Multi-scale modeling and variability in cardiac cellular electrophysiology

Propositions, accompanying the thesis

"Multi-Scale Modeling and Variability in Cardiac Cellular Electrophysiology"

1. *Myokit* is a novel tool for the development and analysis of models of the cardiac action-potential. It can help scientists to collaborate, to integrate new data into systematic frameworks, and to broaden the scope of their work (chapter 3).
2. There is cell-to-cell variability in the kinetic properties of the cardiac fast sodium current (chapter 5).
3. Predicting the effects of *SCN5A* mutations on the cardiac fast sodium current will first require the careful collection of a large number of negative results (chapter 6).
4. Reconstructions of heart-surface potentials from body-surface recordings are improved using simulations of propagating action potentials, but adding more detail does not lead to better results (chapter 7).
5. Normal cardiac function cannot be understood without considering the complex interplay of innumerable components; in many cases, this will require numerical simulation.
6. The big breakthroughs in the treatment and understanding of arrhythmias will not be the identification of novel drug targets or single genes.
7. Interdisciplinary science is becoming the norm and not the exception. Administrative and organizational aspects of universities, funding bodies, and educational institutions should be updated to reflect this.
8. *Myokit* has helped to disseminate research done at Maastricht University to a wider community and has increased the university's world-wide visibility.
9. Faced with sudden unexplained death syndrome, only a scientist would worry about "sudden" and "unexplained".
10. Some ideas might work immediately and produce brilliant results, but never be afraid to try out new things or share negative results. People will appreciate it!