

Etiënne Rouwette

System dynamics modeling on health care: supply and demand of dementia care

January 19, 2006

Radboud University Nijmegen





System dynamics and dementia care

Topics

1. System dynamics in health care
2. Stakeholder participation in modeling
3. Modeling dementia care
4. Future steps



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System dynamics in health care

Selected applications

- Epidemics (Kreutzer 1987; Roberts, 1989; Dangerfield 2001)
- National health care systems (Kim 1990; Ratanawijitrasin 1993; Hirsch et al. 2004)
- Hospital care (Au 1972; Baugh 1994), community care for chronic illness (Homer et al. 2004)
- Capacity planning (Wolstenholme 2005)
- Staff training (Jones 1978; Winch and Derrick 2006)

Applications in the Netherlands

- National health care costs (Verburgh 1994)
- Referral rates (Vennix et al. 1988; Vennix et al. 1990; Post and Vennix 1992)
- Dental health (Bronkhorst 1990)
- Capacity planning (Van der Sanden et al 2004)

Special Interest Group of System Dynamics Society

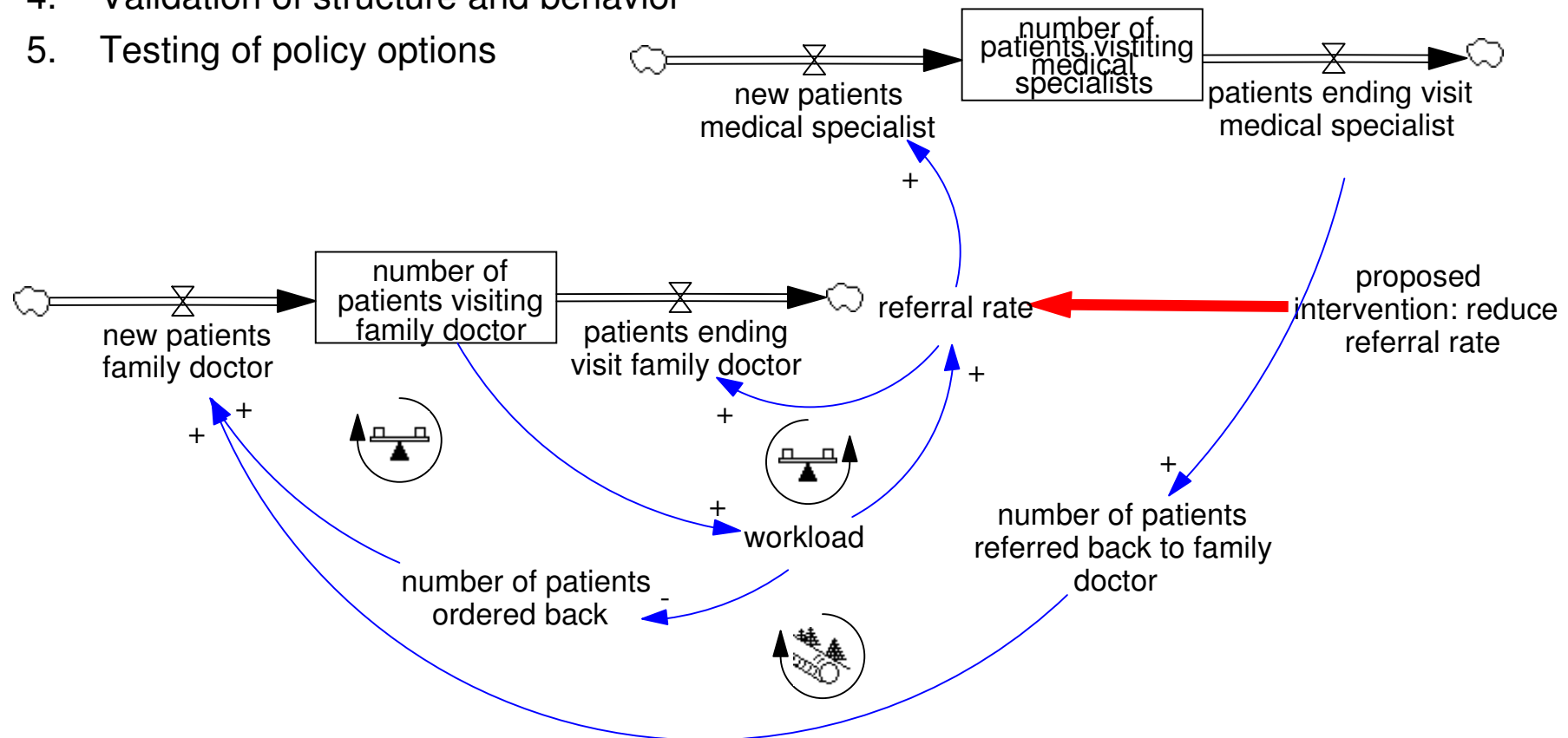
Discussion meeting with health care practitioners at 2005 and 2006 conference



