Foresight Obesity Project

Tackling Obesities: Future Choices

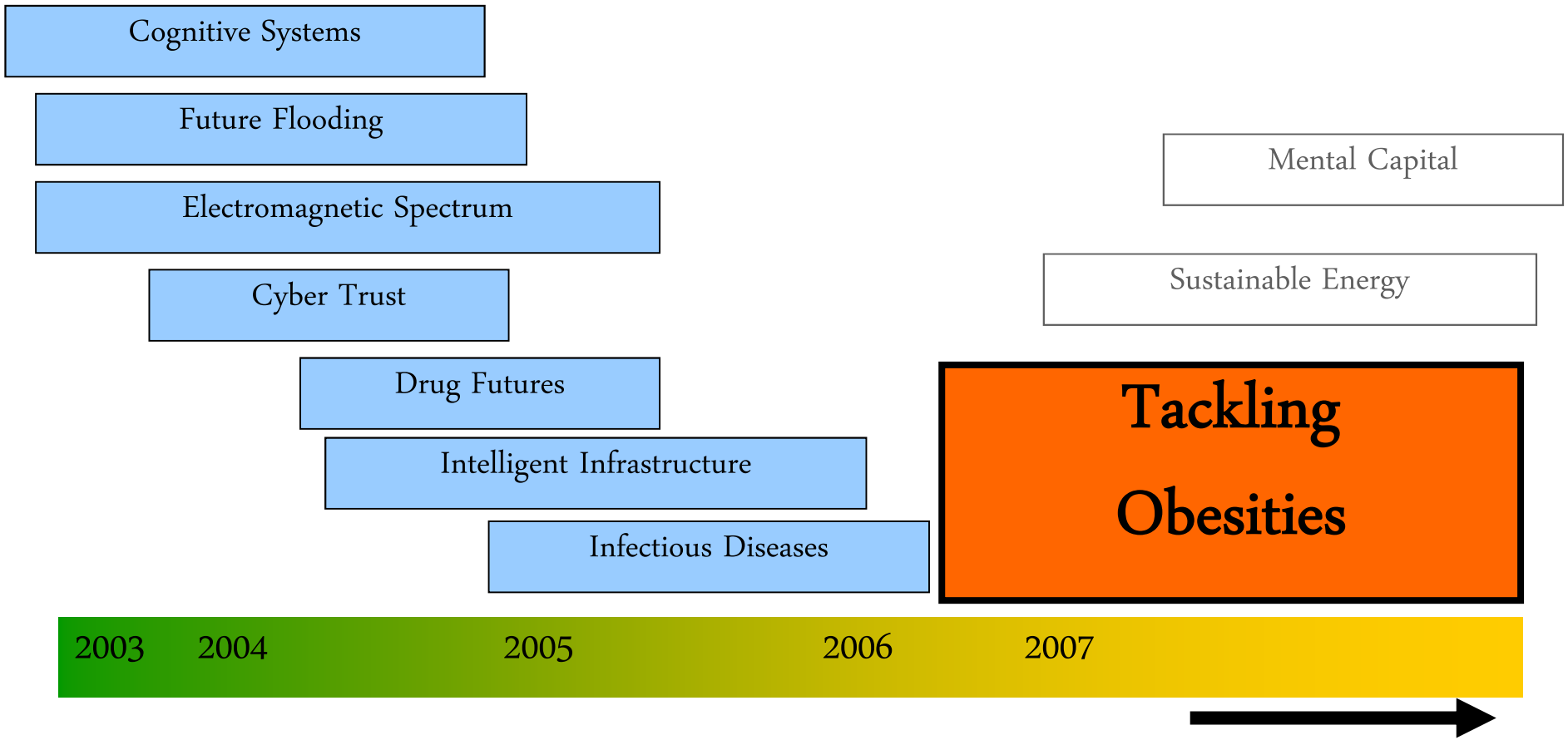
'To produce a long term vision of how we can deliver a sustainable response to obesity in the UK over the next 40 years'

www.foresight.gov.uk

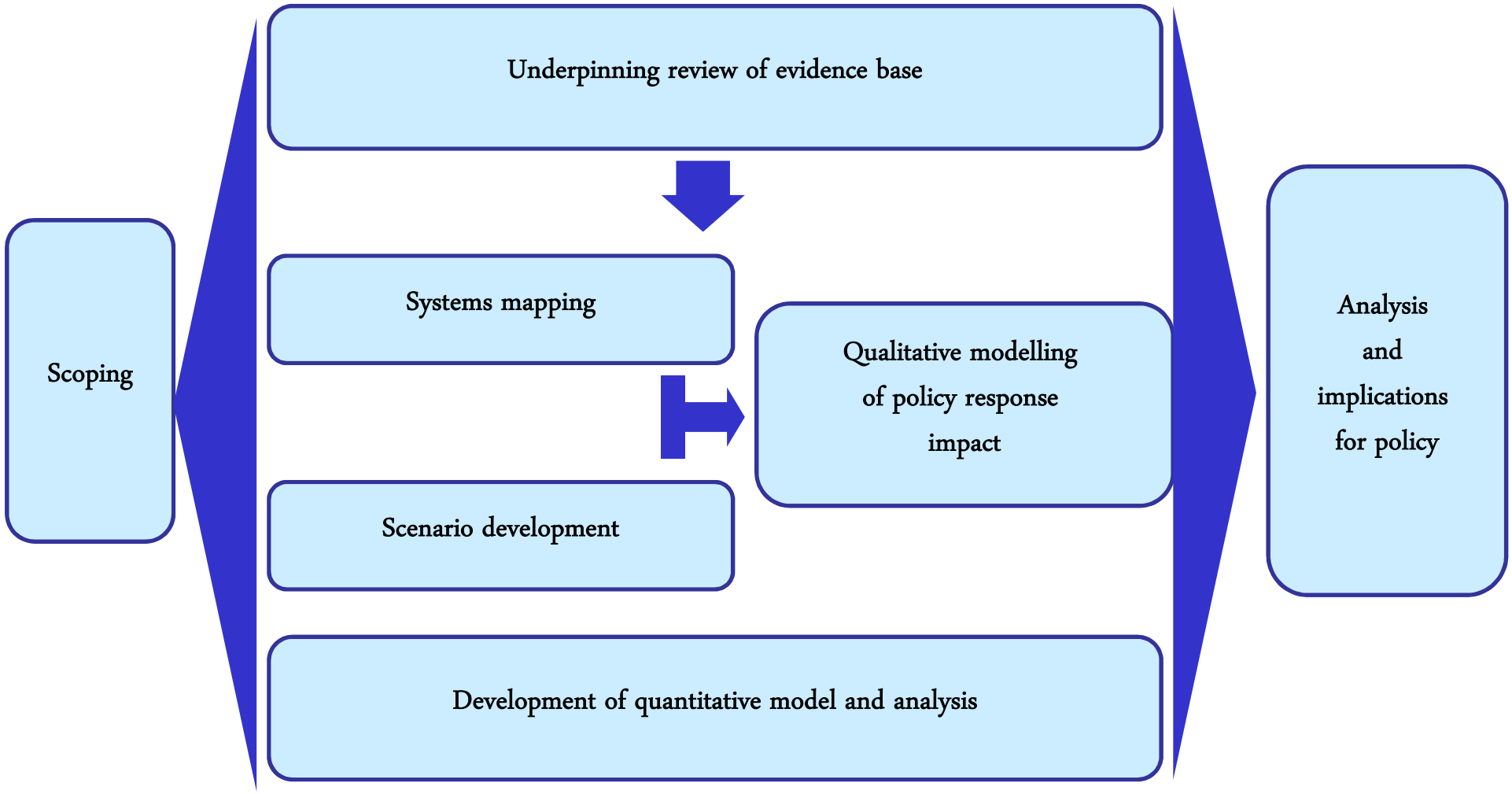
Foresight produces

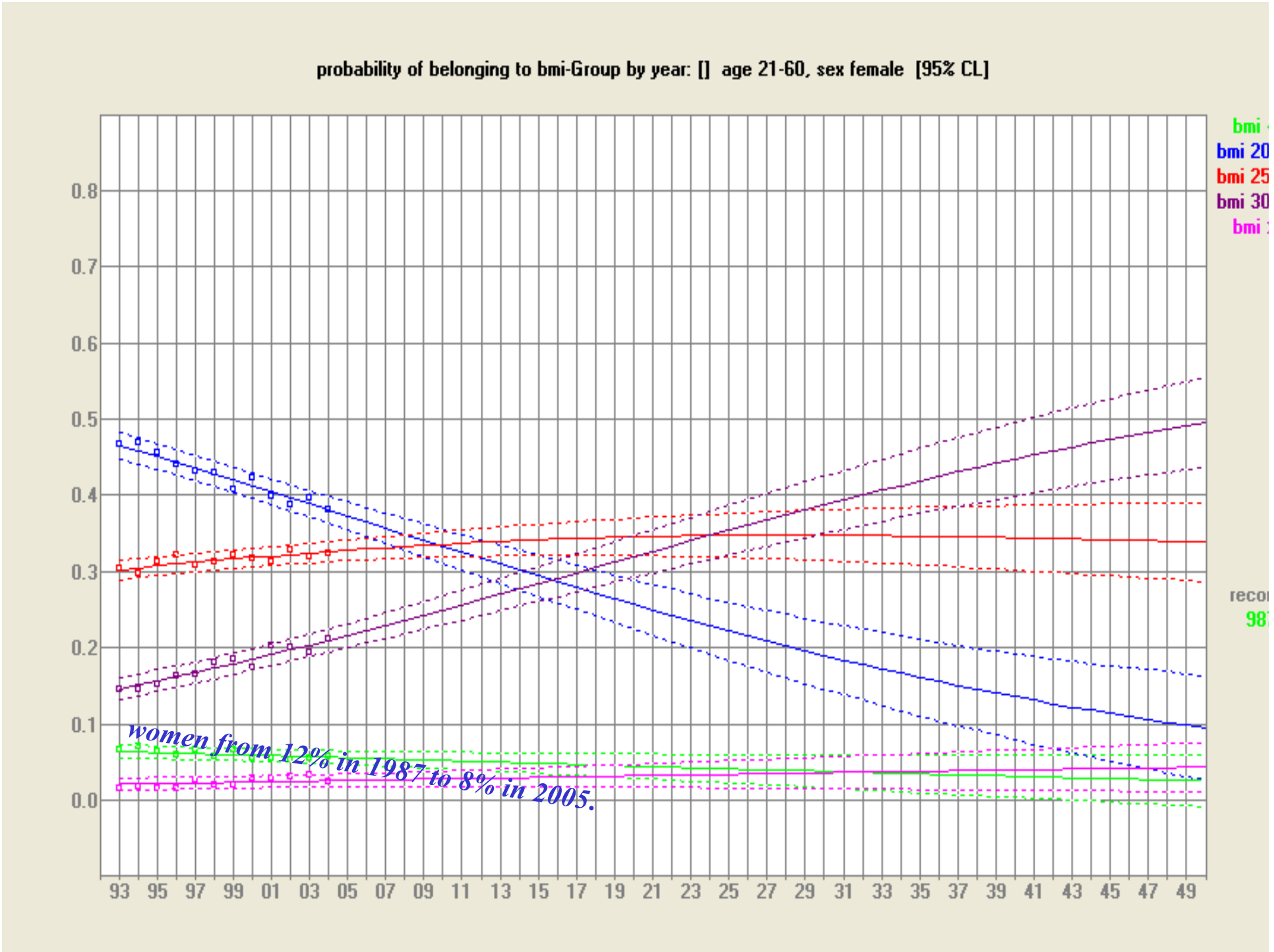
challenging visions of the future

to ensure effective strategies now



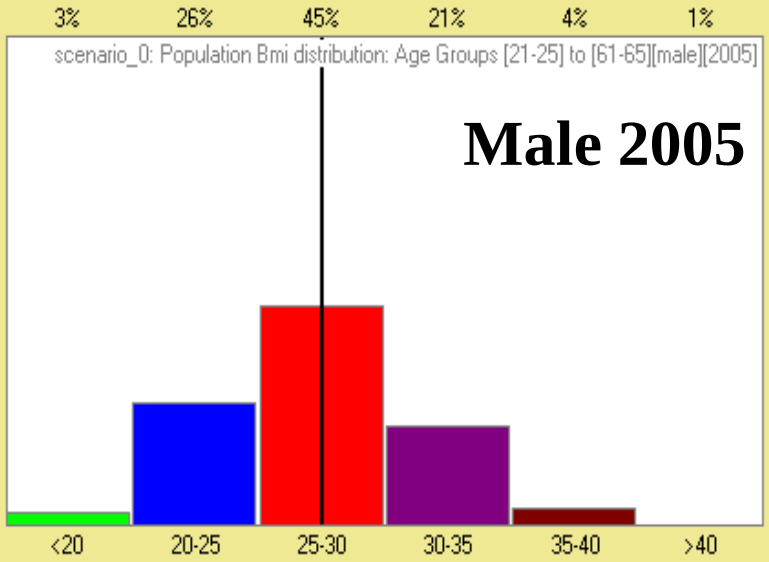
What we did

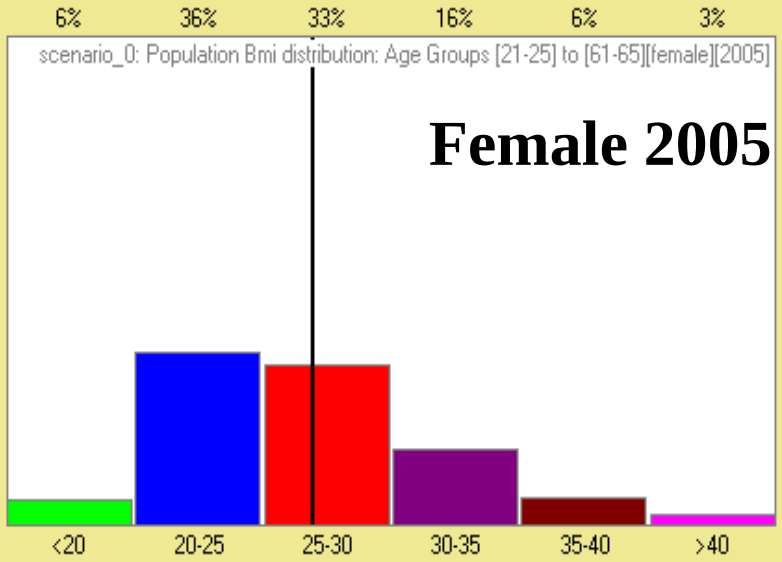

Underpinning review of evidence base
Scoping
Systems mapping
Qualitative modelling of policy response impact
Scenario development
Development of quantitative model and analysis
Analysis and implications for policy

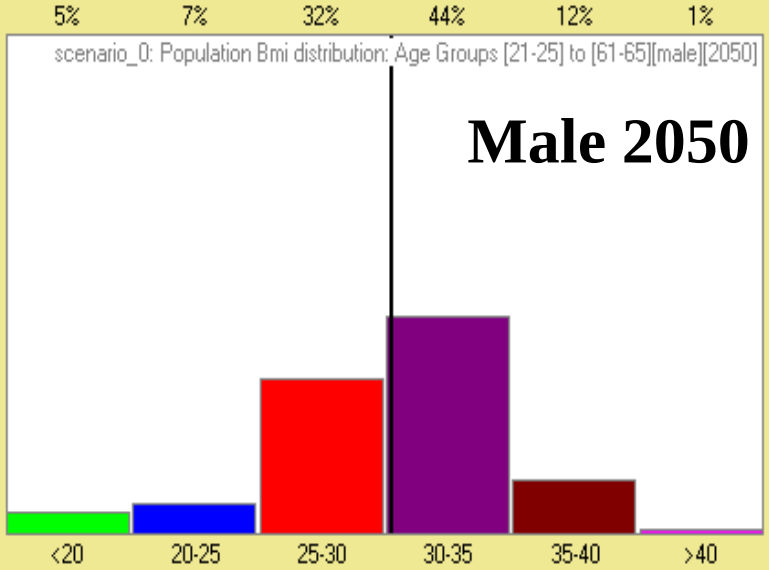

probability of belonging to bmi-Group by year: [] age 21-60, sex female [95% CL]
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
93 95 97 99 01 03 05 07 09 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49
bmi
bmi 20
bmi 25
bmi 30
bmi
women from 12% in 1987 to 8% in 2005.

