PART I

Chapter 1

Introduction

The introduction provides answers to the following questions: Why has the Handbook *been produced? Who is the intended audience for the* Handbook*? What does the* Handbook *contain?*

The *Handbook* and its rationale

The *Handbook to Measuring the Space Economy* is part of a broader systematic effort within the OECD to understand and assess the contribution of new sectors to economic and social development more generally.

This involves looking beyond the core sector to explore its wider interactions with other sectors and other markets. Thus, in the past, attention has shifted for example from the ICT sector to the information economy, from the biotechnology sector to the bio economy, and more recently from the space sector to the space economy (OECD, 2011a).

Like the information economy and the bio economy, the concept of the space economy endeavours to capture the numerous complex value chains and downstream applications that reach into many aspects of economic and social life. Moreover, in the current economic context, the search is on to identify new potential sources of economic growth. The space economy, with its vast array of scientific, technical, environmental, business and consumer applications is a particularly promising field of study. For all the aforementioned reasons, it is crucial to improve our ability to measure the space economy.

Work on space activities at OECD

As part of its mission, the OECD IFP is examining how space technologies could potentially affect the general economy.

- A two-year in-depth project (2002-04) on the potential of space applications conducted in collaboration with private and public actors from the international space community resulted in two publications: *Space 2030: The Future of Space Applications* (OECD, 2004) explored promising space applications for the 21st century. *Space 2030: Tackling Society's Challenges* (OECD, 2005) assessed the strengths and weaknesses of the regulatory frameworks that govern space and formulated a policy framework that OECD governments might use in drafting policies to ensure that the potential offered by space is fully realised. Following this project, there was a demand for the OECD to lead further innovative economic analysis of the sector and to create a dedicated Forum, complementing other existing institutional structures.

- The OECD Space Forum's mission is to investigate the economic dimensions and implications of space infrastructure for the wider economy. It published *The Space Economy at a Glance,* the first OECD statistical overview of the emerging space economy, a novel compilation of statistics on the space sector and its contributions to economic activity (OECD, 2007). An updated version was released in the summer of 2011 (OECD, 2011b). In parallel to statistical activities, case studies on space applications are conducted to examine the socio-economic impacts of space applications in diverse sectors. As a first step, this work has resulted in the publication of *Space Technologies and Climate Change (OECD, 2008)*. Focussing on examples of water management, marine resources and maritime transport, the report critically looks at the arguments for developing satellite systems that measure and monitor climate change and help mitigate its consequences. A second forthcoming publication examines the contributions of space applications in global food supplies (*i.e.* agriculture and fisheries production, transport, distribution networks).

Users of the *Handbook*

As in the case of other manuals published by the OECD, the audience of this *Handbook* includes a broad range of users.

- policy makers and representatives of governmental agencies form a major part of the demand for more detailed information on the space sector;
- commercial actors, active in the space community and beyond, many of whom have contributed data and analysis for this *Handbook*, as well as potential investors in space products and services;
- researchers in different disciplines and policy or financial analysts who interpret statistical information and need to access the methodologies that underlie that information;
- and finally, international organisations, whose information requirements centre on comparability across countries, are part of the target audience.

Scope and content

This *Handbook* is intended to assist in the consistent application of concepts and definitions, as well as the collection of comparable data via statistical surveys.

- the report identifies the obstacles to reliable measurement of key aspects of the space economy and offers several avenues for data improvements;
- It complements the publication *The Space Economy at a Glance 2011*, while also providing a compendium of indicators that are currently available, with methodological notes for users.

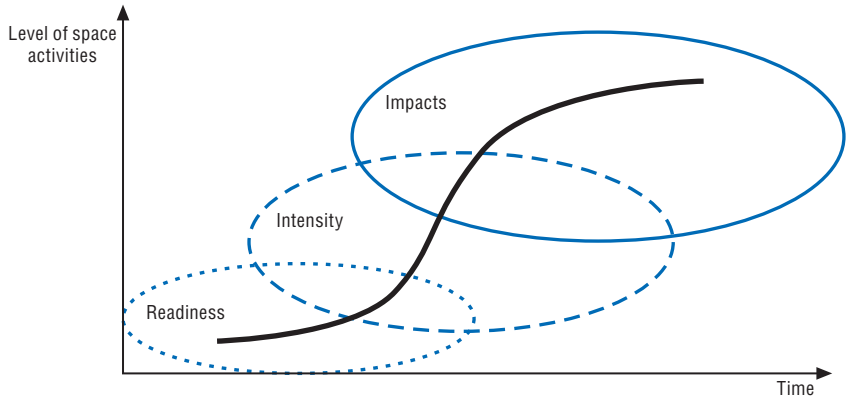
The methodologies and indicators on the space economy are presented here in a framework that consists of three interdependent categories: readiness (inputs), intensity (outputs), and impacts:

- The readiness factors of the space economy, which include the different elements that are necessary for the development of space activities. These elements encompass the technical, financial and social infrastructures that enable the production of space-related hardware or the provision of services, *i.e.* government budgets for space activities (both for public space programmes and for R&D activities) and human capital.
- The intensity indicators of the space economy; which are constituted by all the diverse outputs (products, services, science) that are produced or provided by the space sector. These outputs are very diverse in nature, from commercial revenues from industry, scientific outputs such as patents, to number of satellites, space missions or space launches.
- The impacts indicators of the space economy, which include various types of socio-economic impacts derived from the development of space activities. Four main categories of impacts have been identified so far, although further work is certainly needed on the social dimensions of the use of space applications (*e.g.* reduction of the digital divide via satellite communications); they include: the creation of new commercial products and services, productivity/efficiency gains in diverse economic sectors (*e.g.* fisheries, airlines), economic growth regionally and nationally, and cost avoidances (*e.g.* floods).

The diagram below illustrates the different steps from readiness to impacts. This is, of course, a stylised representation. The overall size of the space economy grows in a given country as the "level of space activities" increases: a minimum of readiness factors are needed, such as budgets for R&D and human resources; this allows the intensity of a space programme to grow (more scientific missions, more patents, and/or more revenues generated by commercial space applications depending on the strategic objectives of the programme), thus leading to potentially more socio-economic impacts (*e.g.* productivity gains, regional economic growth).

The quality of available measures and comparable data for the space economy varies considerably throughout the input, output and impact stages. Some official statistical data are available for the readiness factors (*e.g.* space budgets, although not always readily comparable) and the intensity factors (*e.g.* number of space missions), but these need to be supplemented by private data sources (*e.g.* industry surveys) for revenues of the space sector. There are relatively less data on impacts, although the number and quality of datasets have improved since the early 2000s, as more countries study the impacts of their respective space sector on the wider economy.

Figure 1.1. **Development of the overall space economy**



Source: Adapted from OECD (2011), *The Space Economy at a Glance 2011*, OECD Publishing, *http://dx.doi.org/10.1787/9789264111790-en*, p. 16.

In order to provide a better indication of the state of the space economy, more work on the concepts and definitions for the space sector and the wider space economy is needed. This calls for significant international co-operation, and the OECD Space Forum is working with the space community to provide a platform for such work.

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