



SPRSA GOALS AND ASSESSMENTS



Small Payload Ride Share Association

PURPOSE AND PROCESS

Community solutions are the focus



Purpose of Community Goals

- **Improve rideshare activities in the space industry**
- Goals – not requirements
 - Avoid financial or operational constraints
- Flexible – altered, amended or changed as necessary
- **Utilize metrics to measure progress**
- Be vigilant with trends and issues
- **Identify potential solutions and alternatives, before regulations or operational constraints are imposed**
- **Address the common welfare for total community**
- Open forum for discussion and collaboration – not lobbying

Process for Community Goals

- **Identify progress and impediments to goals**
 - Consider changes/clarifications to goals
 - Consider adopting additional goals
- All evidence of progress or impediments must be:
 - Available in public domain
 - Vetted, if possible, by organization involved
- **Progress is not equivalent to success**
 - Market will determine success and failure
- Provide suggestions, changes, additions/deletions
- **Results will be circulated for comments**
- Community goals and assessments will be presented annually at the SPRSA Symposium

COMMUNITY GOALS



14 Goals Identified Oct 18

Access To Space

Multi-Manifesting (Rideshare)

Launch Vehicle
Rideshare
capability

Rideshare Cross
Sector Access
Process

Rideshare U.S.
Access Process

Dedicated

Multiple Small
Launch Vehicle
Capability

Design

Spacecraft

Efficient Spacecraft
Licensing Process

Spacecraft
Identification Devices

Spacecraft Position
Devices

Spacecraft Maneuver
Capability

Standard De-orbit
Policy

Common
"Do-No-Harm"
Criteria

Common "Line
Replaceable Unit"
Criteria

Operations

Warning

USG Catalog
and Warning

Commercial
Catalog and
Warning

Communications

Information

Independent,
Public
Community
Database

STATUS SUMMARY



**SPRSA WORKSHOP OCT 2018
NASA AMES**

**Identified 14
Community Goals**

**SPRSA WORKSHOP APR 2019
USAFA - Golf Course**

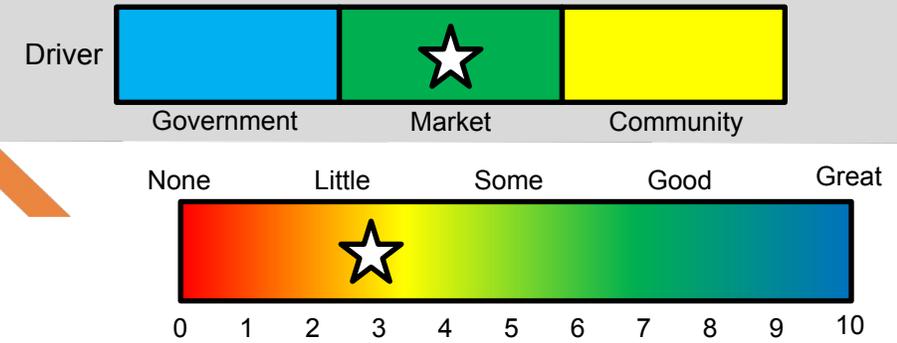
**SPRSA WORKSHOP MAY 2019
SLO – Cal Poly**

**Focus on ESPA
Standardization**
Small Satellites Design Standard

LV RIDESHARE CAPABILITY

Every LV with excess performance should have a capability to carry secondaries

- Goal: address capabilities and does not imply a requirement to carry secondaries
- Value of excess launch capacity should not be wasted without well-defined and accepted reasons
- Access to excess capacity may be limited by lack of clarity as to who owns the excess
- Progress in meeting this goal could be measured by the frequency and characteristics of the secondary adapters and small payloads flown



Progress

- ESPA rings are available for launch on ULA and SpaceX rockets
- Smaller adapters ranging from P-PODs to Aft Carriers are available as well
- Newer launch vehicles, such as Firefly Alpha, have rideshare opportunities as a primary part of their business model.

