ARESS – A Roadmap for Emerging Space States

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30th Space Studies Program 2017, Ireland

- 112 participants
- 4 Team Projects:
  - ARESS – A Roadmap for Emerging Space States
  - A New Vision: The Future of the ISS
  - Astropreneurs – The Galactic Guide to Space Entrepreneurship
  - NetSpace – The Internet of Things and Future Applications for Energy and Space

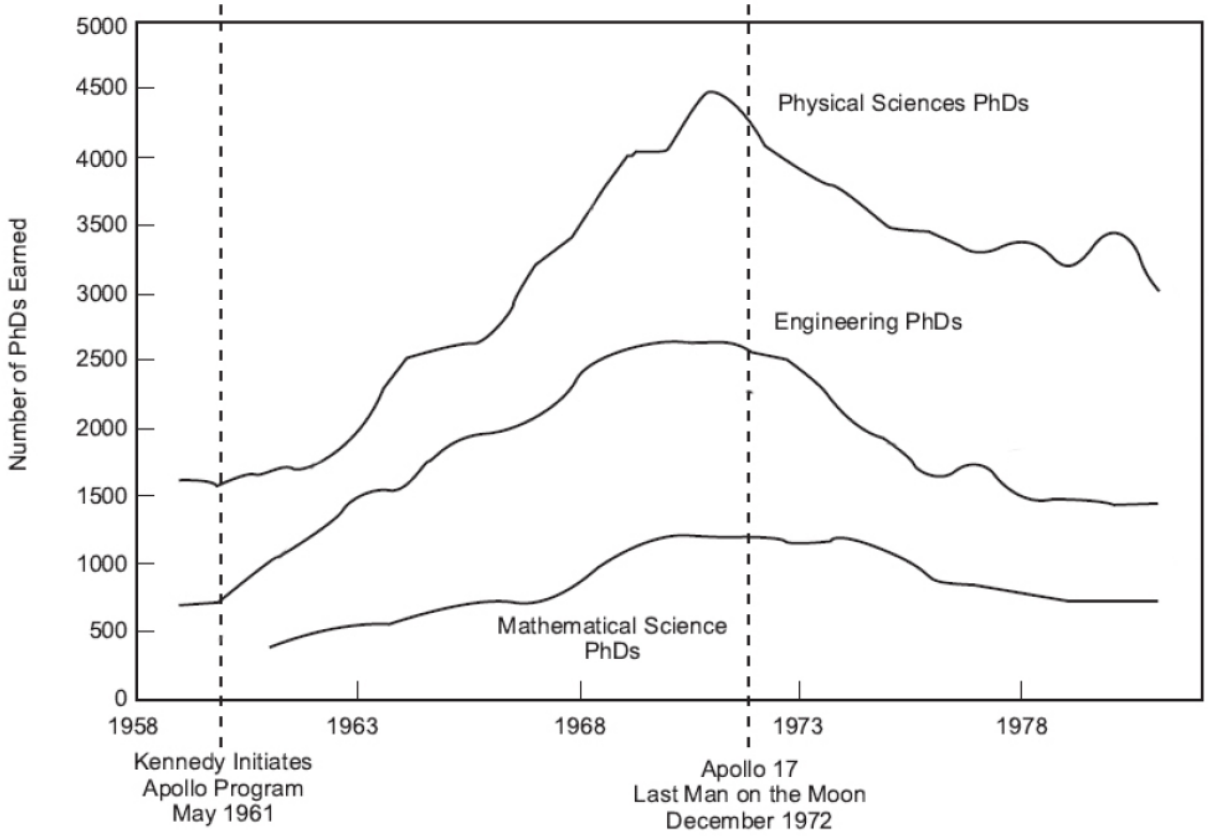
ARESS – Mission Statement

Humaid Al Habsi	Oman
Ali Said Rashid Al Kalbani	Oman
Ciara Backwell	Ireland
Miles Bengtson	USA
Tom Morten Berge	Norway
Audrey Berquand	France
Amy Capener	Ireland and UK
Chunlei Guan	China
Lorraine Conroy	Ireland and UK
Jing Dai	China
Maeve Doyle	Ireland
Huishen Duan	China
Moena Kinami Egawa	Japan
Chance P. Garcia	USA
Beth Healey	UK
Daisuke Kawamura	Japan
Antonio Martelo Gómez	Spain
Hadas Nevenzal	Israel
Dillon O'Reilly	Ireland
Harold Bryan S. Paler	Philippines
Rui Guo	China
Istvan Sarhegyi	Hungary
Eoin Scanlon	Ireland
Victoria Katharina Schebek	Austria
Roberto Adolfo Ubidia Incio	Peru
Dilip V	India
Chao Wu	China
Yanbin Xu	China