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Stakeholder participation in modeling

1. Formation of management team
2. Analysis of trends in performance measures
3. Formulation of high-level map and population with data
4. Validation of structure and behavior
5. Testing of policy options





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Case dementia care - background

Care offices want to increase their insight into long term developments in AWBZ (long-term and intensive) care

“Will newly constructed nursing homes be left vacant in the future?”

Increase insight into supply and demand of dementia care in nursing homes in the region Kennemerland



achmea



Radboud Universiteit Nijmegen





1. Formation of management team

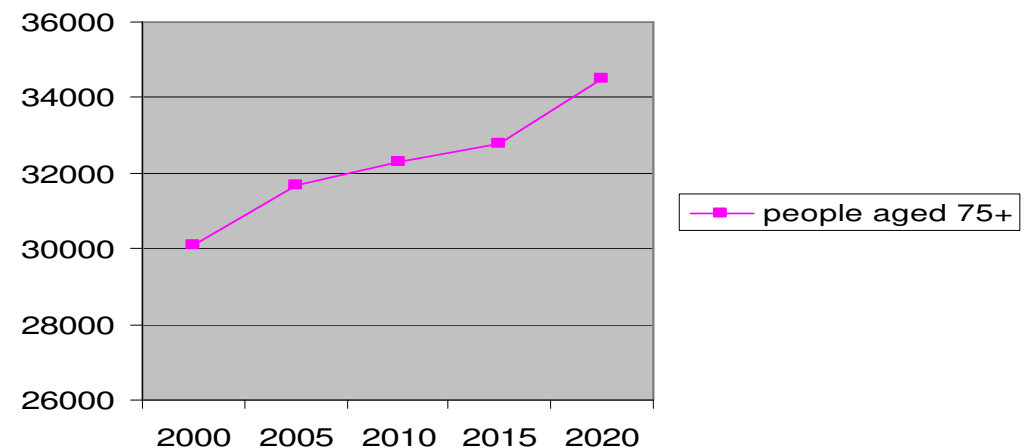
- Nine participants from care offices, insurance organisation, infrastructure, Regional Assessment Board (RIO/ CIZ), health care training, nursing homes, research and consultancy
- Interviews, literature study, databases (e.g. CBS, ZOÏS), conference on assessment
- Workshop Oct 25, 2004 and workbook
- Presentation results March 21, 2005



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2. Trends in performance measures ('symptom')