Impediments

- Launch services providers have been reluctant to develop secondary capabilities as part of their designs due to the lack of clarity as to who owns excess capacity. This confusion has limited commercial developments

Advocates/Supporters

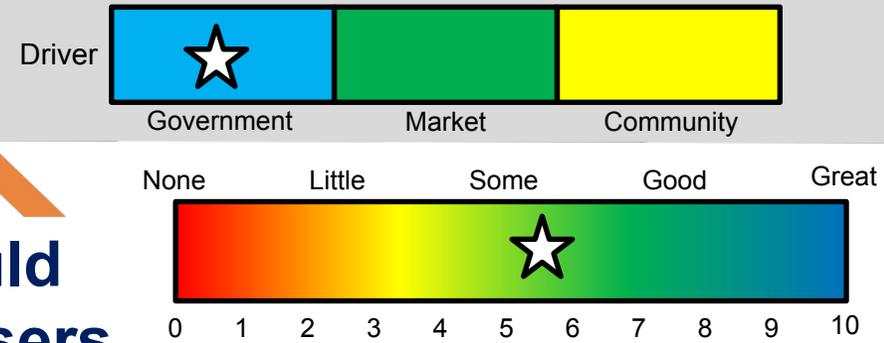
- Make sure anyone involved in project understands action plan

Opposition

- Agencies, Program Offices

Suggestions

RIDESHARE CROSS SECTOR ACCESS PROCESS



U.S. launch sector (NSS, civil, and commercial) should have a process to allocate excess capacity to U.S. users

- Each sector could adopt a different process to meet their individual needs, but each process should
- provide for easy and efficient use of any excess capacity.
- No excess launch capacity should be wasted by the inability of any sector to provide a viable means
- for its use by any valid user from any sector.
- This first indication of progress toward achieving this goal would be a process by which the national
- security and civil sectors could routinely fly their own secondary payloads on the other sectors flights.
- Progress in meeting this goal could be measured by the composition of each sector rideshares, e.g.
- how many payloads from other sectors were carried on the specific mission.

Progress

- The Air Force SMC/LE Mission Manifesting Office has made progress in establishing a periodic rideshare flight and is developing a process for accessing this capability. They recently awarded a support contract to assist in their efforts. The MMO should facilitate easier manifesting of
- approved secondaries. Academic institutions/universities and R&D organizations with small payloads and flexible launch destinations would benefit from low-cost, shared access to space

Impediments

- Current efforts appear to be limited to USG secondaries. Current launch services contracts do
- not clearly define who owns any excess performance. Small launch services companies see
- better USG secondary manifesting as competition with commercial industry

Advocates/Supporters

- Advocates/Supporters: SMC/LE, NASA GSFC

Opposition

- Commercial launch services providers see this as competition

Suggestions

- Establish a mechanism for launch providers to make excess capacity available to secondary payloads. Include information on payloads seeking access to space as secondaries

RIDESHARE US ACCESS PROCESS

3



The U.S. should provide for U.S. small satellite builders to fly as rideshares on U.S. launches rather than relying on foreign launch services for access to space

- The U.S. policies and practices result in U.S. small payload operators subsidizing foreign launch service providers, albeit in the margin, rather than relying in U.S. launch systems.
- Progress in meeting this goal could be measured by the proportion of U.S. built small payloads launched on domestic and foreign launch vehicles each year.

