



# Economic aspects of breast cancer screening

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# Economic aspects

- **History**
- Organisation
- Cost effectiveness
- Applicability

# Dutch health council

15 June 1987

Mammography screening at this moment is the only cost effective screening in breast cancer, **if we can meet certain criteria on organization and financing.**

We expect that **500** deaths will be saved... because of this program

Start: 50-69

Interval: 2 years

# Cost-effectiveness

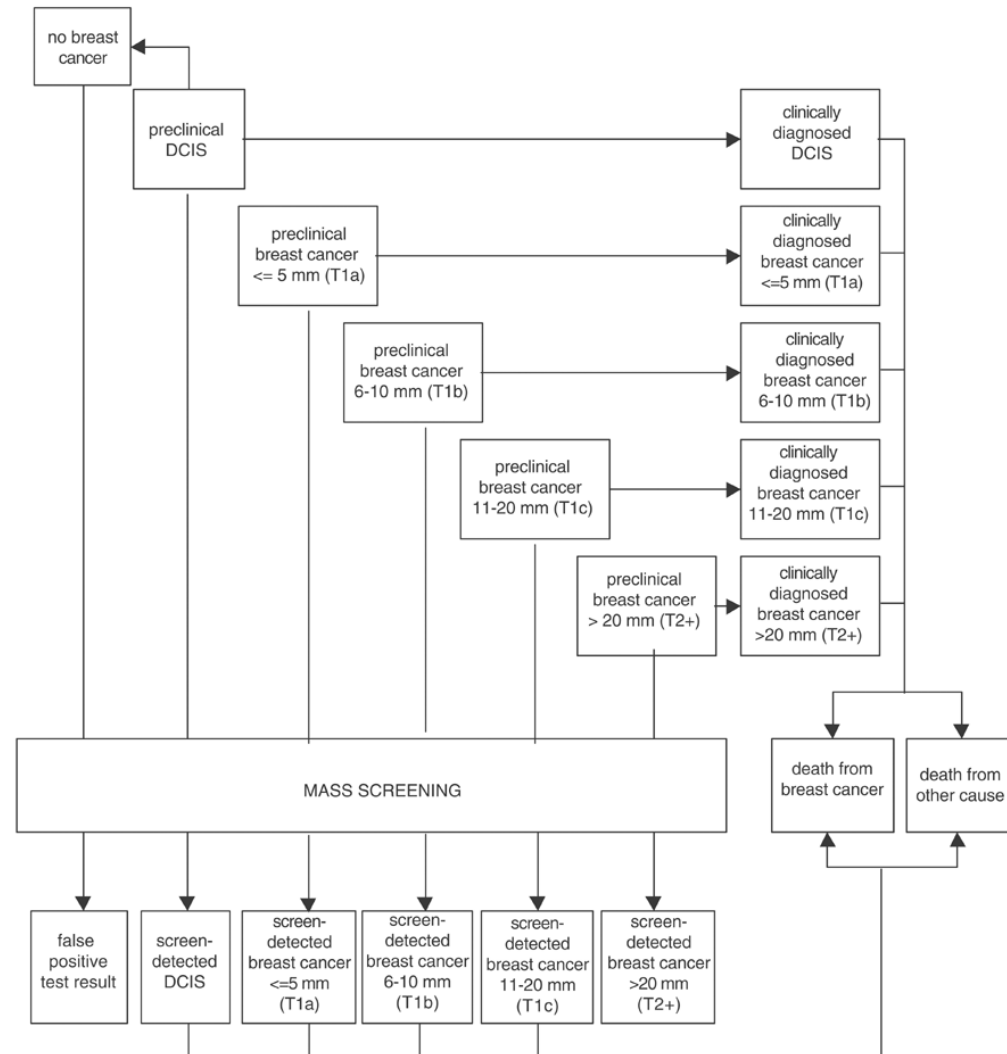


## April 1990

- Expected effects
- Material and immaterial costs
- Optimal ratio in different scenarios
- Uncertain factors
- Information required

- Microsimulation model - MISCAN  
van Oortmarssen, de Koning and colleagues
- CE ratios
- Compared to situation without a screening programme

Structure of the MISCAN model for breast cancer



# Selected screening policy

## Basic variant

- Women aged 50 – 69
- 10 invitations
- 2-yr screening interval
  
- MISCAN estimates 1990 - 2017

# Selected screening policy

	Basic		No screening		Difference	
<b>Costs</b>	<b>mln.</b>	<b>%</b>				
Screening	599	7.5				
Diagnosis						
- Screening	126	1.5				
- Outside	1509	18.8				
Primary therapy	2333	29				
Follow up care	416	5.2				
Palliative care	3051	38				
<b>Total</b>	<b>8034</b>	<b>100</b>				



