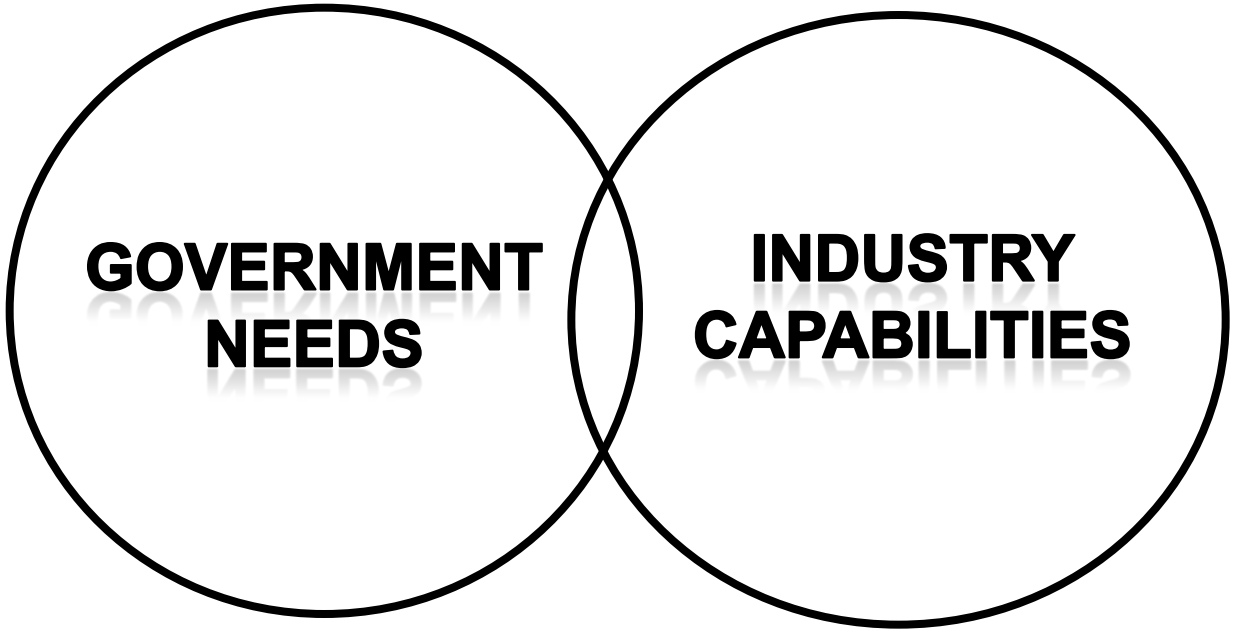
"A robust and competitive commercial space sector is vital to continued progress in space. The United States is committed to encouraging and facilitating the growth of a U.S. commercial space sector that supports U.S. needs, is globally competitive, and advances U.S. leadership in the generation of new markets and innovation-driven entrepreneurship."

What is Commercial Space?

According to the current National Space Policy, dated June 28, 2010:

The term “commercial,” for the purposes of this policy, refers to space goods, services, or activities provided by private sector enterprises that bear a reasonable portion of the investment risk and responsibility for the activity, operate in accordance with typical market-based incentives for controlling cost and optimizing return on investment, and have the legal capacity to offer these goods or services to existing or potential nongovernmental customers.”

An Opportunity for Progress



What Government Brings to the Table

- Expertise
- Experience
- A continuing need for space products and services

What Industry Brings to the Table

- The potential for lower cost
- The potential for increased innovation
- The potential for greater risk tolerance
- The potential for new customers and new markets
- The potential for new sources of funding

The Impact of Wealthy Individuals

According to the Forbes' 2013 Billionaires List, there are currently 1426 billionaires worldwide; 442 of whom are in the U.S.

- Paul Allen ($15B) – Scaled Composites, Stratolaunch
- Jeff Bezos ($25.2B) – Blue Origin
- Richard Branson ($4.6B) – Virgin Galactic
- Elon Musk ($2.7B) – SpaceX

Others who have made an impact: Robert Bigelow, Dennis Tito, John Carmack

Potential Mission Categories

- Suborbital Missions
- Missions in Low Earth Orbit
- Missions Beyond Low Earth Orbit

Suborbital Missions

Suborbital Human Spaceflight

Why Does Suborbital Spaceflight Matter?