Progress

- Limited progress. Some U.S. small payloads have been flown on ULA and SpaceX launches
- SMC/LEX's newly approved acquisition strategy for OSP-4 would allow for government and/or commercial rideshares, with "Do No Harm" provisions, to allow SMC/LEX to accept both government and commercial rideshare proposals for those missions where that makes sense within the context of pricing and mission requirements, with the proviso that for missions where
- rideshare is allowed, the OSP-4 launch service will be the primary customer, with the orbit parameters and launch date as directed to comply with the OSP-4 mission task order

Impediments

Advocates/Supporters

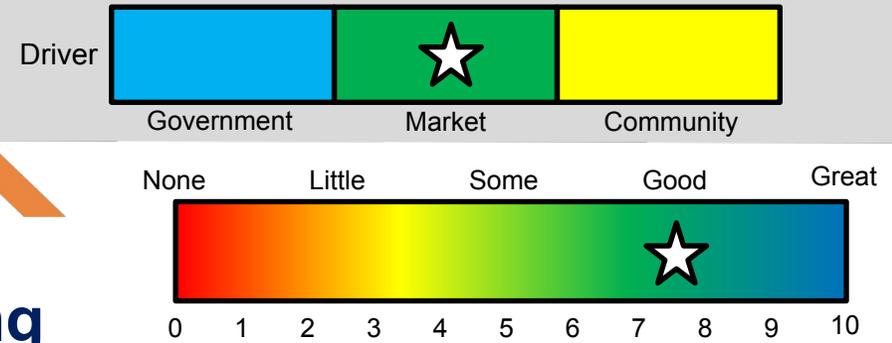
Opposition

Suggestions

MULTIPLE SMALL LV CAPABILITY

There should be multiple, competitive U.S. small dedicated launch service providers capable of placing up to 1,000 pounds into a reference orbit from multiple launch sites within the U.S.

- This goal envisions a market where a variety of U.S. small launch services providers are operating from a number of U.S. launch sites capable of reaching the full range of orbital inclinations required by the small satellite community.
- Progress in meeting this goal could be measured by an evaluation of:
 - the number of small launch services active in the market
 - the number of U.S. launch sites supporting these providers
 - The range of inclinations accessible from these sites
 - the number of small launch services missions each year.



Progress

- Firefly:
 - Has announced launch sites at VAFB & CCAFS
 - Plans to deliver 630 kg to 500 km sun synchronous
- RocketLab:
 - Four launches from New Zealand to date
 - MARS is building an Electron launch facility at Wallops
- Virgin Orbit:
 - Plans its first launch in 2019
- Vector:
 - DARPA Launch Challenge selections

Impediments

Advocates/Supporters

Opposition

Suggestions

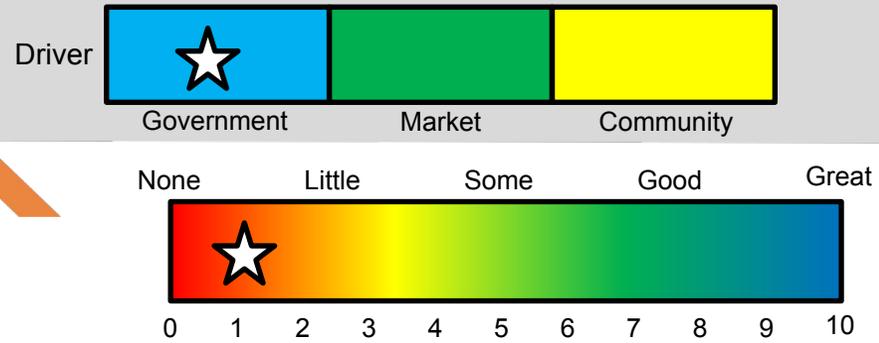
- Reference orbit should be 500 km sun synchronous – weight TBD

EFFICIENT SPACECRAFT LICENSING PROCESS

There should be a standard, efficient spacecraft licensing process

- Currently, a number of federal agencies are involved in the licensing process.
- Current commercial plans include constellations of thousands of small satellites in low earth orbit.
- Licensing may become more complicated and effective, efficient processes will be essential to supporting a healthy, vibrant small payload community.
- Progress in meeting this goal could be measured by a survey of spacecraft operators.