# Selected screening policy

	Basic		No screening		Difference	
	mln.	%	mln.	%		
Screening	599	7.5	--	--		
Diagnosis						
- Screening	126	1.5	--	--		
- Outside	1509	18.8	1656	21.9		
Primary therapy	2333	29	2233	29.5		
Follow up care	416	5.2	372	4.9		
Palliative care	3051	38	3307	43.7		
<b>Total</b>	<b>8034</b>	<b>100</b>	<b>7568</b>	<b>100</b>		

# Selected screening policy

	Basic		No screening		Difference	
	mln.	%	mln.	%	mln.	%
<b>Costs</b>						
Screening	599	7.5	--	--	+ 599	+ 7.9
Diagnosis						
- Screening	126	1.5	--	--	+ 126	+ 1.6
- Outside	1509	18.8	1656	21.9	- 147	- 1.9
Primary therapy	2333	29	2233	29.5	+ 100	+ 1.3
Follow up care	416	5.2	372	4.9	+ 44	+ 0.6
Palliative care	3051	38	3307	43.7	- 256	- 3.4
<b>Total</b>	<b>8034</b>	<b>100</b>	<b>7568</b>	<b>100</b>	<b>+ 466</b>	<b>+ 6.1</b>

# Selected screening policy

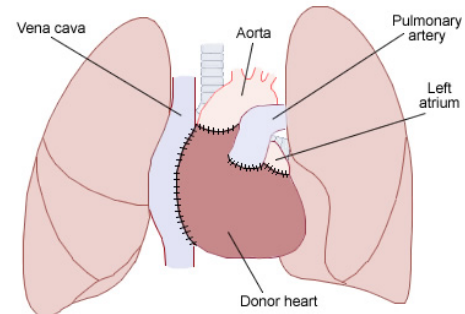
## Basic variant

- 466 million
- 61.000 life-years gained
- Cost per life-year gained: 7.650 ( $\approx$  3.500 Euro)
- Cost per QALY: 8.100 ( $\approx$  3.700 Euro)
  
- MISCAN estimates 1990 - 2017

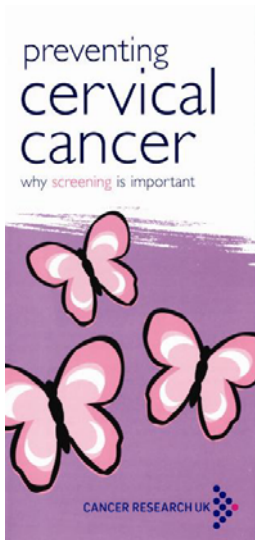
# QALY - other interventions



**8.1**



**65**



**26**



**25 per baby**

# Economic aspects

- History
- **Organisation**
- Cost effectiveness
- Applicability

# Organisational framework



Ministry of Health, Welfare and Sport



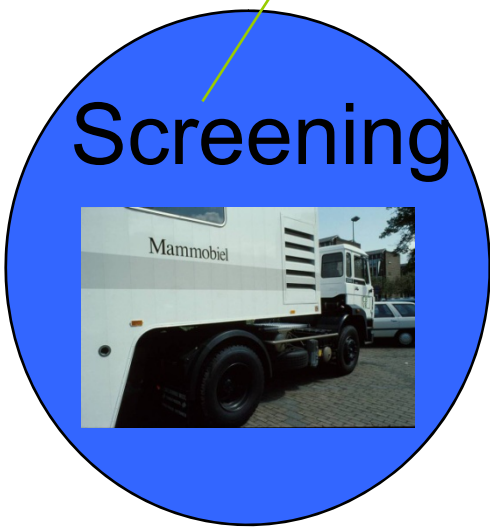
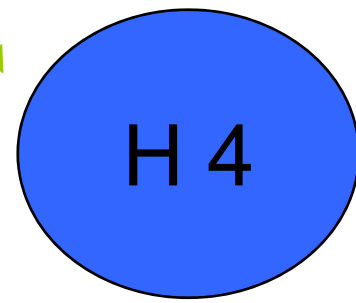
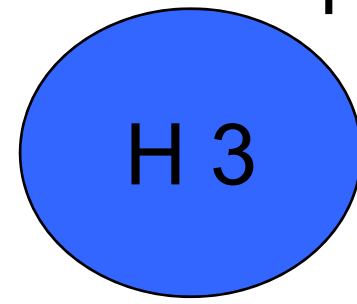
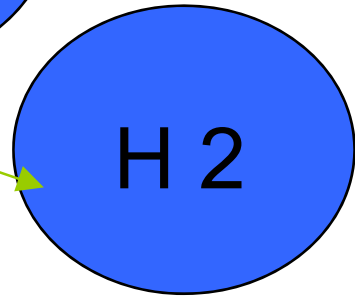
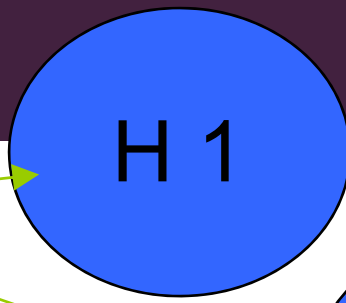
National Institute for Public Health and the Environment

