# Chapter 5
# Smart Senior Residences:
## How to Improve Services Efficiency and Quality by Exploiting Big Data and Ambient Intelligence

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## ABSTRACT

*Population aging is the most significant social transformations of our century. In this context, affordable senior housing with supportive services is a key component to the world's long-term care continuum. One of the main issues is how to cost-efficiently provide adapted (and increasingly complex) care services in senior residences to an exponentially growing number of people considering staff shortage. The rise in operating costs (energy, food, etc.) forces companies to find new ways to stay competitive. In that context, this chapter tries to propose avenues of solutions by giving some answers to a simple question: how to optimize the work of the staff to meet the growing demand considering the context of staff shortage. More precisely, this chapter studies methods and strategies to exploit Ambient Intelligence and Big Data to increase the number of residents an employee can support by automating a part of his daily work.*

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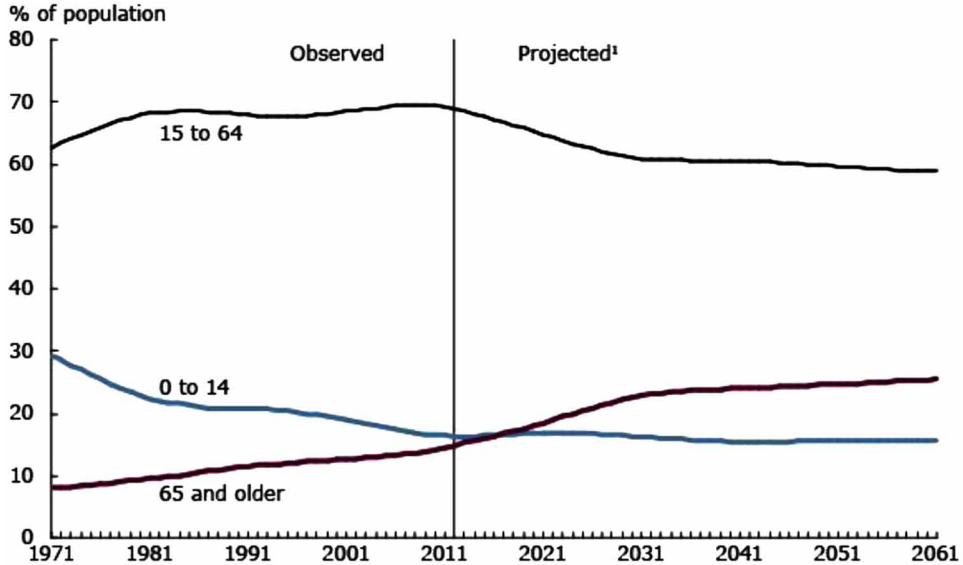
## INTRODUCTION

The world is actually facing the worst demographic crisis of its history (He et al., 2016). Virtually every developed country is now experiencing population aging. It is poised to become one of the most significant social transformations of the twenty-first century, with implications for nearly all sectors of activities, including labor and financial markets, the demand for goods and services, such as housing, transportation and social protection, as well as family structures and intergenerational ties (United Nations, 2015). As an example, in Canada, the median age was 26.2 years old in 1974, according to *Statistics Canada* (2017), but the Canadian population reached the median age of 39.9 years in 2011. This situation can be explained by the decline of the average number of children per woman, the increase in life expectancy and the aging of the baby boomer generation. Ultimately, the number of Canadians aged 65 and over is projected to increase from 5 to 10.4 million between 2011 and 2036. By 2051, almost 25% of the Canadian population is expected to be 65 years of age, as shown in Figure 1 (Statistics Canada 2011). Another important element is seniors' people are living longer. According to a study by the Canadian Institute for Health Information (CIHI, 2011), they also live longer. Indeed, most people under the age of 85 feel that they have no limitations on their functional abilities. As of age 85, the situation is rapidly changing and almost 25% of people aged 85 and over report having average (15%), serious (5%) or total (5%) limitations. Note that functional abilities include both basic activities of everyday life (e.g. walking, washing, eating, etc.), as well as everyday instrumental activities such as shopping or preparing meals. The limitation most often mentioned by people was the inability to do housework without help (14%). For its part, the inability to prepare its meal was mentioned by nearly 5% of the elderly. In terms of cognitive impairment and dementia, in 2011, according to the Alzheimer Society of Canada, 747,000 people had Alzheimer's disease or related illness, or 14.9% of those aged 65 and more. Among those aged 85 and over, this rate is even 33%. By 2031, this figure could reach 1.4 million.

*Figure 1. Population by age group in Canada, observed and projected (Statistics Canada 2011)*




1. The M1 projection scenario combines medium fertility, life expectancy, immigration and internal migration observed from 1981 to 2008.