

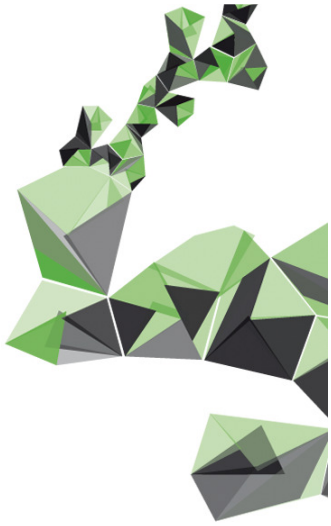
# Capacity Planning in Health Care: a case study

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**UNIVERSITY OF TWENTE.**

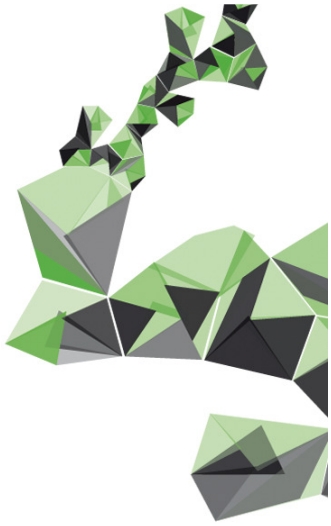


## Outline

- Problem outline: customer case
- Capacity planning including Yearly Workforce Production Plan (Dutch: Jaarurensystematiek)
- Modeling

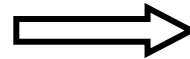
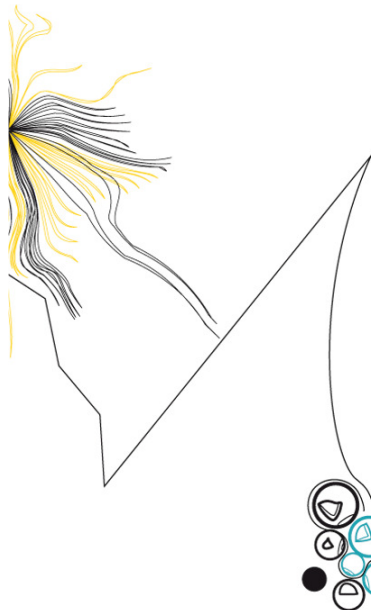
NB: *work in progress*





## Customer motivation

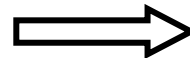
- Care provider for the physically disabled
- Pre 2009: payment based on capacity (# clients that can be housed)
- Since January 1<sup>st</sup> 2009: payment based on # housed clients and care indications