# The Dutch way of screening



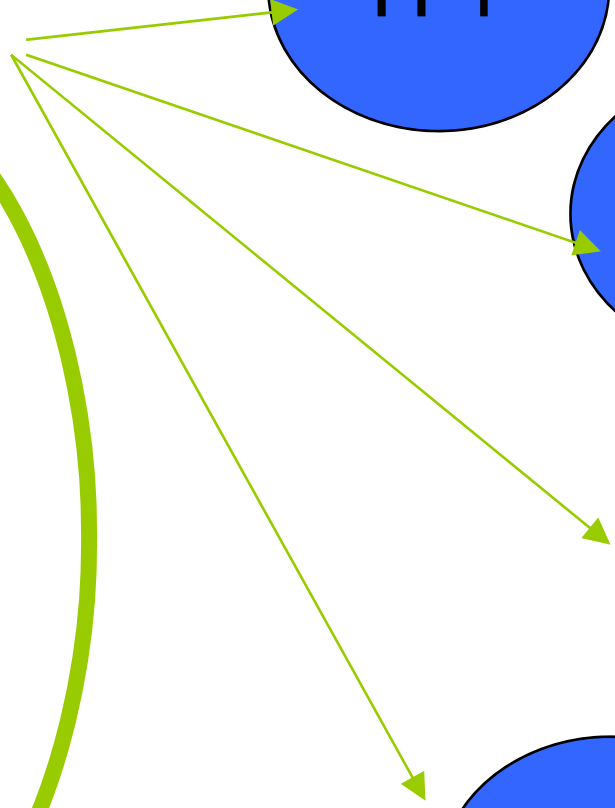
- Dutch screening act
- Strict separation from health care
- Different funding - taxes vs premiums
- Lowest referral rates in the world
- Daily quality control & monitoring