- It will open up access to space to the general public
- It will keep human spaceflight in the public view while orbital systems are being developed
- It will offer cost-effective opportunities to conduct scientific and technological research
- It has the potential to strengthen our aerospace industrial base and support economic growth
- With hundreds of launches per year, it will offer an opportunity to learn how to build safer, more reliable, and more cost-effective space vehicles, lessons that in many cases will be applicable to orbital systems

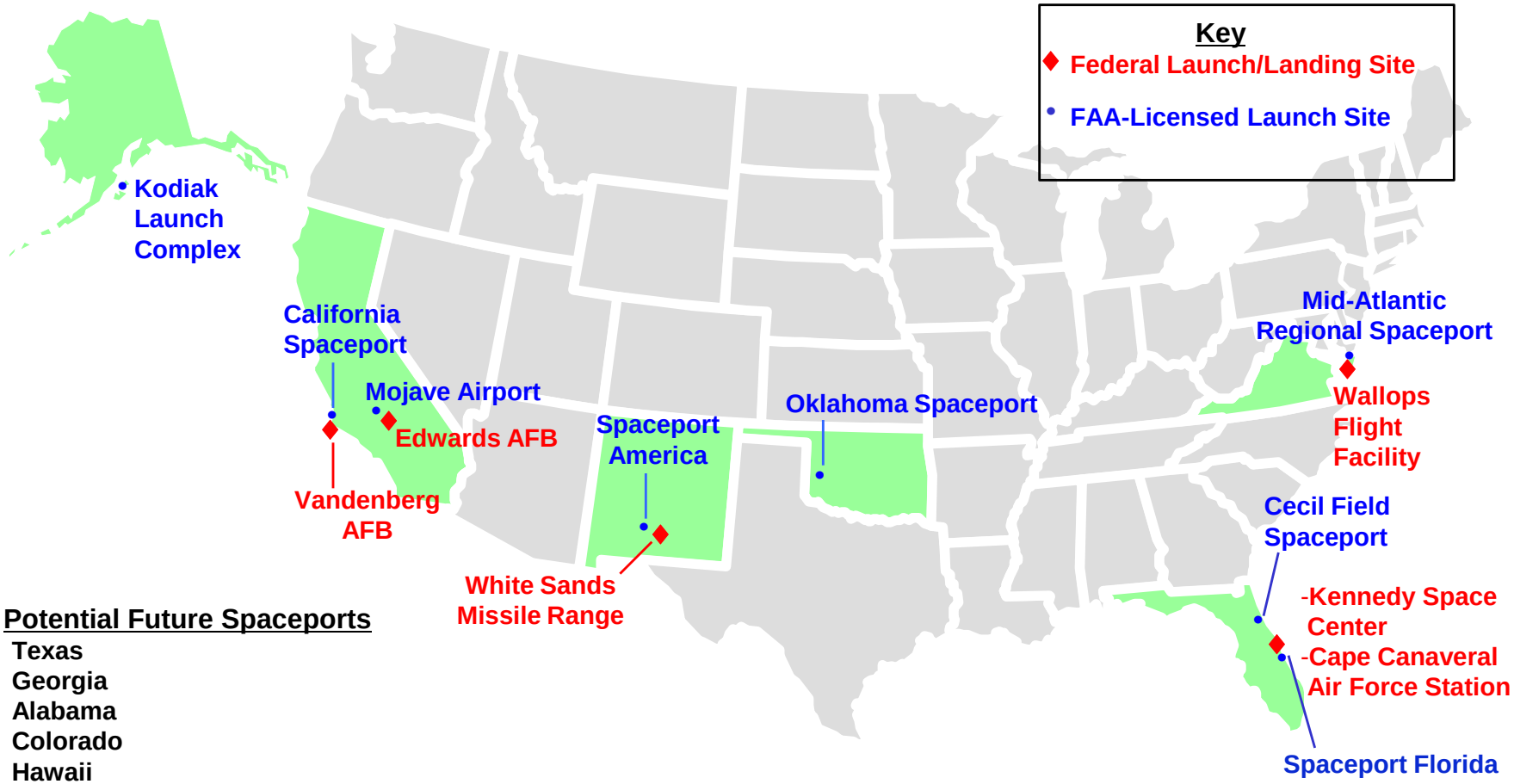
The Milestones of Flight Gallery

Suborbital Space Tourism

