DYNAMO-HIA

How it works + presentation

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11 November 201011/11/2010

Inhoud

DYNAMO-HIA: what does it do?

- Organizes and stores necessary input data sets
  ➔ REFERENCE DATA

- Projects how changes in risk factor distribution affect disease-specific and summary measures of population health
  ➔ SIMULATION

User should tell the program how a policy affect risk factor exposure

SIMULATION in DYNAMO: how does it work?

- Situation with current risk factor exposure : Business-as-usual or reference scenario
  = reference scenario:
  initial exposure + future transitions

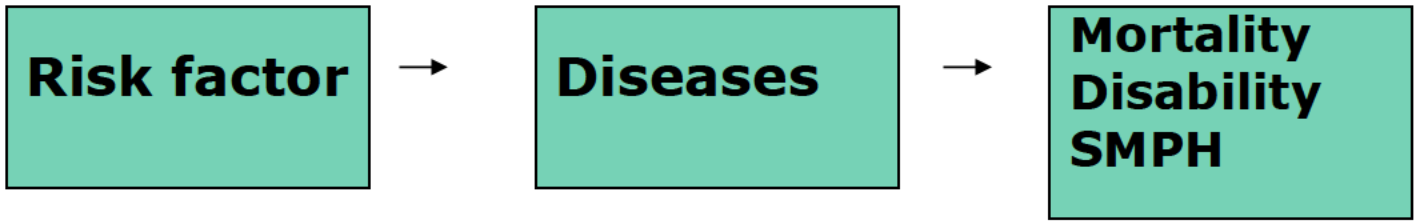
- Situation with changed risk factor exposure
  = intervention scenario
  - new initial exposure and/or future transitions

➔ Project future situation under both scenarios and compare

- Compare both situations: gives effect of policy, action or intervention
  - Disease-specific measures
  - Summary measure of population health

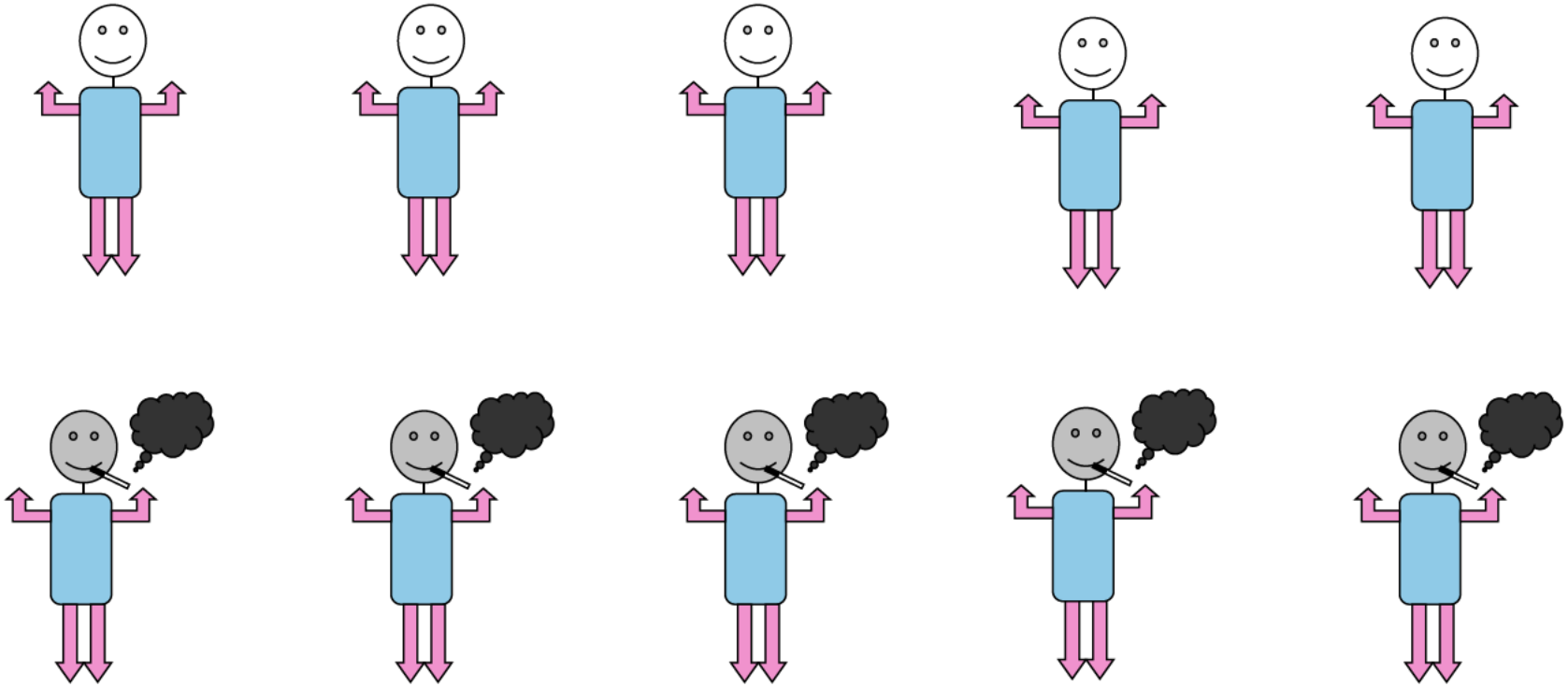
How does the projection work?