« To identify recommendations for emerging space states that will inspire and enhance social and economic growth «

Space Rationales

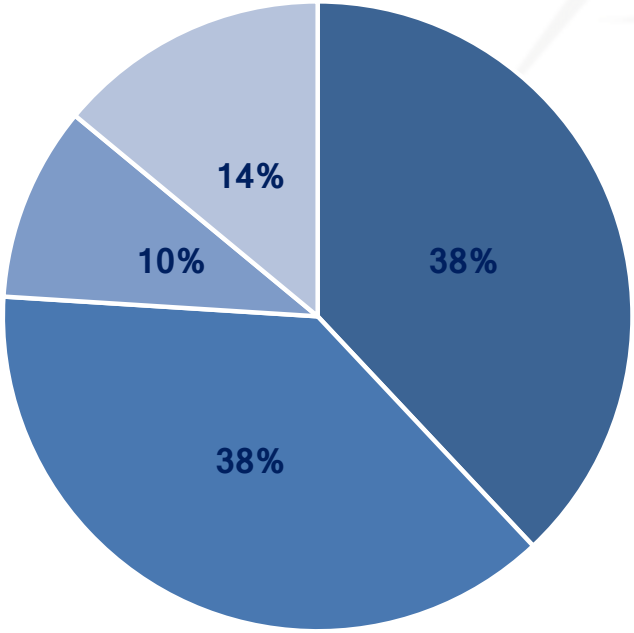
- Economic sphere
- Cooperation and partnerships
- Technology
- Culture
- Education
- Opportunity loss



Source : Benefits Stemming from Space Exploration (2013), ISECG

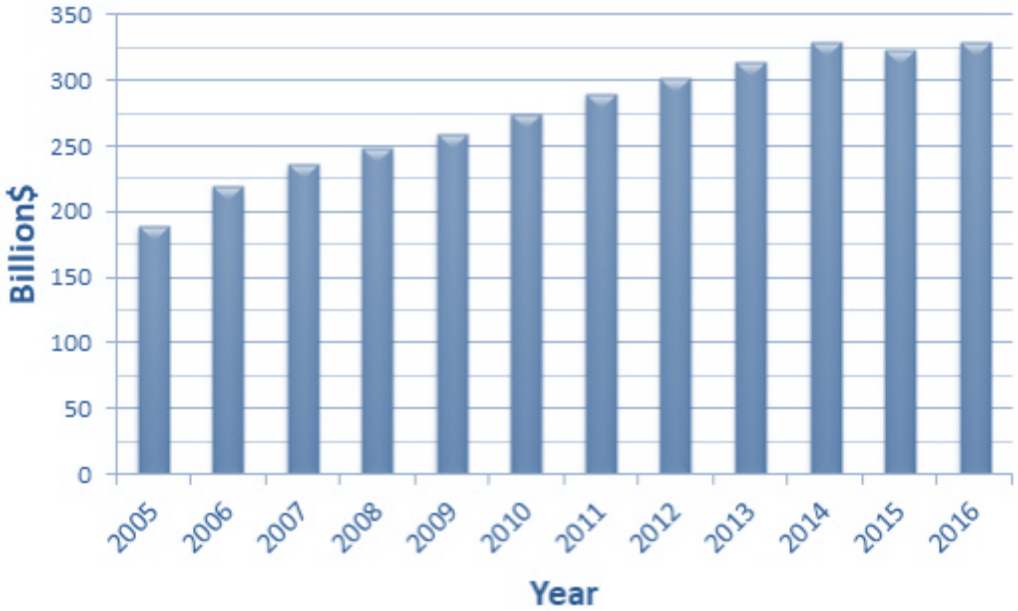
Space Sector Analysis

Global Space Activity, 2016 (US$ 329.31B)