GP



Taxes

Health care  
Premiums



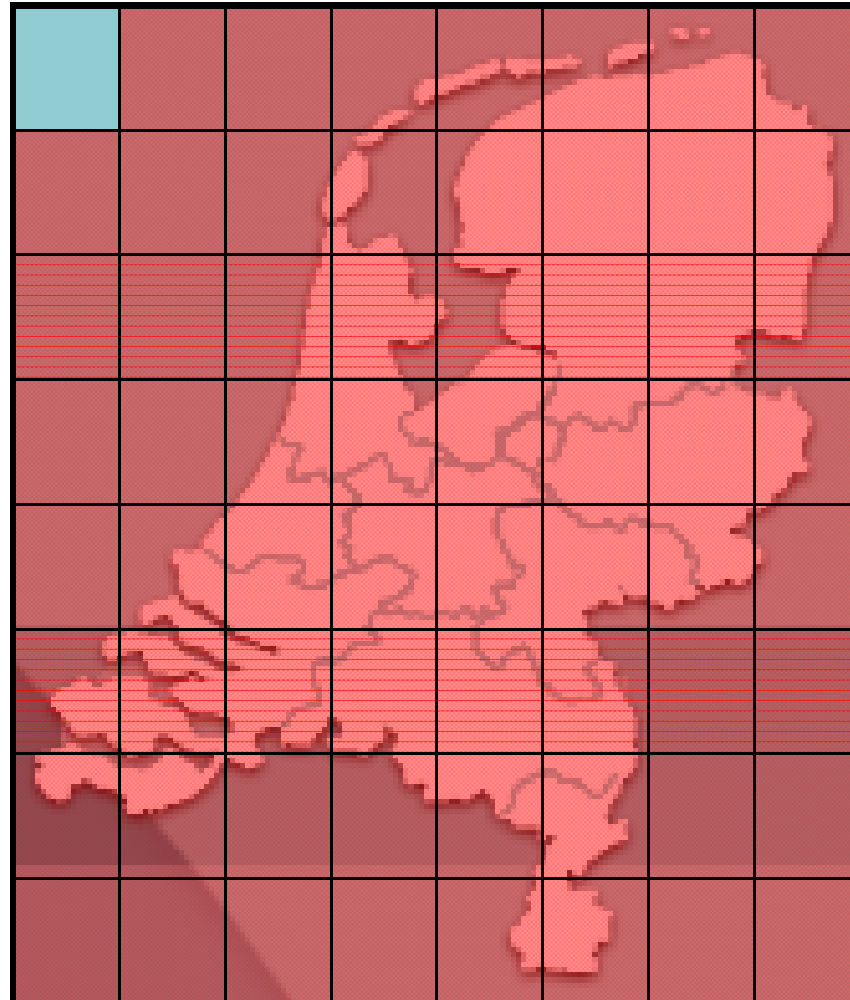


# Organisation



9 regional foundations

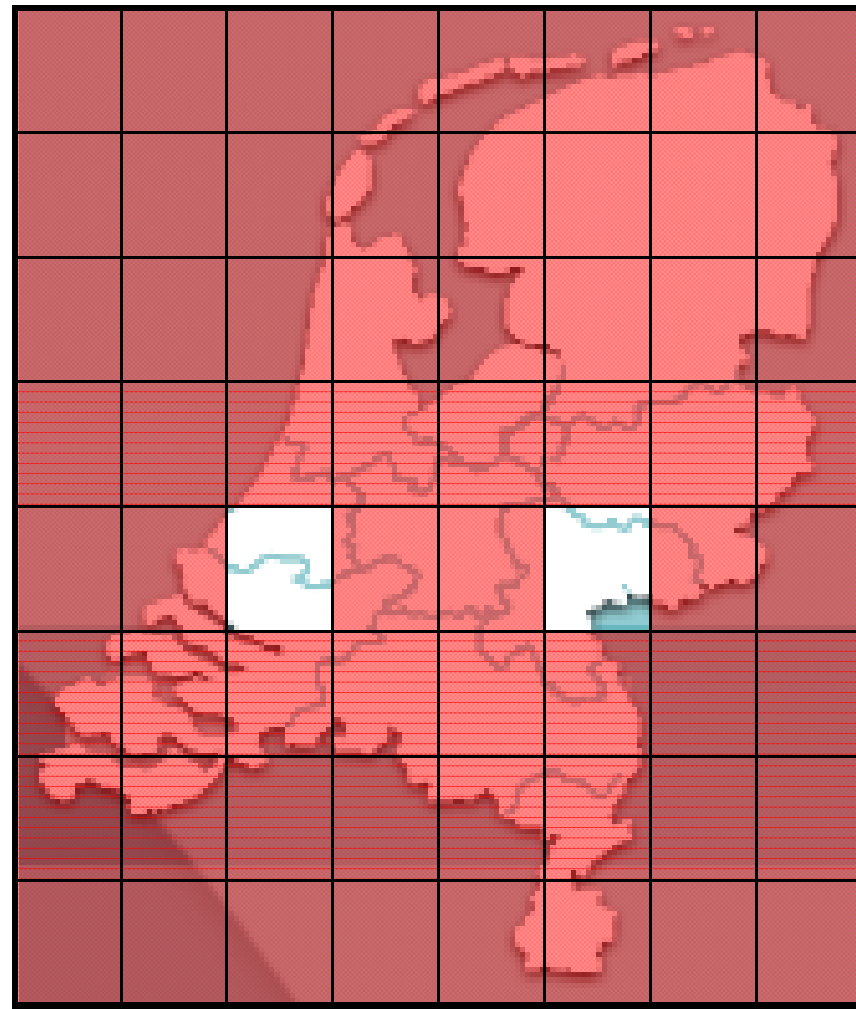




64  
screening  
units



LETB  
Rotterdam



LRCB  
Nijmegen

Audit, Quality Control, Evaluation

# Economic aspects

- History
- Organisation
- **Cost effectiveness**
- Applicability

# Facts

- 16,5 million inhabitants
- 8,2 million women
- 13 800 new cases of breast cancer in 2006
- 8 000 in the age group 50-74
- 20 year breast cancer screening
- 82% participation
- 4 000 screen-detected cancers in 2006

# Screening outcomes - international

## NL

Referred	18 per 1000
Breast cancer	5.5 per 1000
False positive screening test	12.5 per 1000
Interval cancer	1.0 per 1000


# Screening outcomes - international

	<b>NL</b>	<b>UK</b>	<b>USA</b>
Referred	18 per 1000	36	80
Breast cancer	5.5 per 1000	5.4	3.6
False positive screening test	12.5 per 1000	30	76
Interval cancer	1.0 per 1000	≈ 1.0	≈ 1.0

LETB / NETB 2008

Based on J Med Screen 2005;12:50-54





Total National Budget for “prevention”  
(early detection):