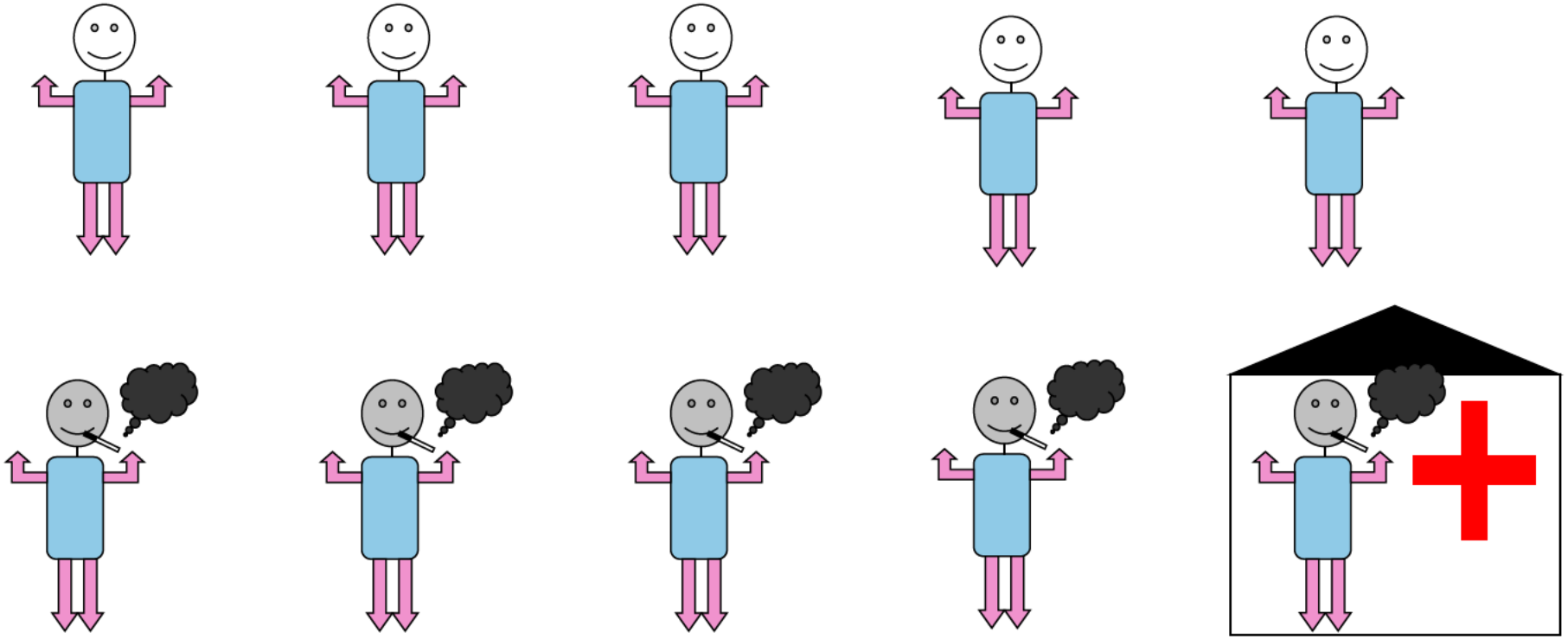
- Standard causal pathway in epidemiology