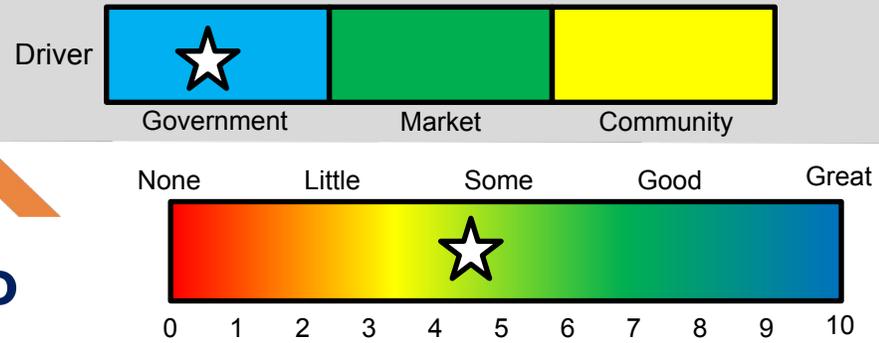
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Progress	
Impediments	<ul style="list-style-type: none">• Currently FCC, NOAA, NTIA are involved in licensing. No single point USG entry point.• Complex process managed by limited USG personnel
Advocates/Supporters	
Opposition	
Suggestions	<ul style="list-style-type: none">• Reference orbit should be 500 km sun synchronous – weight TBD

SPACECRAFT IDENTIFICATION DEVICES

6



All spacecraft should have an identification device to facilitate catalog maintenance

- An active or passive identification device would be helpful in identifying small space objects and in catalog maintenance
- Progress in meeting this goal could be measured by a review of the percentage of new satellites deployed with this capability each year.

Progress

- Several technical options have been proposed and prototyped
- Space insurance providers openly stated this would be a desirable capability (addresses risk) in a recent Dept of Commerce Space Summit event in Washington, DC