- Number of people aged 75+ expected to increase in region Kennemerland



- New infrastructure built recently





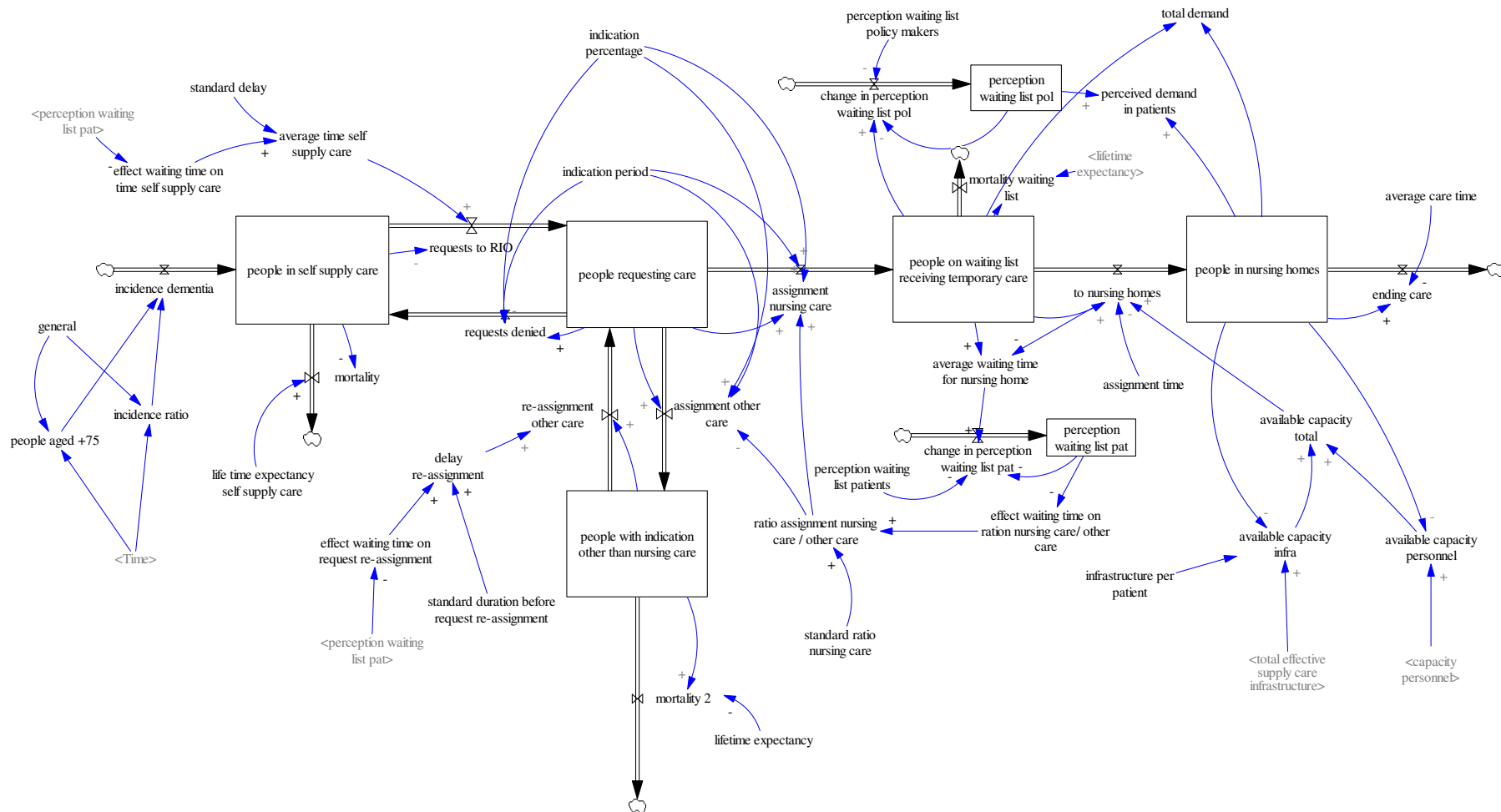
3. High-level map and data

- Three submodels: patient flow, personnel flow, infrastructure
- Most parameters estimated on the basis of literature and databases and checked with participant group