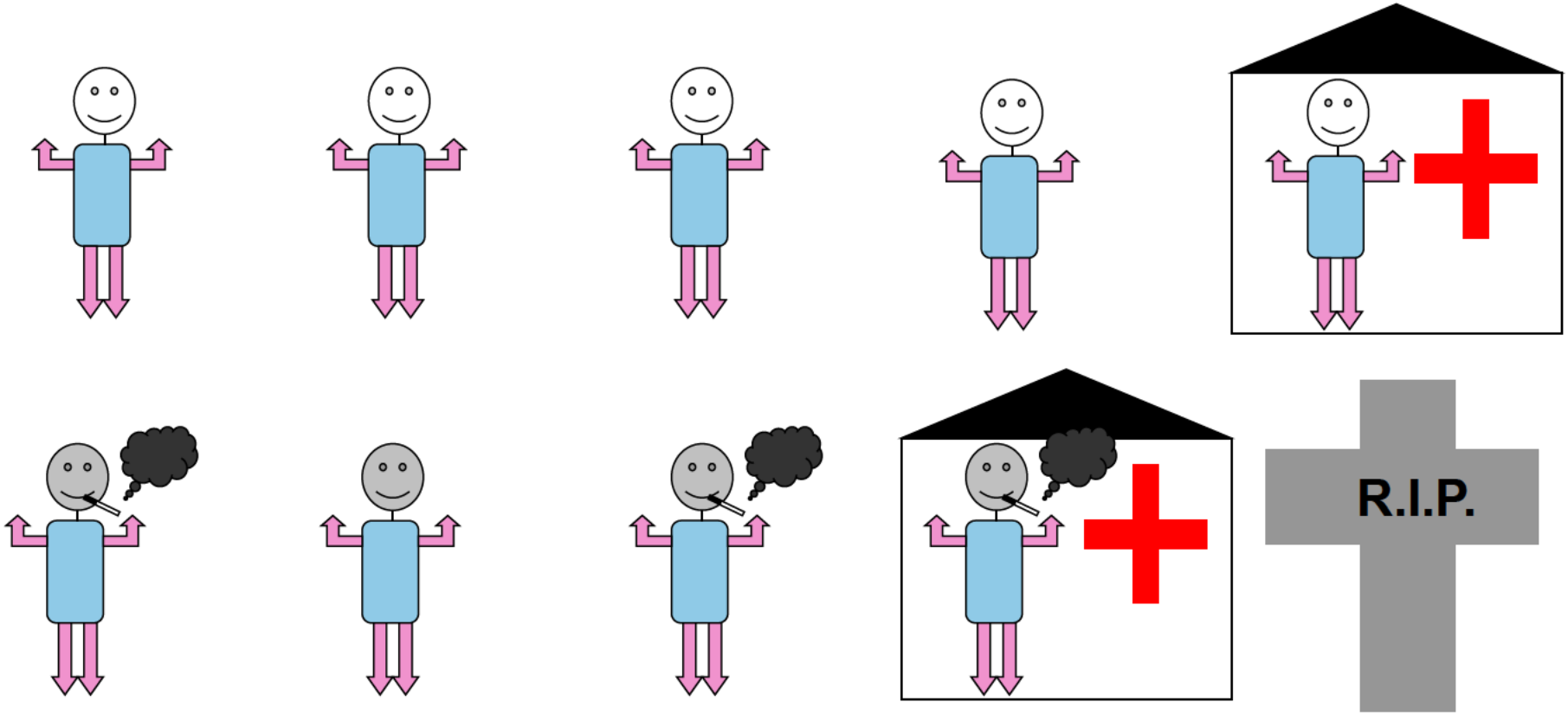


- Markov modeling framework
  - Explicit risk factor states = follows persons with a particular risk factor level development
  - Disease states: incidence, prevalence, mortality (no recovery)
  - Competing risks are taken into account

- Technical realization
  - Dynamic micro simulation (risk factor)
  - Discrete time frame using a multi state model (disease process)



