



› GRIP ON BURNOUT

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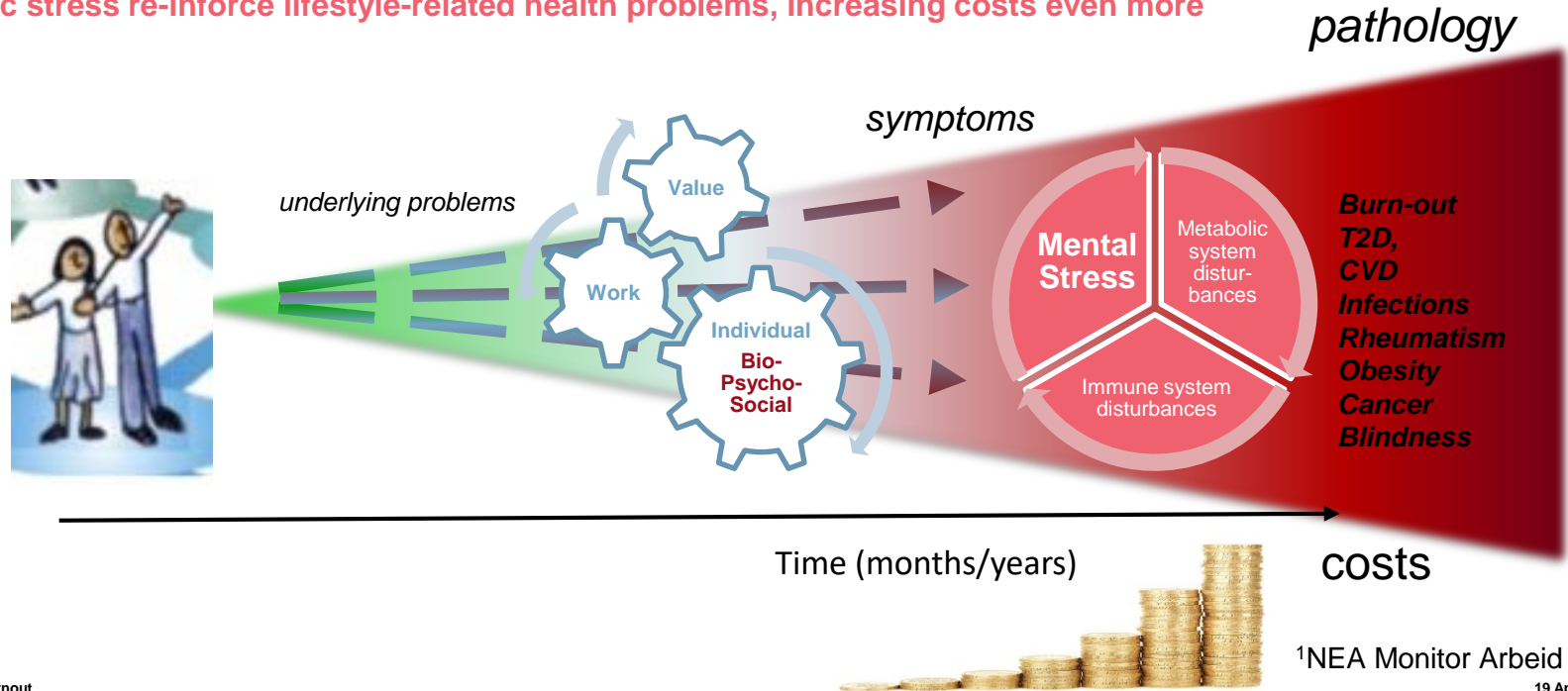
TNO innovation
for life

PROBLEM: CHRONIC LIFESTYLE-RELATED HEALTH PROBLEMS 70%

Example: Work-related Stress 1.000.000 individuals in NL

Cost Employers 1.800.000.000 EURO / year

Chronic stress re-inforce lifestyle-related health problems, increasing costs even more

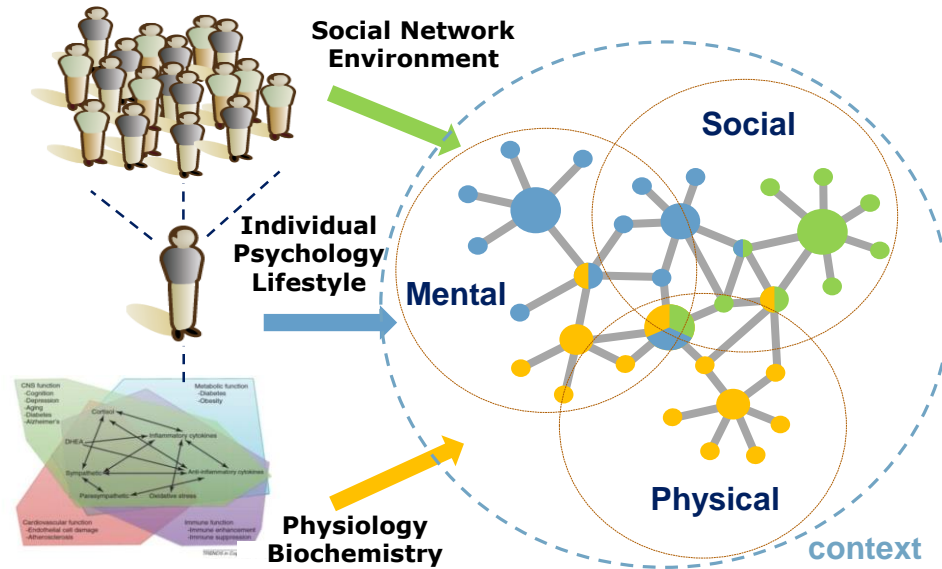


HEALTH: A COMPLEX SYSTEM

CONTINUOUSLY CHANGING OVER TIME ...



Society



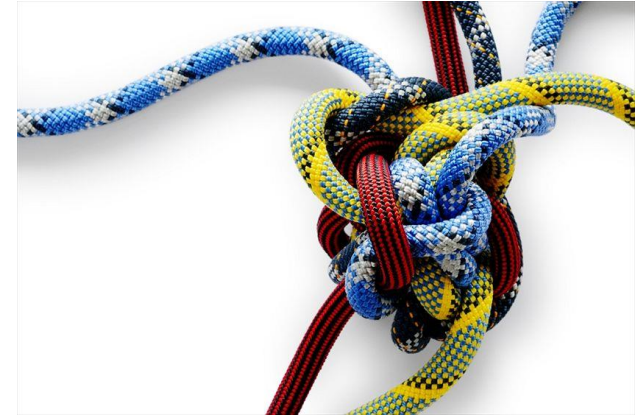
Molecule

GRIP ON VITALITY

Problem: Despite multiple prevention programs, societal & lifestyle-related health problems remain, resulting in a continuous burden on societal costs.