Impediments

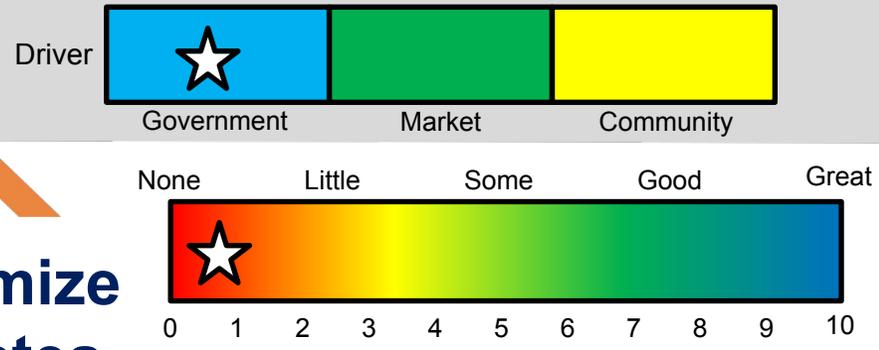
Advocates/Supporters

Opposition

Suggestions

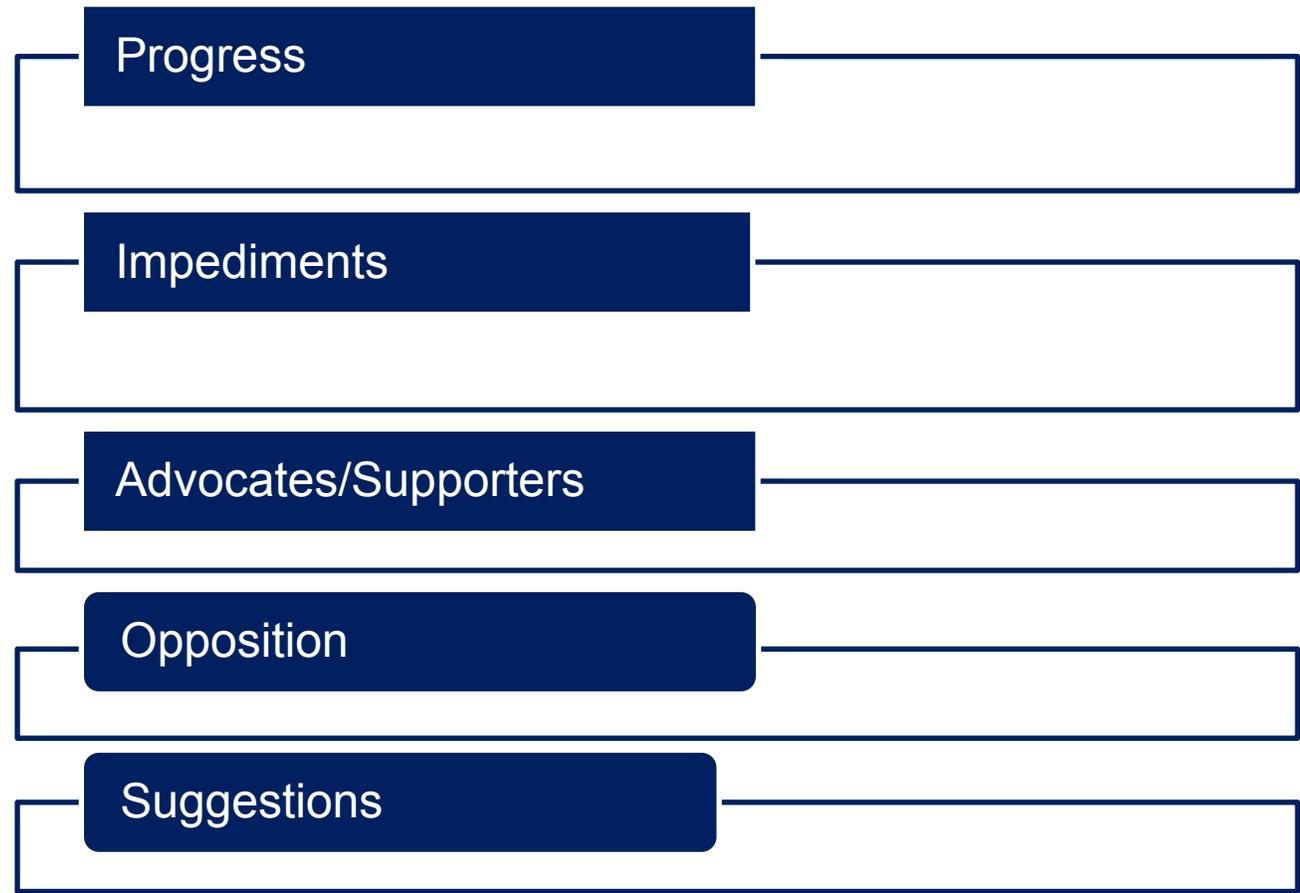
SPACECRAFT POSITION DEVICES

7



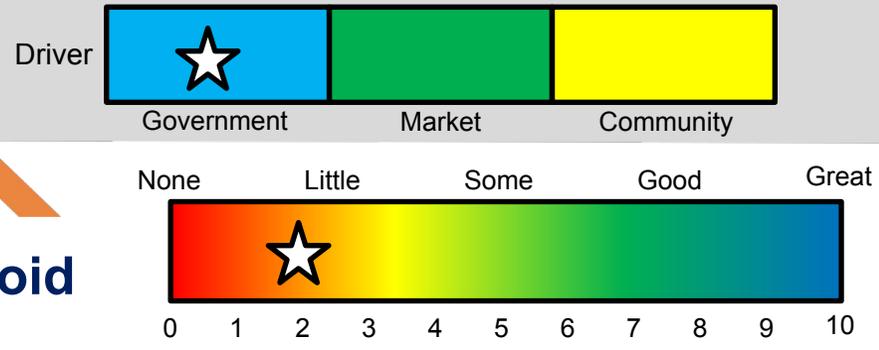
All spacecraft should have a position device to minimize ephemeris uncertainties due to limited tracking updates

- Spacecraft with a positional device could transmit position and velocity when queried
- This could reduce the uncertainty associated with periodic tracking observations and reduce the uncertainty “bubbles” used in predicting potential collisions
- This would be especially useful for small satellites under constant thrust
- This could improve catalog maintenance, reduce the tasking of limited space track assets, and lower the spacecraft requirement for maneuvering capability to avoid potential collisions
- Progress in meeting this goal could be measured by a review of the percentage of new satellites deployed with this capability each year.