WhiteKnightTwo and SpaceShipTwo

Spaceport America in New Mexico

U.S. Spaceports



Potential Future Spaceports

- Texas
- Georgia
- Alabama
- Colorado
- Hawaii

Missions in Low Earth Orbit

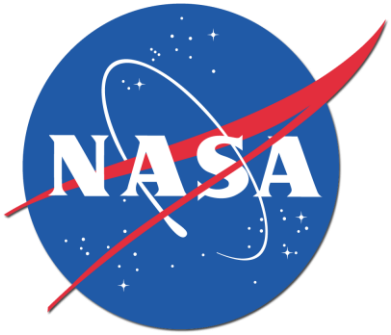
Commercial Cargo Program

SpaceX Missions to ISS

SpaceX Grasshopper

Orbital Sciences Test Flight

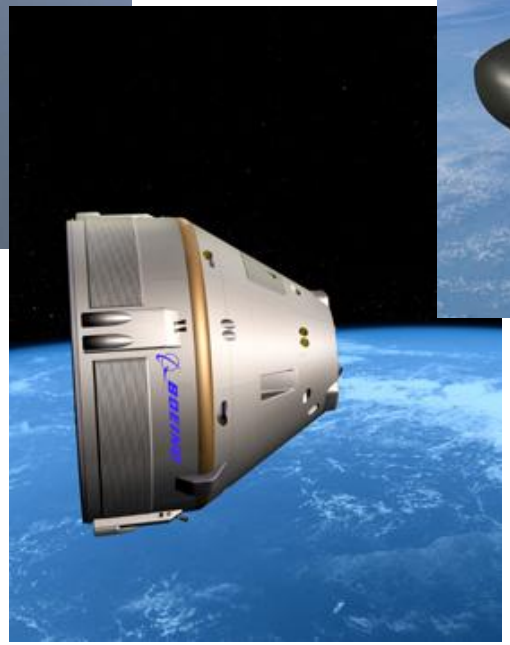
MOU on Commercial Human Spaceflight



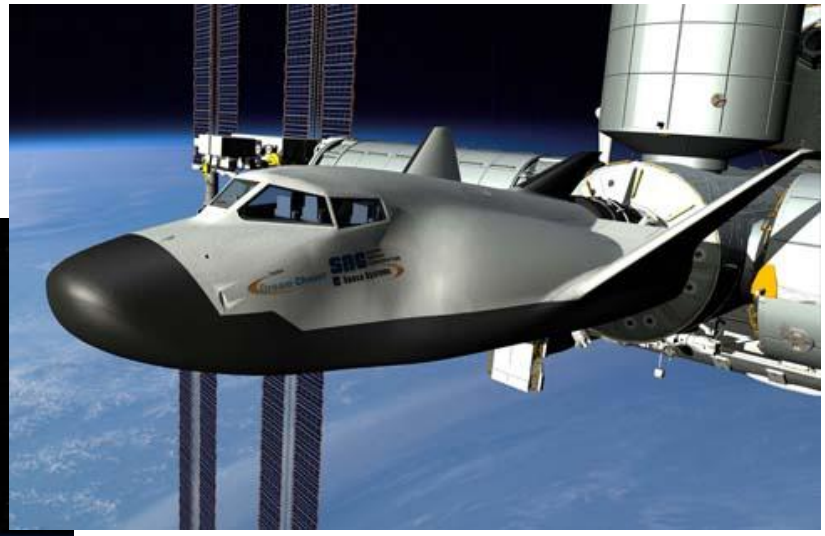
- Signed by the FAA and NASA on June 4, 2012.
- Establishes intent for all operational missions to the ISS to be licensed for public safety by the FAA.
- NASA will be responsible for crew safety and mission assurance.