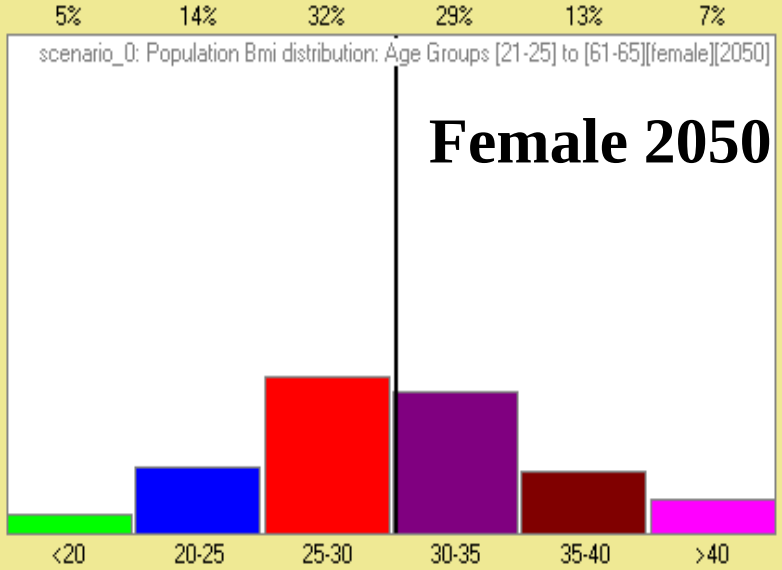

probability of belonging to bmi-Group by year: [] age 21-60, sex male [95% CL]
1993-2004 data set – male, 21-60
bmi <20
bmi 20-25
bmi 25-30
bmi 30-40
bmi >40
records:
86542
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
93 95 97 99 01 03 05 07 09 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49

Obesity distribution BMI units 2005 and 2050



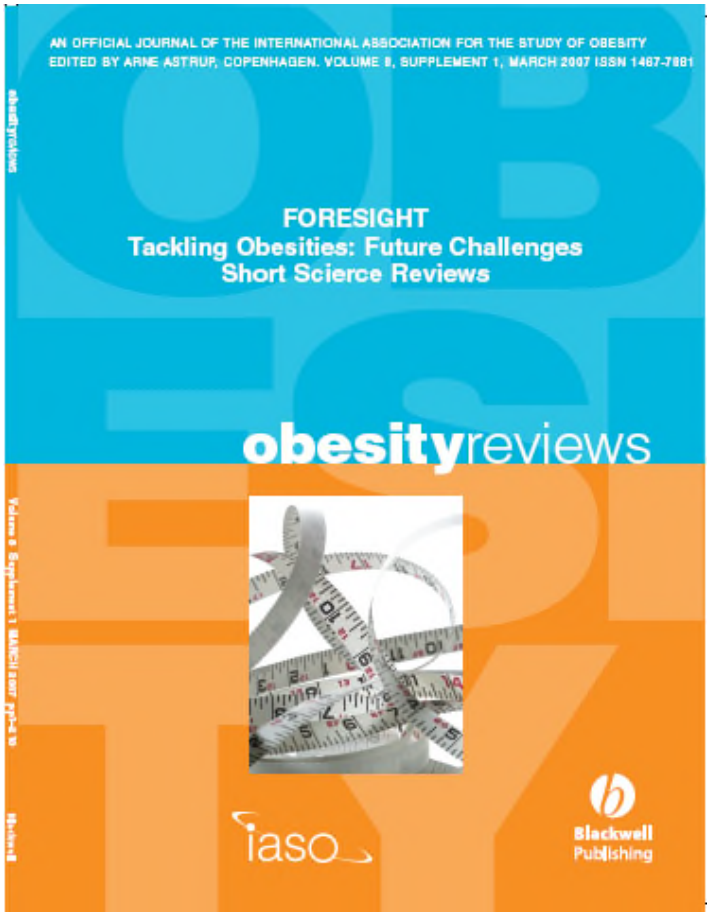


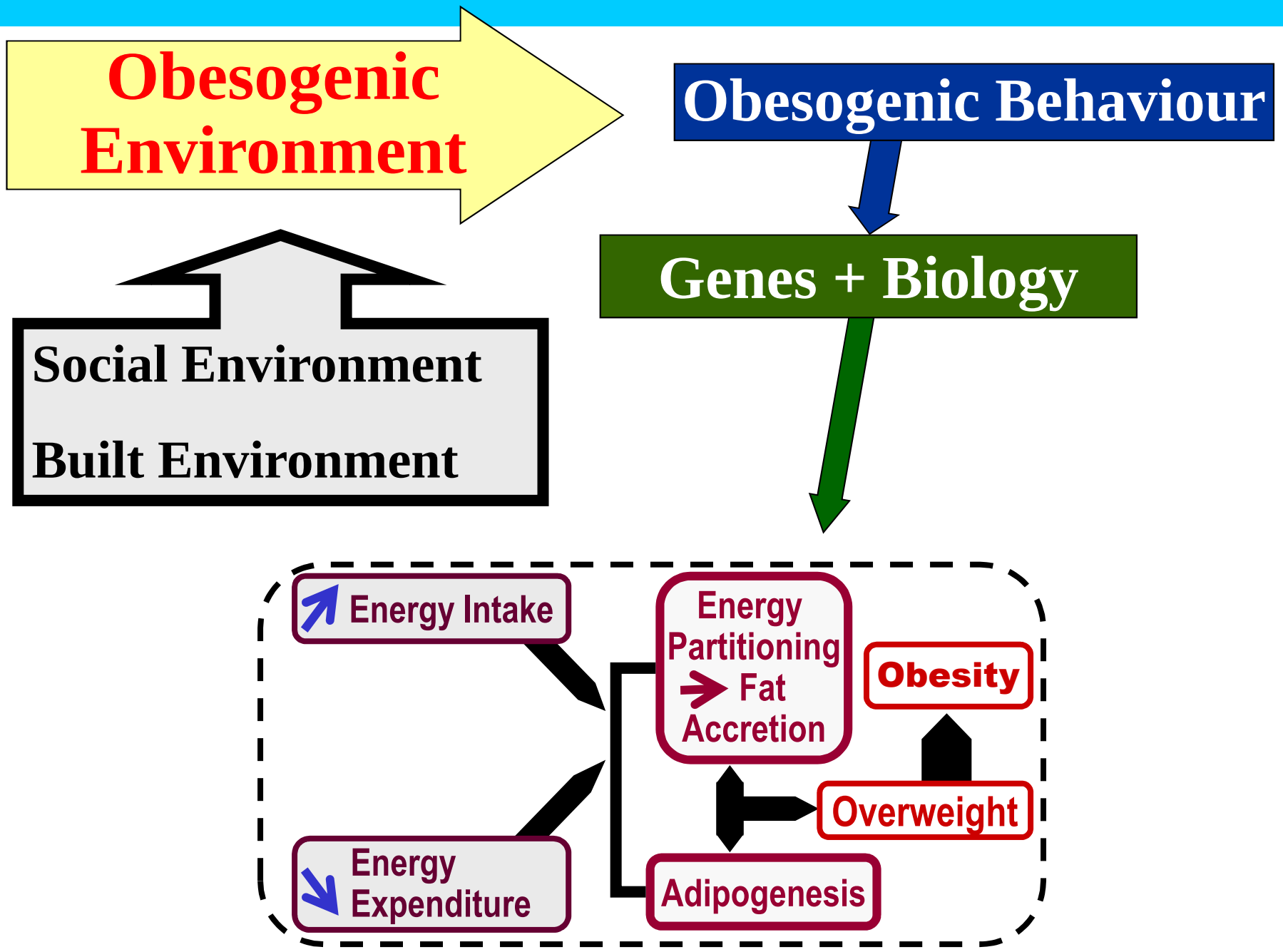




Science Review

- Epidemiology
- Basic biological processes
- The eating process
- Obesity determinants – intake & expenditure
- Behaviour change
- Activity environment
- Intervention strategies for prevention & treatment
- Lessons learned
- Policy & economic context
- Social & cultural context
- International context
- Ethics

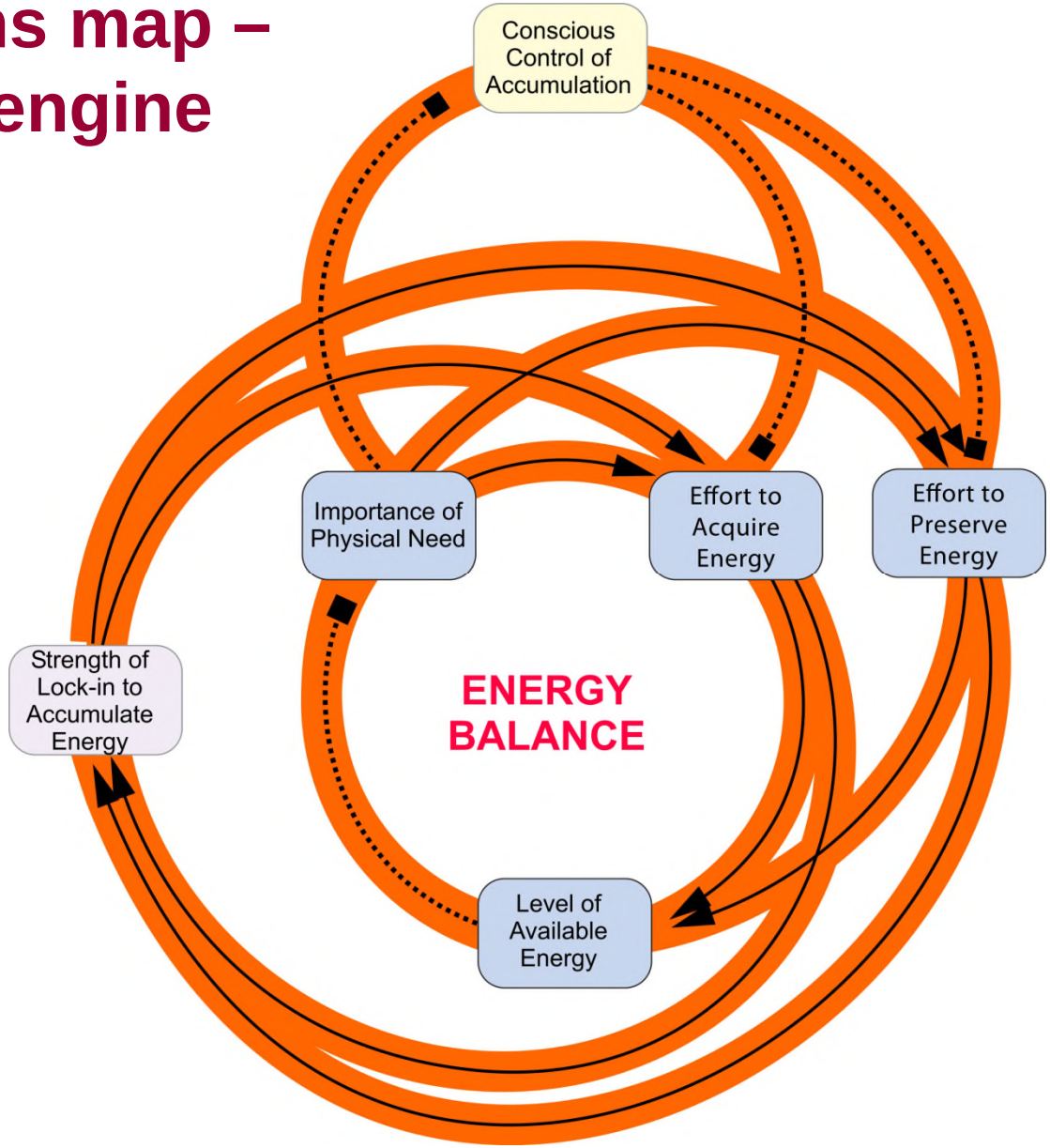



Obesogenic Environment
Obesogenic Behaviour
Genes + Biology
Social Environment
Built Environment
Energy Intake
Energy Expenditure
Energy Partitioning → Fat Accretion
Obesity
Overweight
Adipogenesis