Vision: Health and well-being are complex systems
A complex systems approach helps us to understand and get grip on solutions *prior* to real actions to identify the best-estimated strategy for sustainable results.

Why TNO: Multi-disciplinary Knowledge & Technology
Work, Health, Sustainability, Business, Strategy, e-Health, Sensoring, Simulation, Serious Gaming & Complex Data Science



APPROACH

- › Deepen our understanding of the system structure underlying burnout
 - › **System Dynamics modelling**
- › Transfer this understanding by personalized application
 - › Workshops ('Graphs over time'), Plausible futures, Coaching
 - › **Use model to let persons experience plausible future outcomes of their current/desired behaviour.**

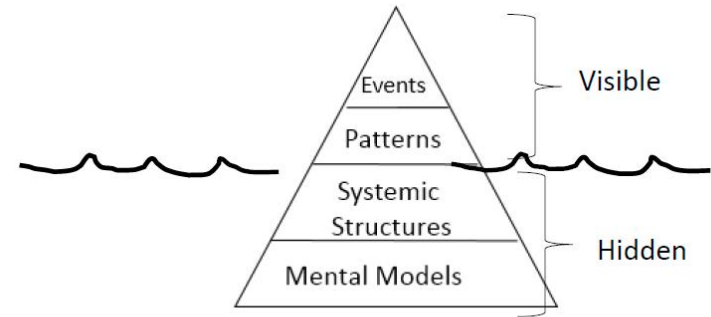
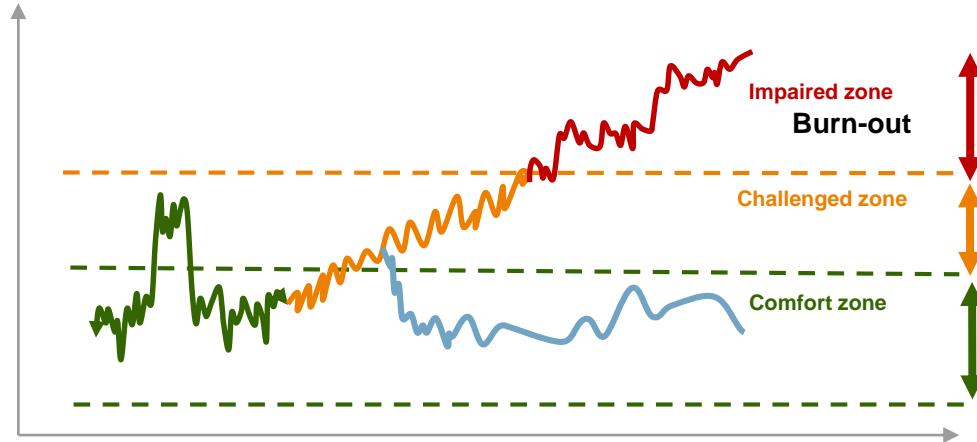
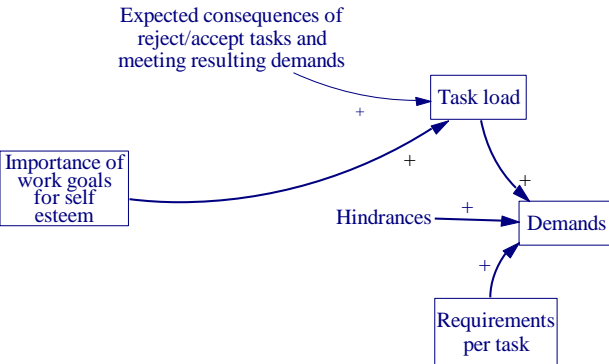
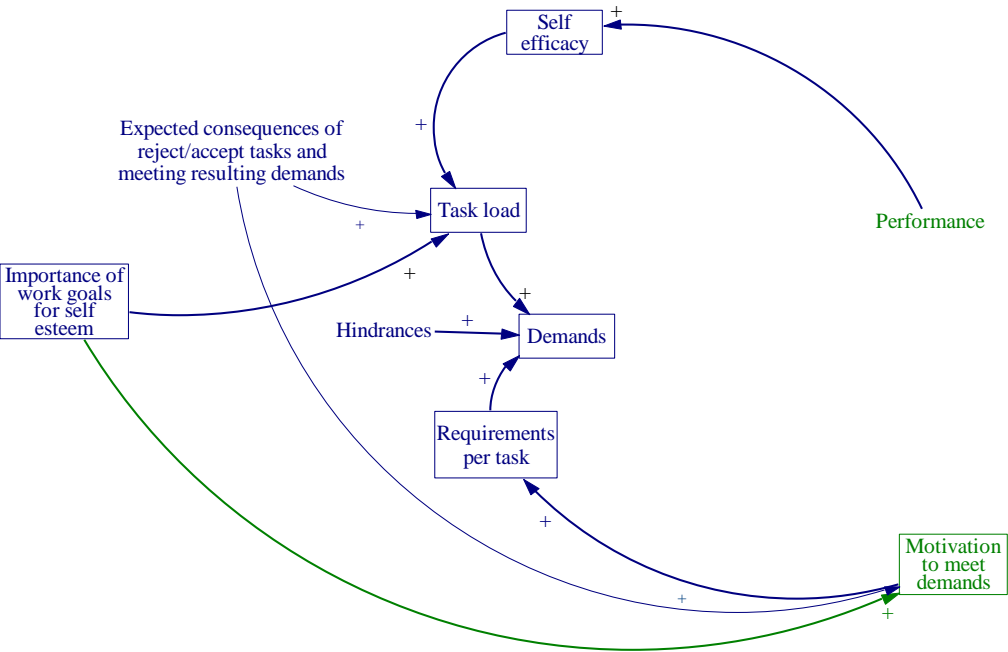