< 2009

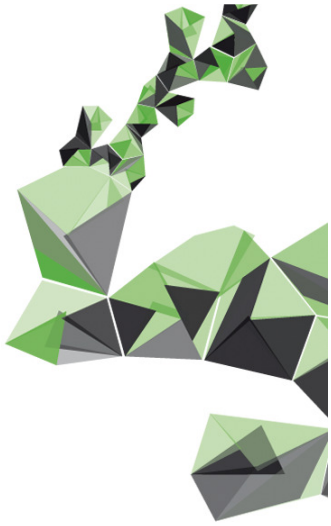


≥ 2009



→ **demand based capacity planning needed**





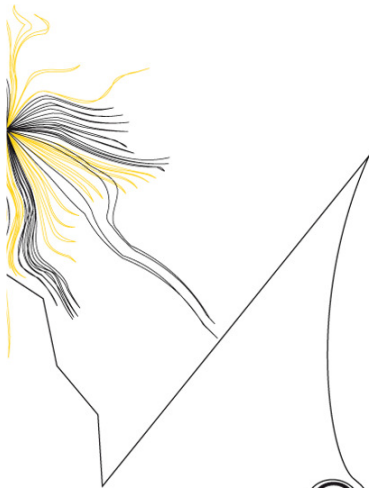
## Customer case

### Challenges:

- Is current workforce sufficient?
- Determine 'optimal' workforce

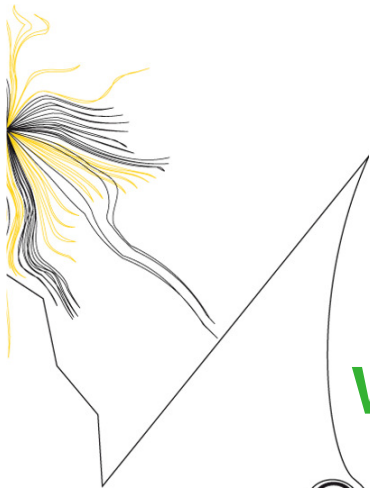
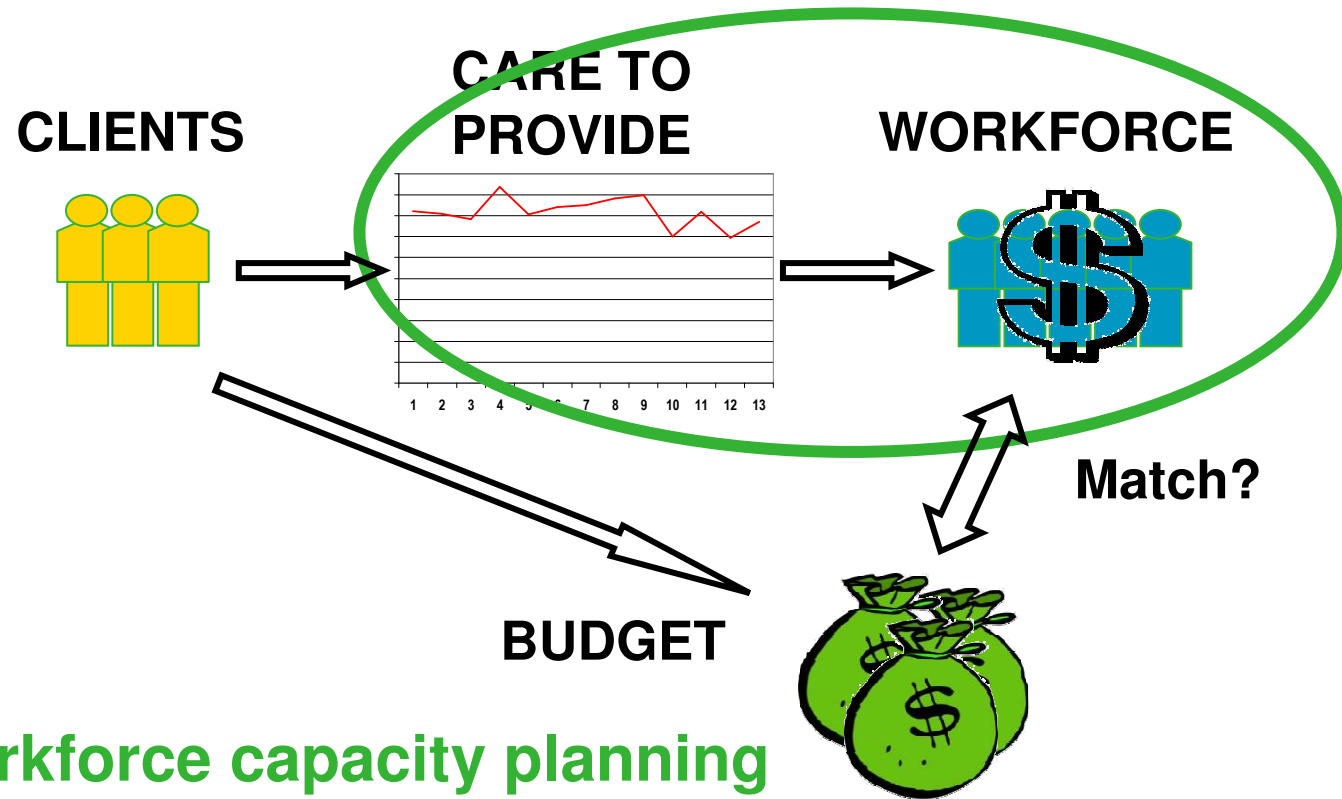
### Currently used models:

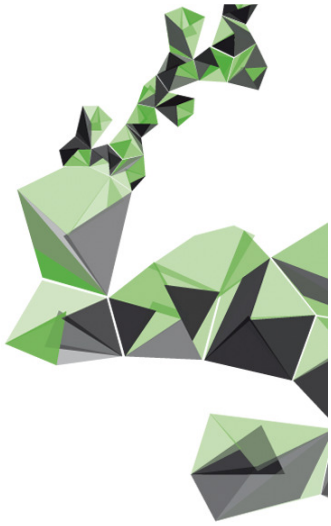
- Financial model: staffing based on *what can be paid*
  - Tells *nothing* about scheduling
  - What if it is not possible to create schedules?
- Yearly scheduling model with only aggregate figures





# Customer case: solution approach





## Workforce capacity planning

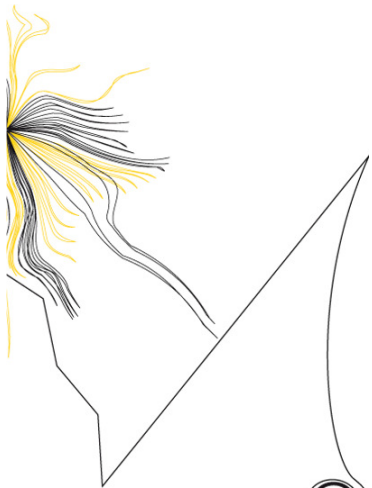
*Determine # employees needed per contract type, and how works when and how much*

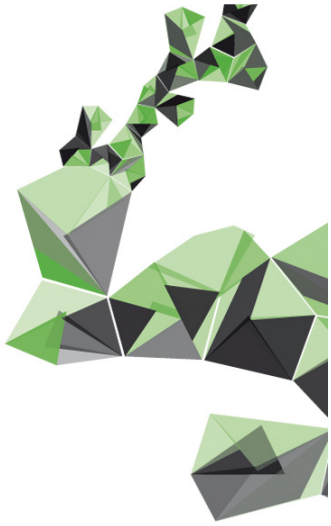
Inputs:

- Contract types: weekly hours, skill level, wages
- Account for illnesses, holidays and other unavailability
- Demands: staffing levels, skill level in specific timeslots

Use: Yearly Workforce Production Plan

NB: 'availability based' instead of 'task based' scheduling



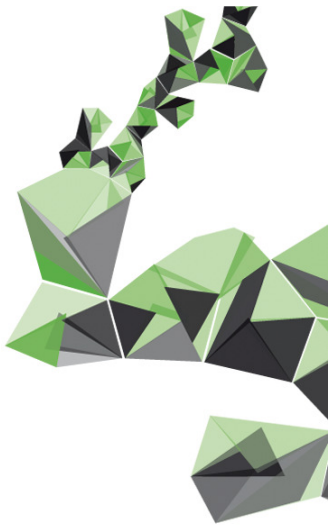


## Contract types

Contract types:

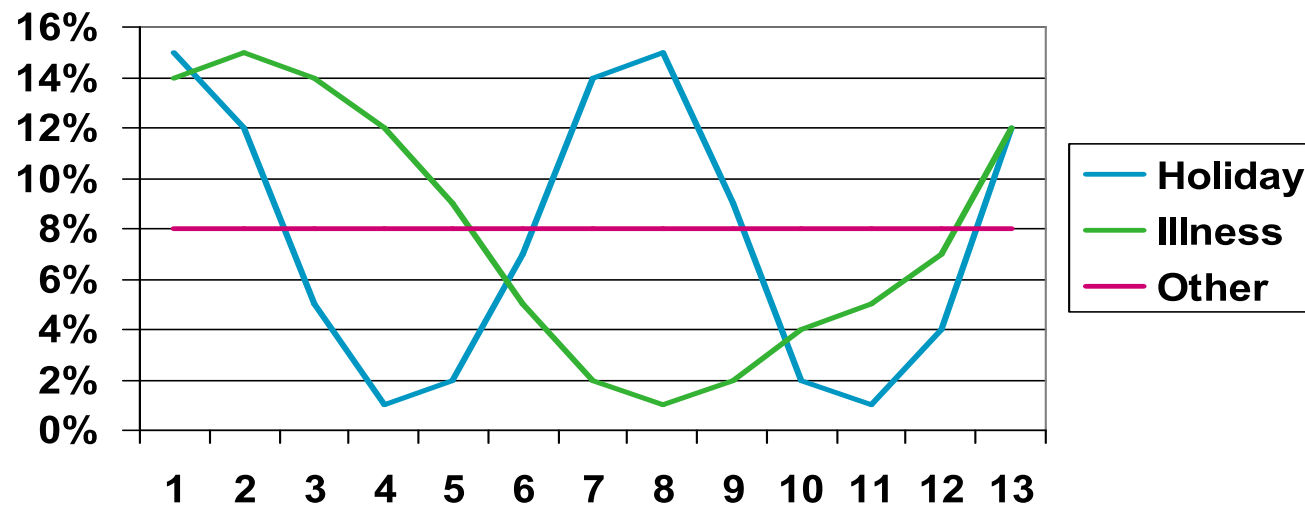
- Full time, part time
- Min-max
- 0-hours contract
- Flexpool / internal subcontractors
- Subcontractors (external)
- ...