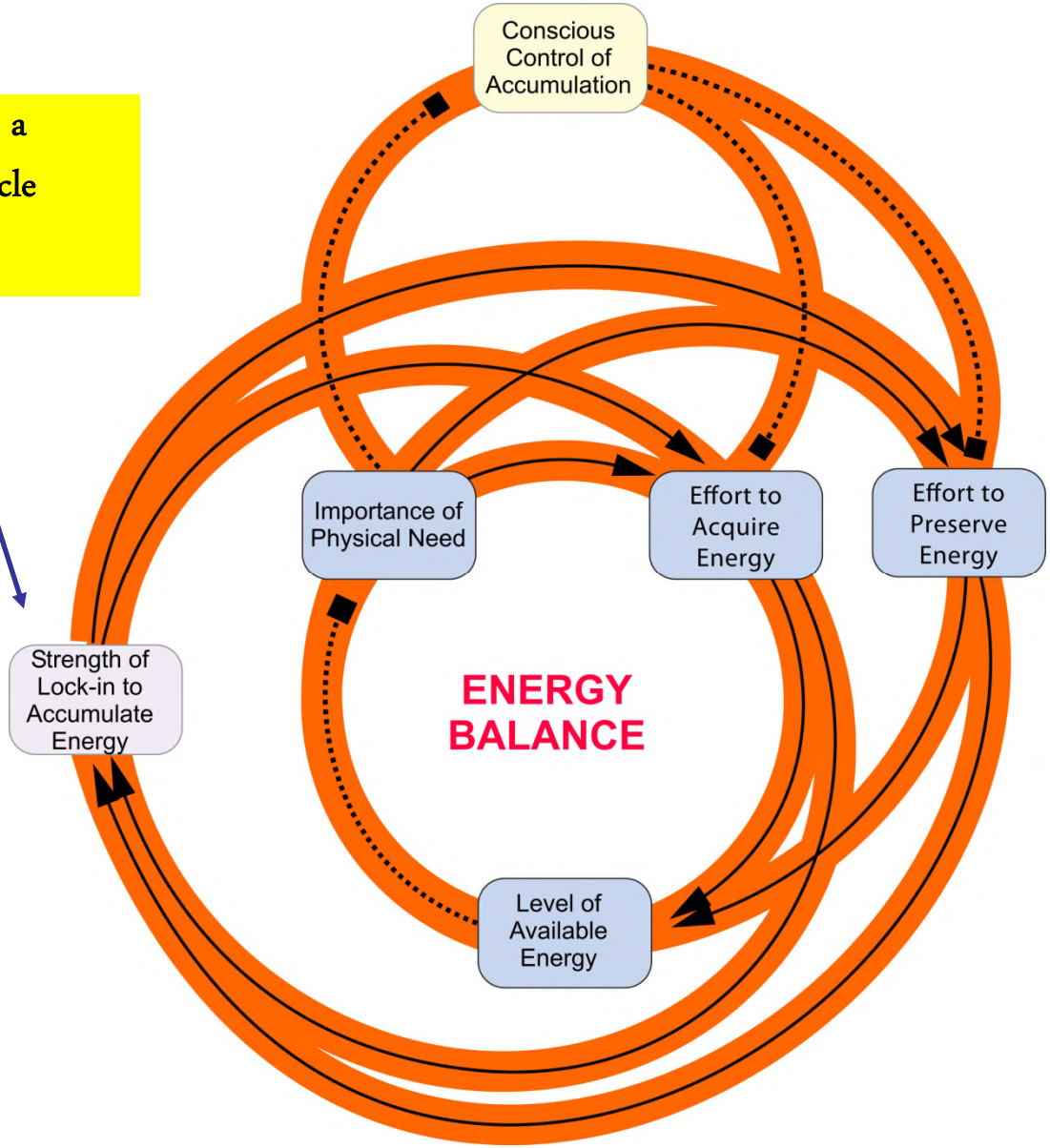
Key issues

- How is the biological weight control system programmed?
- Conscious mechanisms override appetite regulation
- Force of dietary habits locks individuals into unhealthy eating patterns
- Low levels of regular physical activity
- Psychological ambivalence about making lifestyle choices
- Limited impact of obesity treatment

