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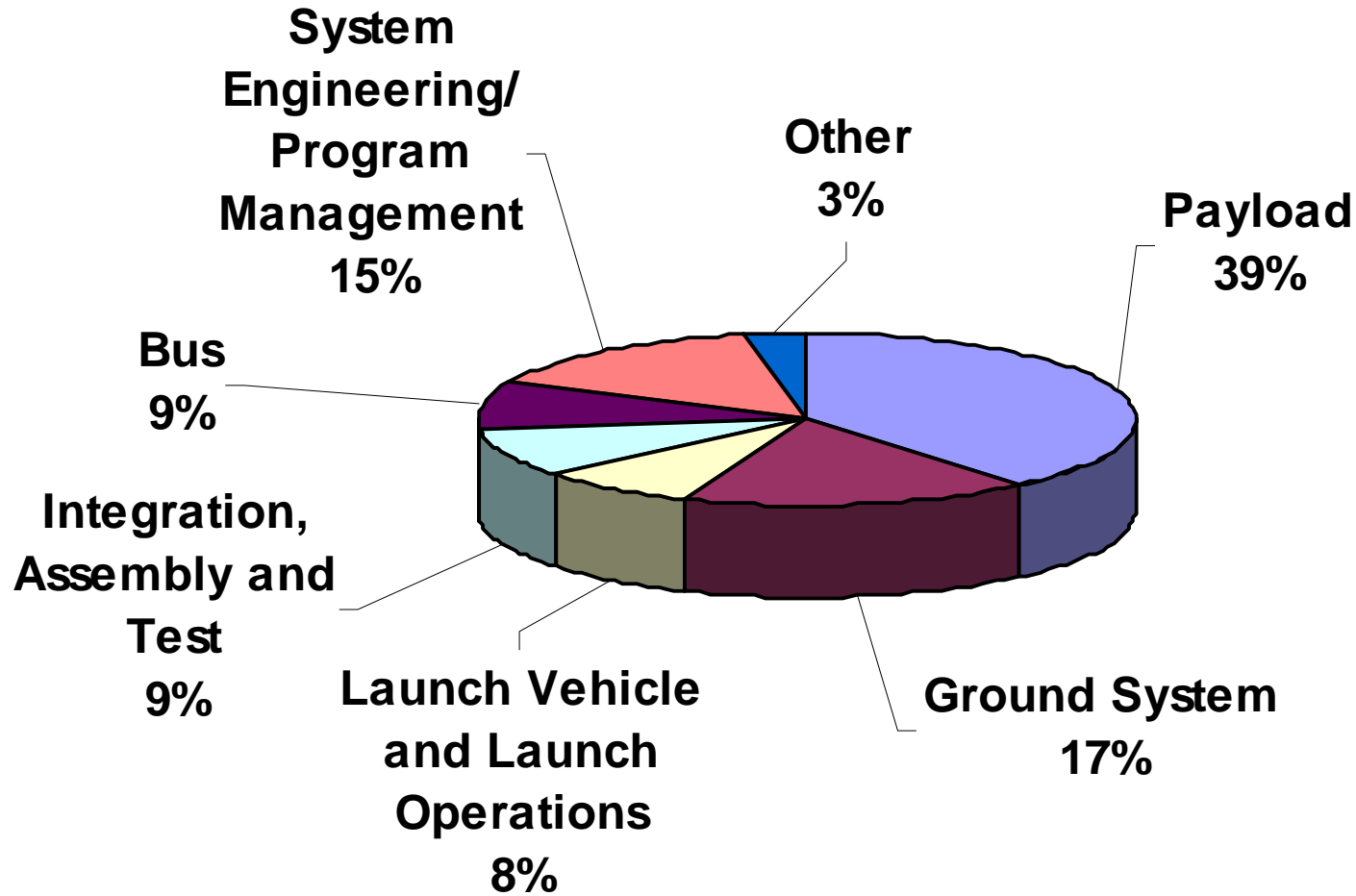
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**Achieving Operationally
Responsive Ground Systems**



Typical Space System Percentage Allocation of Development Costs



Why Operationally Responsive?

- **Increasing reliance on space requires “evolutionary” capabilities in space and on ground**
- **These demands require ability to rapidly:**
 - **Adapt existing assets to support urgent needs**
 - **Infuse technology and innovation**
 - **Augment or reconstitute space systems**
 - **Adapt to new user requirements or use space and other assets in a modified manner**



How Do We Get There?

- **Change the economics of space**
 - Smaller and simpler satellites in shorter timeframes
- **Surge and Replenish**
 - Requires responsive launch, ground and spacecraft
- **Technology Push**
 - Use small satellites to drive technology insertion
- **Partnering**
 - Acquisition practices and collaboration with industry and academia
- **CONOPS enables ORS**
 - Ground Systems implement concept of operations



Operationally Responsive Ground System Drivers

- Long duration missions
- More complex & larger flight software
- Bandwidth requirements increasing rapidly
- Worldwide distribution of data on demand
- Continually shrinking timelines
- Changing user needs due to new opportunities and/or updates to space assets



Challenges to the Ground System Community

- Respond to rapidly changing user requirements
- Guarantee information assurance
- Reduce risk, cost & time for system refreshes
- Maintain interoperability between legacy and future systems
- Provide information to user in a transparent manner

Ground Systems are the Enabler of Operationally Responsive Space