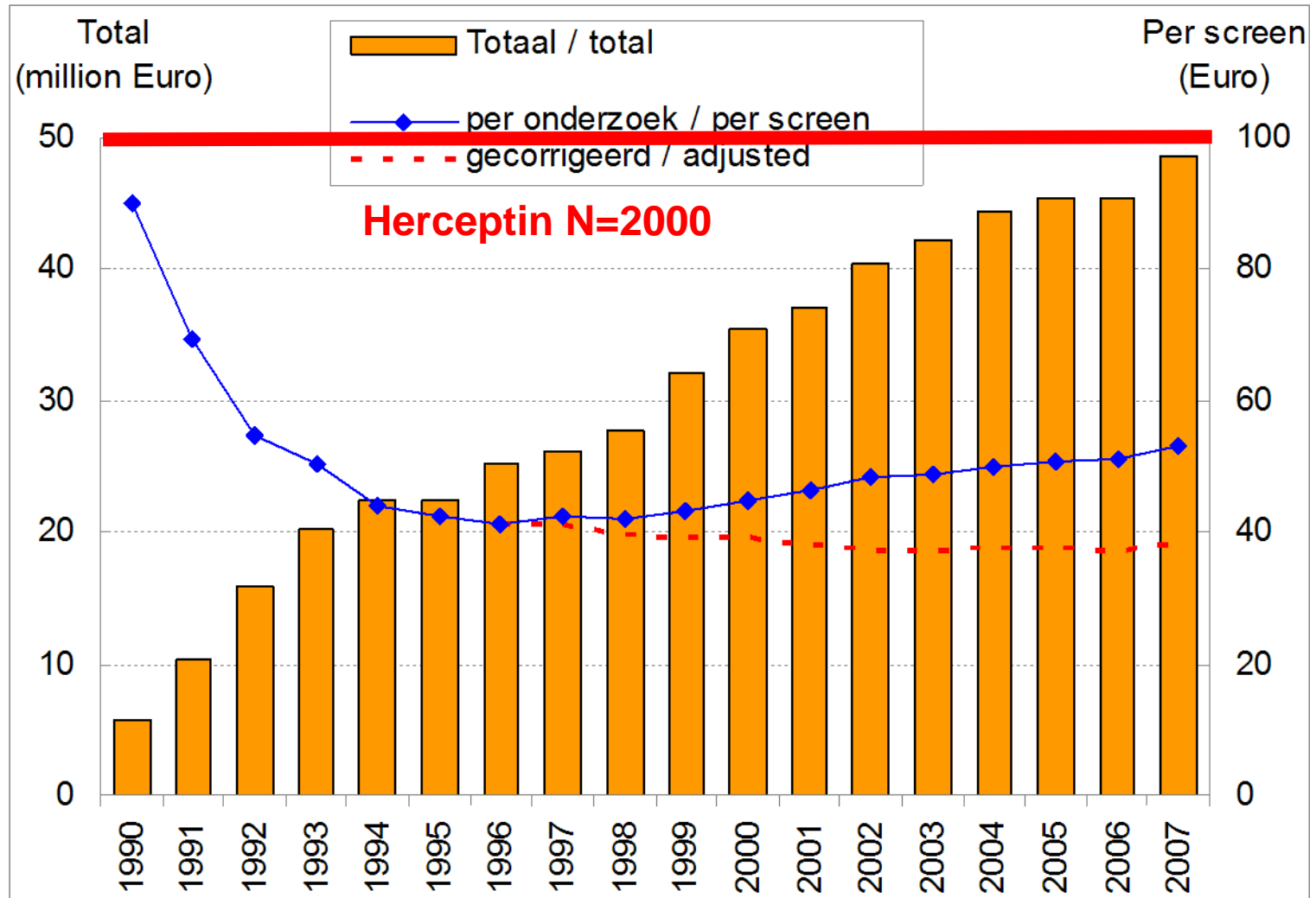
200 Million €

49 Million €

Breast cancer screening (2007)



# Costs from 1997 on (in Euro)



# Quality and evaluation costs

National costs for

- Coordination,
- Quality assurance,
- Evaluation,
- 3 € per screen (7%)

(LETB, 2005)

# Cost per life year saved

- 3500 Euro - **Breast** Cancer Screening
- 8000 Euro - FOBT Screening **Colon** Cancer
- 12500 Euro - **Cervical** Carcinoma Screening
- 20000 Euro - Dutch limit (in screening)