Systems map – core engine

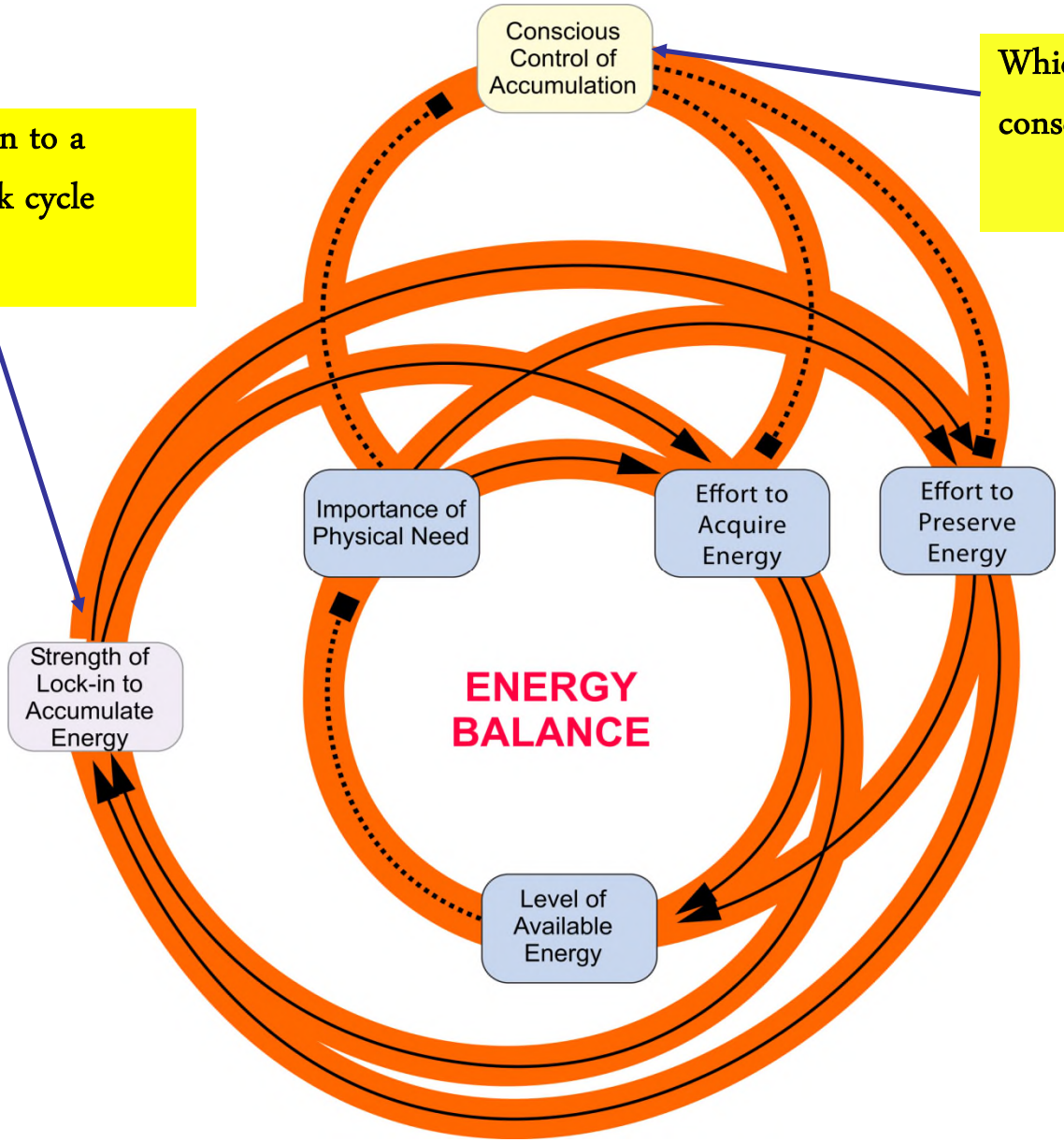


We are locked in to a positive feedback cycle

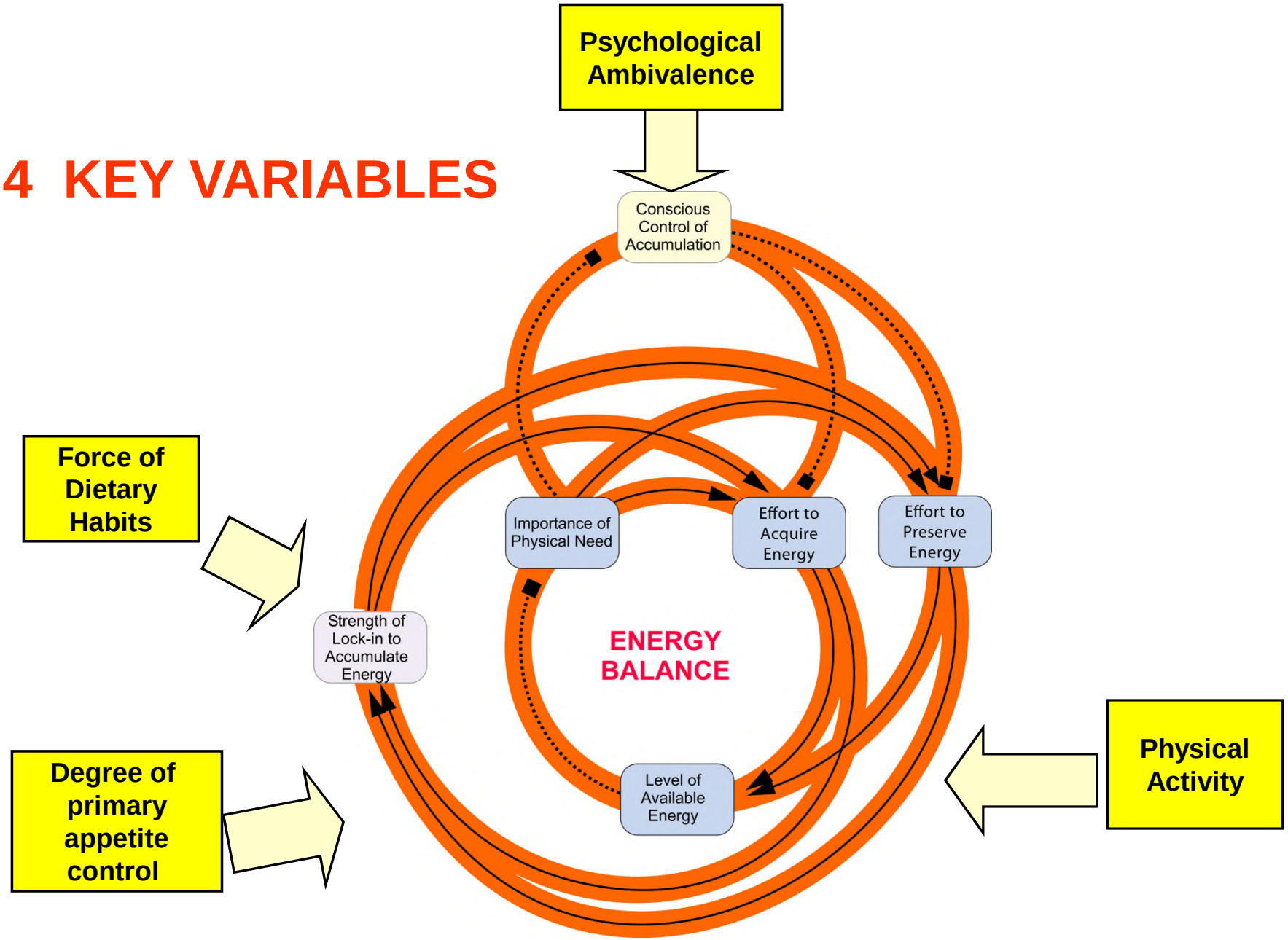


We are locked in to a positive feedback cycle

Which can only be overriden by conscious control



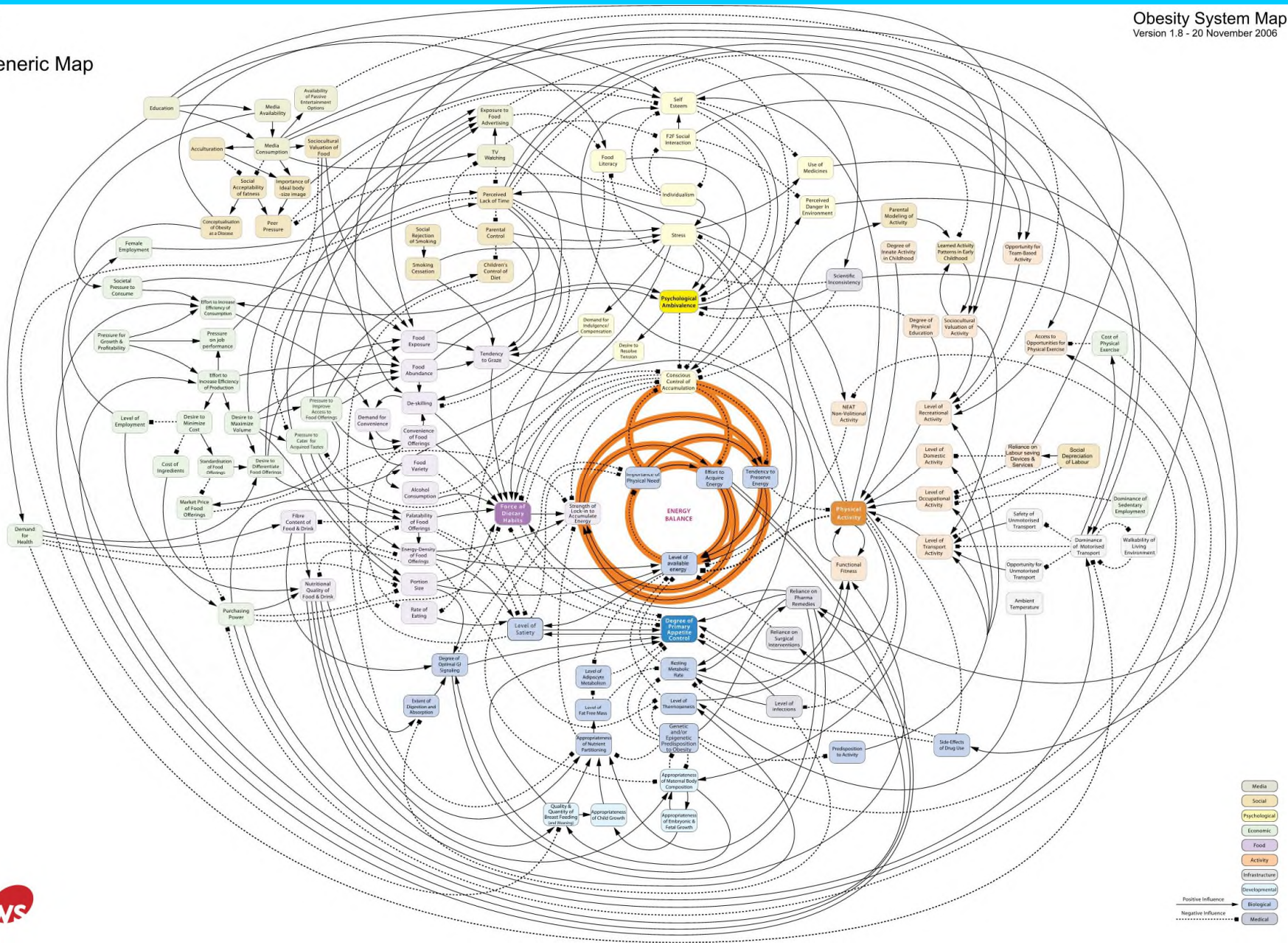
4 KEY VARIABLES



Map 0

Full Generic Map

Obesity System Map
Version 1.8 - 20 November 2006



Map 0

Full Generic Map

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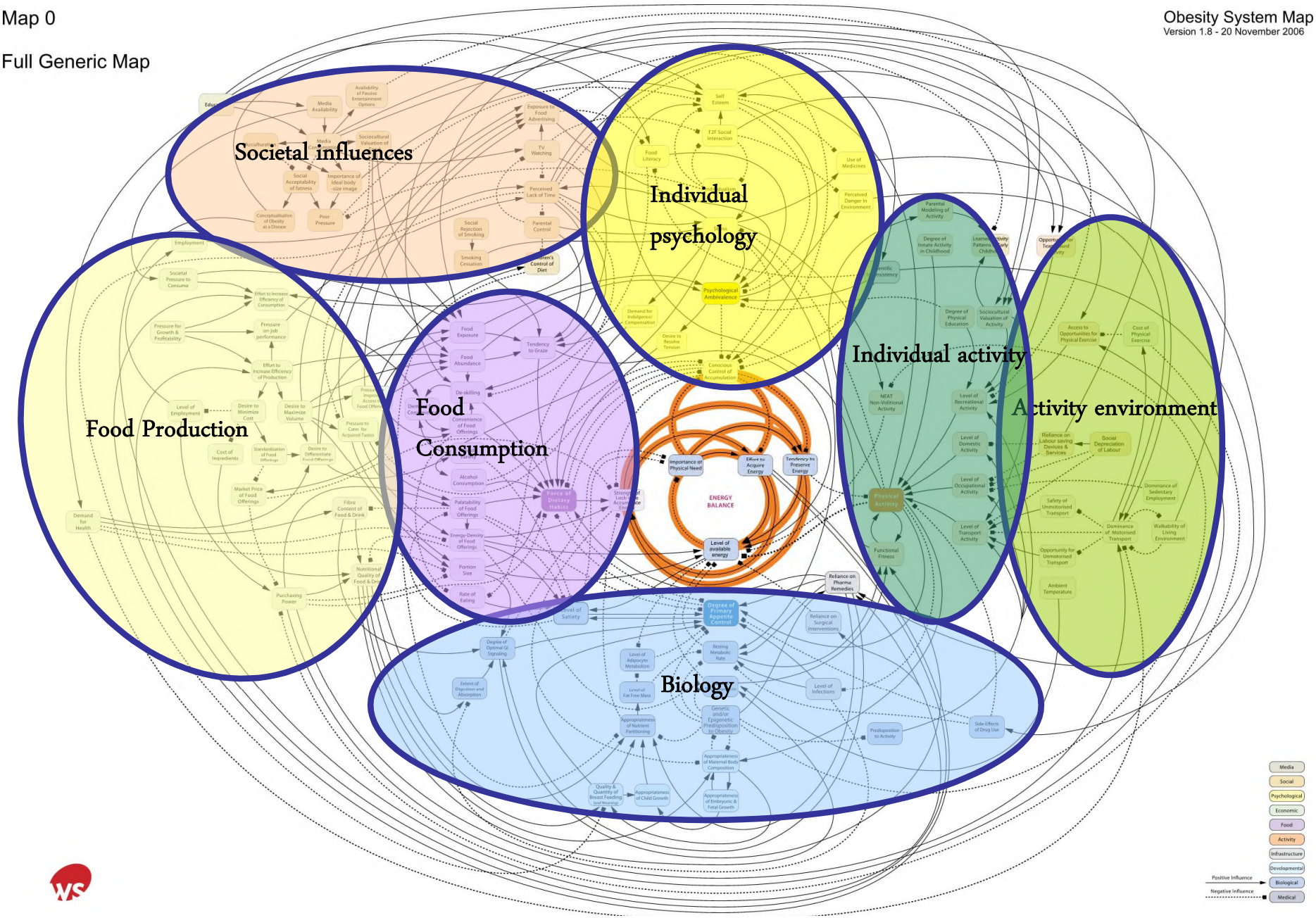
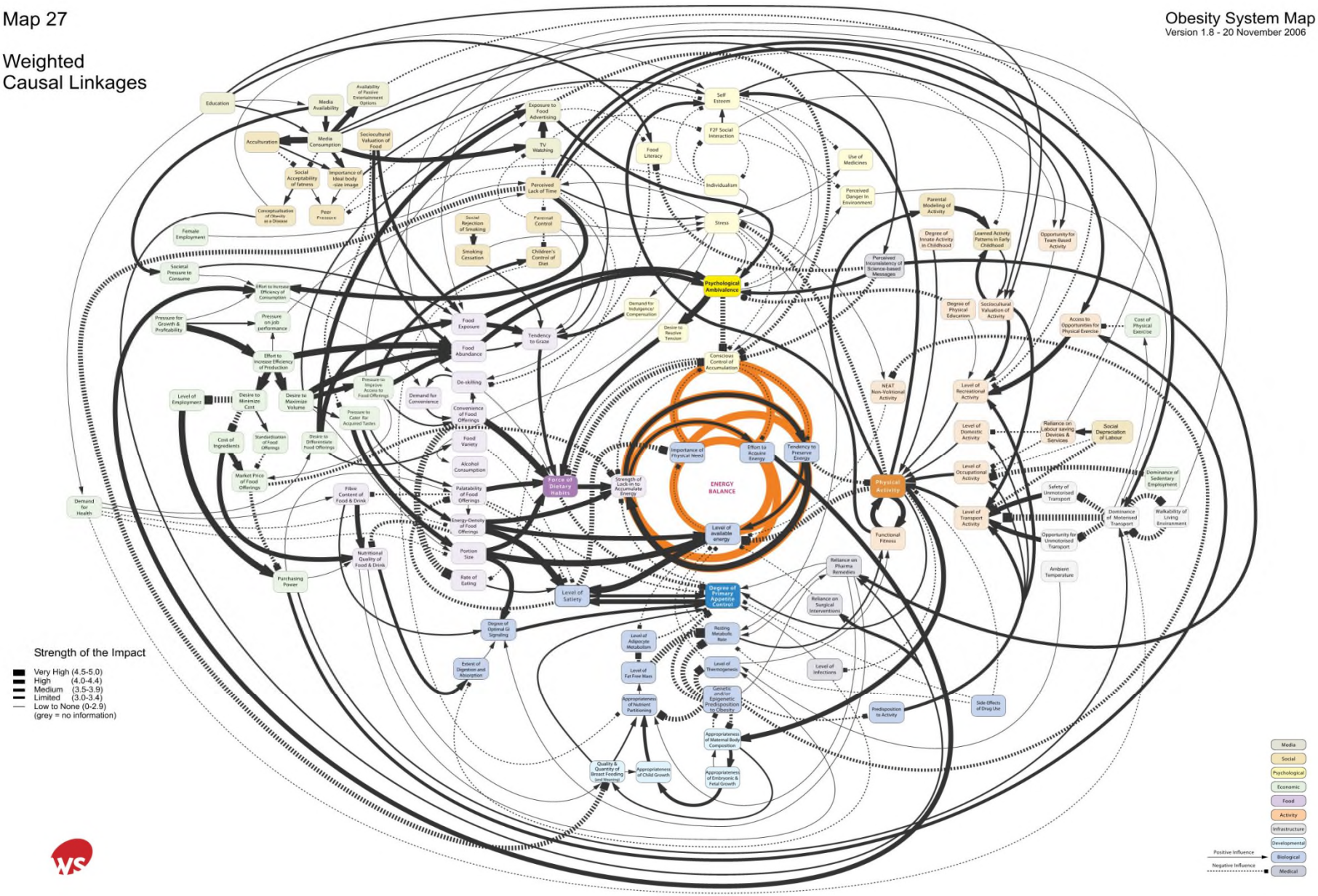


Map 27

Weighted
Causal Linkages

Obesity System Map
Version 1.8 - 20 November 2006



Key variables

- Central 'engine' and principle of 'lock-in'

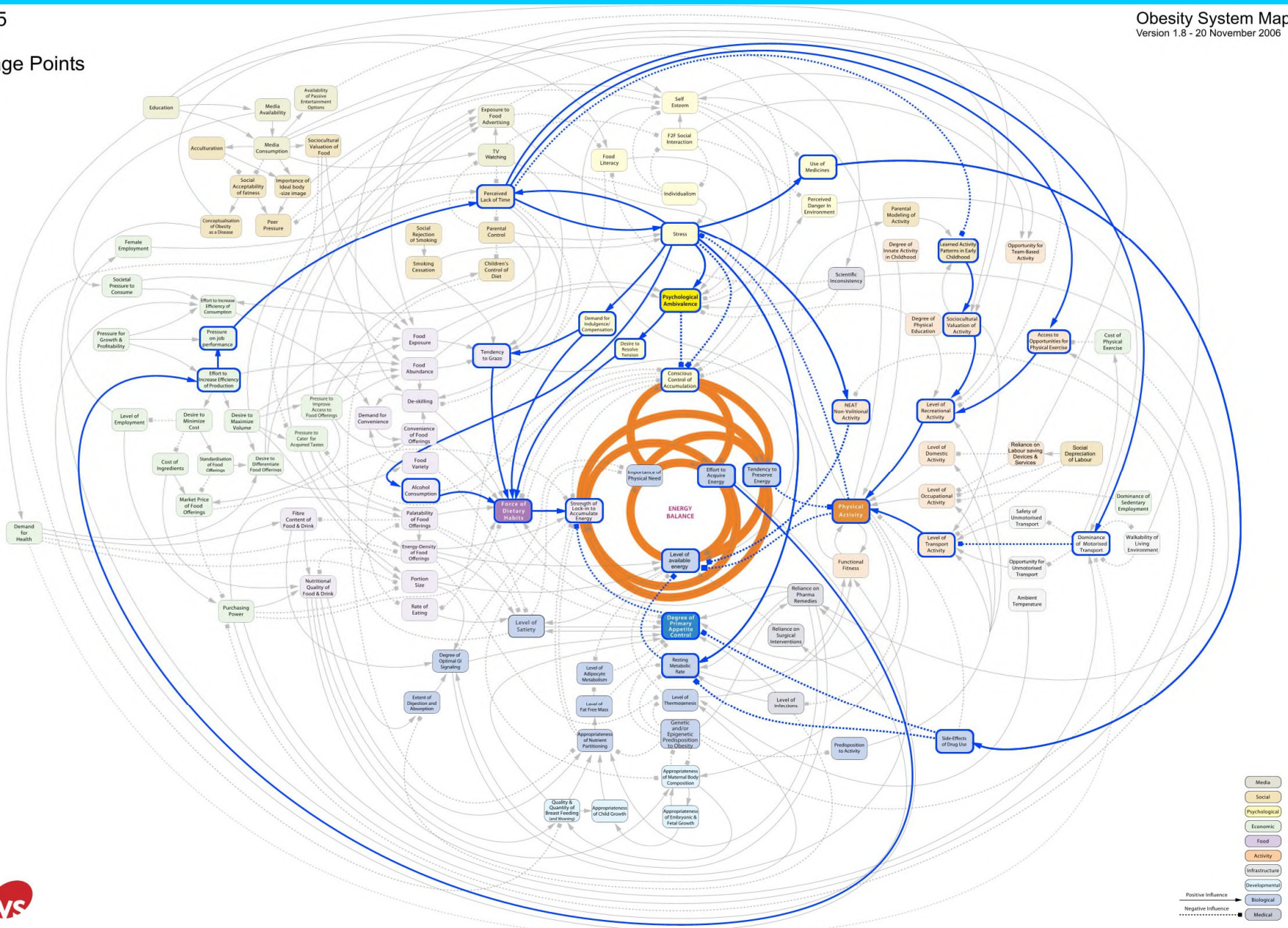
- Key variables
  - Primary appetite control by brain
  - Force of dietary habits
  - Level of physical activity
  - Psychological ambivalence

- Other leverage points
  - Education
  - Grazing
  - Purchasing power
  - Stress
  - Maternal body composition

Map 25

Leverage Points
Stress

Obesity System Map
Version 1.8 - 20 November 2006



Lessons from the evidence

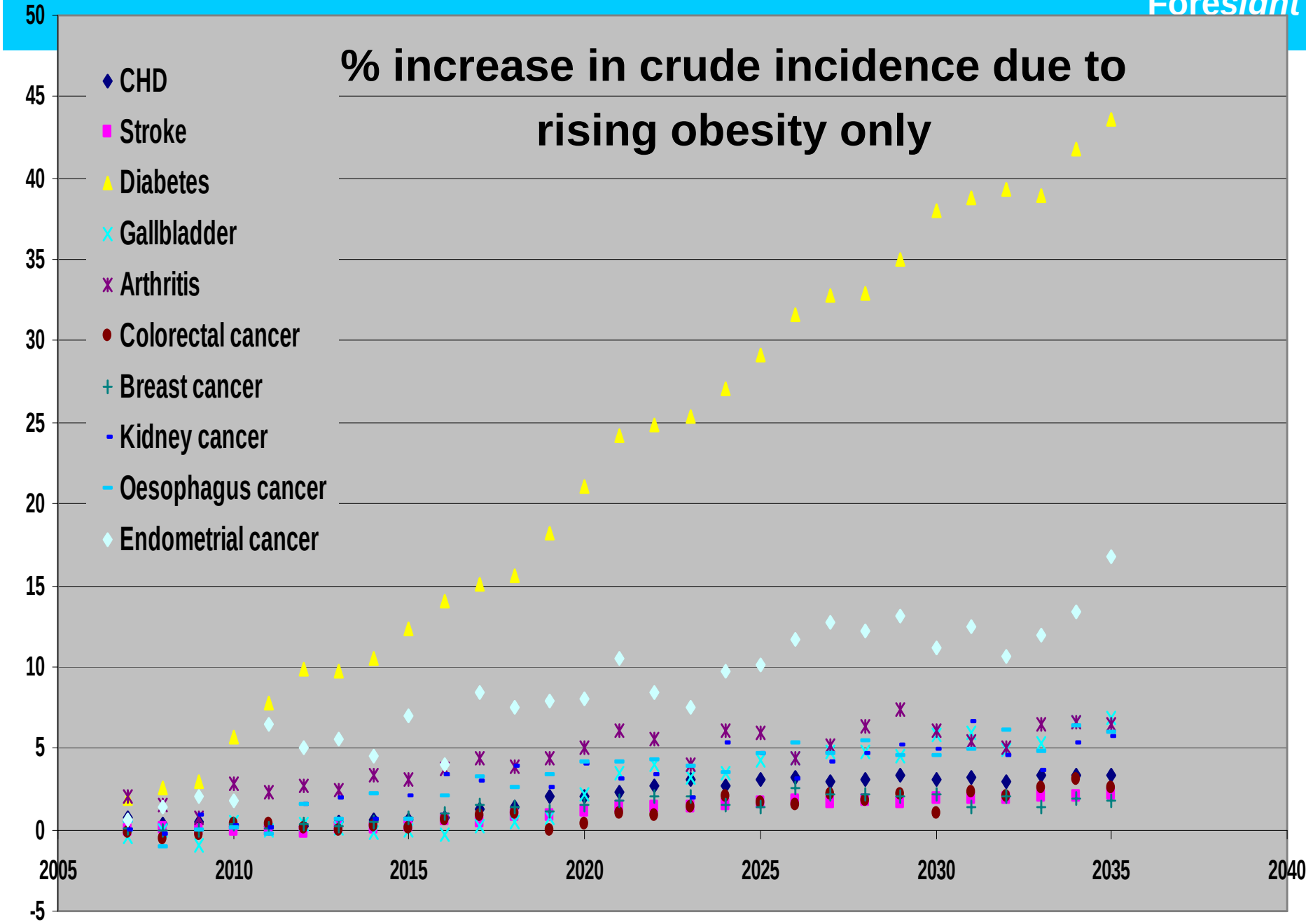
- The determinants of obesity and complex - obesity develops in individuals but within a social & cultural context
- Obesity cuts across other policy areas and demands an integrated approach
- Limited evidence for intervention
- Tension between developing a solid evidence base and pressure to act quickly