Figure 4. The Iceberg Model

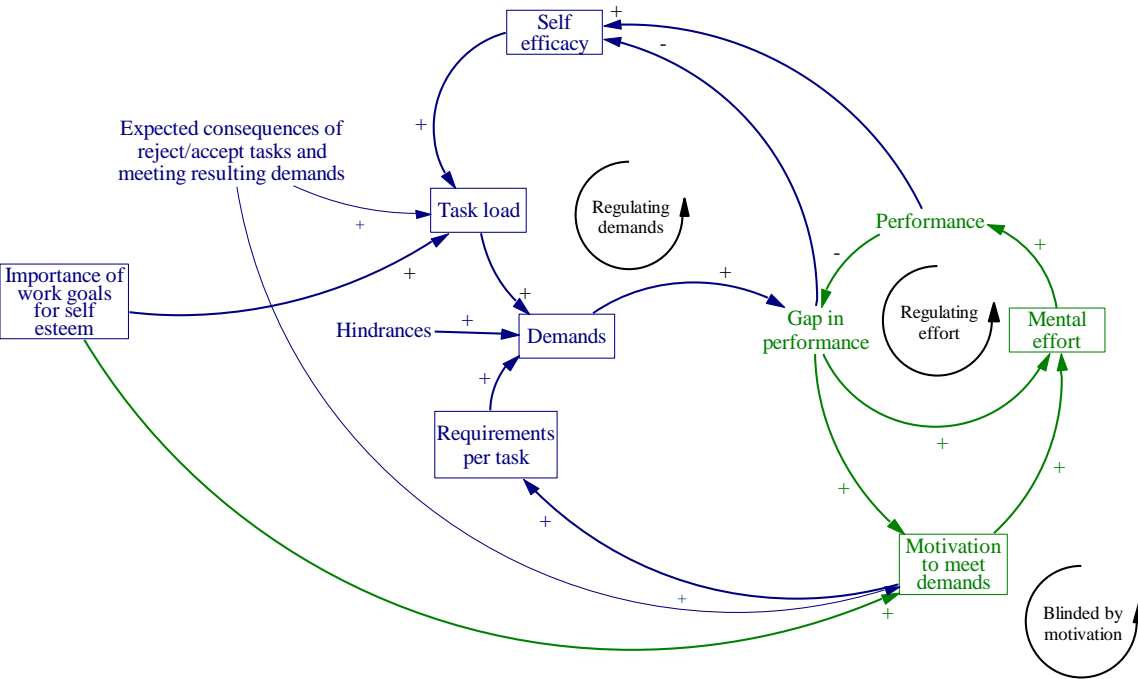
MODEL DEVELOPMENT

- › Based on literature review
 - › Extensive body of literature available
 - › However, often only describes part of the problem
 - › Cross sectional (does not describe emerges/dynamic behaviour)
- › Burnout intervention Subject matter experts