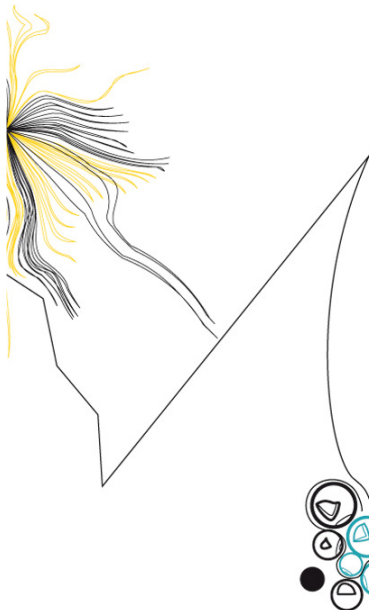


## (Un)availability

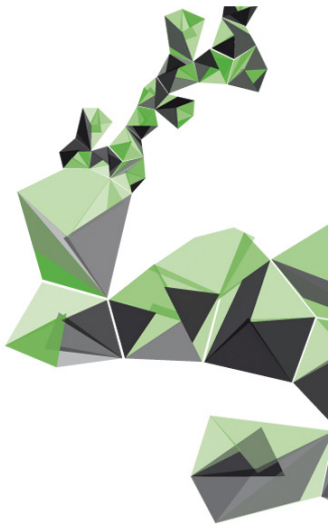
### Example



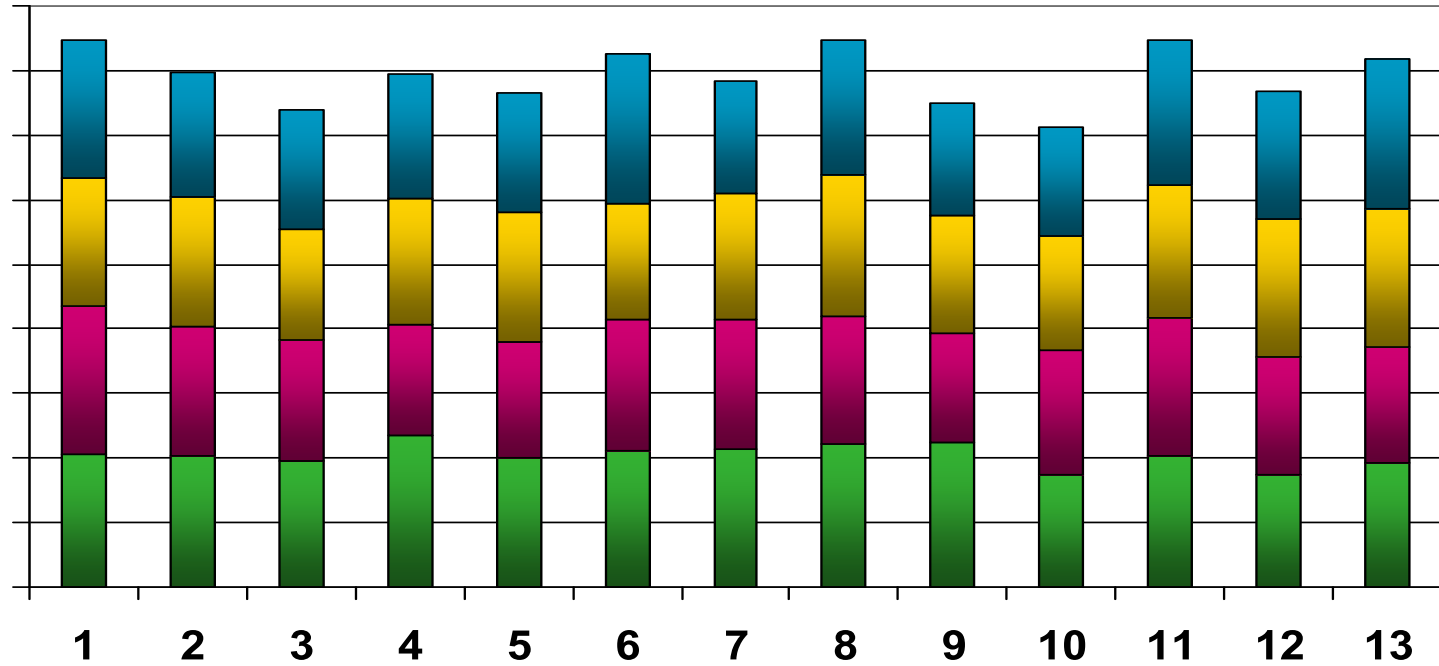
- Other is e.g. meetings, studying, scheduling time, administration, client care plans, ...