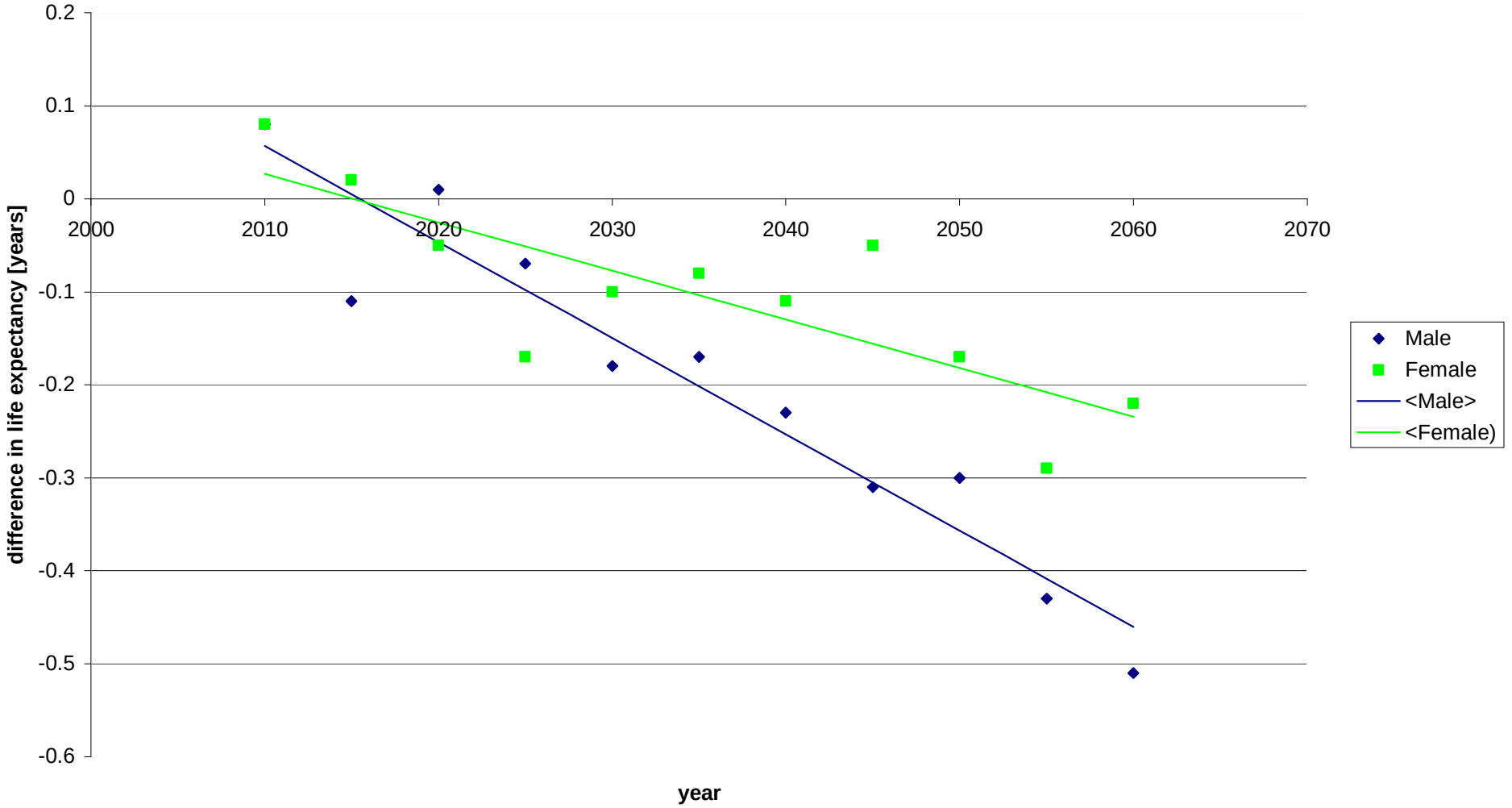
To examine the effect of obesity

on disease incidence and life expectancy

Simulation 0: No intervention to increasing obesity anticipated

Simulation 7: Current obesity levels held (stochastically) constant.


% increase in crude incidence due to rising obesity only
CHD
Stroke
Diabetes
Gallbladder
Arthritis
Colorectal cancer
Breast cancer
Kidney cancer
Oesophagus cancer
Endometrial cancer
50
45
40
35
30
25
20
15
10
5
0
-5
2005
2010
2015
2020
2025
2030
2035
2040



Expected net loss of period life expectancy (in years) for each sex by year attributable only to growing obesity levels compared with no change from current levels (Sim 0 – Sim 7)

Estimated future NHS obesity disease related costs in cost/year; £ Billion, assuming obesity growth

	2007	2015	2025	2050
Diabetes	2.0	2.2	2.6	3.5
CHD	3.9	4.7	5.5	6.1
Stroke	4.7	5.2	5.6	5.5
Colorectal cancer	0.45	0.50	0.53	0.50
Breast cancer	0.27	0.29	0.32	0.31
NHS cost (all related diseases)	**17.4**	**19.5**	**21.5**	**22.9**

Estimated costs of obesity growth

£Billion/year (constant prices)

Year	2007	2015	2025	2050
Extra future NHS costs	-	2.2	4.1	5.5
Estimated NHS costs	1.0	3.2	5.1	6.5
% NHS cost @ £70 billion	1.4%	4.6%	7.3%	9.3%
Extra future total costs	-	15	29	38
Total costs of obesity	7	22	36	45

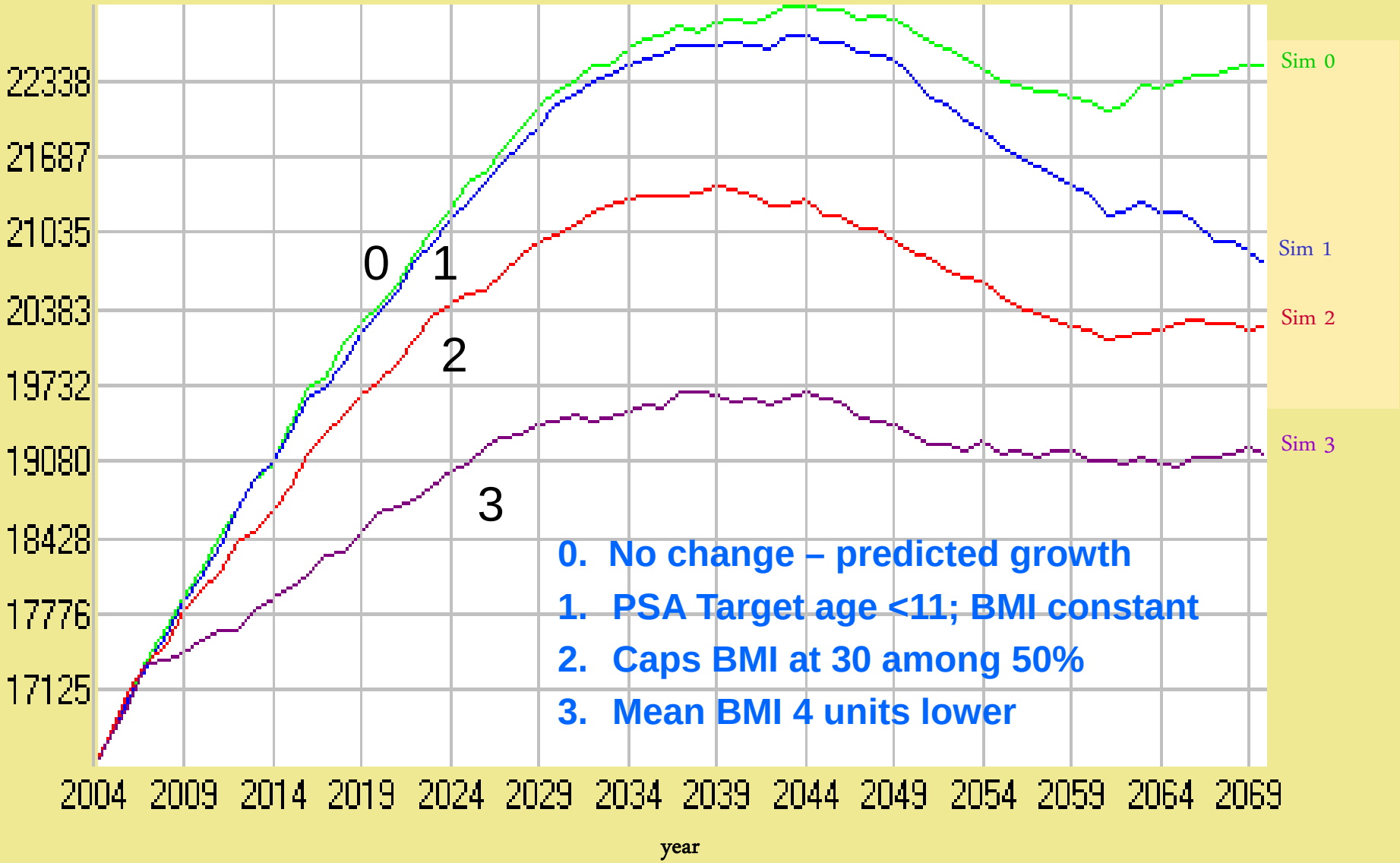
Sim 0: 2008-2070; No interventions

Sim 1: 2008-2070; Age{6-10} no BMI growth

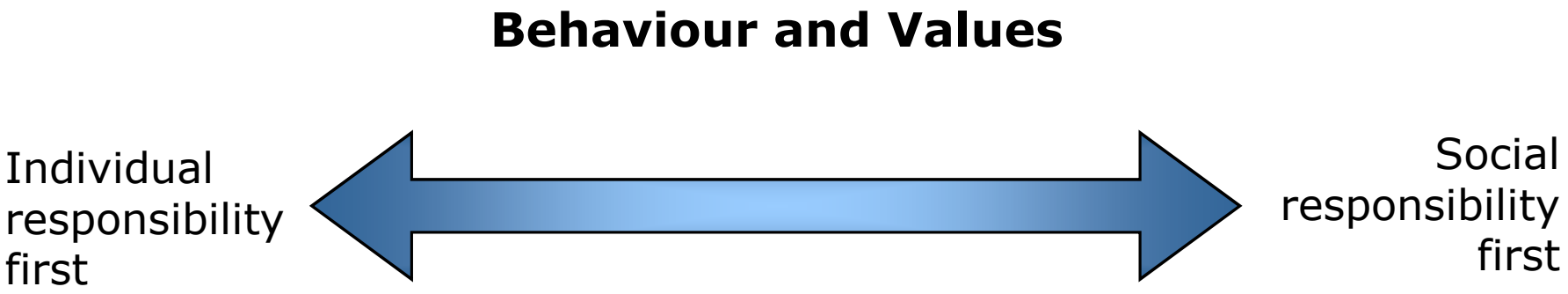
Sim 2: 2008-2070; All ages; BMI cap 30; caps 50%

Sim 3: 2008-2070; Ages 20-100; BMI shift- 4.0

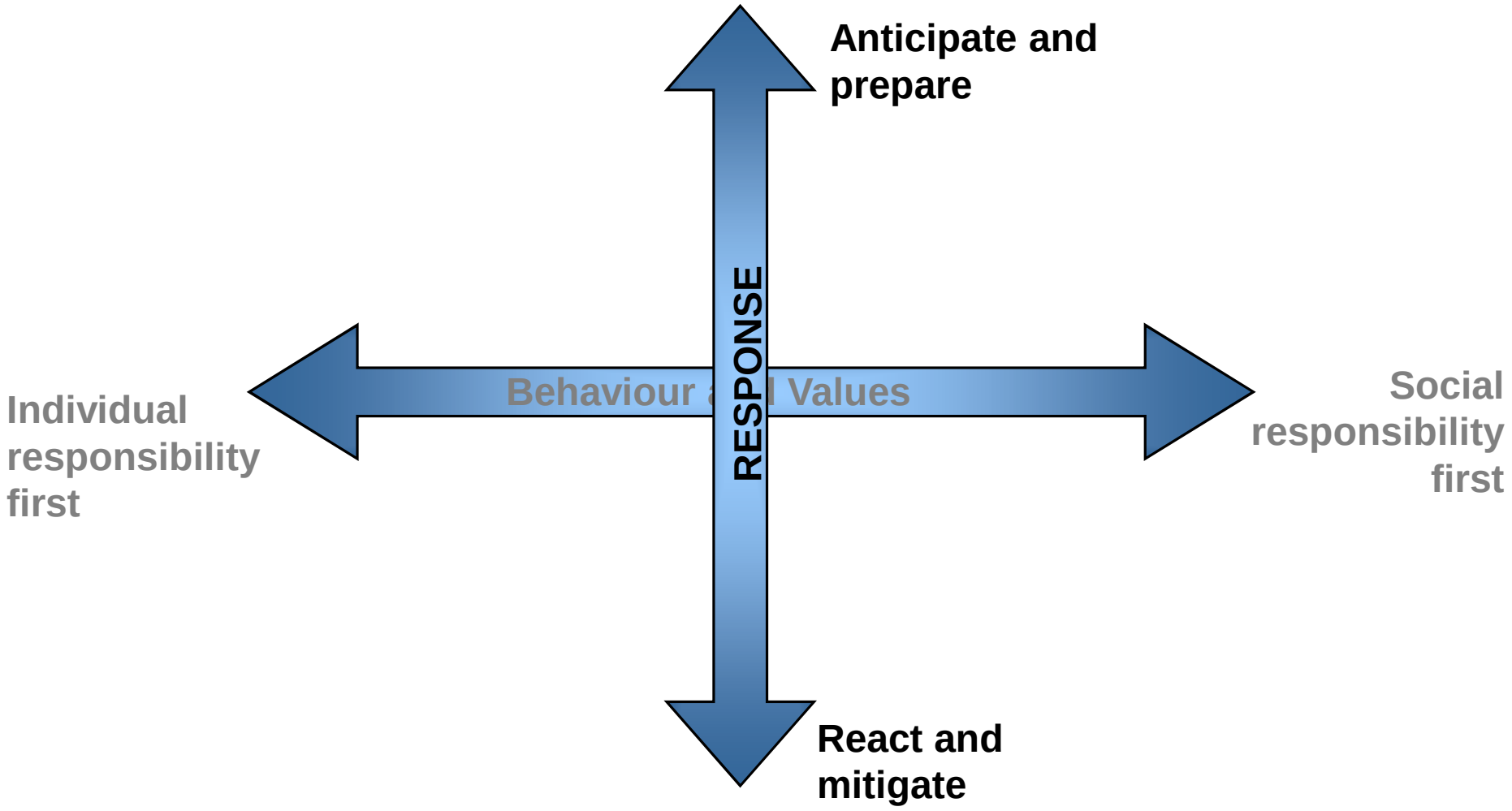
Total NHS Costs (M£/year)