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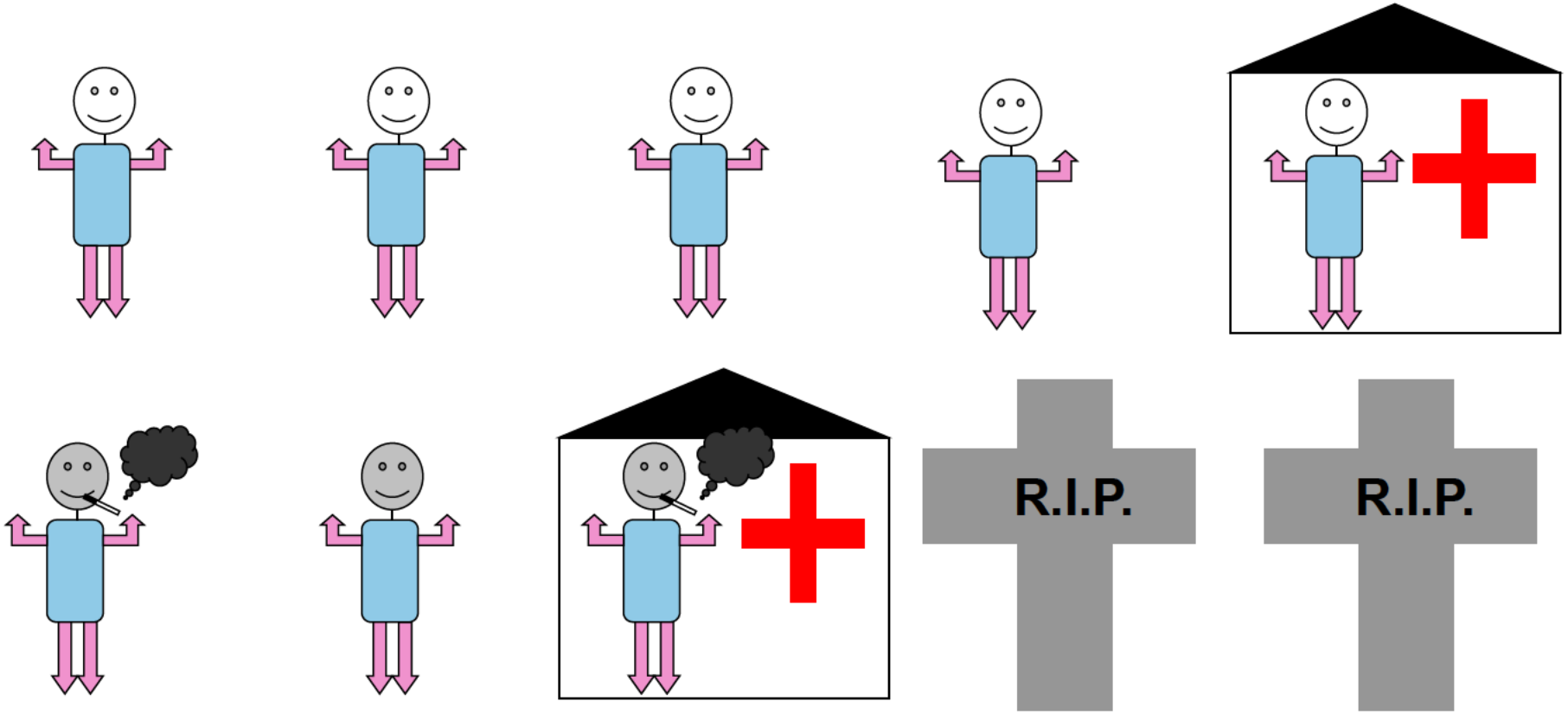
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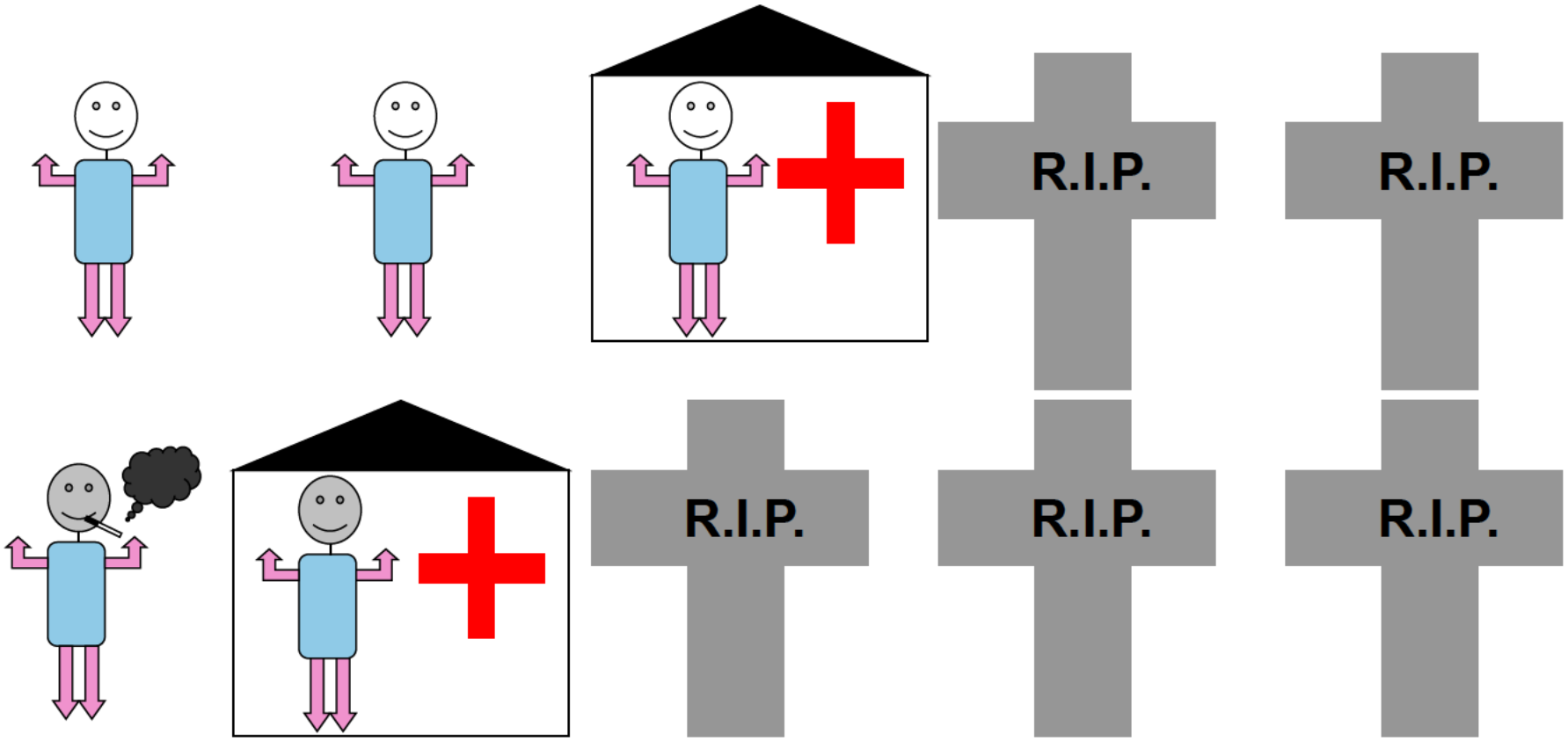
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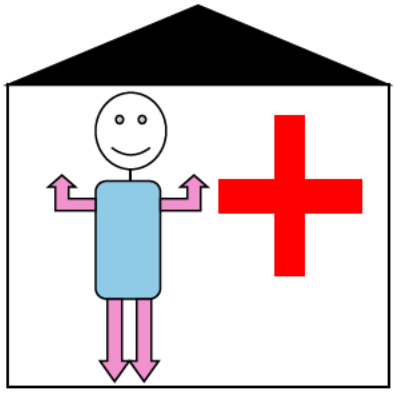