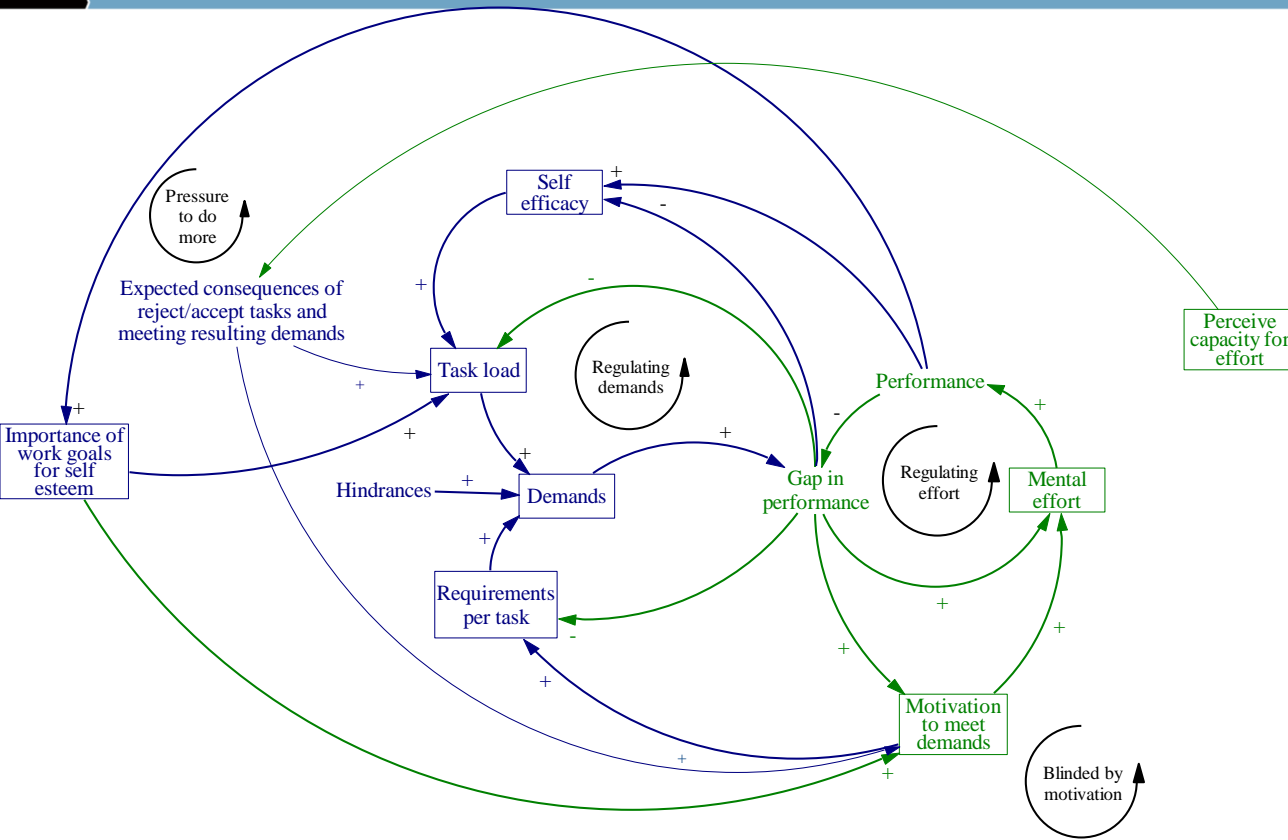


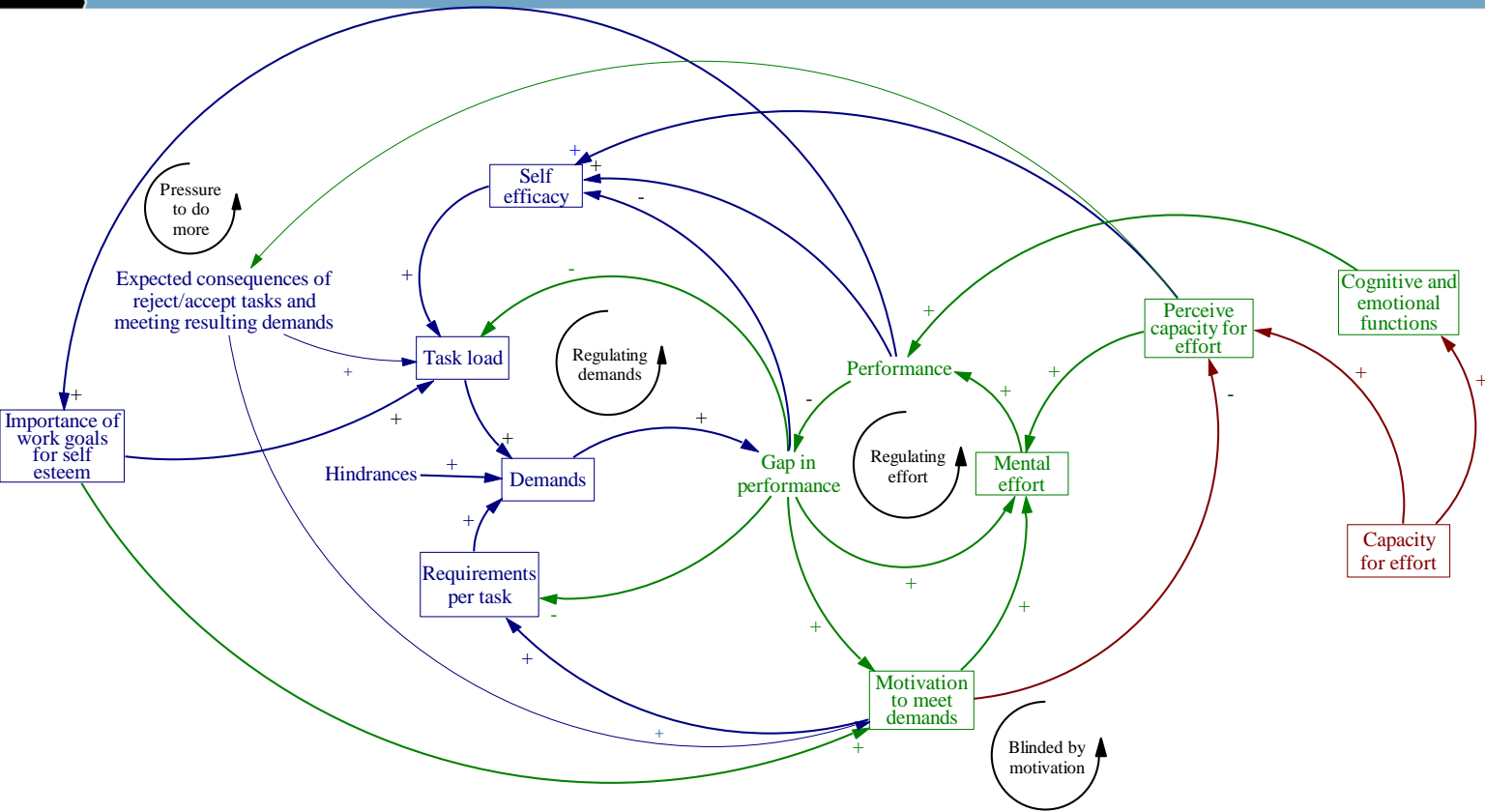


REGULATING EFFORT AND DEMAND

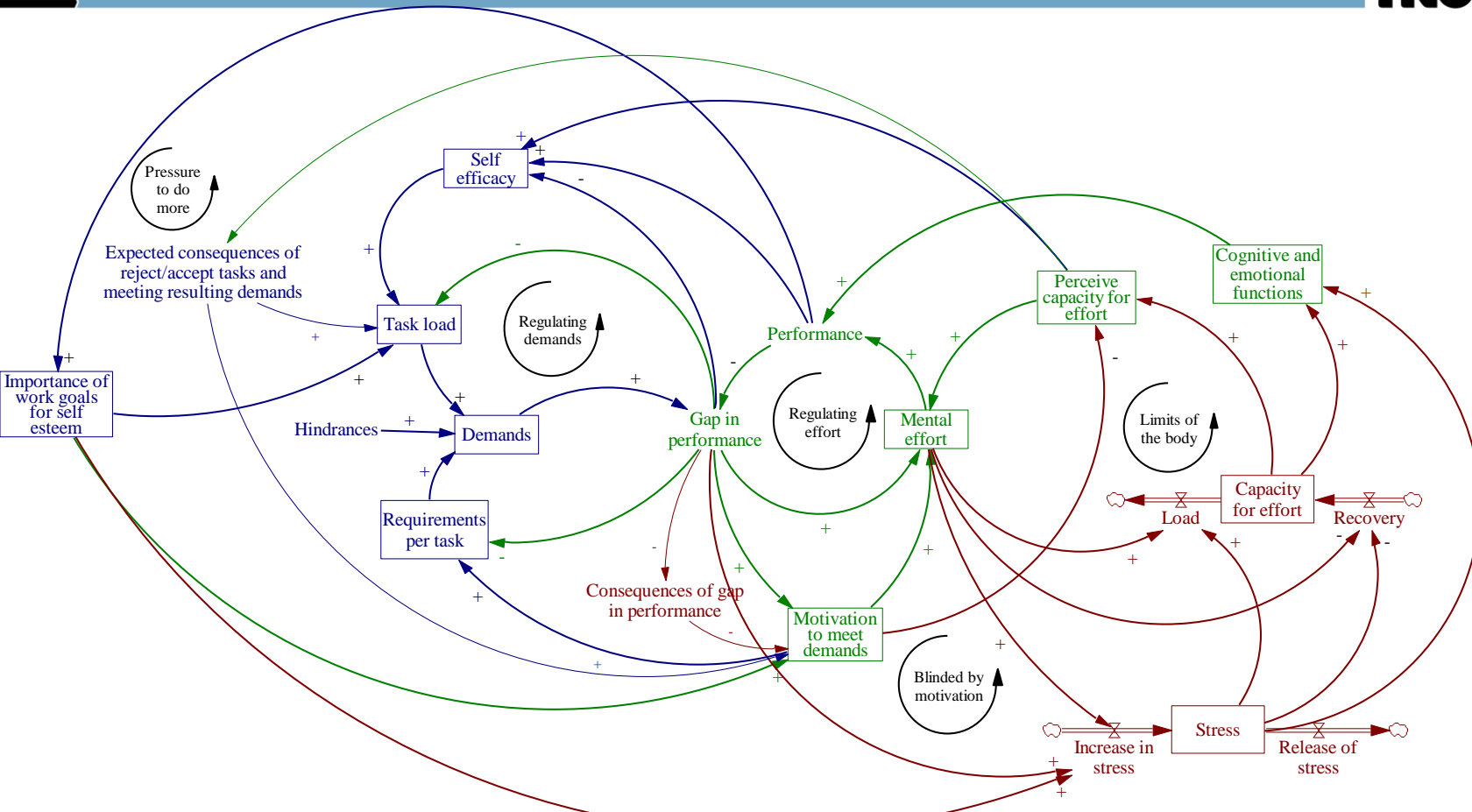


OUTCOME EFFECT ON FUTURE DEMANDS

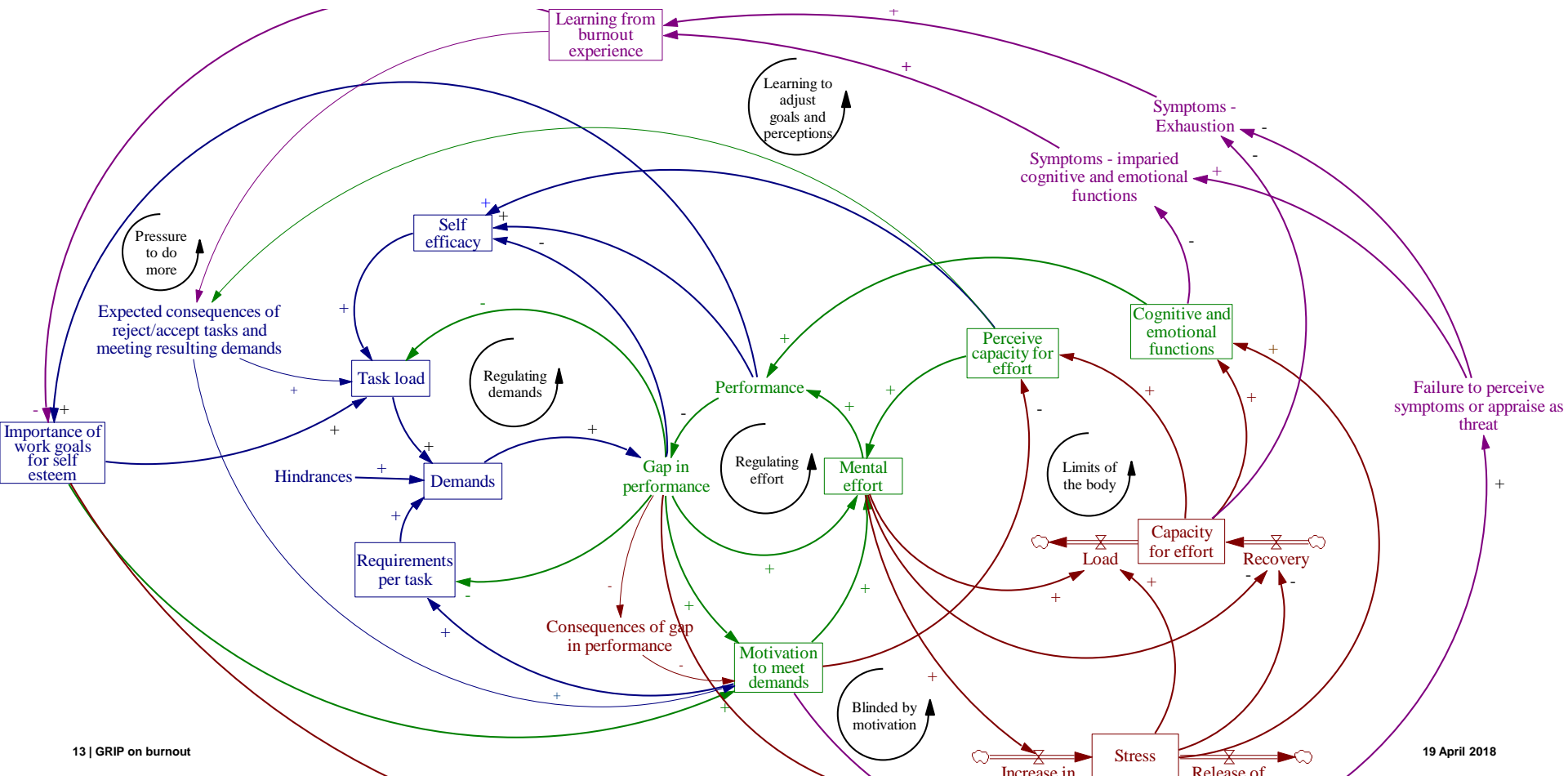




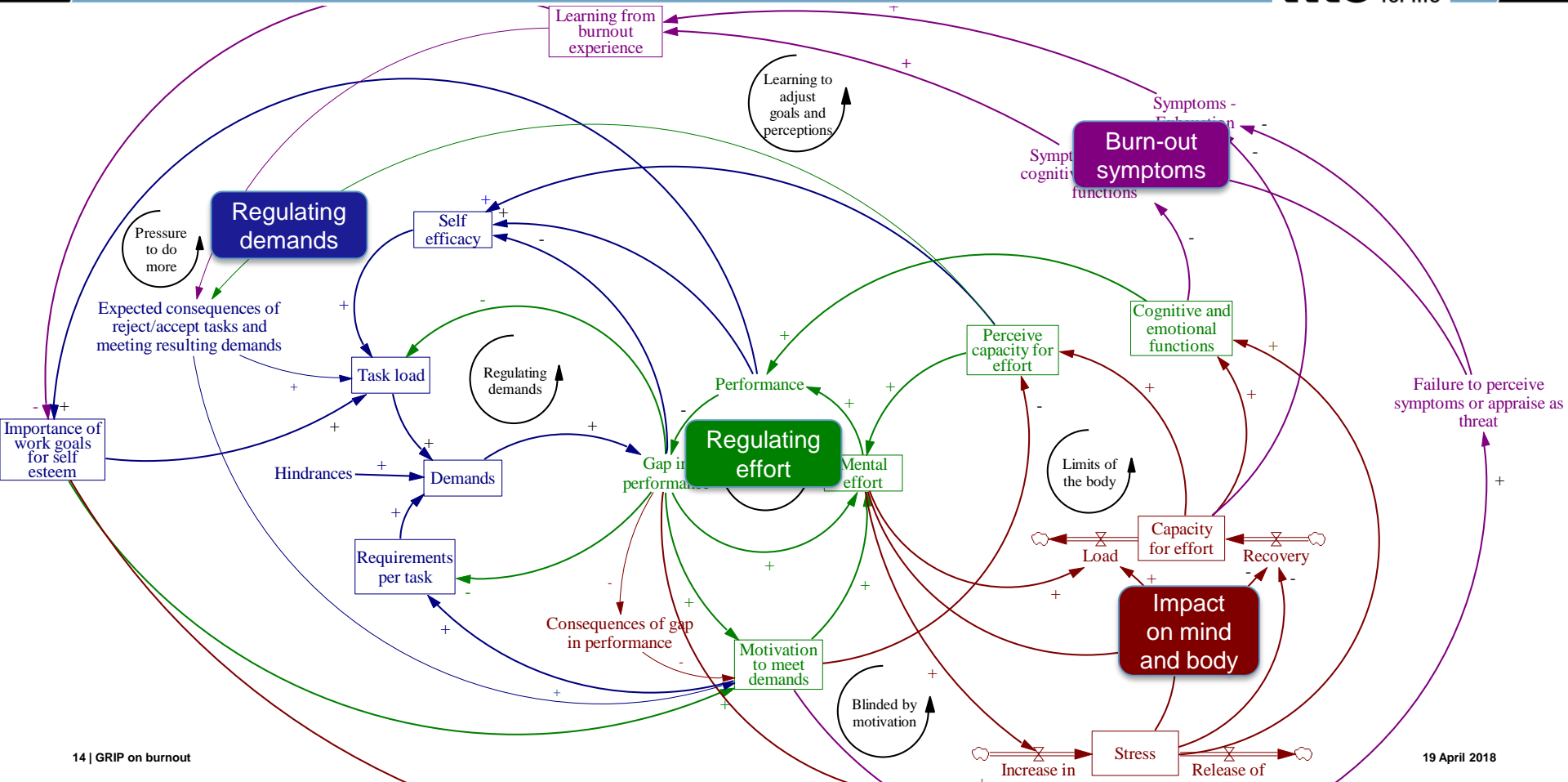
IMPACT ON MIND AND BODY