- Commercial Infrastructure and Support Industries (US$ 126.26B)
- Commercial Space Products and Services (US$ 126.62B)
- Non-U.S. Government Space Budgets (US$ 31.98B)
- U.S. Government Space Budget (US$ 44.44B)

Global Spending in the Space Industry from 2005-2016 (US$)



Source : The Space Report 2017, Space Foundation

Space Sector Analysis

- Historically technical and legal challenges, substantial risks, and significant budgets
- Space industry generally associated with exploration, research, and governments

- **Upstream vs. downstream activities; public vs. private actors**

- Main space applications: Earth observation, satellite navigation, satellite communications, and combinations (e.g., telemedicine)
- Current and future market trends: small satellites, space mining, on-orbit servicing, space tourism




Method

Analysis of 13 established space states…

Australia, Austria, Brazil, Canada, China, India, Israel, Luxembourg, Nigeria, Norway, South Africa, United Arab Emirates, United Kingdom

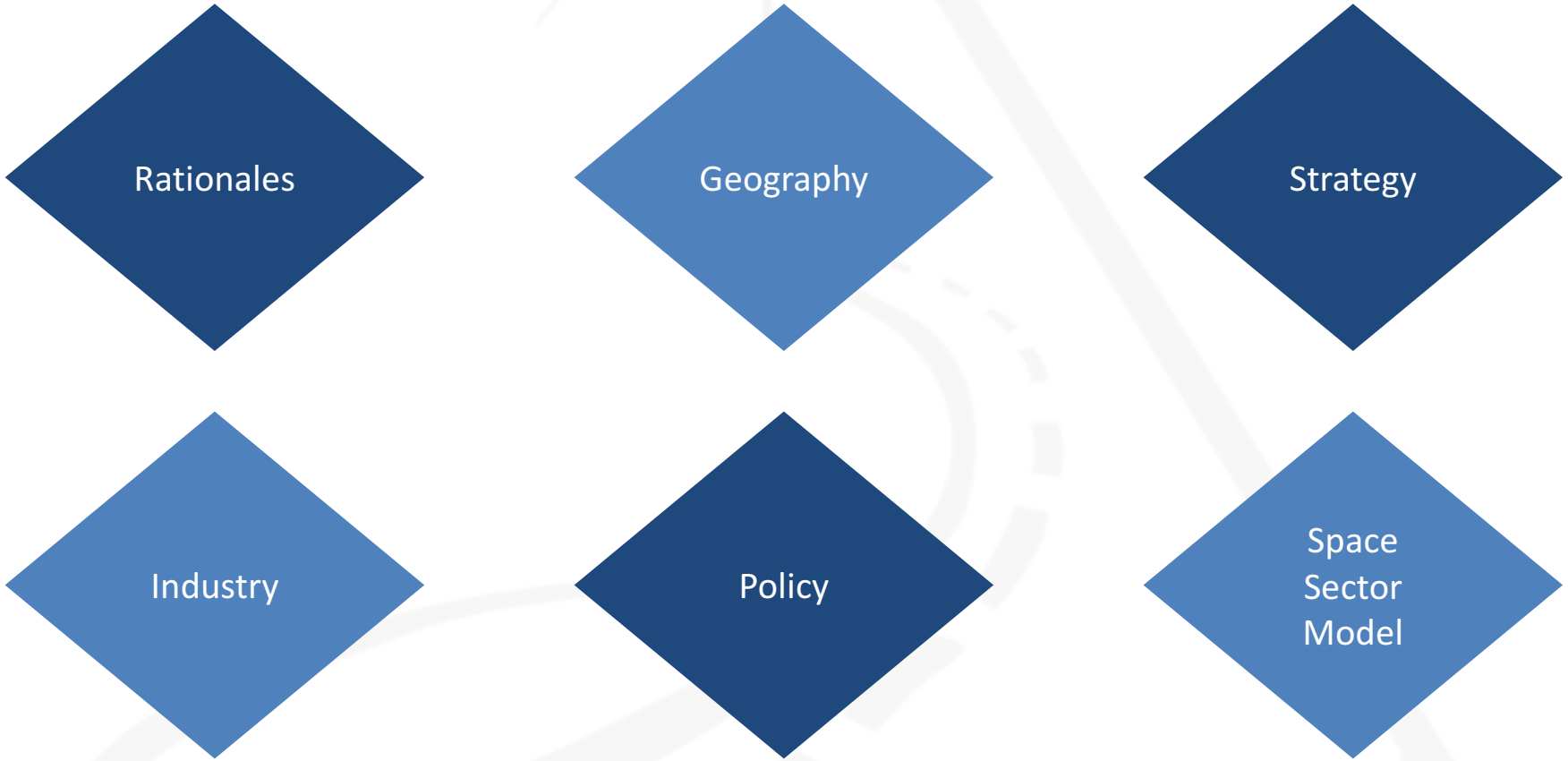
Method