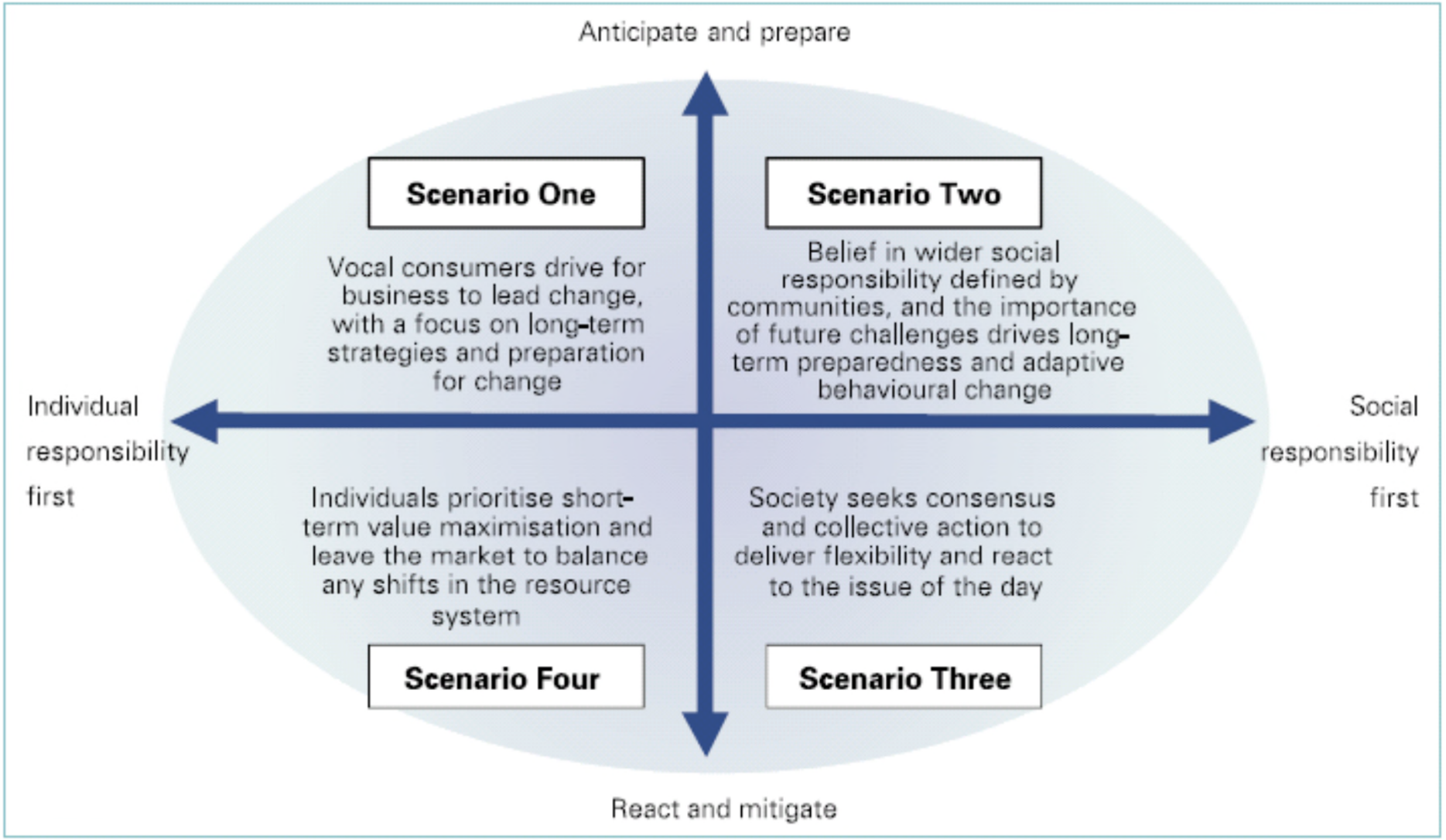
Project scenarios: societal values



Project scenarios: Our response to challenges



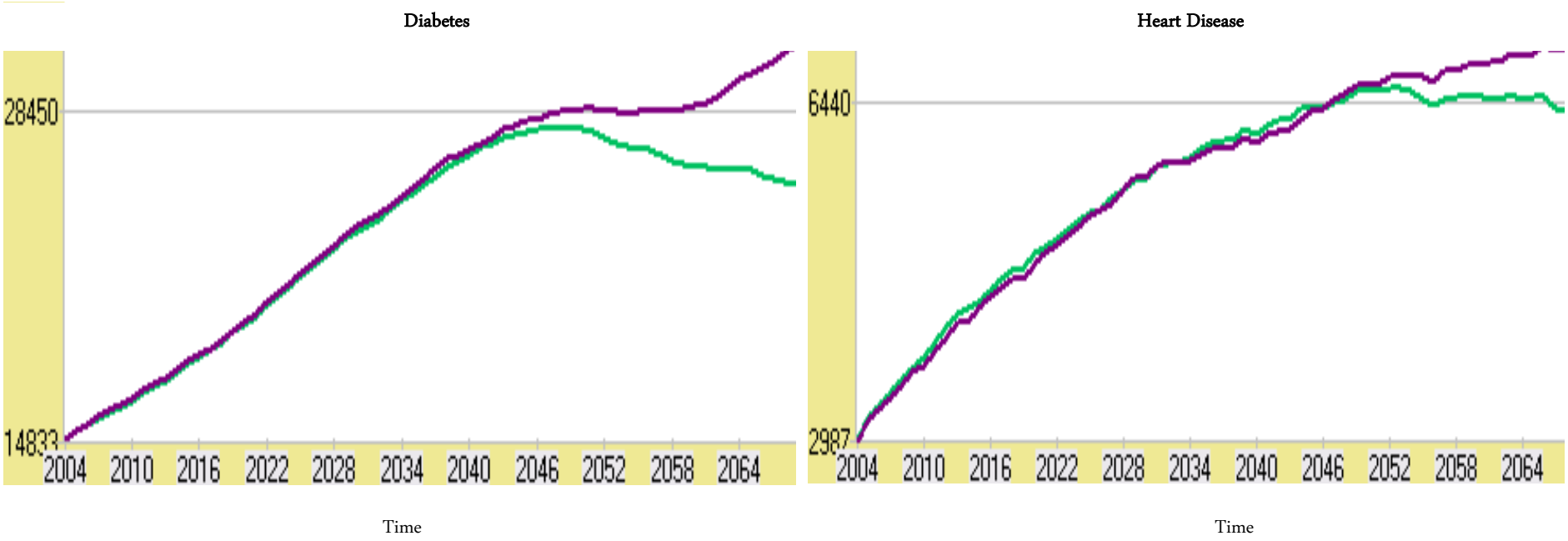
Scenario summary



Decreasing levels of obesity related disease will require more intervention

Significant time lag to seeing effect of intervention on BMI to impact on disease levels.

Disease incidence: no intervention (purple) vs preventing obesity in children 6-11 (green)



Response Options	SC1	SC2	SC3	SC4
BUILT ENVIRONMENT & TRANSPORT				
Health planning criteria in all procedures				
Improve perceptions of safety				
Increase walkability and cyclability				
HEALTH				
Targeted interventions				
Population interventions				
Focus on consequences				
RESEARCH				
Invest in post-hoc solution				
Evaluation toolkits				
FISCAL				
Tax obesity promoting food				
All organisations responsible for employee health				
Individually targeted fiscal measures				
EDUCATION				
Food literacy and skills programmes				
REGULATION				
Control food exposure				
SOCIAL STRUCTURE				
Directive approach to changing cultural norm				
Technology to support individual choice				
FAMILY				
Early life intervention				
Penalise parents for unhealthy children				

Map 33

Mapping of Policy Response Ideas

Obesity System Map
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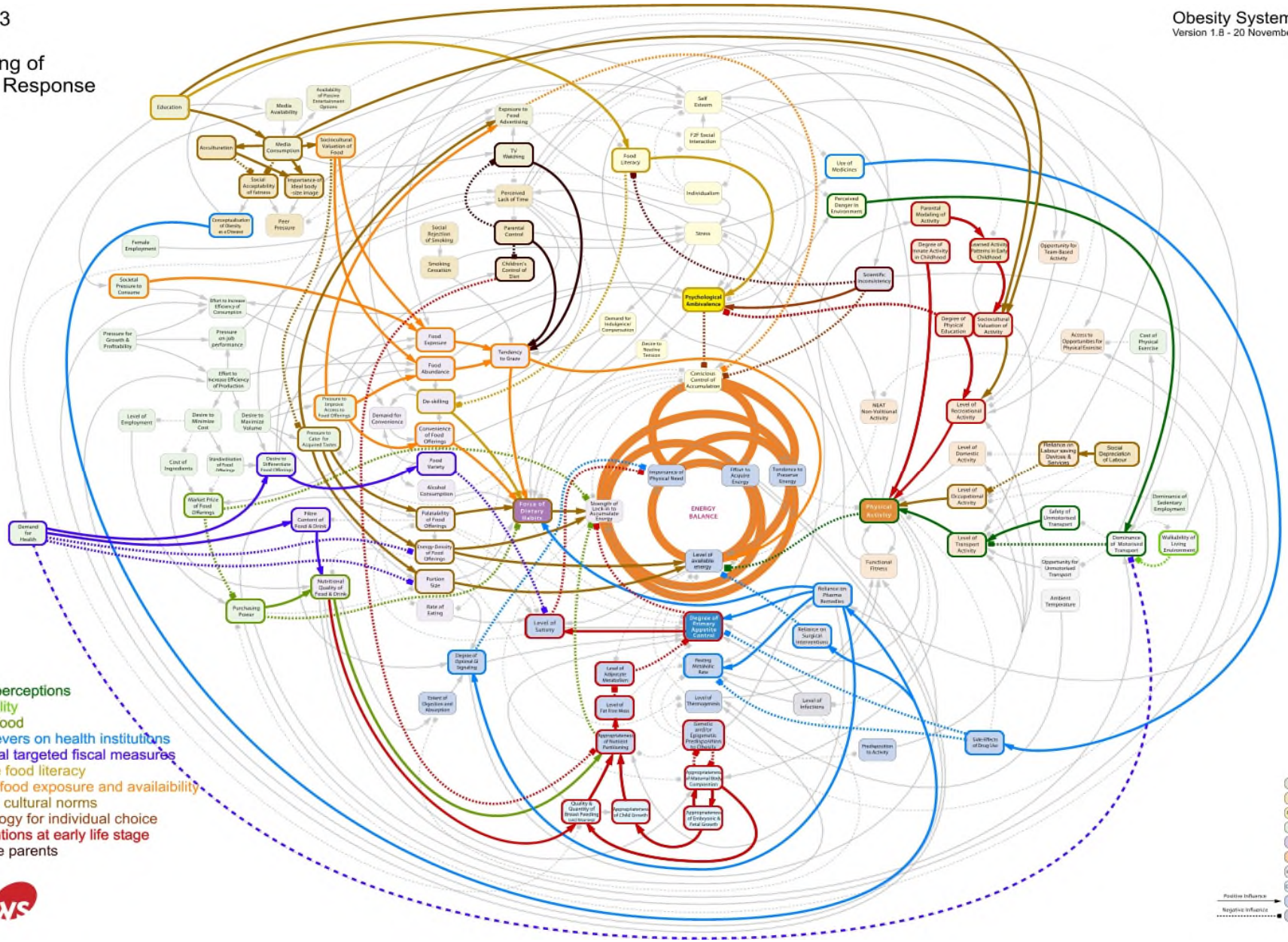
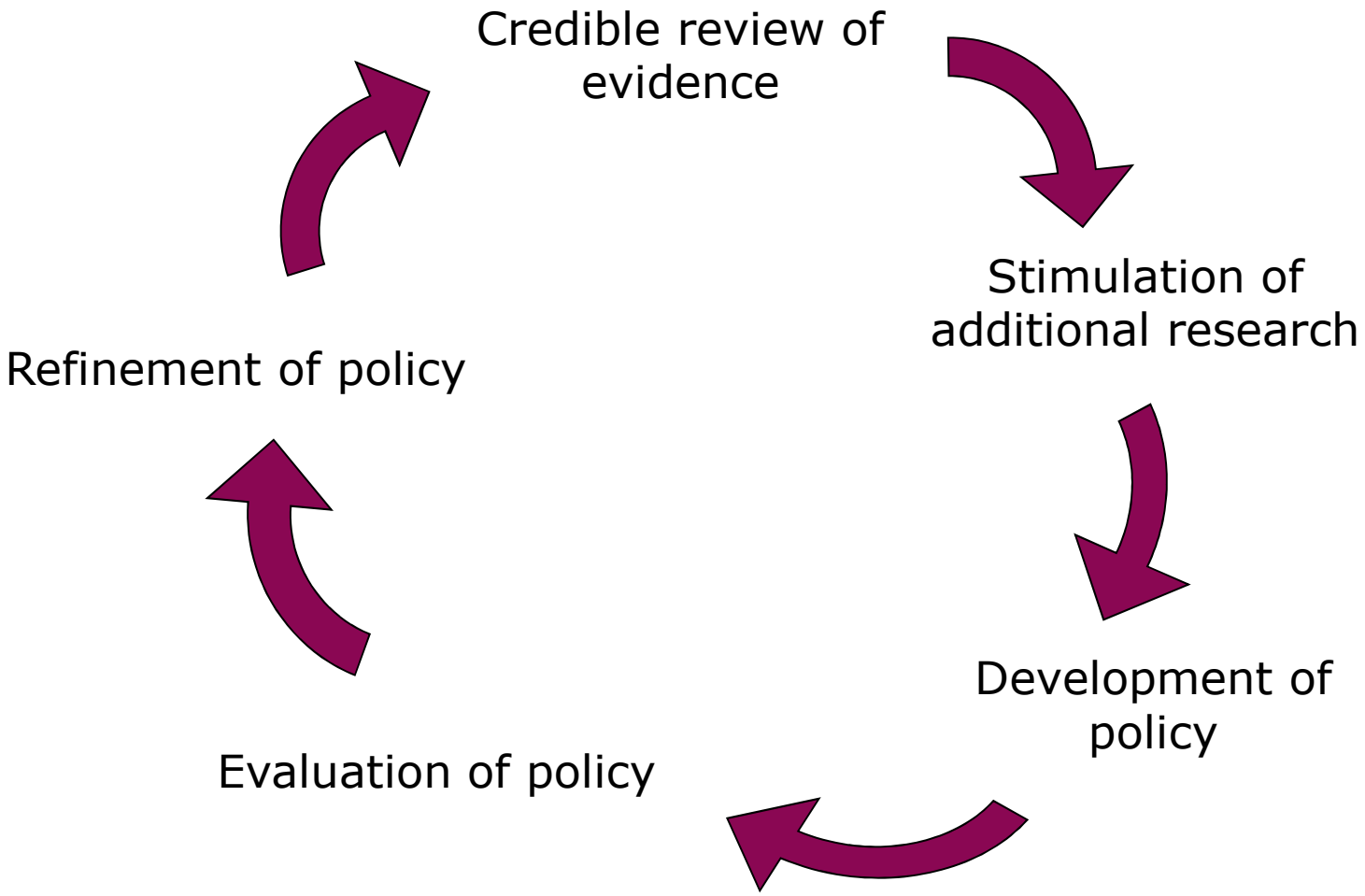


