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Abstract #XXX

Preferred Topics: NEWSPA / TESTING / SUSTSP (3 maximum from the list of topics)

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### Title

## Agile component of infrastructure in New Space companies

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### Abstract

The number of global young space companies that are developing hardware like launchers or propulsion for spacecraft is constantly increasing. There are many causes for that increase. Commercial – a rapid increase in space economy, not only in government contracts but also demand in the private sector. Technology accessibility – technologies like additive manufacturing, specialized machining, and advanced quality control became easily accessible for every company that wants to develop space hardware. Knowledge transfer – each year many skilled scientists publish papers, migrate between jobs, and transfer knowledge from one company to another. This and many more reasons are in favor of the rapid development of the growing commercial space sector.

Unfortunately in the space economy, some factors seem to be acting unfavorably for New Space companies. Less space for Space – when we look at western European countries we can see that new businesses tend to agglomerate near large cities, and at the same time there is no space for large workshops or advanced test facilities in that cities. Laws and regulations – with time there are more regulations and law across countries or regions that are creating necessary restrictions, some operations (like handling and storage of certain propellants, launching a rocket, or transporting pyrotechnics) is more regulated than it used to be. Very often those regulations are based on the foundations of proven experience and existing heritage but are not in favor of young, dynamic New Space companies. Dynamics of modern space economy – very often small space startups need to pivot from their original idea and pursuit different goals discovered in a process to gain new experience or business partners. This creates a need for change or new infrastructure, and investment.

Above challenges might present strictly business problems at first. At a closer look, they are impacting engineering decisions and create challenges that in the end are very often solved by system solutions. One such solution, known before but nowadays adopted in different ways by many is agility in form of mobile test and launch infrastructure. Each year more and more companies are making their infrastructure without permanent bonds to the ground. Infrastructure that can be moved to any place, easily scaled, or quickly modified for different purposes. Mobile propulsion test facilities can be transported to the military test ranges when they are needed. Mobile rocket launch pads that can be brought to the test range and taken back in a couple of days. Existing agile companies have solutions even for long-duration vacuum testing of thrusters – capabilities reserved only for large test facilities.

Łukasiewicz Research Network – Institute of Aviation is also using, creating, and designing this type of agile infrastructure. Authors of the paper analyze existing solutions for mobile infrastructure around the world, and present future trends in the space economy. The paper also presents the design and status of Mobile Laboratory for Rocket Propulsion (MOLAR) and lessons learned during the design and usage of the Mobile Rocket Launchpad (WR-2).