…selected using the “Space Participation Metric” developed by Wood and Weigel…

	Space Participation Metric
(1) Low	▪ UNCOPUOS Members ▪ Group on Earth Observation Members ▪ Host an International Astronautical Congress ▪ Signed the Outer Space Treaty ▪ Members of: o International Mobile Satellite Organization o International Telecommunications Satellite Organization o International Telecommunications Union o International Astronautical Federation o International Astronomical Union
(2) Medium-Low	▪ Inclusion in American Astronomical Society Directory ▪ National Space Program ▪ Space Institutes or Organizations ▪ Participate in U.N. Program on Space Applications ▪ Report to UNOOSA on National Space Research Activities
(3) Medium	▪ Domestic Communication Satellite system ▪ International Communication Satellite Earth Stations ▪ Earth Observation Facilities and Equipment
(4) Medium-High	▪ Launch Facilities ▪ Launch Vehicle(s) ▪ Appear on UN Launch Registry
(5) High	▪ Participate in International Space Station or National Human Launch Capability

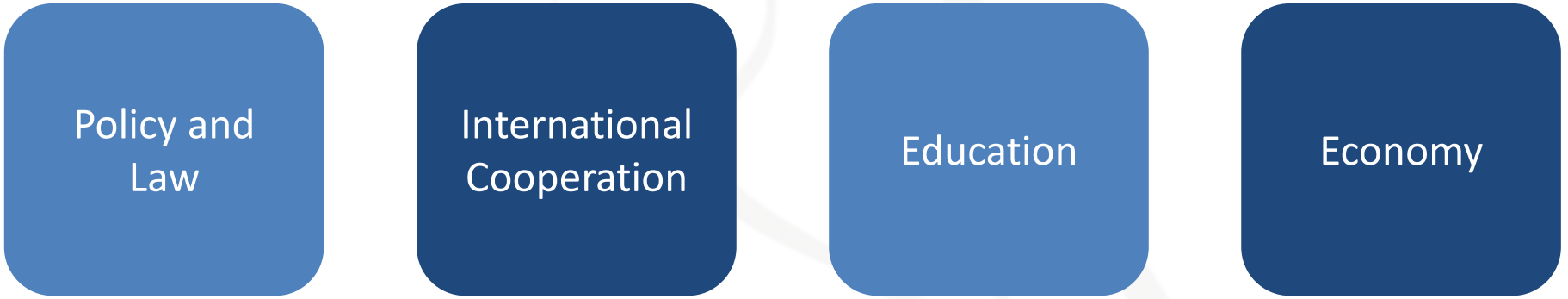
Method

…looking at various aspects.