# The Dutch screening goes digital



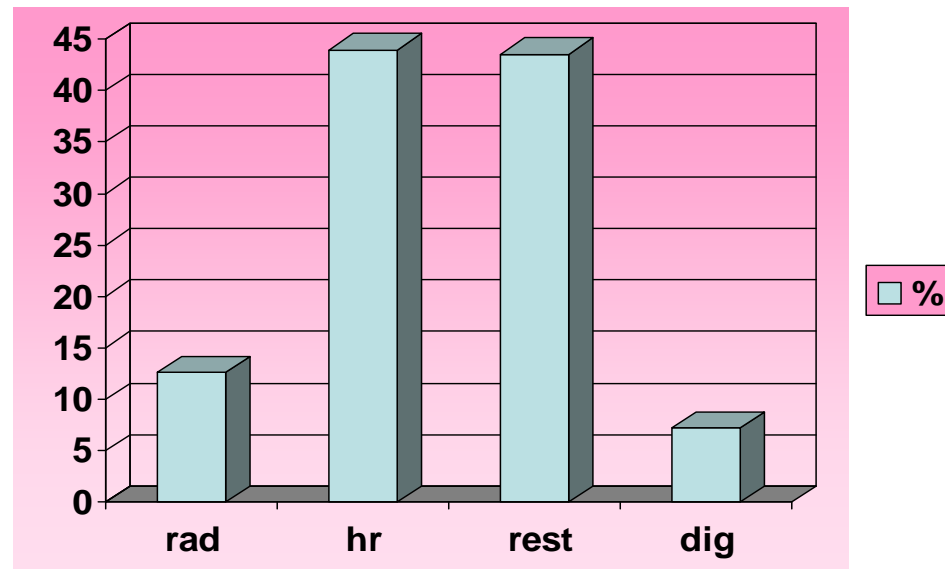
20 mijl  
20 km

# Digitization costs

- National costs for digitization per screen
- €3,61 per investigation
- All-in: 64 digital mammographs, 30 reading stations, 57 mobile units