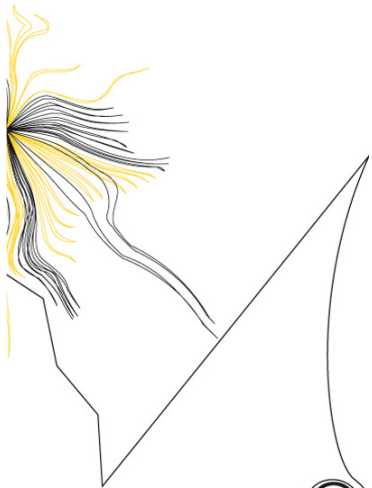


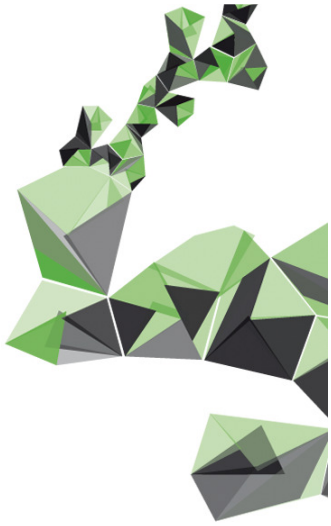
# Demand



Staffing levels:

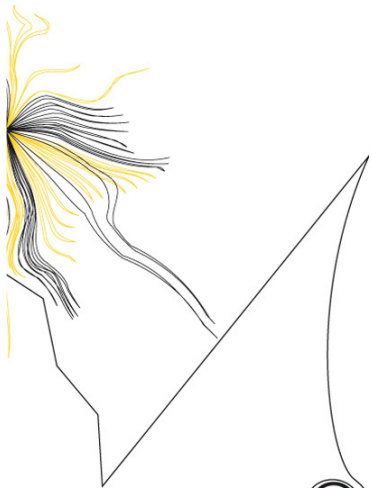
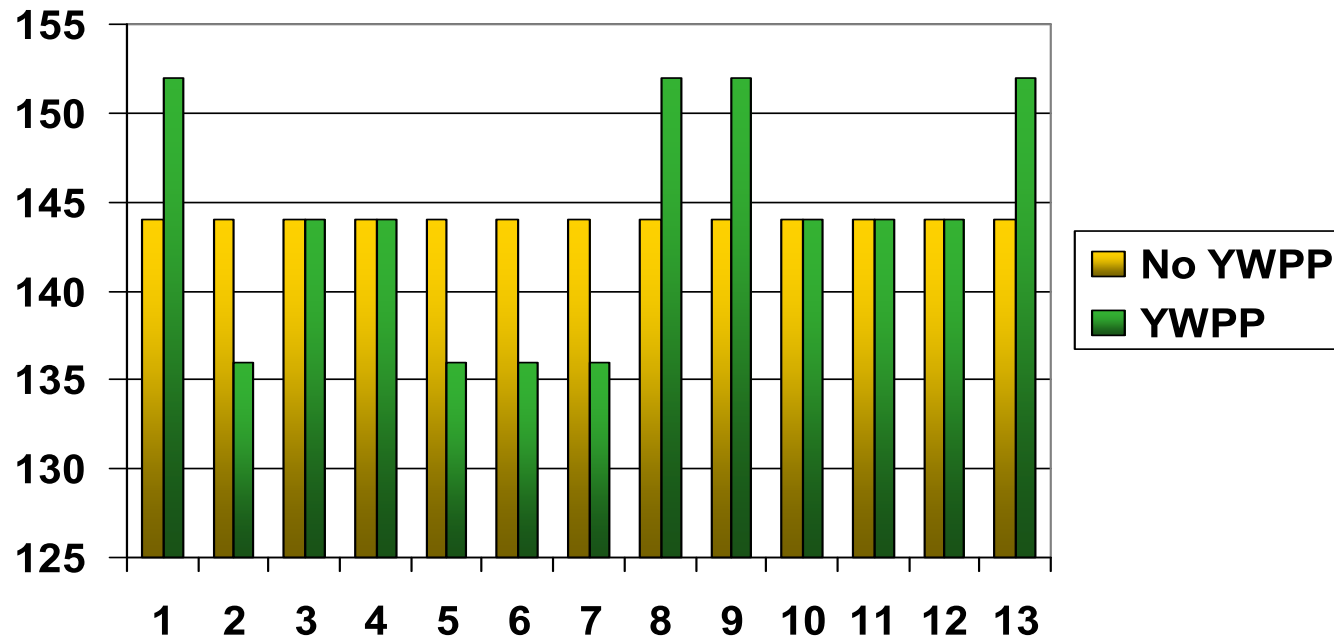
- Skill categories
- Time slots