Commercial Crew Program

SpaceX



Boeing



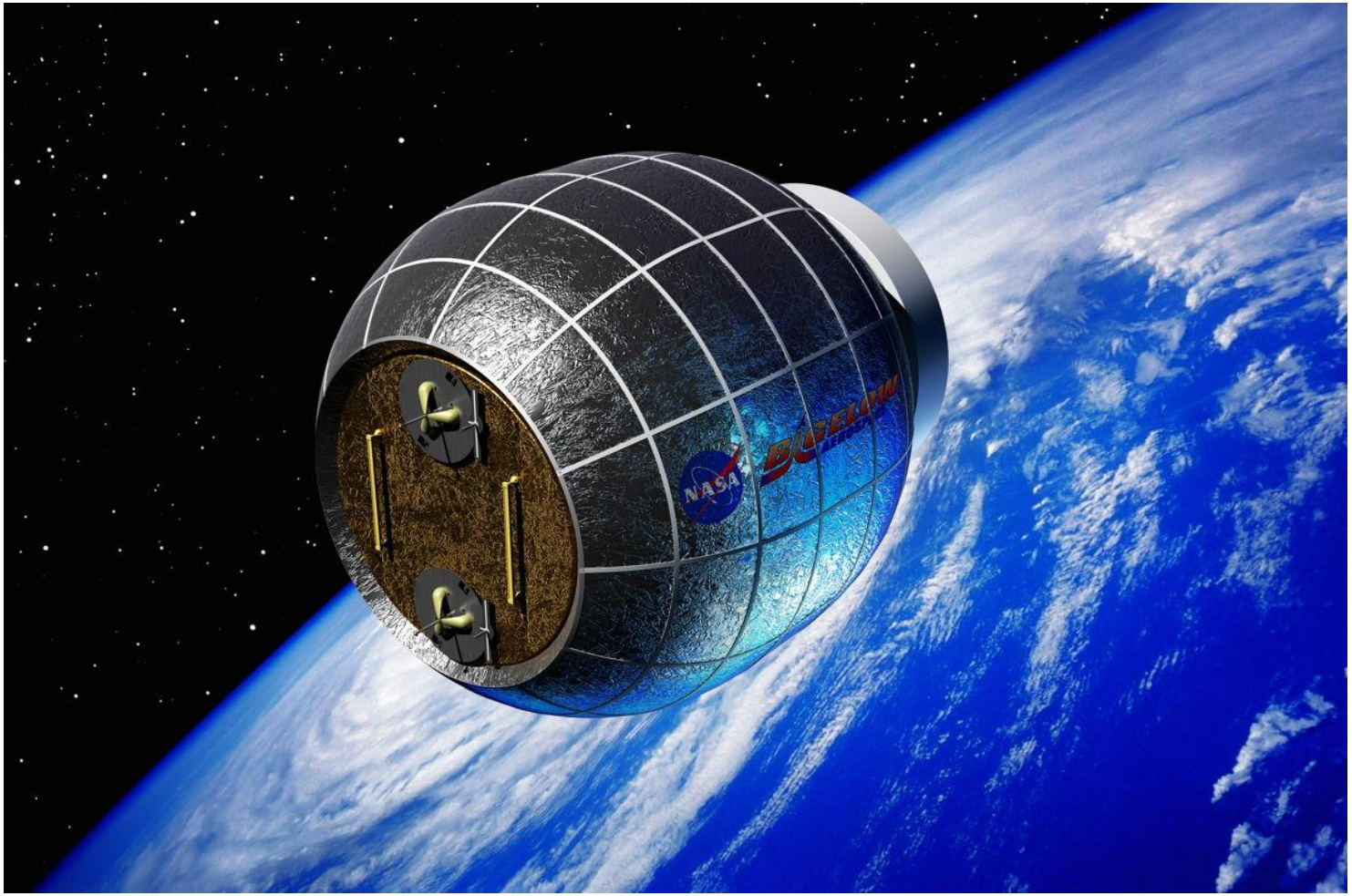
Sierra Nevada Corporation

Boeing CST-100

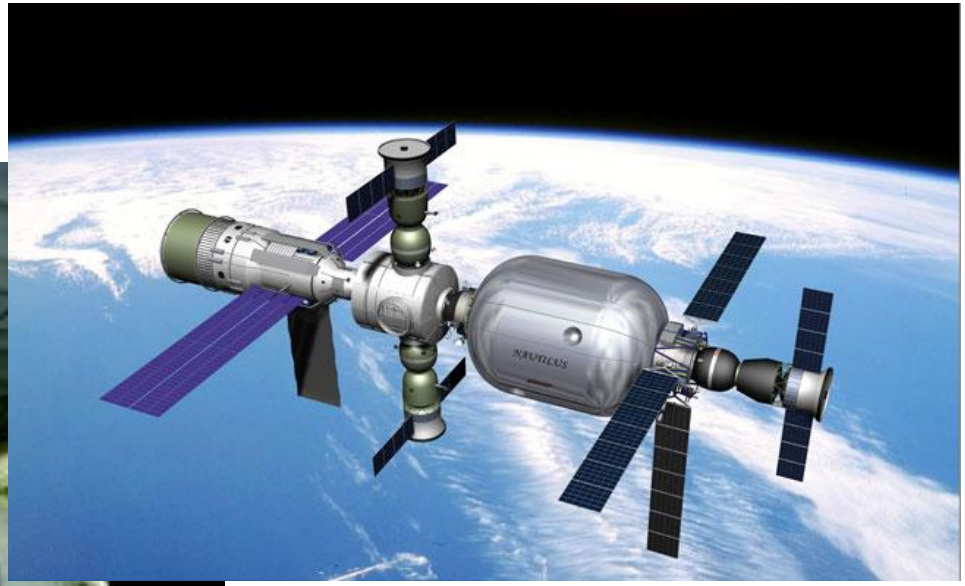
Dream Chaser

Use of Atlas V for Commercial Crew Missions

Bigelow Expandable Activity Module



Bigelow Aerospace: The First Commercial Space Station?