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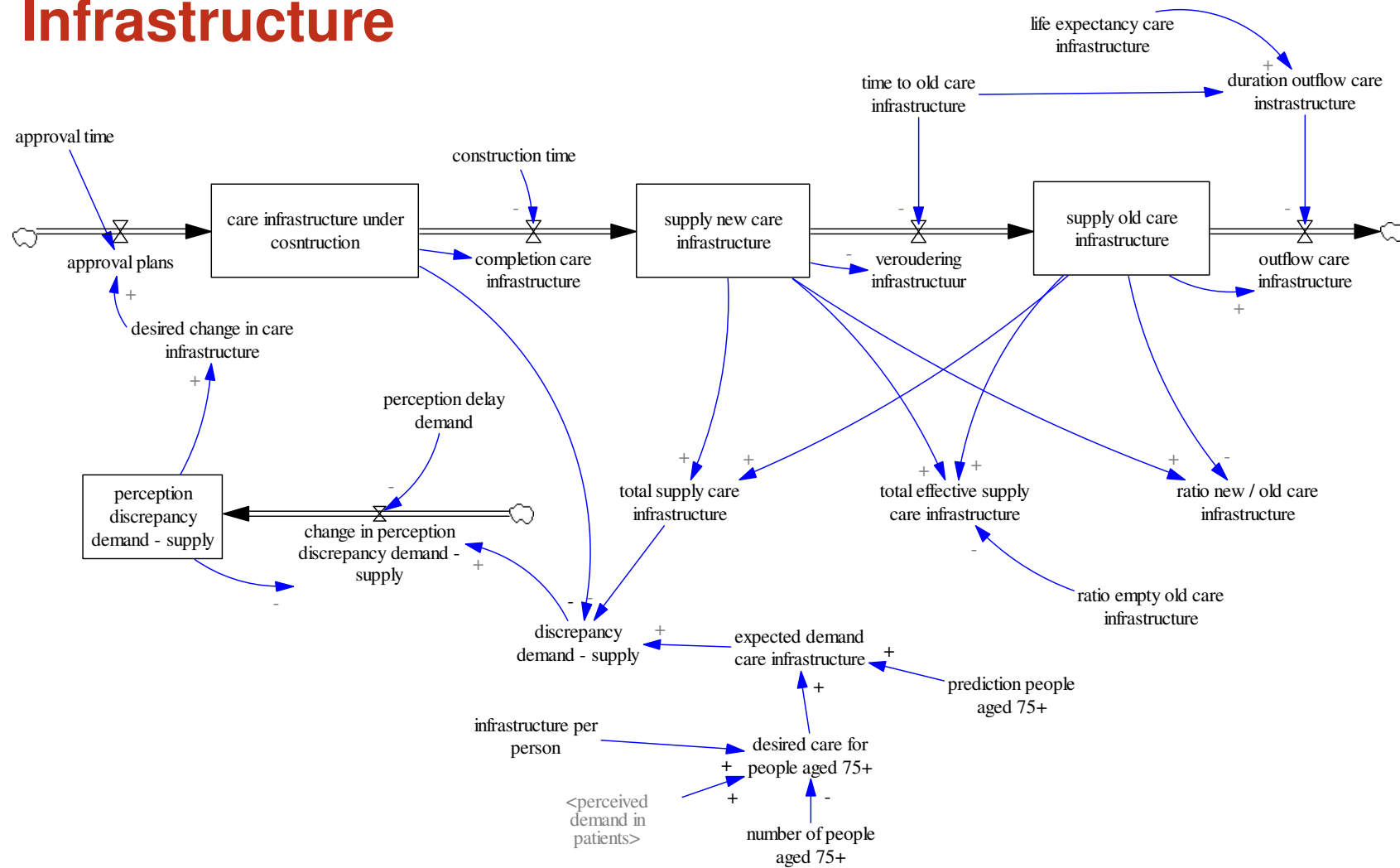
Patient flow