SPACECRAFT MANEUVER CAPABILITY

8



All spacecraft should have adequate maneuver capability to avoid potential collisions within the normal warning timelines and to provide for a timely de-orbit rather than an uncontrolled re-entry through orbital decay

- This goal addresses two types of maneuver capability:
 - The maneuver capability required to avoid potential operational collisions
 - The capability required to provide a more controlled de-orbit
- De-orbit maneuver capability could be either active or passive
- Maneuver to avoid potential collisions imply active capabilities to respond to the short warning timelines

Progress

- No progress. Discussions about within the community

Impediments

- Cost and additional “Do-No-Harm” considerations limit progress

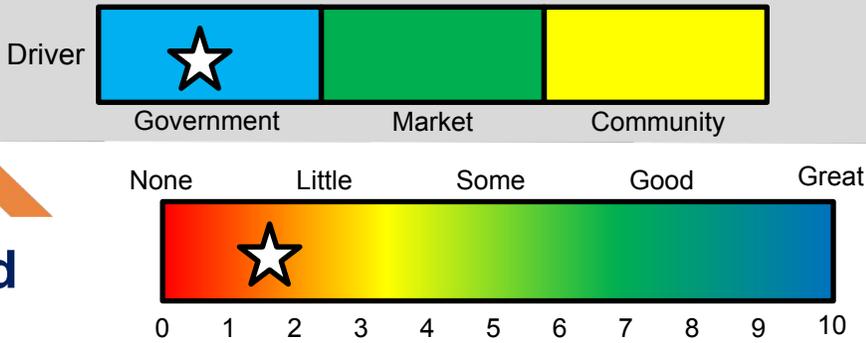
Advocates/Supporters

Opposition

Suggestions

STANDARDIZE DEORBIT POLICY

9



There should be a standard US de-orbit policy for spacecraft and orbiting upper stages

- This goal recognizes that not only the small spacecraft, but also the final orbit insertion stages, represent a collision hazard if left in orbit after completing their missions
- Progress in meeting this goal could be measured by a review of mission designs and FAA launch license approvals each year.

Progress

- No progress. Policies exist for USG (DoD and NASA).

Impediments

- DoD and NASA policies do not have the same parameters; this should be corrected
- The 25 year natural decay “policy” may become inadequate as LEO small satellite constellations proliferate

Advocates/Supporters

Opposition

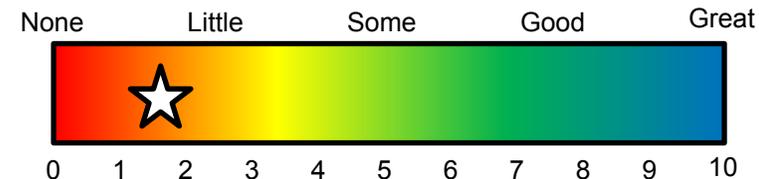
Suggestions

Change terminology from Deorbit to Debris mitigation in include disposal orbits in addition to deorbit options

USG CATALOG AND WARNING



Driver



The USG should continue to provide a publicly available space object catalog and warnings of potential collisions

- The U.S. has produced a space object catalog and made it largely available for all space operators to share at no cost.
- Space traffic management is an international issue that will present great challenges in the future.
- The continued provision of accurate space catalog information should remain the role of the government.
- Progress in meeting this goal could be measured by reviewing government space track actions and commercial space track providers on an annual basis.