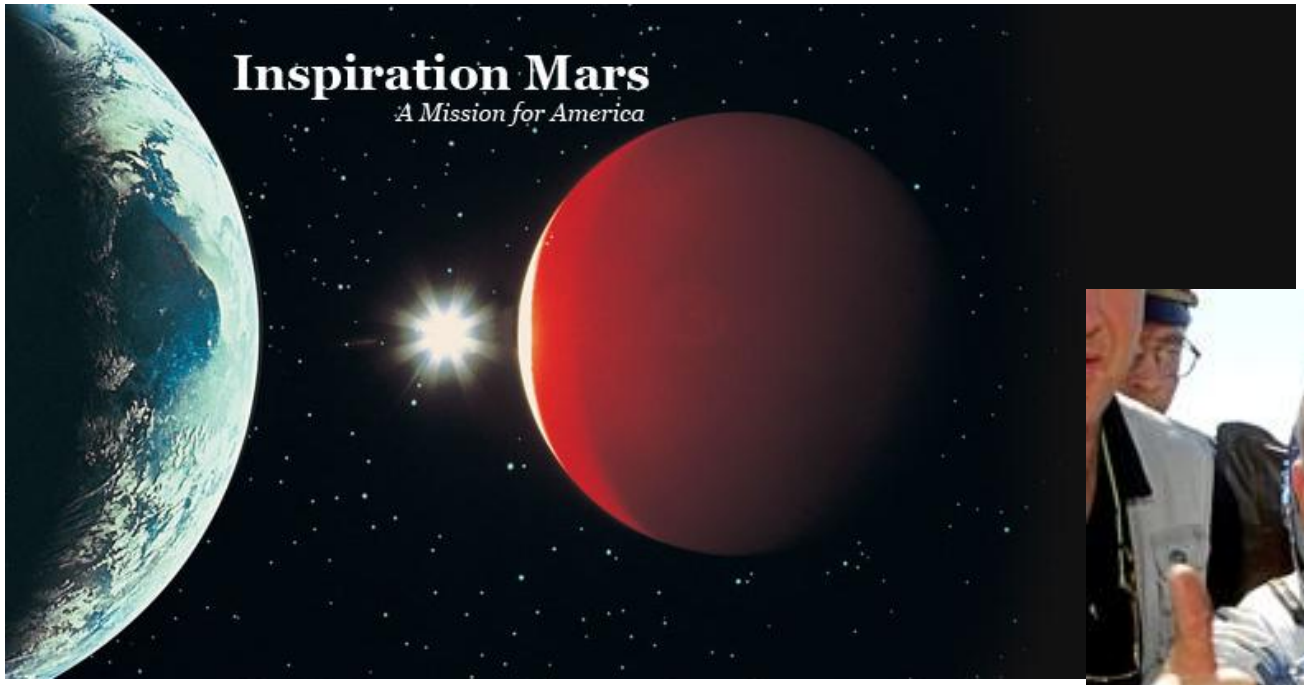
Missions Beyond Low Earth Orbit

Orion Test Flight on a Delta IV Heavy

Space Adventures

Golden Spike

Inspiration Mars



What Can the Government Do to Help?

1. Conduct more research, such as through our new Commercial Space Transportation Center of Excellence
2. Offer prizes to encourage out-of-the box thinking and new ways of doing business
3. Upgrade and modernize our nation's launch infrastructure, through FAA Spaceport Grants or other mechanisms
4. Capture and communicate Lessons Learned and Best Practices
5. Encourage the development of industry consensus standards
6. Reform our liability and risk sharing regime to provide more certainty that a launch operator doesn't have to "bet the company" on every launch

What Can the Government Do to Help?

7. Streamline our existing regulations, taking advantage of what we have learned over the years to take out the excessive conservatism and incorporate the benefits of new technologies

8. Be open to sharing, leasing, or turning over to industry the control of excess or under-utilized government facilities

9. Provide more certainty on the size and stability of the government market through anchor tenancies or guaranteed launch purchases like NASA's Flight Opportunities Program

10. Continue to support STEM education to ensure that we will be able to have a qualified aerospace workforce in the future

Conclusions

- In its Statement of Task from Congress, the Committee on Human Spaceflight was directed to consider the foundations of a “compelling and sustainable U.S. human spaceflight program,” a challenging goal in today’s budget climate.
- By properly engaging industry, we have the potential to achieve significant benefits in cost, innovation, risk tolerance, and the amount of outside investment, as compared to a traditional government aerospace program.
- The key to success will be in finding the proper balance in the government/industry partnership and in being open to new ways of doing business.