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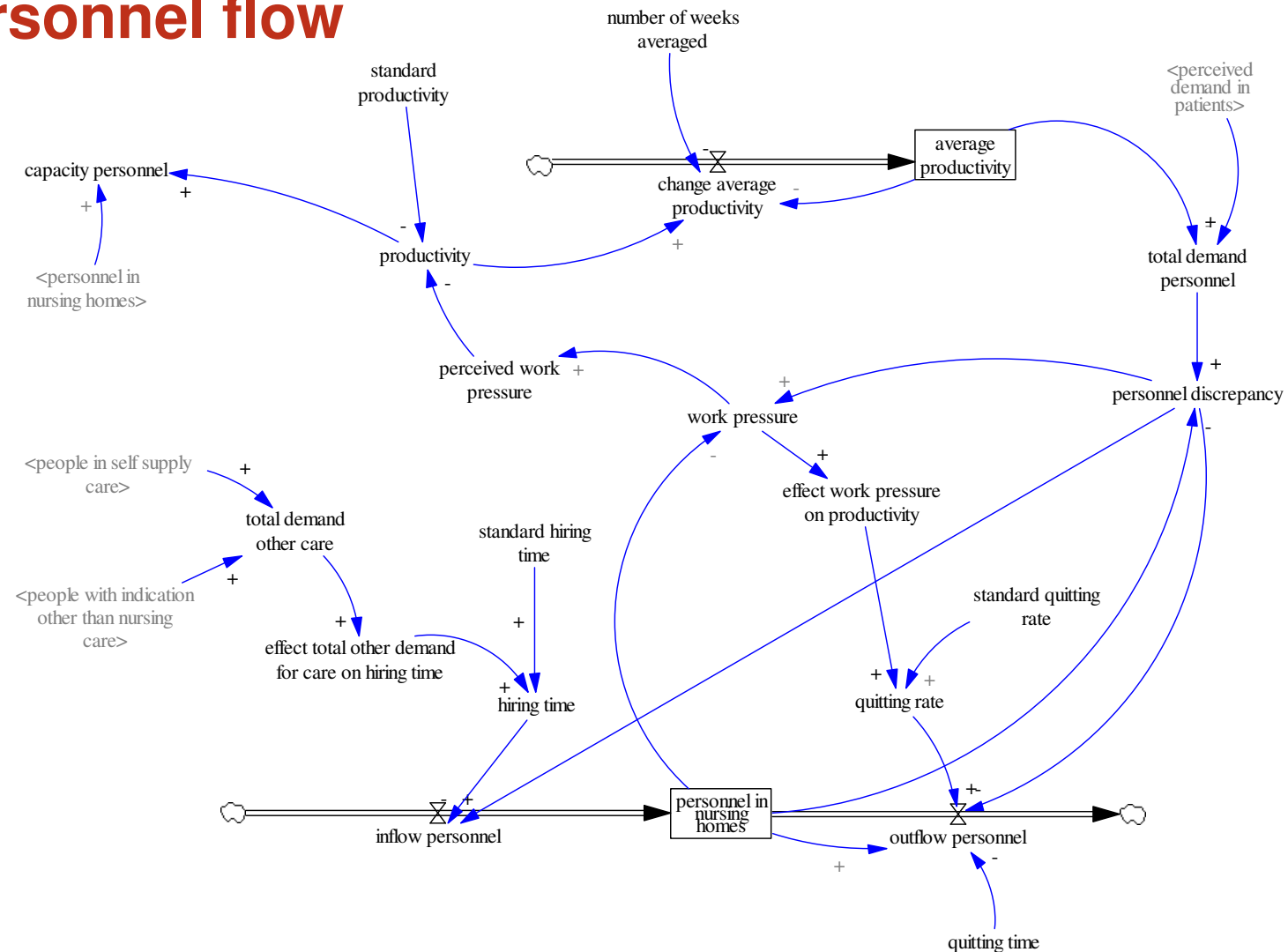
Infrastructure





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Personnel flow





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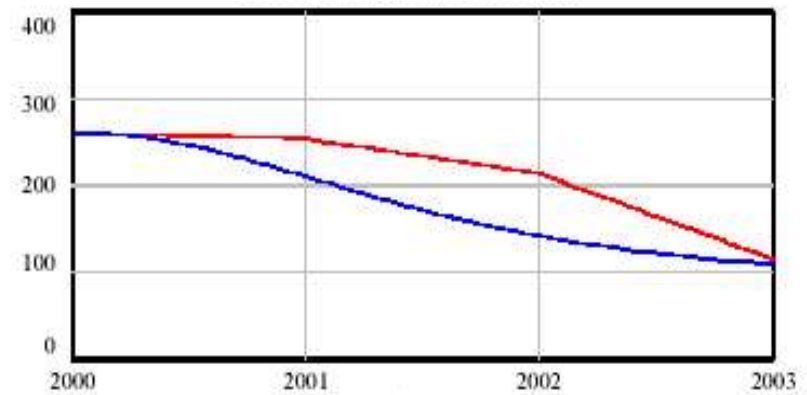
4. Validation of structure and behavior ('diagnosis')