LEARNING AFTER A BURNOUT



FULL MODEL



QUANTITATIVE MODEL DEVELOPMENT

- › Quest for data
 - › Longitudinal studies are on the rise but limited in scope and measurement point

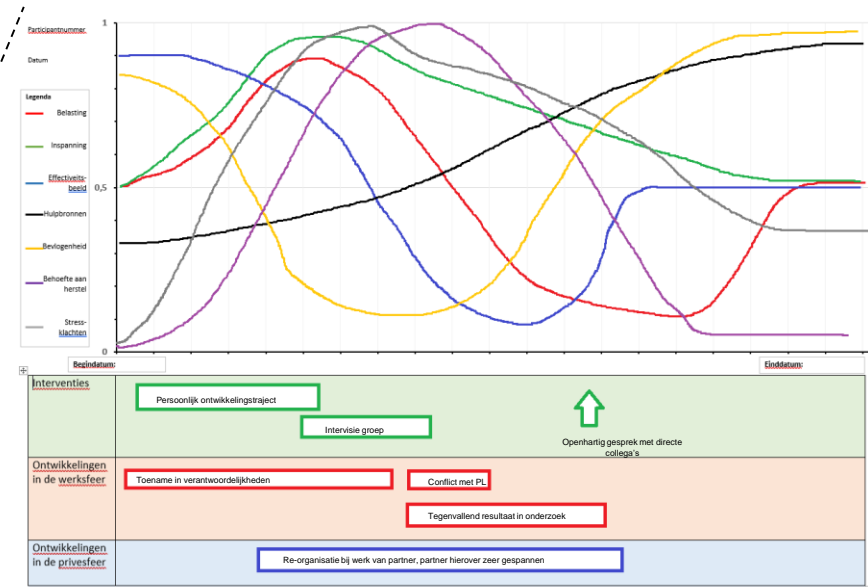
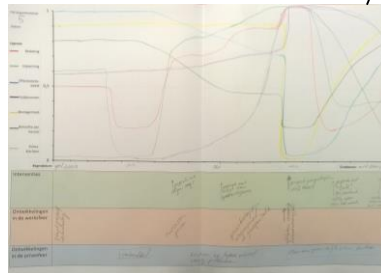
- › Detailed case data is not available
