Handbook of Research on ICTs for Healthcare and Social Services: POMP Chapter Proposal

Michiel Meulendijk, MSc. (m.meulendijk@cs.uu.nl), Dr. Marco Spruit (spruit@cs.uu.nl)
Department of Information and Computing Science, Utrecht University, the Netherlands

In the Netherlands, seventeen percent of the chronically ill use more than five different drugs permanently; half of these patients are over seventy years of age (Stichting Farmaceutische Kengetallen, 2005). Although this polypharmacy is often unavoidable, it significantly increases their chances of hospitalization. Problems often associated with polypharmacy are, among others, an increasing risk of adverse effects, under-prescribing, decreased adherence to daily doses, and increased appropriate medication usage (Björkman, Fastbom, Schmidt, & Bernsten, 2002; Claxton, Cramer, & Pierce, 2001; Frazier, 2005; Kuyuma, Endo, & Umegaki, 2000; Shi, Mörike, & Klotz, 2008; Sloane, et al., 2004; Steinman, Landefeld, Rosenthal, Berthenthal, Sen, & Kaboli, 2006; Wright, et al., 2009).

Recognizing these problems, the Prescribing Optimization Method (POM) was devised, a six-step routine through which General Practitioners can optimize the prescriptions of patients experiencing polypharmacy. During tests usage of this method significantly increased the relevance of their prescriptions (Drenth-van Maanen, van Marum, Knol, Van der Linden, & Jansen, 2009).

Currently, we are researching the development of a POM Platform (POMP) in our vision of optimizing and capitalizing the POM through the use of information and communication technology. Through the decision-supportive platform, GP's would be advised on how to prescribe in patient-specific cases; advice would be based on proven clinical interactions between drugs, compatibility of medicine with patients' other diseases, and best practices extracted through knowledge management.

A feasibility study is presently being performed in order to gain insight into the obstacles that may delay the implementation of the POMP at a later stage. The approach through which these issues were identified will be described in the proposed chapter, with the POMP itself acting as a running example throughout the text. Through this approach the following research question will be explored: **"How can the feasibility of a decision-supportive knowledge platform in the care domain best be investigated?"** Issues reviewed will include:

- *Necessity and societal relevance of a POM platform;* a wide variety of solutions is being investigated in order to ensure the vitality and prolonged well-being of elderly people. Many of those cope with numerous development and implementation problems. How exactly a prescription enhancement method would benefit societal goals will be discussed, especially regarding the technological approach pursued in the POMP.
- *GP's user preferences;* ICT systems that only focus on functional requirements and do not cater to the specific preferences of their intended users are prone to fall into disuse. In the POMP project's feasibility study, this issue was attended by surveying potential users about their wishes and expectations regarding such a system. In the chapter this approach and the implications this had will be elaborated upon. Mapping these issues will be approached through usability engineering techniques, including UML diagramming.
- *GP's technology acceptance;* user preferences are closely related to the issue of technology acceptance; even if general practitioners' ideas are accommodated, a disbelief in systems' usefulness or their ease-of-use may keep potential users from actually including it in their routine. In the POMP project, this issue was investigated both through the survey mentioned earlier and by interviewing GP's. The chapter will thus elaborate on how acceptance theories (such as the Technology Acceptance Model (Davis, 1989)) can be applied to practical projects.
- *Integration from an organizational point of view;* to coordinate a project within the care domain, collaboration of many actors in the chain is required. As has been visualized in Figure 1, the POMP's

dependencies include both the involvement of general practitioners (and the willingness of their patients) and the producers of their information systems. In the chapter, the mapping of these dependencies, and their implications, will be described, under more through software-ecosystem and ArchiMate modeling (Abdat, Spruit, & Bos, 2010; Lankhorst, 2004).