Progress

- USG continues to provide these services. No change over past year

Impediments

Advocates/Supporters

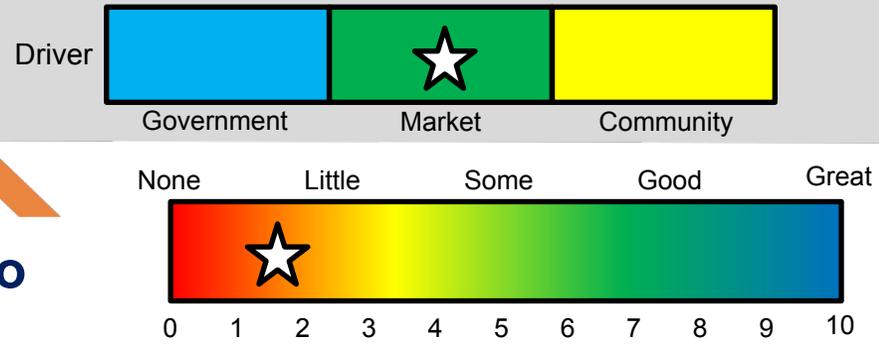
Opposition

Suggestions

COMMERCIAL CATALOG AND WARNING

There should be commercial space tracking services available to users requiring more precise or sophisticated support.

- As space operations become more congested and complex, spacecraft operators may need more
- detailed and more frequent information than what is available in the free government catalog.
- This combination of basic space catalog data provided at no cost by the government and
- additional commercial data provided for a fee appears to be the best solution for future operations.
- Progress in meeting this goal could be measured by reviewing the commercial track providers
- on an annual basis.



Progress

- LeoLabs is bringing a third space tracking radar on line in New Zealand

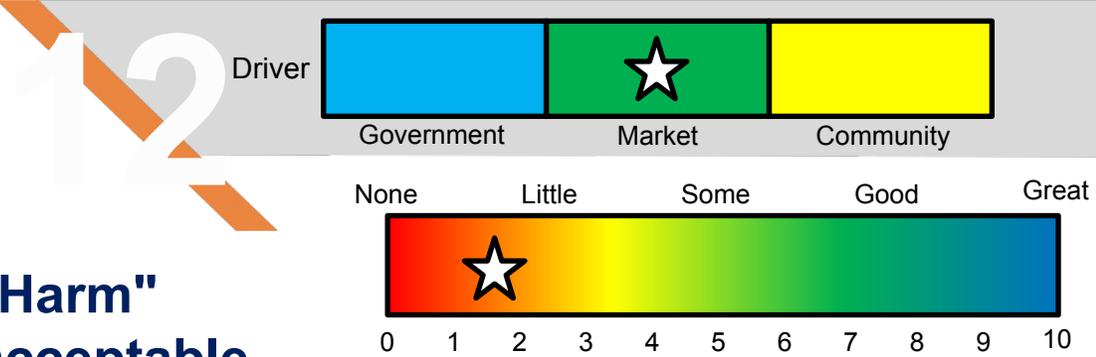
Impediments

Advocates/Supporters

Opposition

Suggestions

COMMON DO-NO-HARM CRITERIA



There should be a community accepted set of "Do-No-Harm" criteria that ensures that small spacecraft pose no unacceptable hazards to the launch vehicle or the prime payloads

- Large spacecraft requiring large launch vehicle typically are high cost and high value
- These missions rarely use all the lift capability
- This "excess capacity" is a valuable asset that should not be wasted, but carrying secondary payloads represents an additional complexity to the mission and a marginal increase in risk
- "Do-No-Harm" criteria for secondary components have been developed by several organizations which would mitigate concerns of the prime mission planners
- These various sets of "Do-No-Harm" criteria should be consolidated into a common set accepted by the community
- Progress in meeting this goal could be measured by an evaluation of the individual criteria and their general acceptance within the community each year