 - › Retrospective workshops
 - › Gather data
 - › Validate model assumption based on cases

WORKSHOPS AND INTERVIEWS TO COLLECT SCENARIO DATA

REAL LIFE DATA RESULTS

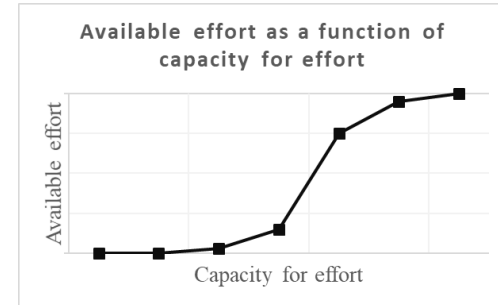
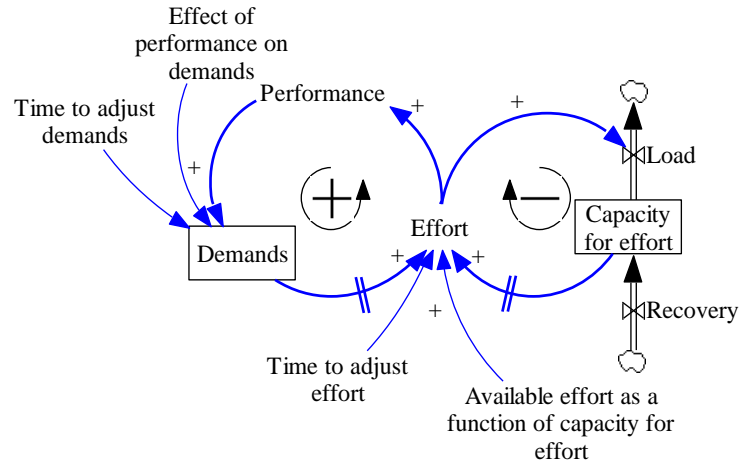
Draw and tell us your story