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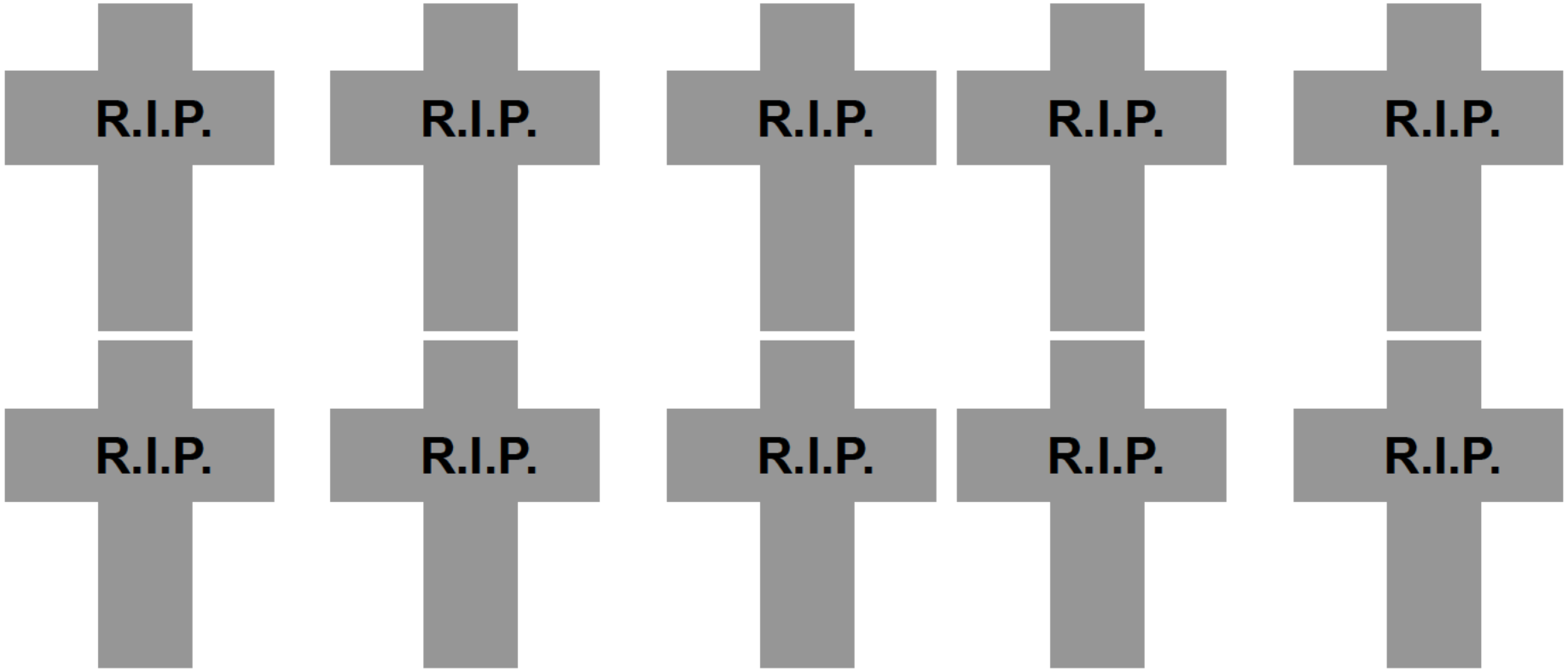