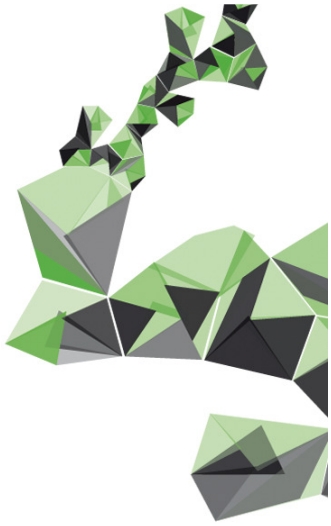




# Yearly Workforce Production Plan

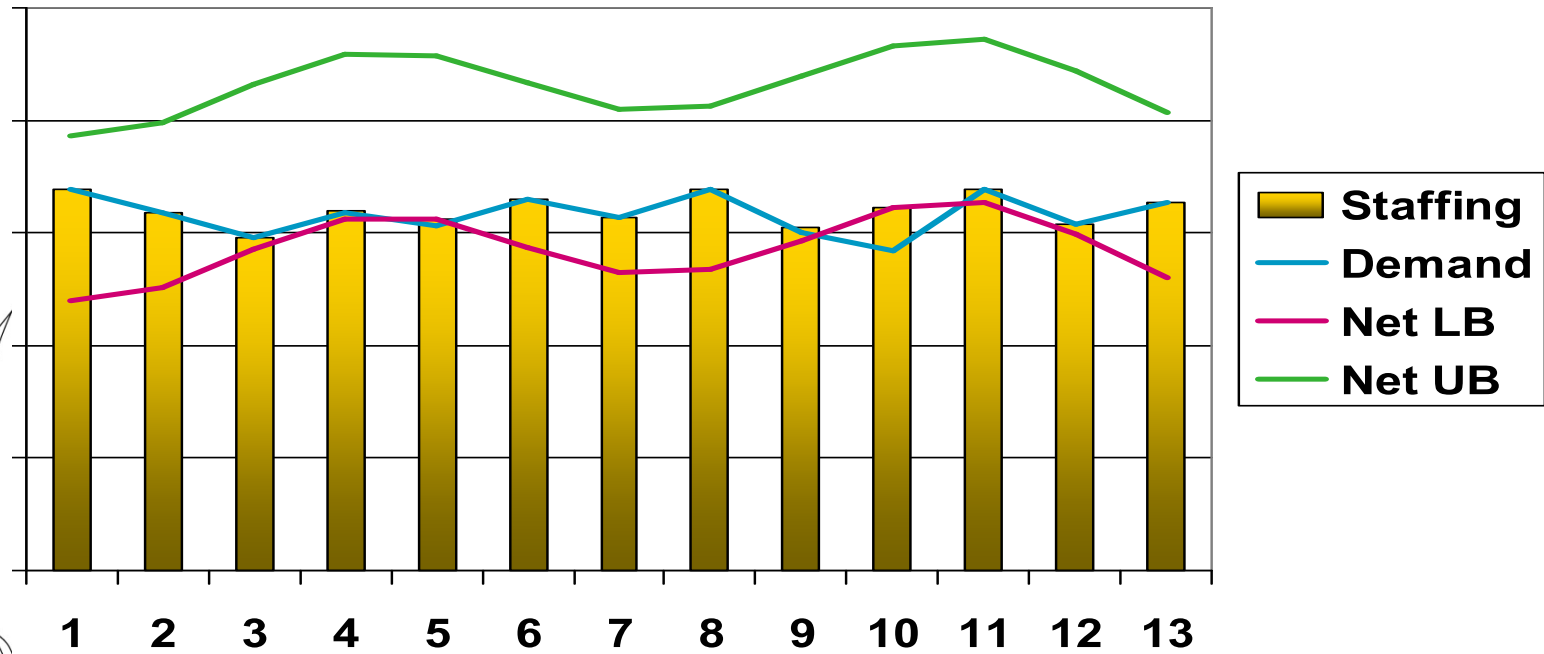
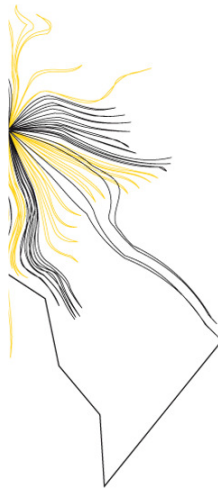
- Since January 1<sup>st</sup> 2002 in Dutch Health Care
- Labor time measured per *year* instead of per *week*
- Flexibility for employer *and* employee