- › A relevant period
- › Indicate developments at work
- › Indicate developments private situation
- › Prepare graphs of various variables
- › Describe factor and interventions
- › In depth interview

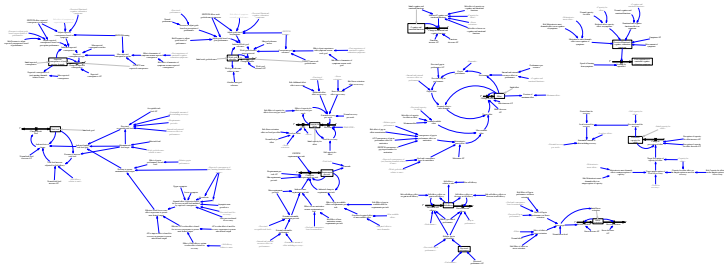


IMPLEMENTATION IN STOCK AND FLOW MODEL: SMALL EXAMPLE

- › Stock and flow model
- › Continuous simulation
- › Feedback rich
- › Time delays
- › Non-linear relations



Full model

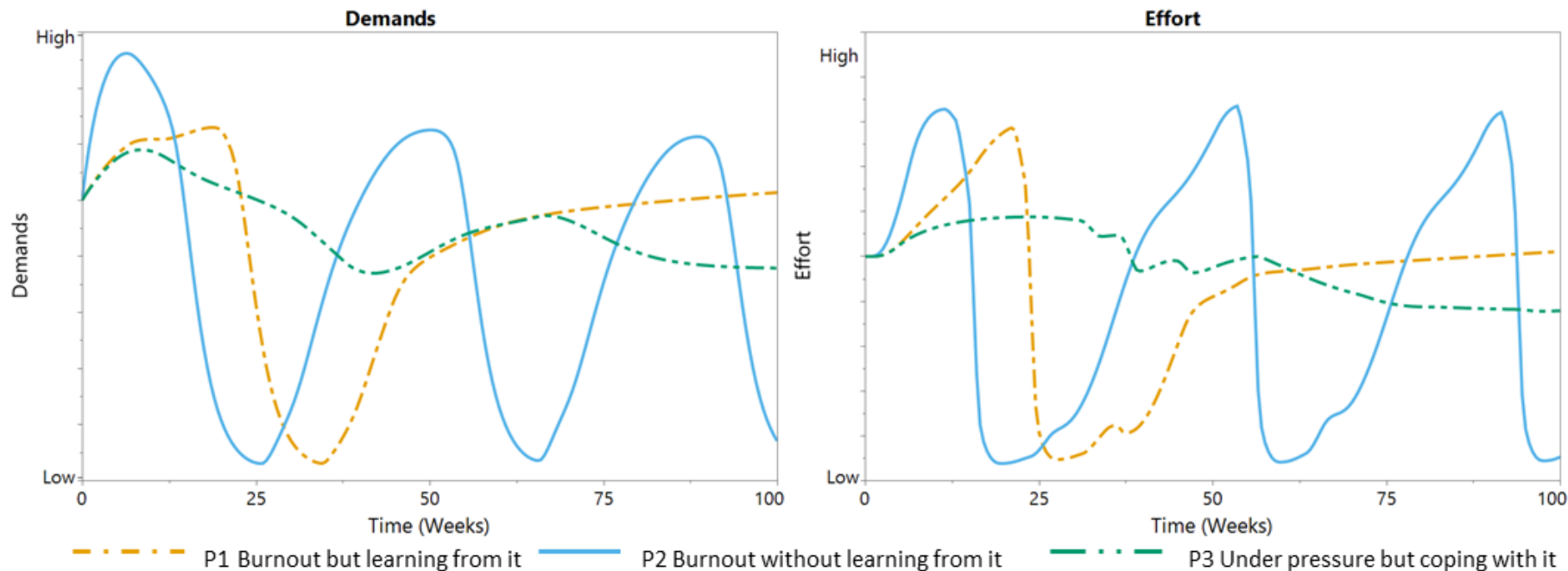


$$Capacity\ for\ effort(t) = \int_{t_0}^t [Recovery - Load] ds + Capacity\ for\ effort(t_0)$$

$$Demands(t) = \int_{t_0}^t \left[\frac{Demands(t_{-1}) - (Demands(t) * Effect\ of\ performance\ on\ demands)}{Time\ to\ adjust\ demands} \right] ds + Demands(t_0)$$