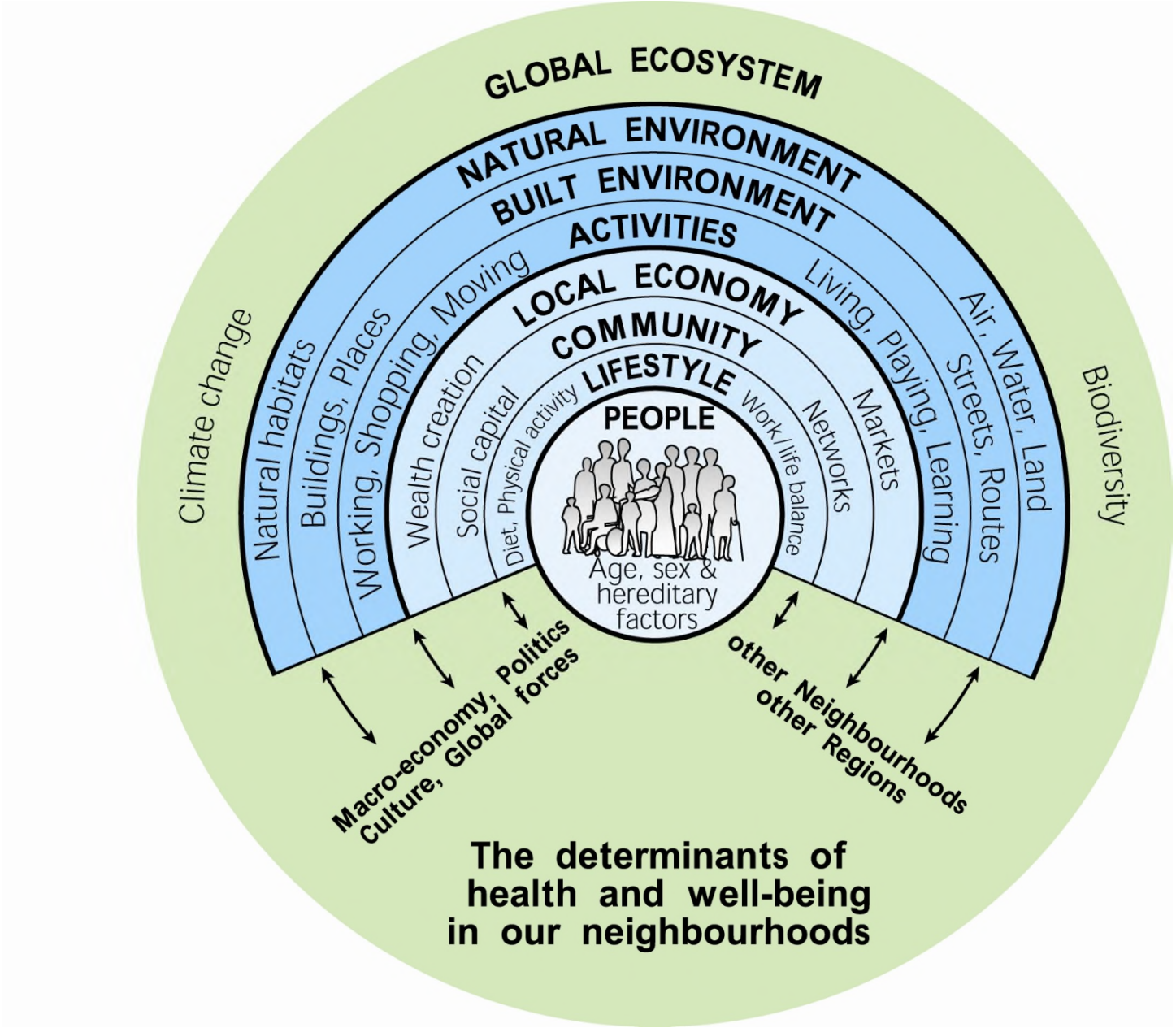
2. Safety perceptions
3. Walkability
9. Tax on food
10. Fiscal levers on health institutions
11. Individual targeted fiscal measures
12. Improve food literacy
13. Control food exposure and availability
14. Change cultural norms
15. Technology for individual choice
16. Interventions at early life stage
17. Penalise parents

Most promising policies

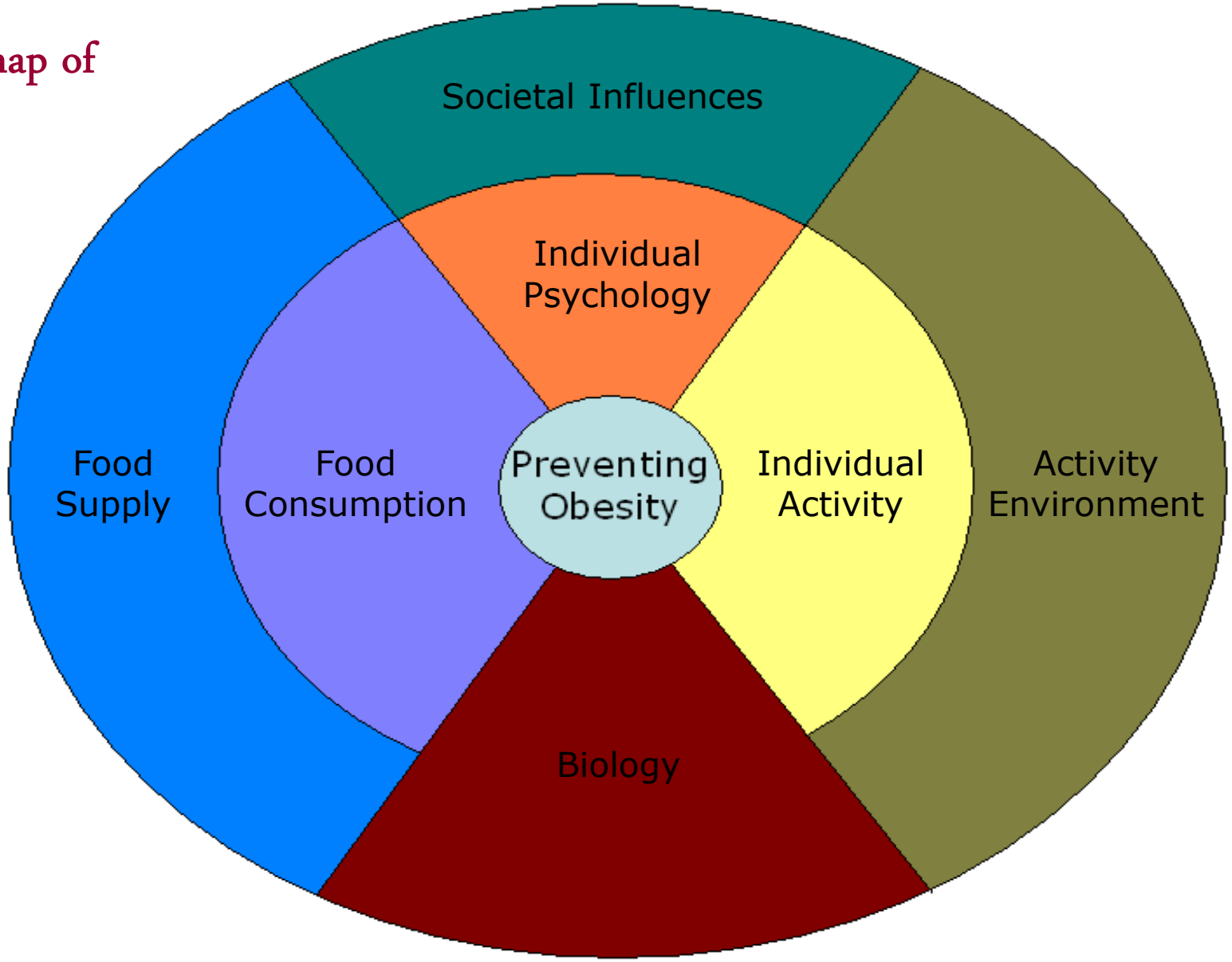
- Increased walkability/cyclability of the built environment
- Controlling the availability of and exposure to obesogenic food and drink
- Investment in early-life interventions
- Targeting health interventions for those at high risk
- Increasing responsibility of organisations for the health of their employees

The importance of evaluation: a continuous improvement model




GLOBAL ECOSYSTEM
NATURAL ENVIRONMENT
BUILT ENVIRONMENT
ACTIVITIES
LOCAL ECONOMY
COMMUNITY
LIFESTYLE
PEOPLE
Age, sex & hereditary factors
Natural habitats
Buildings, Places
Working, Shopping, Moving
Wealth creation
Social capital
Diet, Physical activity
Work/life balance
Networks
Markets
Living, Playing, Learning
Streets, Routes
Air, Water, Land
Climate change
Biodiversity
Macro-economy, Politics
Culture, Global forces
other Neighbourhoods
other Regions
The determinants of health and well-being in our neighbourhoods