Structure and parameters checked against data

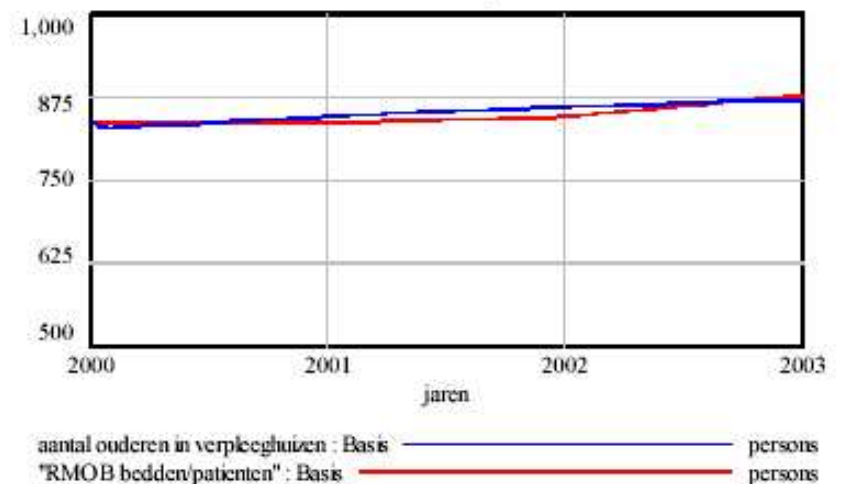
Baseline behavior close to reference mode and checked with participants

Inconsistency in data

Waiting list



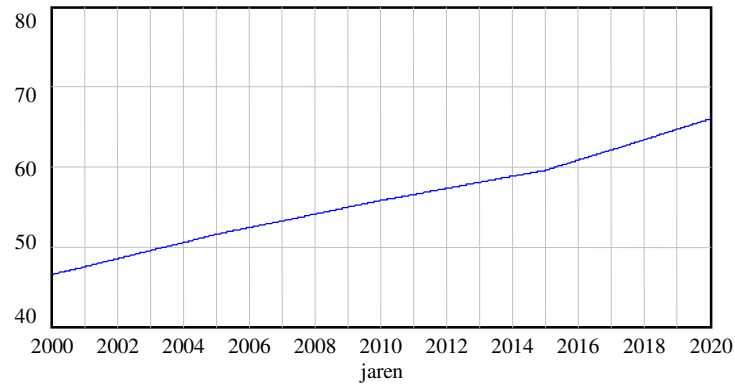
Patients in nursing homes





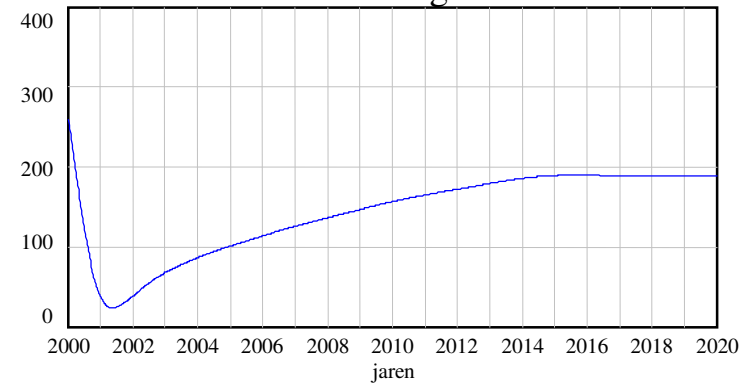
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Incidence dementia



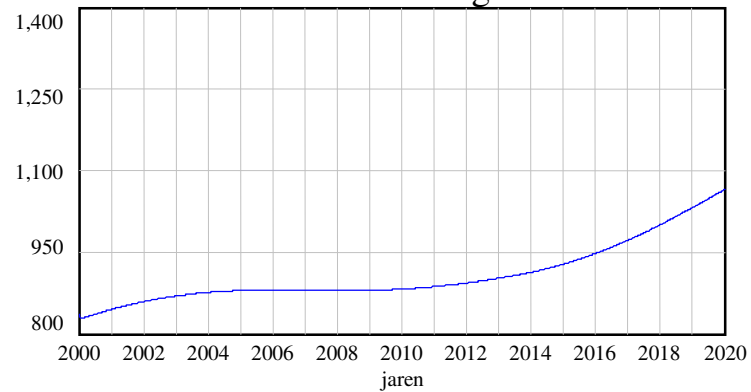
Incidentie dementie : Basis — person/Week