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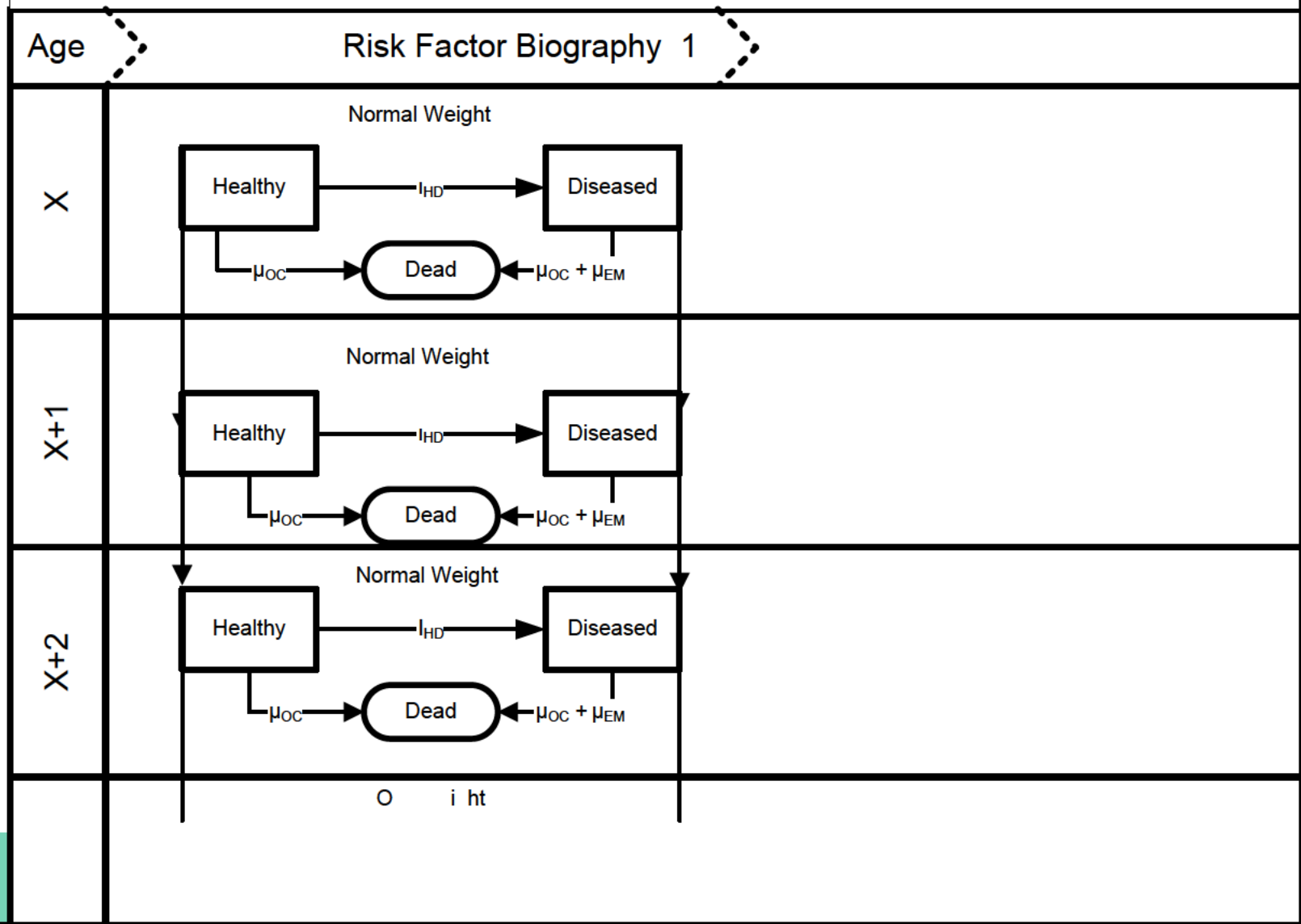