Progress

- Proliferation of "Do-No-Harm" criteria continues. SPRSA, Aerospace, NASA, MMO, and ULA
- all have sets of "Do-No-Harm" criteria.
- SMC/LEX plans to include "Do No Harm" criteria as a provision for OSP-4 rideshare missions

Impediments

- Lack of reconciliation of the various sets of criteria limit value.
- Contractor DNH criteria may be proprietary

Advocates/Supporters

Opposition

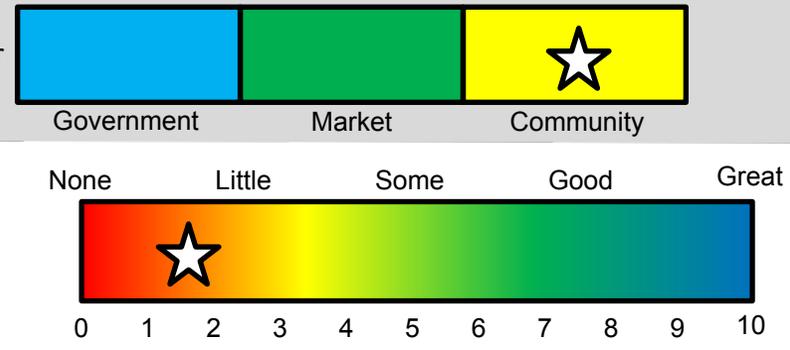
Suggestions

- A common, community accepted set of "Do-No-Harm" criteria should be adopted that
 - encompass or reconcile the various sets of criteria.
 - A "Standard", rather than accepted criteria, has been suggested.
 - Ownership should be with a neutral party

COMMON “LINE REPLACEABLE UNIT” CRITERIA

There should be a community accepted set of criteria that would allow compliant payloads to move more easily from one launch option to another, e.g. a rideshare to small, dedicated launch service or vice versa

- These criteria should address the requirements of the small dedicated launch services providers as well as the ride share Do-No-Harm criteria
- Ideally, small payloads meeting both these sets of criteria should be able to switch from a ride share
- Opportunity to a dedicated small launcher or vice versa
- Progress in meeting this goal could be measured by an evaluation of the individual criteria and their general acceptance within the community each year



Progress

Impediments

Advocates/Supporters

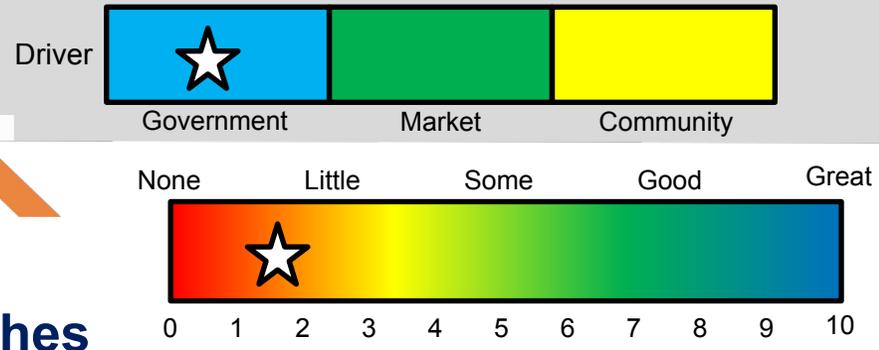
Opposition

Suggestions

INDEPENDENT, PUBLIC, COMMUNITY DATABASE

There should be an independent, publicly available database of both potential launch opportunities and payloads seeking launches

- There is a need for information about payloads seeking launch opportunities, launch service provider's flight opportunities, and rideshare flight opportunities
- This goal only addresses data that is unrestricted and publicly available
- Progress in meeting this goal could be measured by an evaluation of the available databases for usefulness, accuracy, and currency.



Progress

Impediments

- Previous efforts have asked for or expected too much information and have not been useful.
- Contractors will not provide proprietary data

Advocates/Supporters

Opposition

Suggestions

Ask the community what information they need and what they would be willing to provide