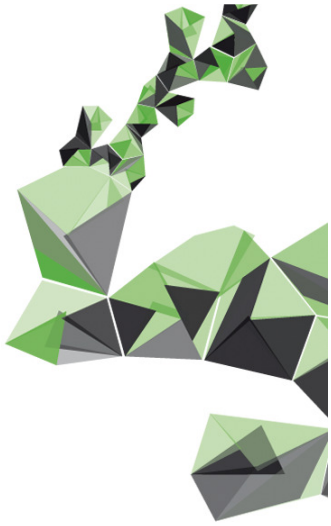




## Outputs

- Contract mix
- *Who works when, how much and 'on' which skill*

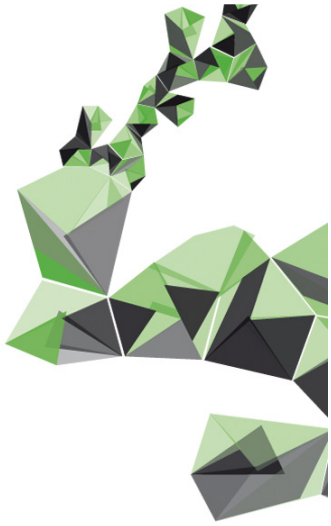




## Modeling

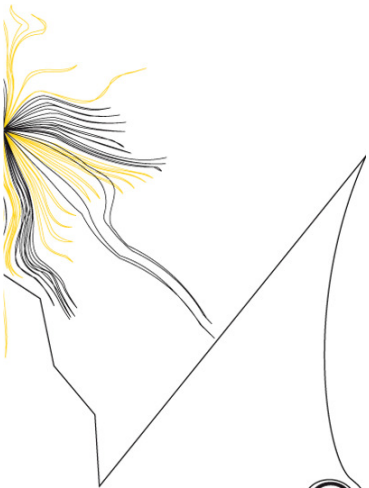
- MILP, important elements
  - Employee cost
  - Demand constraints
  - Labor time constraints (band-width)
- ...