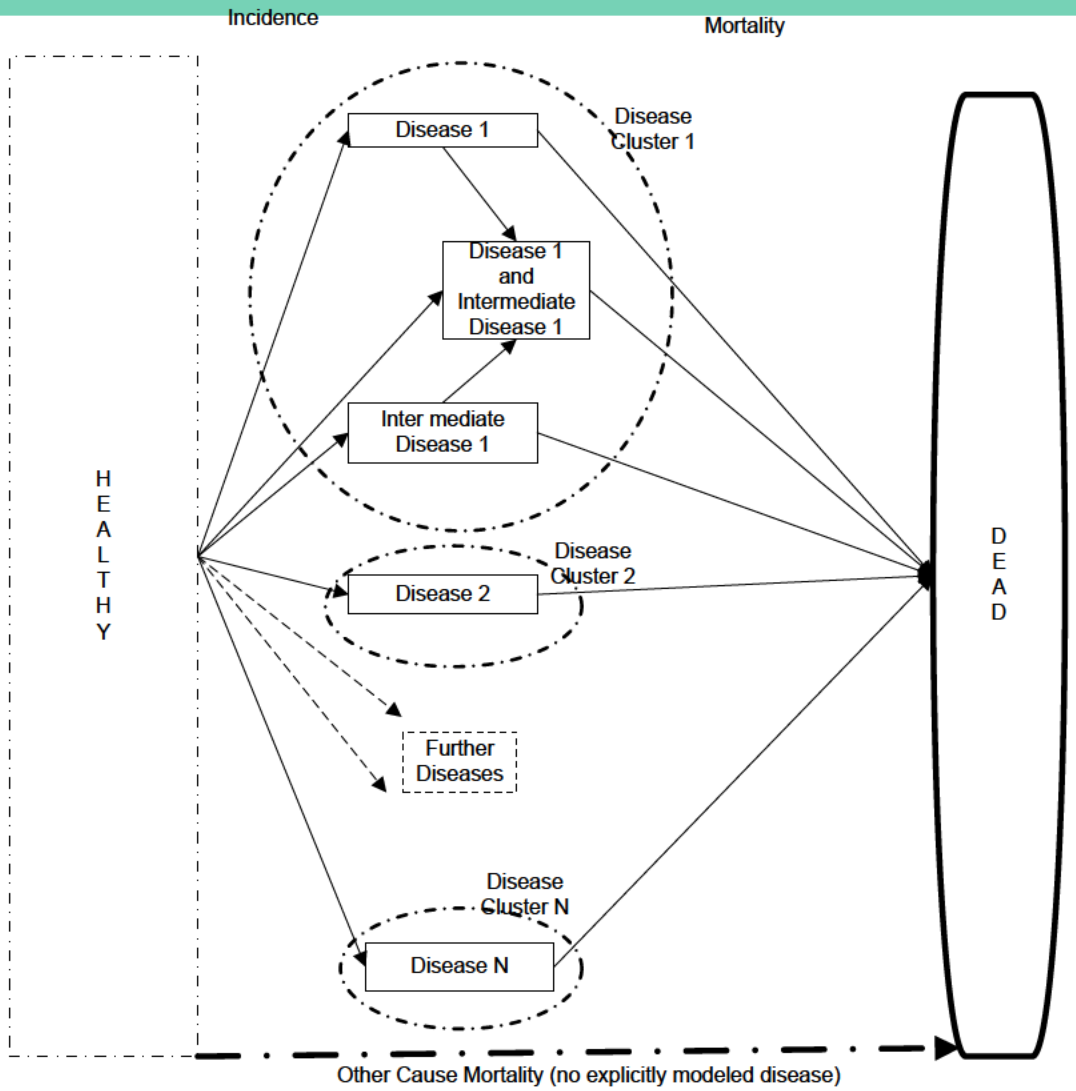
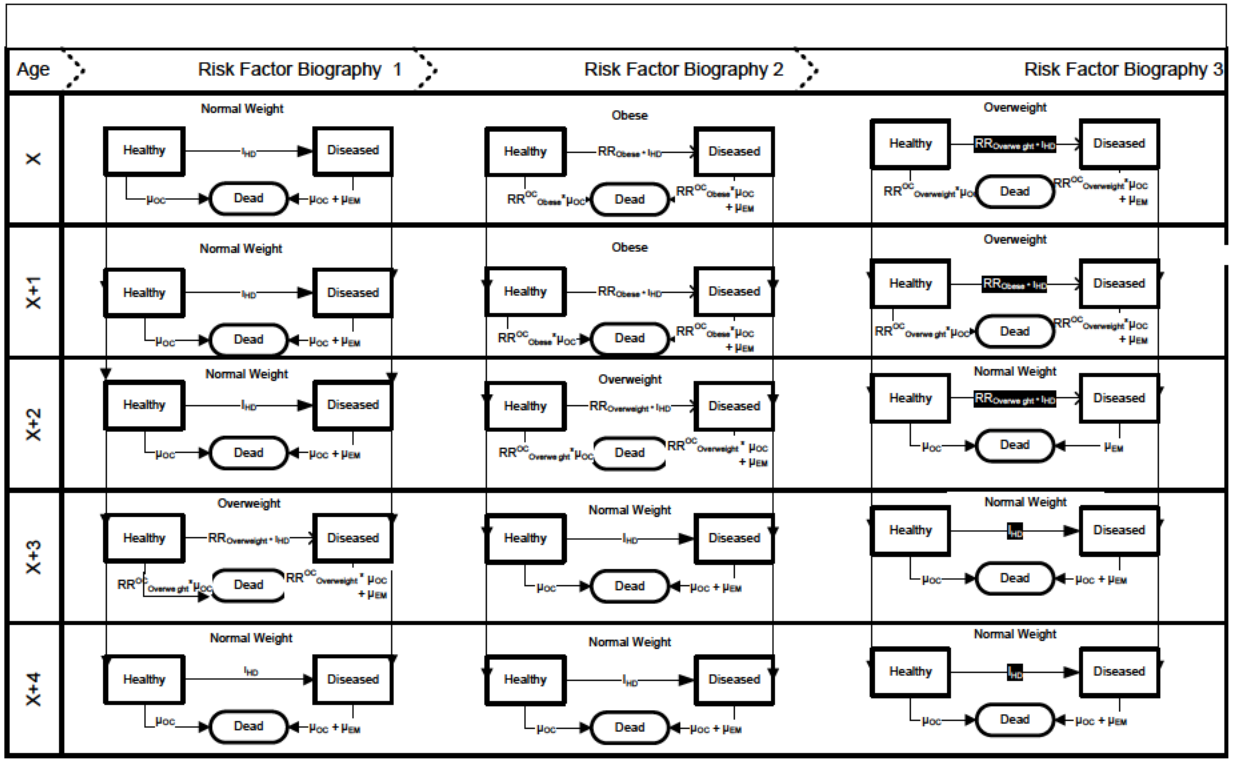