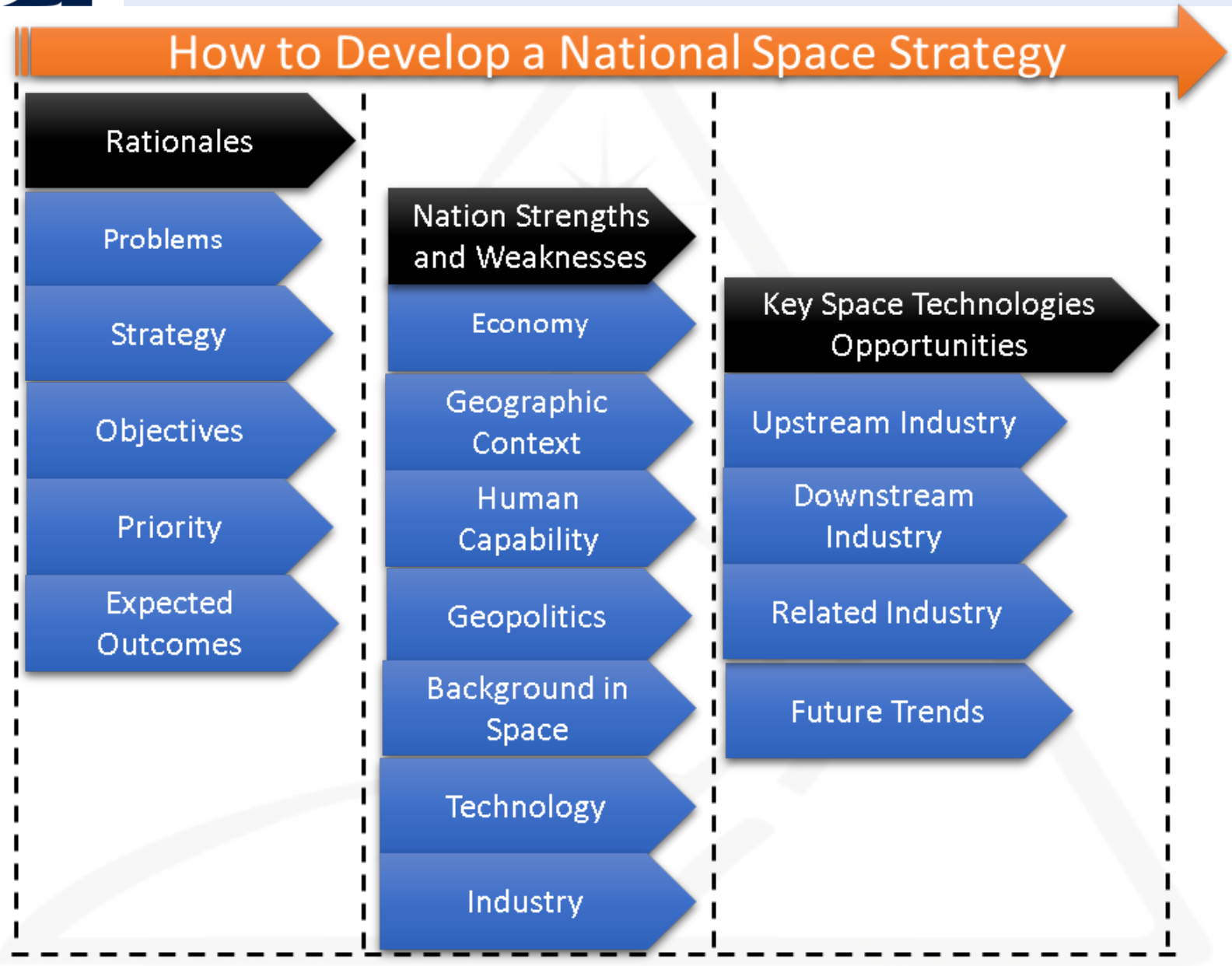
Recommendations

- 21 recommendations
- 4 categories

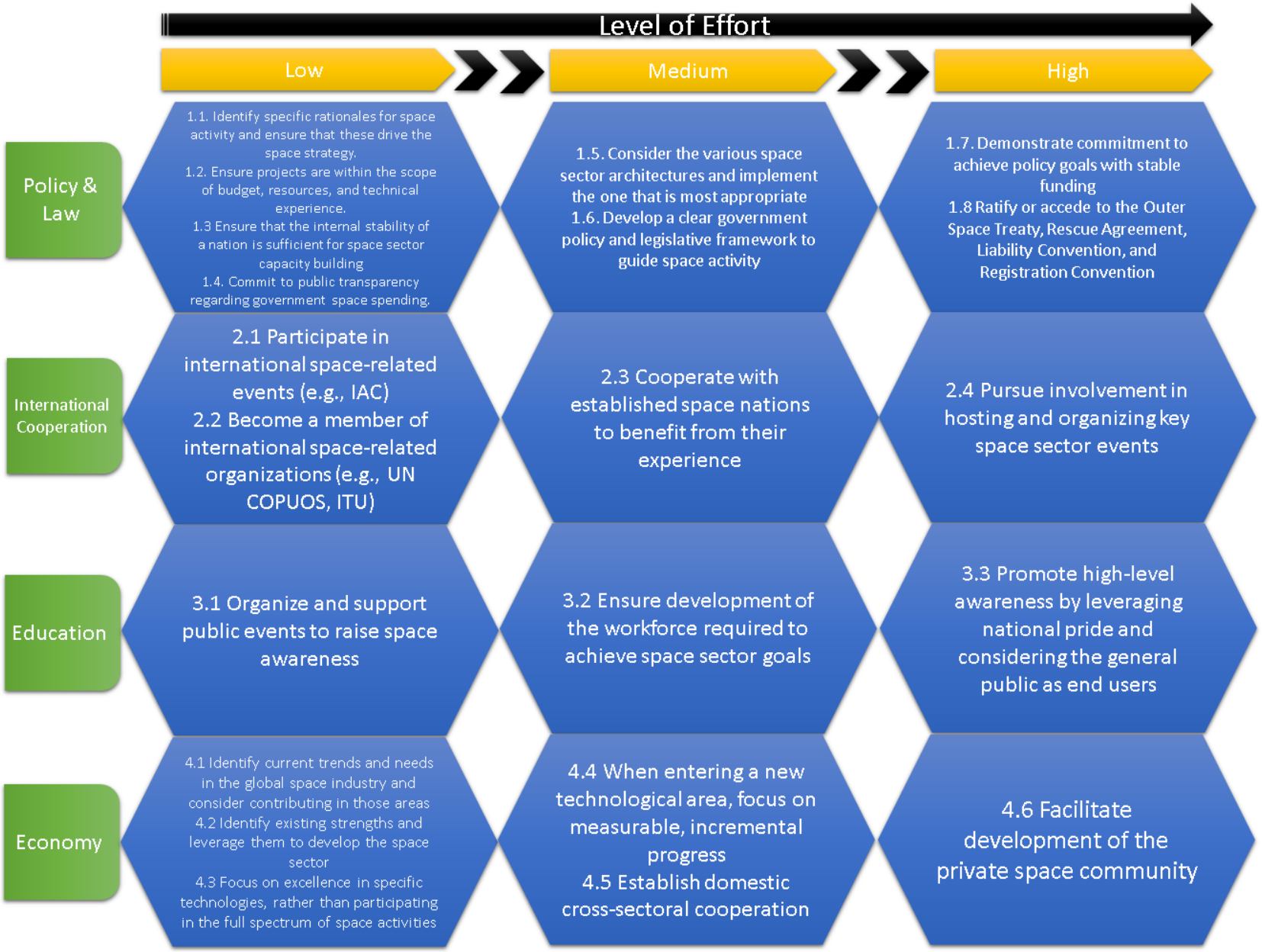


- Analysis of space rationales, strengths and weaknesses and opportunities as precondition

1. Analysis


How to Develop a National Space Strategy
Rationales
Problems
Strategy
Objectives
Priority
Expected Outcomes
Nation Strengths and Weaknesses
Economy
Geographic Context
Human Capability
Geopolitics
Background in Space
Technology
Industry
Key Space Technologies Opportunities
Upstream Industry
Downstream Industry
Related Industry
Future Trends

2. Application of Recommendations



Application of Recommendations - Examples

- Europe: Create a knowledge sharing public outreach program.
- Middle East: Accede to major international space treaties.
- South America: Host international space events.
- Southeast Asia: Construct and operate a launch facility.

Analysis of Ireland

- Space rationales: economic sphere
- Strengths: technology and innovation
- Weaknesses: no body to promote the development of the space industry; no member of COPUOS; no national space law
- Opportunities: downstream industry; pharmaceutical industry

Recommendations for Ireland

- Establish a national space agency or a similar body.
- Join COPUOS and other space related international organizations.
- Increase investment in space-related STEM education.
- Encourage private industry to engage in space-related activities.

ARESS Executive Summary and Report are available at https://isulibrary.isunet.edu/opac/index.php?lvl=notice_display&id=10147

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