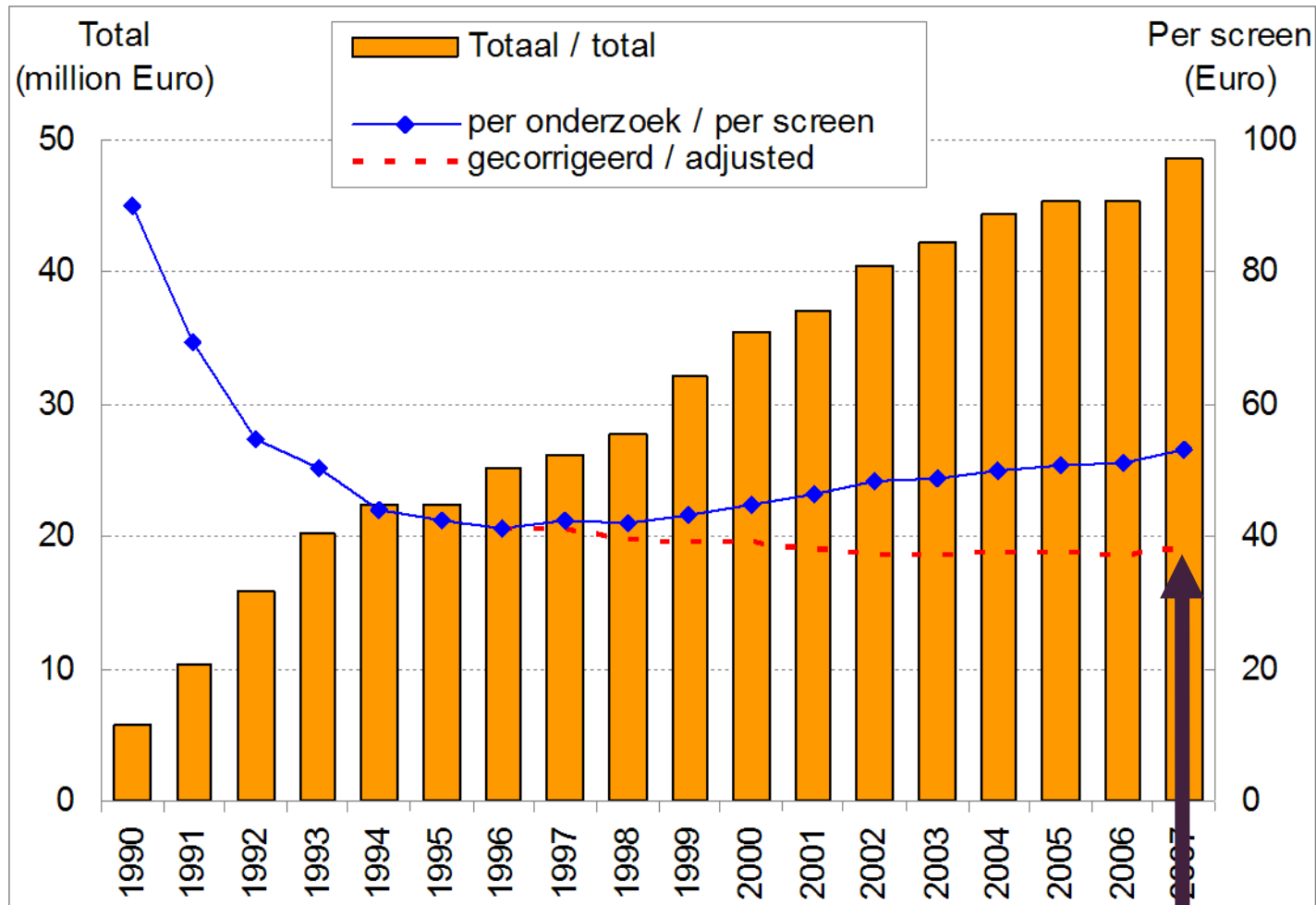
**2004: € 49.30**

**2007: € 53.36**



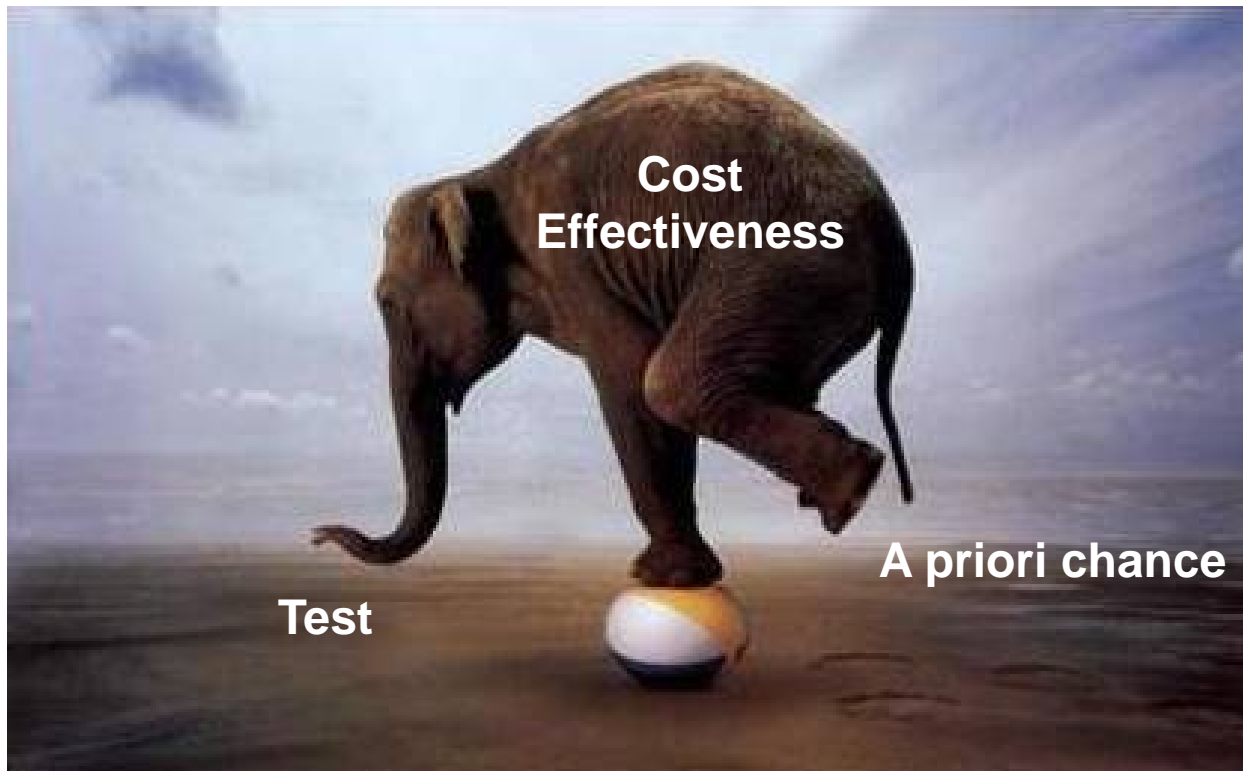


# Costs from 1997 on (in Euro)



€3,61

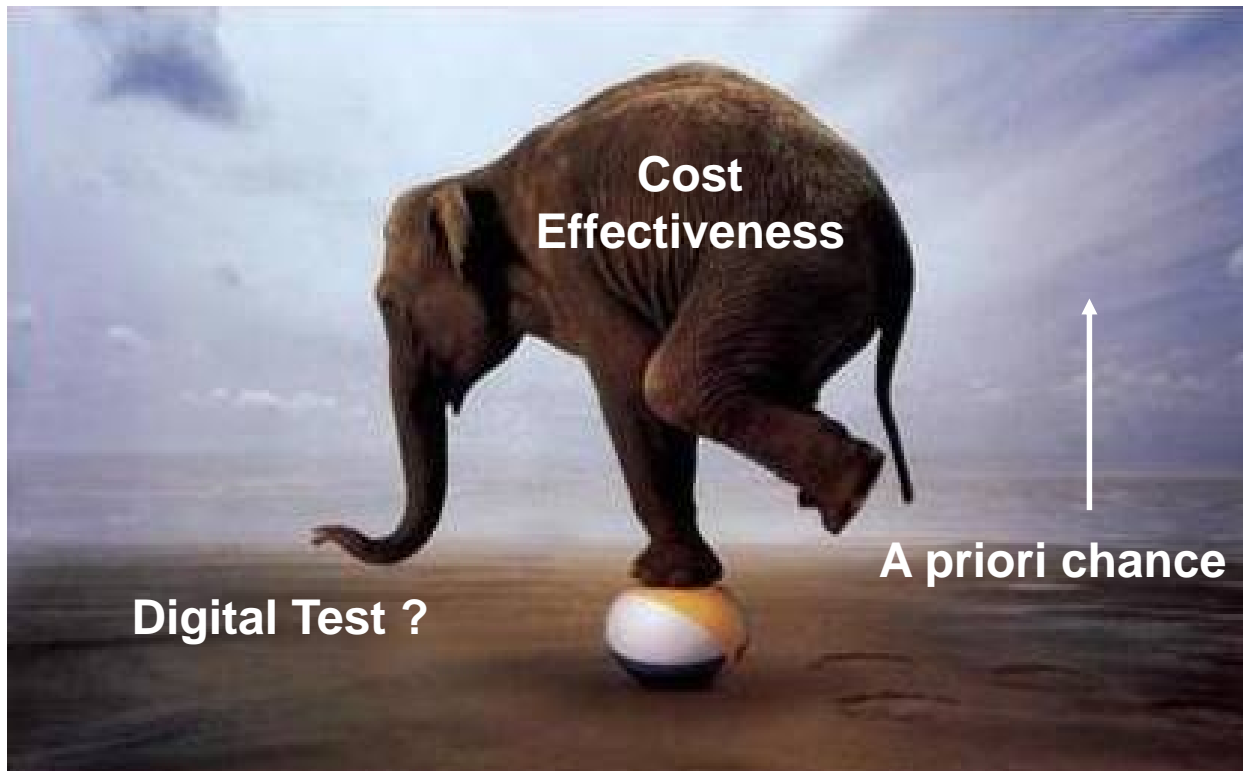
€ 3500 per life-year gained



500 lives saved



# Balance?



# Economic aspects

- History
- Organisation
- Cost effectiveness
- **Applicability**

# Applicability – other countries

	<b>CE-ratio euro / LY gained</b>
• Germany	9600
• Spain	7125
• France	4950
• United Kingdom	2900
• The Netherlands	3400

# Applicability – other countries

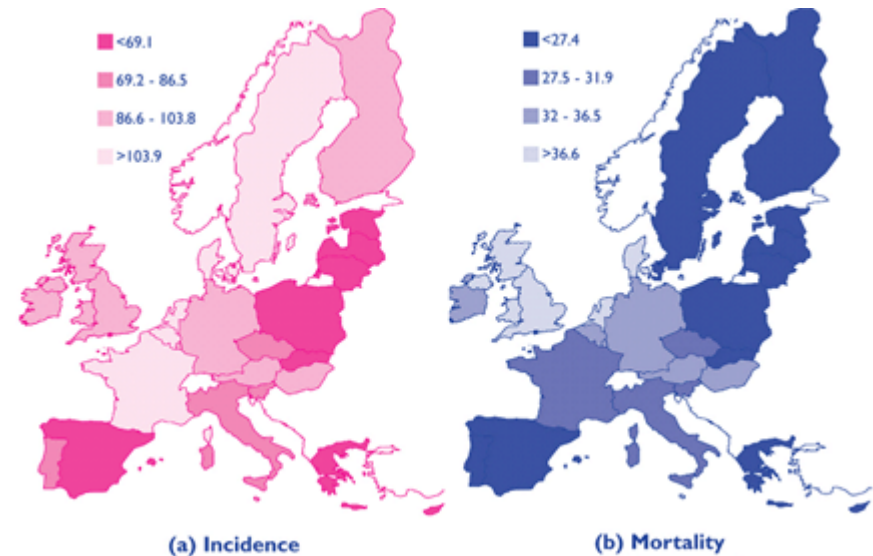
## Cost-effectiveness is influenced by:

- Age-specific incidence
- All-cause life expectancy and temporal trends of major epidemics
- Population age structure
- Availability, effectiveness and costs of treatment
- Health system costs of screening

Brown et al, Health service interventions for cancer control in developing countries, Disease Control Priorities Project

# Applicability – other countries

**START SMALL,  
SCALE UP SMART**



Brown et al, Health service interventions for cancer control in developing countries, Disease Control Priorities Project

# Applicability – other countries

**“Starting small might entail applying an initial (pilot) program to a limited age range that is estimated to yield the most benefits per resource use”**

**“Programs can later be extended (wider age groups, more frequent screening) after analysis of the initial program indicating that the incremental cost-effectiveness of these extensions would be favourable”**

Brown et al, Health service interventions for cancer control in developing countries, Disease Control Priorities Project

# Thank you for listening!