Age
Risk Factor Biography 1
X
X+1
X+2
Normal Weight
Healthy
i_{HD}
Diseased
μ_{OC}
Dead
$\mu_{OC} + \mu_{EM}$
Normal Weight
Healthy
i_{HD}
Diseased
μ_{OC}
Dead
$\mu_{OC} + \mu_{EM}$
Normal Weight
Healthy
i_{HD}
Diseased
μ_{OC}
Dead
$\mu_{OC} + \mu_{EM}$
O i ht


Incidence
Mortality
HEALTHY
Disease 1
Disease Cluster 1
Disease 1 and Intermediate Disease 1
Inter mediate Disease 1
Disease 2
Disease Cluster 2
Further Diseases
Disease Cluster N
Disease N
DEAD
Other Cause Mortality (no explicitly modeled disease)



I_{HD}=Incidence from Healthy to Diseased (minus Remission when specified)

μ_{OC}=Other Cause Mortality, i.e. non-diseases and relative risk of one

μ_{EM}=Excess Mortality, i.e. mortality due to diseases state

$RR_{Overweight}$=Relative Risk for incidence given overweight compared with normal weight

RR_{Obese}=Relative Risk for incidence given obesity compared with normal weight

$RR^{OC}_{Overweight}$= Relative Risk for other cause mortality given oveweight compared with normal weight

RR^{OC}_{Obese}= Relative Risk for other cause mortality given Obesity compared with normal weight

DYNAMO HIA

a Dynamic Model for Health Impact Assessment

REFERENCE DATA in DYNAMO

= INPUT for the model

DYNAMO-HIA back-calculates from population-based data

→ Disease data can be used for all risk factors

Data-base storage is part of DYNAMO

Data on disease / risk factor must be complete before they can be used in simulation

DYNAMO HIA

a Dynamic Model for Health Impact Assessment

- Risk factor exposure types:
  - Categorical: never, current, former smokers
  - Continuous: mean BMI
  - Compound: former smokers by time since quitting

- Diseases: 3 types of disease processes
  - Chronic disease
  - Partly acute fatal disease
  - Disease with cured fraction

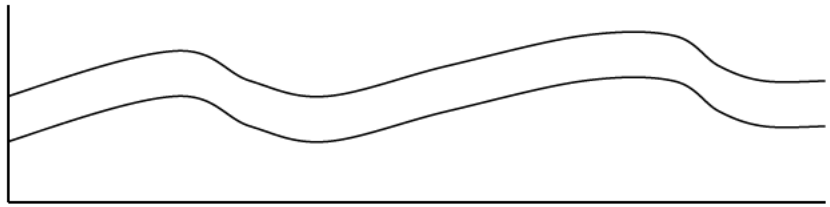
← Combination not allowed

- Transitions between risk factor states: = define the future
  - Zero transitions = no change of individuals
  - Net transitions = keeps age-specific distribution constant
  - User-defined transitions

SCENARIO DEFINITION

DYNAMIC MODEL: ➔ need to define the future

- Zero transitions = no change of individuals → cohort effect
- Net transitions = keeps age-specific distribution constant
  Also: changes in initial prevalence are retained→ no cohort effect



- User-defined transitions

Now, let's see how it works

Exercise 3: running of predefined case

Predifined case= domestic falls in older persons

- Reference scenario:
  - ✓ Risk factor = percentage of barrier-free housing: 1% (same all ages)
    + zero-transitions
  - ✓ Population = any country
  - ✓ Diseases = hip fractures
  - ✓ Fractures as disease type with acute but no chronic mortality
  - ✓ →zero excess mortality
  - ✓ →fatal fraction from CBS
  - ✓ RR barrier-free housing on fractures = 0.5
  - ✓ Incidence = hospital admission: ignores second fractures
  - ✓ Prevalence = calculated from incidence and mortality

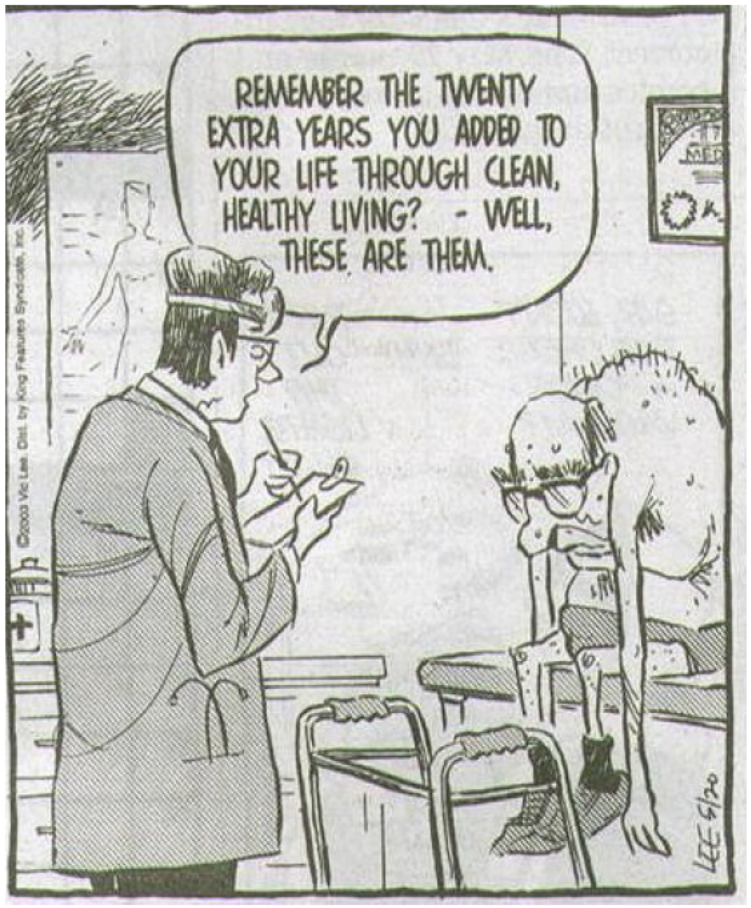
- Intervention scenario:
  - ✓ Baseline prevalence of housing changed to 100%
  - ✓ zero transition rates

DYNAMO HIA

a Dynamic Model for Health Impact Assessment

Contact:

Website: www.dynamo-hia.eu

Email:

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