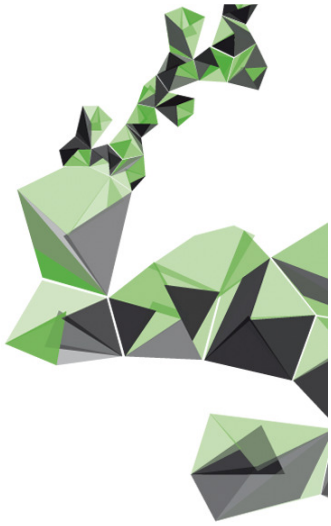




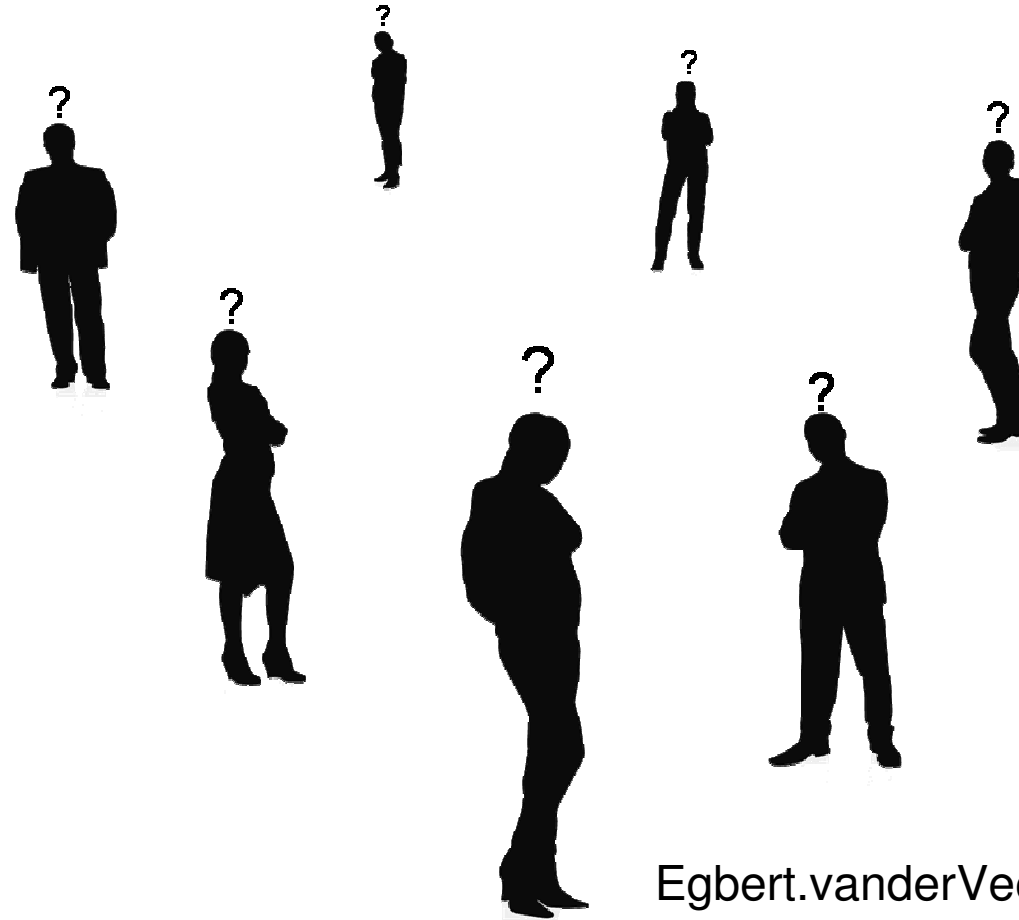
## Conclusions

- Demand based capacity planning really needed in Dutch Care-Sector
- Yearly Workforce Production Plan offers flexibility
  
- Developed model that,
  - given *staffing levels, contract types, and unavailabilities*
- determines optimal
  - *workforce and capacity allocation*





# Questions



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