Summary
During a wheelchair basketball game, the interaction between wheelchair and athlete has an impact on the performance of the athlete. Optimal interaction is therefore extremely important because it may be decisive for winning or losing the game. But what is optimal interaction and how to achieve it? A basketball sports wheelchair can be adjusted in many ways and all adjustments have a potential effect on the interaction and therefore on the performance. In the search for the optimal adjustment of the wheelchair to the athlete, detailed information about all wheelchair movements and athlete actions during a wheelchair basketball game is required. These wheelchair movements and athlete actions are called mobility performance. The research in this thesis describes the way to model mobility performance by means of defining, quantifying, simulating, predicting and optimizing mobility performance (Chapter 1).

The first aim was to define mobility performance in wheelchair basketball (Chapter 2). Based on interviews with Dutch wheelchair basketball coaches from the first division and the national team, clearly described activities of the wheelchair and the way it is handled by an athlete during wheelchair basketball were obtained.

The second aim was to quantify wheelchair basketball mobility performance during a game (Chapters 2 & 3). The defined wheelchair-athlete activities were the basis for the assessment of athlete and wheelchair activities by systematic observation from video footage. Fifty-six elite wheelchair basketball players were observed during matches. Interesting differences were found between playing standards, field position and ball possession. For instance, players at a national standard drove more forward and started more often driving forward during a match while the mean activity duration for these driving forward activities was longer than for players playing at an international standard. Moreover, national standard players performed fewer rotational movements and started less often with the rotational movements while the mean activity duration for a single rotation was shorter than for international standard players. Offense, defense and ball possession influenced mobility performance for the different field positions. During offense, the guards and forwards performed longer driving forward than during defense. Without ball, centers performed driving forward longer than with ball possession.

The third aim was to simulate mobility performance in wheelchair basketball. Based on the quantification data, the Wheelchair Mobility Performance (WMP) test was developed (Chapter 4). The test can be used as a standardized mobility performance test to validly and reliably assess the mobility performance capacity of elite wheelchair basketball players. Furthermore, the WMP test has the ability to measure changes in mobility performance when substantial manipulations were applied to the wheelchair (Chapter 5).
The fourth aim was to *predict* mobility performance (*Chapter 6*). The wheelchair characteristics wheel axis height, hand rim diameter, camber angle, and the vertical distance between shoulder and rear wheel axis (seat height) were positively associated (increased performance) with mobility performance, while the vertical distance between the front seat height and the footrest were negatively associated (decreased performance). Furthermore, the athlete characteristics classification, experience and maximal isometric force were also positively associated with mobility performance.

The fifth aim of the research was to *optimize* mobility performance (*Chapter 7*). As a first step towards optimizing mobility performance in wheelchair basketball, the WMP test was used to measure the effects of the characteristics seat height, mass and grip on mobility performance. For both high and low classification players, a lower seat height resulted in an increased performance while extra mass and glove use did not lead to a significant change in mobility performance. Further research must focus first on the effect of the modifiable characteristics wheel axis height, the vertical distance between the front seat and the footrest (bucket seat) and the maximal isometric force because these may also have a potential effect on mobility performance (*Chapter 6*).

The described method, i.e. defining, quantifying, simulating and predicting can be used in several other domains to gain an extensive understanding of (sport)-specific requirements which then can be used for optimizing the performance in the domain under study.