- ***Integration from a technical point of view;*** projects involving multiple actors in a chain can be technically challenging, since communication interfaces between these often do not exist at all, or to an insufficient degree. Simultaneously, in the care sector such communication interfaces are part of a lively political and societal debate. In the chapter these issues, and the specific way they will be dealt with in the POMP project, will be addressed.
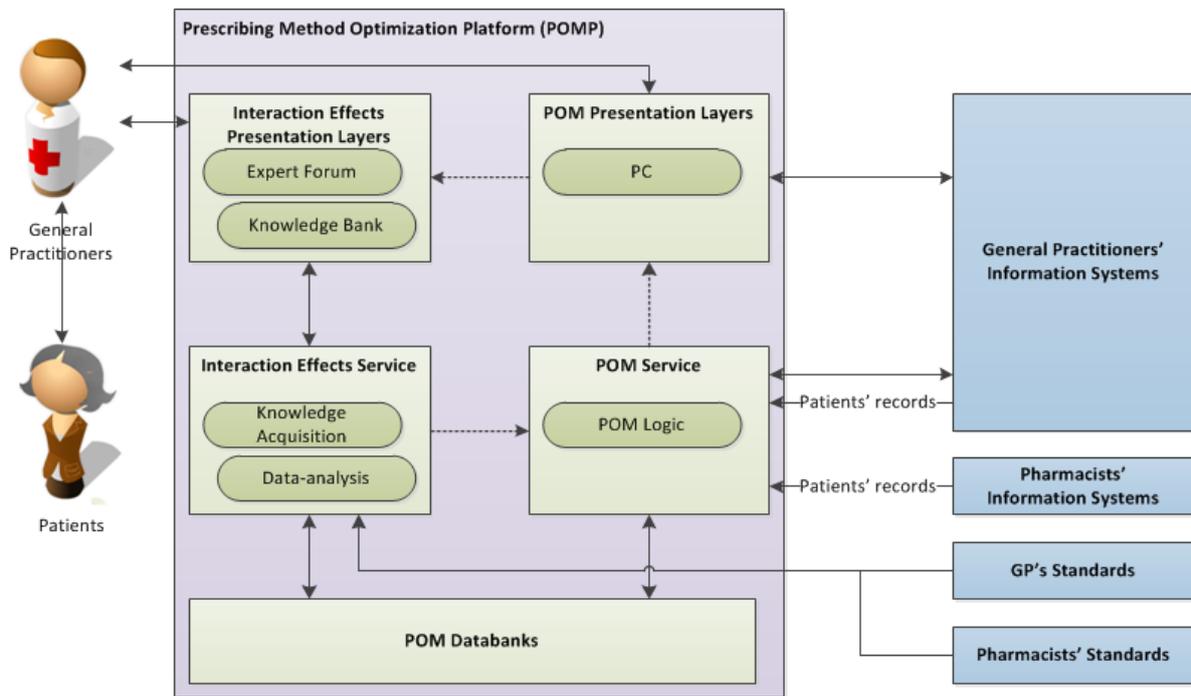

Figure 1: Simplified model of the Prescribing Optimization Method Platform (POMP).

Bibliography

1. Abdat, N., Spruit, M., & Bos, M. (2010). Software as a Service and the Pricing Strategy for Vendors. In T. Strader, *Digital Product Management, Technology and Practice: Interdisciplinary Perspectives* (pp. 154-192). IGI Global.
2. Björkman, I., Fastbom, J., Schmidt, I., & Bernsten, C. (2002). Drug-drug interactions in the elderly. *The Annals of Pharmacotherapy , 36* (11), 1675-81.
3. Claxton, A., Cramer, J., & Pierce, C. (2001). A systematic review of the association between dose regimens and medication adherence. *Clinical Therapeutics , 23* (8), 1296-310.
4. Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly , 13* (3), 319-340.
5. Drenth-van Maanen, A. C., van Marum, R. J., Knol, W., Van der Linden, C. M., & Jansen, P. A. (2009). Prescribing Optimization Method for Improving Prescribing in Elderly Patients Receiving Polypharmacy. *Drugs & Aging , 26* (8), 1-15.
6. Frazier, S. C. (2005). Health outcomes and polypharmacy in elderly individuals; an integrated literature review. *Journal of Gerontological Nursing , 31* (9), 4-11.
7. Kuyuma, M., Endo, H., & Umegaki, H. (2000). Factors influencing nonadherence with medication regimens in the elderly. *Nippon Ronen Igakkai Zasshi , 37*, 363-70.
8. Lankhorst, M. (2004). *ArchiMate Language Primer: Introduction to the ArchiMate Language for Enterprise Architecture.* Enschede: Telematica Instituut.
9. Shi, S., Mörike, K., & Klotz, U. (2008). The clinical implications of ageing for rational drug therapy. *European Journal of Clinical Pharmacology , 64* (2), 183-99.
10. Sloane, P., Gruber-Baldini, A., Zimmerman, S., Roth, M., Watson, L., Boustani, M., et al. (2004). Medication Undertreatment in Assisted Living Settings. *Archives of Internal Medicine , 164* (18), 2031-2037.
11. Steinman, M., Landefeld, C., Rosenthal, G., Berthenthal, D., Sen, S., & Kaboli, P. (2006). Polypharmacy and prescribing quality in older people. *Journal of the American Geriatrics Society , 54* (10), 1516-23.
12. Stichting Farmaceutische Kengetallen. (2005). Polyfarmacie. *Pharmaceutisch Weekblad , 140* (32).
13. Wright, R., Sloane, R., Pieper, C., Ruby-Scelsi, C., Twersky, J., Schmader, K., et al. (2009). Underuse of Indicated Medications Among Physically Frail Older US Veterans at the Time of Hospital Discharge: Results of a Cross-Sectional Analysis of Data From the Geriatric Evaluation and Management Drug Study. *The American Journal of Geriatric Pharmacotherapy , 7* (5), 271-280.