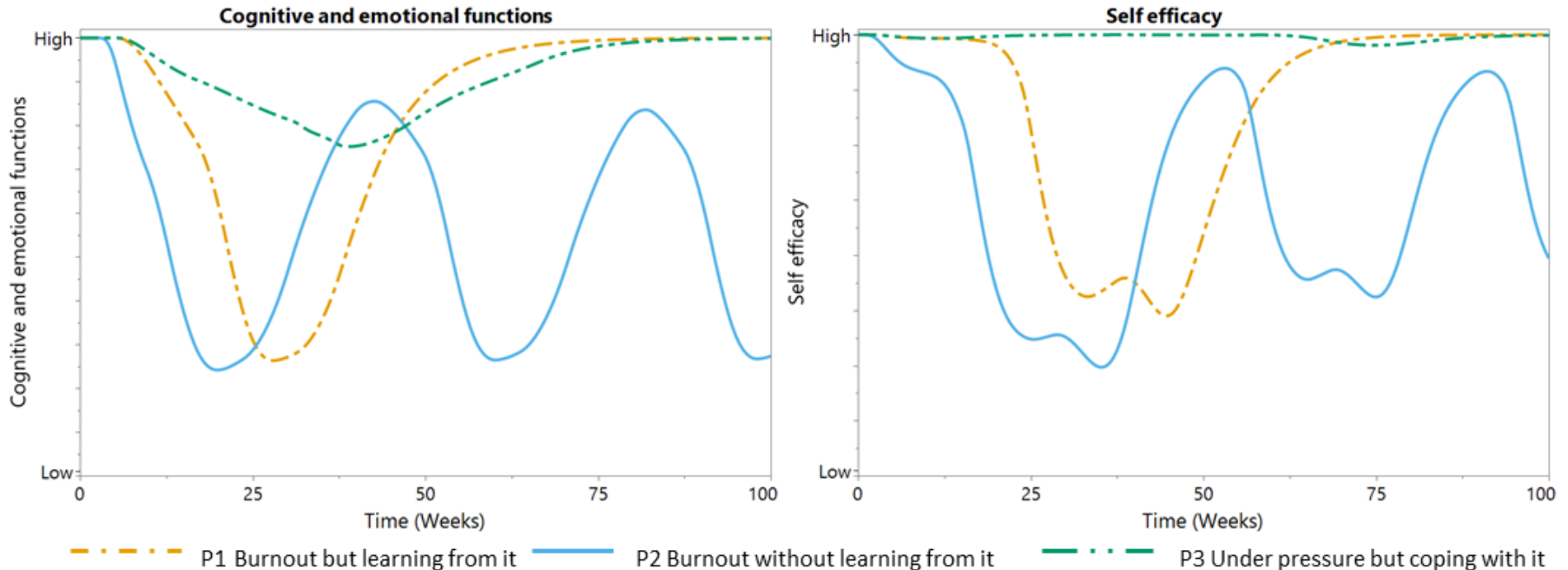
PERSONALIZED SIMULATION RESULTS

Person 1 Burnout but learning from it
Person 2 Burnout without learning from it
Person 3 Under pressure but coping with it



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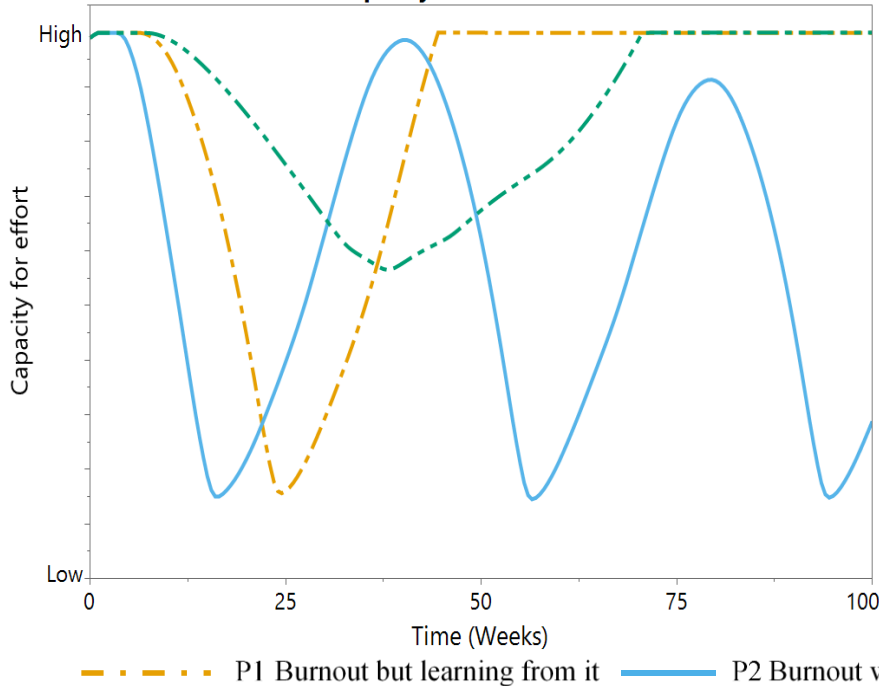
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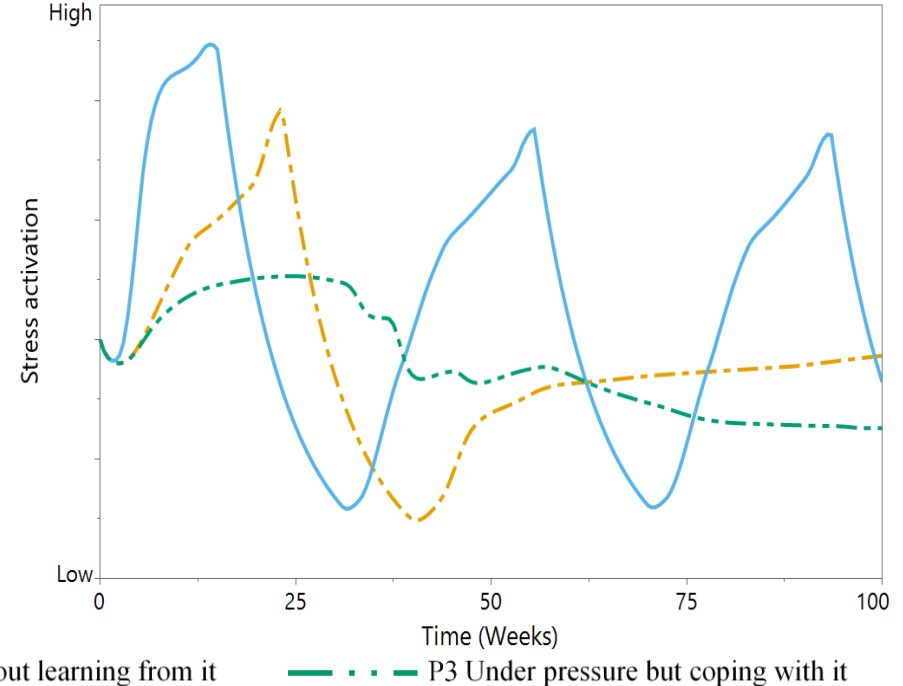
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Capacity for effort

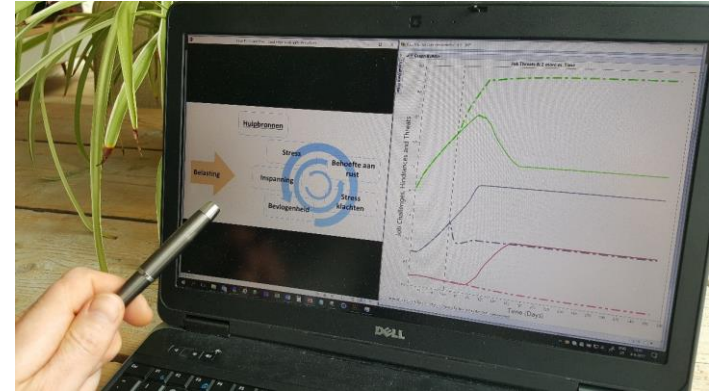


Stress activation



WRAP UP

- › Proof of concept model developed
- › Thinking in time, sketching graphs, proved to be a very usefull exercise to reflect on the burnout experience. In addition, it provided the much needed data.
- › Way-ahead
 - › Further model validation
 - › Development of model interface (game?)
 - › Introduction of model interface in intervention
- › Public Private Partnership
 - › TNO
 - › Deloitte
 - › Zilveren Kruis



Deloitte.