Waiting list



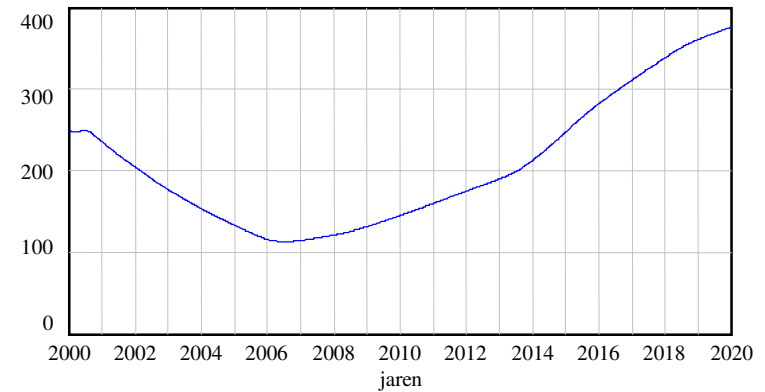
aantal ouderen op wachtlijst en overbruggingszorg : Basis — persons

Patients in nursing homes



aantal ouderen in verpleeghuizen : Basis — persons

Infrastructure under construction



zorginfrastructuur in aanbouw : Basis — bed

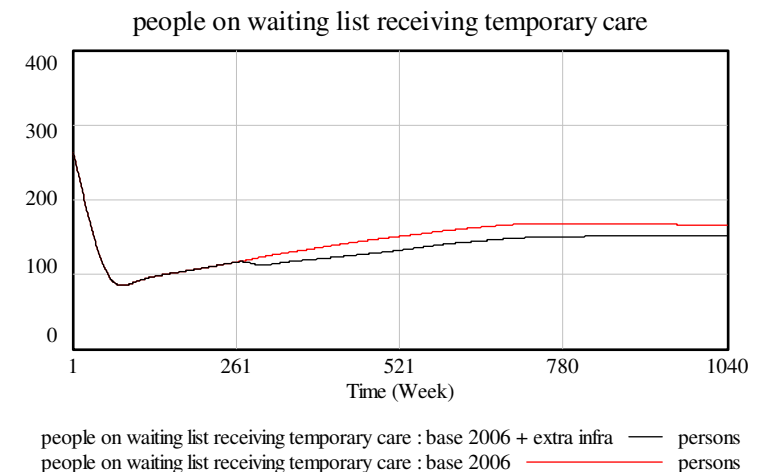


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5. Testing of policy options

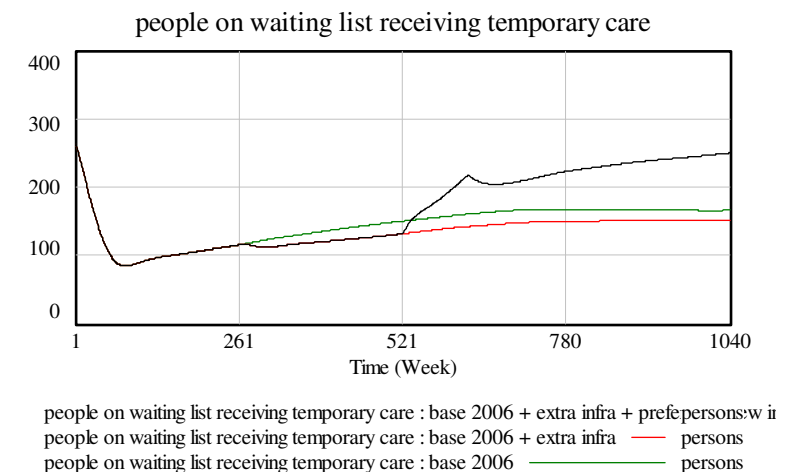
Option: Extra infrastructure (about 33% in 2005)

- People in nursing homes increases, waiting list decreases
- Increase people in nursing homes > decrease waiting list
- Shorter waiting time **increases** demand



Option and scenario: Extra infrastructure + preference for new infrastructure (about 30% old infra empty in 2012)

- Reverse effect: People in nursing homes decreases, waiting list increases
- Longer waiting time **decreases** demand





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Conclusion - Will newly constructed nursing homes be left vacant in the future? ('treatment')

The model replicates historical data

The model provides insights into the system and enables scenario analysis

None of the scenarios shows long term vacancy

Negative feedback effect through waiting list compensates for increase in supply

Recommendation to Achmea is not to change policy of constructing new nursing homes



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"I've got it, too, Omar ... a strange feeling like we've just been going in circles."



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Future steps

System dynamics conference July 23 – 27, 2006 Nijmegen

See www.systemdynamics.org

Have started to develop a preliminary model of changes in
Dutch health care system

Discussion with international group of health care experts and
policy makers at conference