A system map of obesity

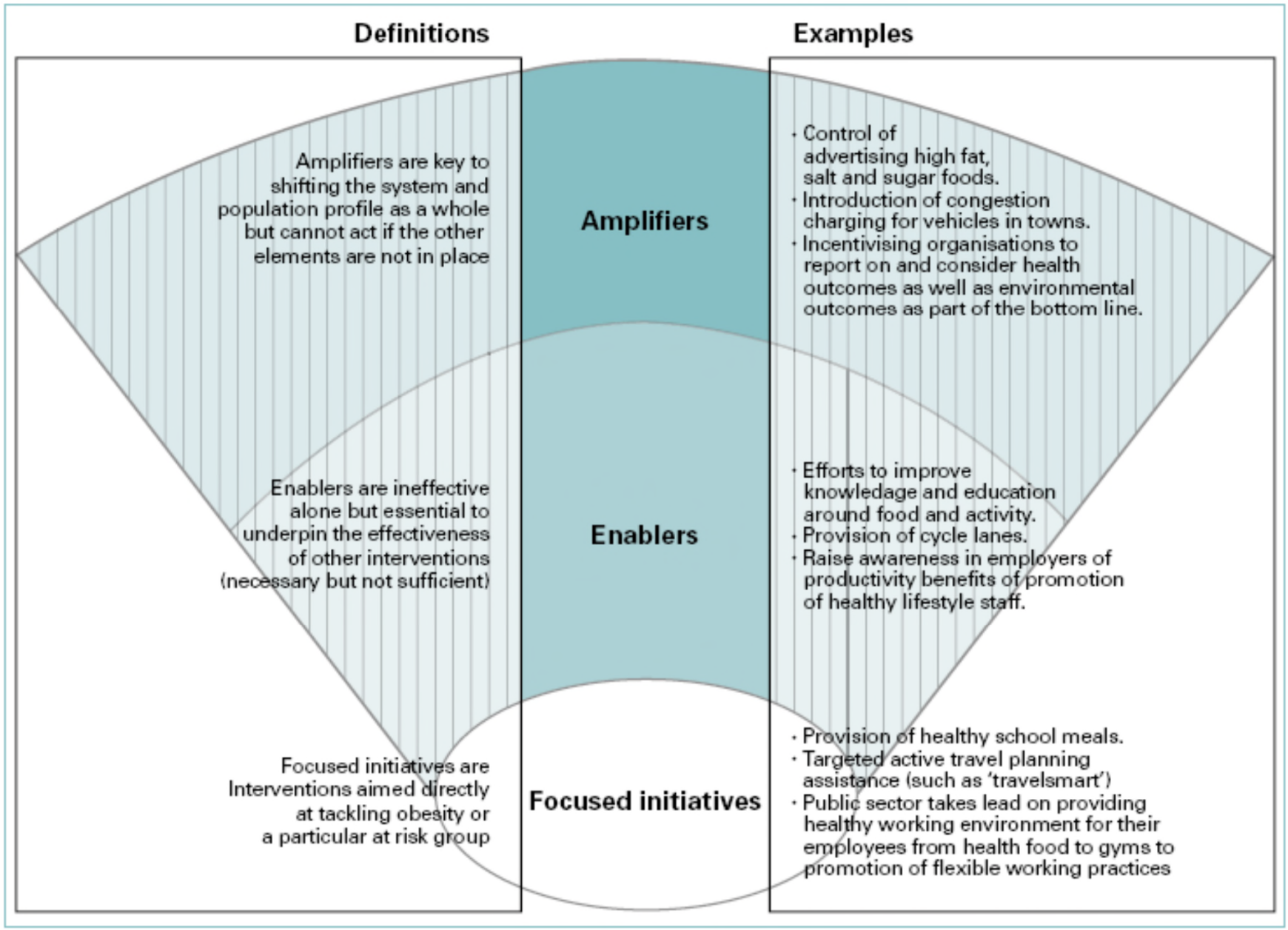


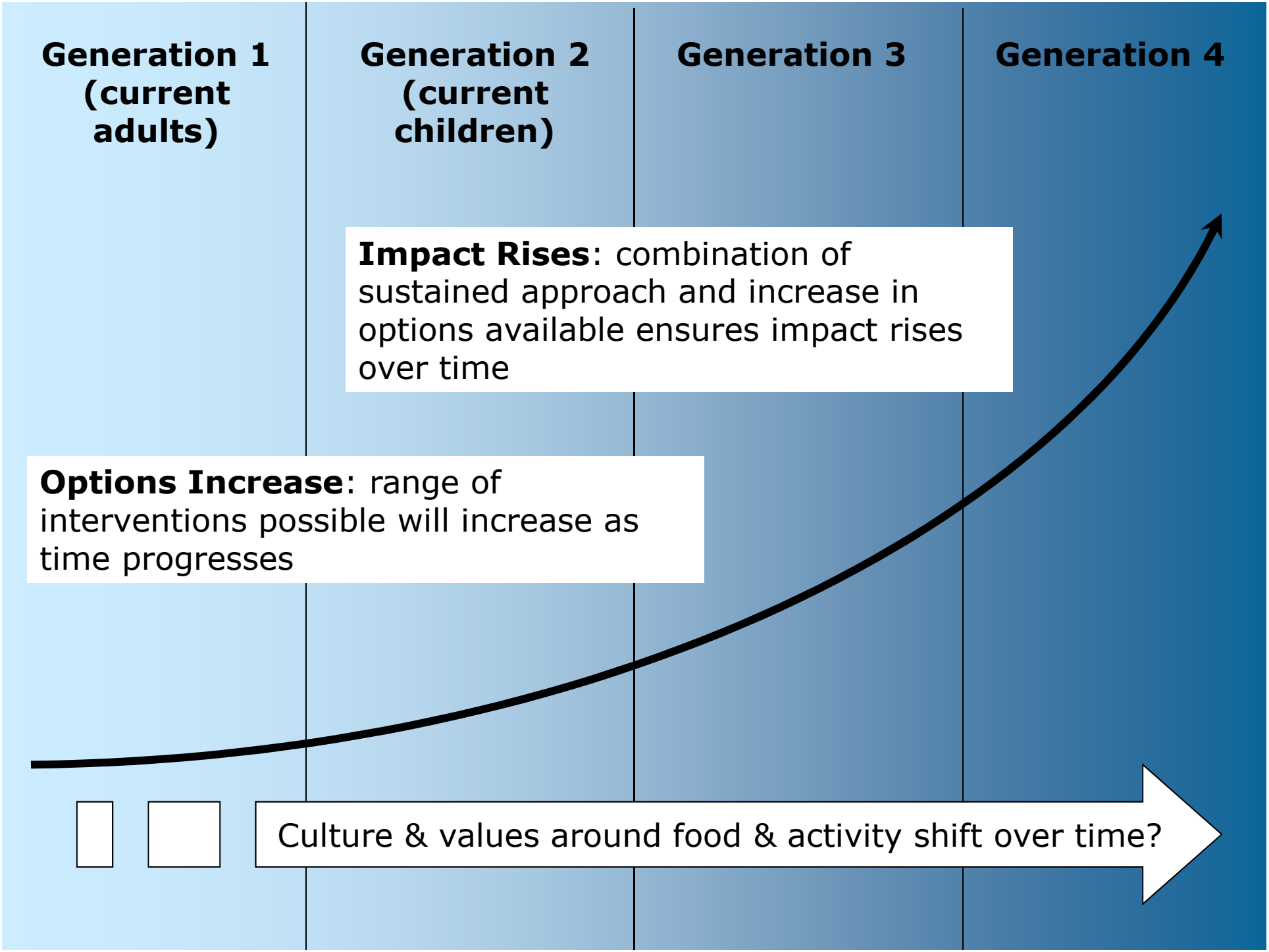
A life-course approach

eg. changing the nutritional balance of the diet

0-6 months	6-24 months	0-4 years	4-16 years	16-65 years	60+
Breast feeding	Improved weaning advice	Nutritional standards for pre-schools	Transformation of school food	Guidelines for workplace canteens	Nutritional standards for elderly care

Rigorous food procurement/provision standards in public institutions


Definitions
Examples
Amplifiers are key to shifting the system and population profile as a whole but cannot act if the other elements are not in place
Amplifiers
· Control of advertising high fat, salt and sugar foods.
· Introduction of congestion charging for vehicles in towns.
· Incentivising organisations to report on and consider health outcomes as well as environmental outcomes as part of the bottom line.
Enablers are ineffective alone but essential to underpin the effectiveness of other interventions (necessary but not sufficient)
Enablers
· Efforts to improve knowledge and education around food and activity.
· Provision of cycle lanes.
· Raise awareness in employers of productivity benefits of promotion of healthy lifestyle staff.
Focused initiatives are Interventions aimed directly at tackling obesity or a particular at risk group
Focused initiatives
· Provision of healthy school meals.
· Targeted active travel planning assistance (such as 'travelsmart')
· Public sector takes lead on providing healthy working environment for their employees from health food to gyms to promotion of flexible working practices


Generation 1 (current adults)
Generation 2 (current children)
Generation 3
Generation 4
Impact Rises: combination of sustained approach and increase in options available ensures impact rises over time
Options Increase: range of interventions possible will increase as time progresses
Culture & values around food & activity shift over time?

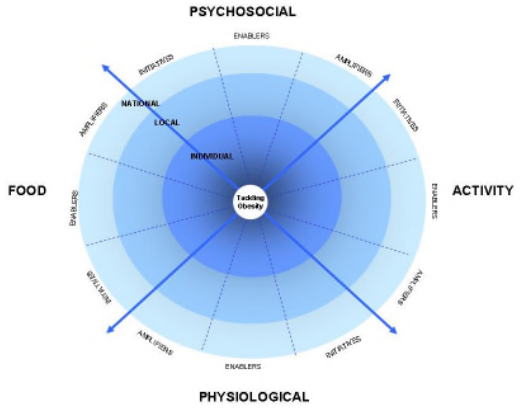
A step-by-step approach over time: the regulatory ladder for intervention

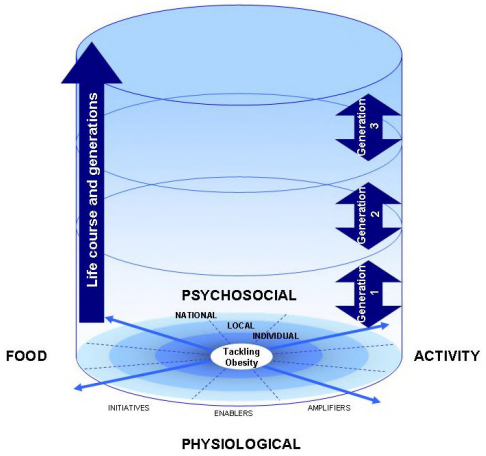
Lessons from tobacco control:

- No action — **Nothing**
- Advice and information — **Information**
- Social marketing campaigns
- Restrictions on tobacco sales — **Facilitation**
- Individualised treatment interventions
- Restrictions on tobacco advertising/promotions — **Regulation**
- Regulations to restrict smoking behaviour

Developing a strategy: The portfolio response

- Systemic change across the system map
- Interventions at different levels: individual, local, national, global
- Interventions across the life-course
- A mixture of initiatives, enablers and amplifiers
- Short, medium and long term plans for change





Developing structures for leadership and governance

- offer senior (Cabinet-level) government support
- develop a high-level, long-term, comprehensive strategy (the portfolio response)
- obtain and act on strategic expert advice on an ongoing basis
- develop synergies with other cross-cutting policy issues
- co-ordinate implementation within and outside Government
- further develop relationships and partnerships with stakeholders
- further develop and resource mechanisms of surveillance and evaluation
- have sufficient resources to meet the rising challenges

Developing structures for leadership and governance

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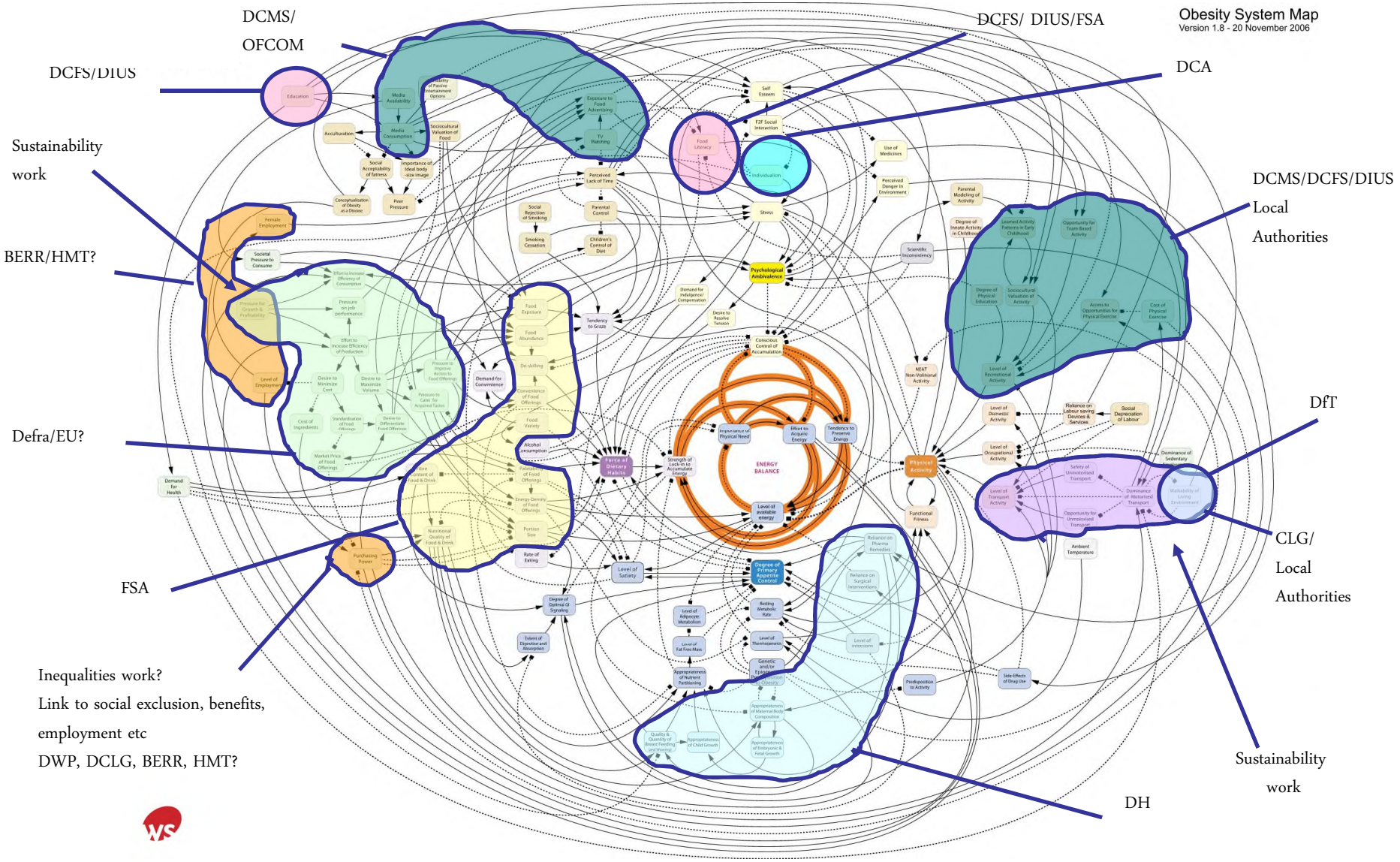
- develop and resource mechanisms of surveillance and evaluation
- have sufficient resources to meet the rising challenges

Developing synergies with other policy areas


Obesity System Map
Version 1.8 - 20 November 2006
DCMS/
OFCOM
DCFS/DIUS
Sustainability
work
BERR/HMT?
Defra/EU?
FSA
Inequalities work?
Link to social exclusion, benefits,
employment etc
DWP, DCLG, BERR, HMT?
DCFS/ DIUS/FSA
DCA
DCMS/DCFS/DIUS
Local
Authorities
DfT
CLG/
Local
Authorities
Sustainability
work
DH
ENERGY
BALANCE

Key Messages

- Most adults in the UK are already overweight. Modern living ensures every generation is heavier than the last – 'Passive Obesity.'

- By 2050 60% of men and 40% of women could be clinically obese. Without action, obesity-related diseases will cost an extra £45.5 billion per year.

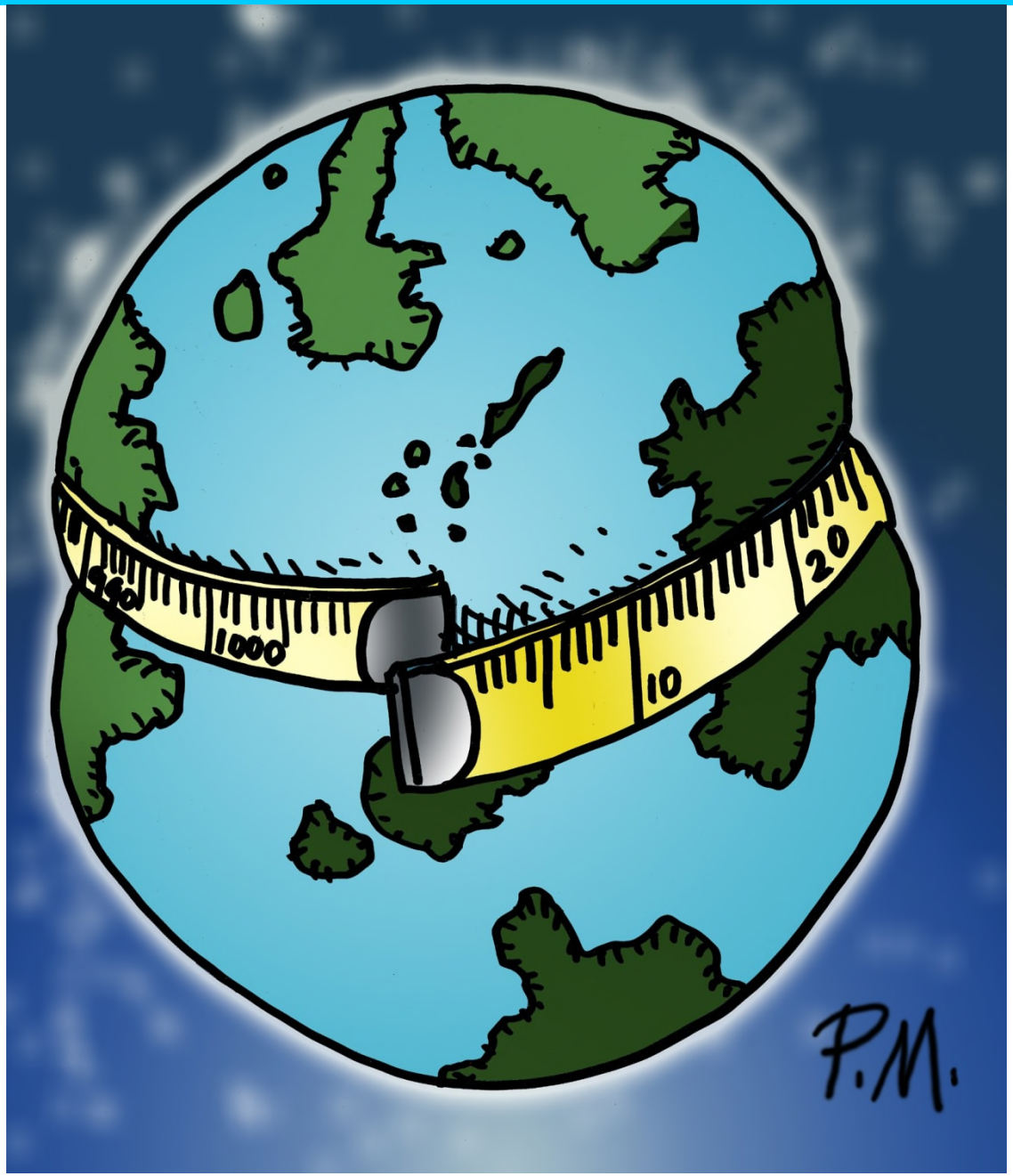
- The obesity epidemic cannot be prevented by individual action alone and demands a societal approach.

- Tackling obesity requires far greater change than anything tried so far, and at multiple levels: personal, family, community and national.

- Preventing obesity is a societal challenge, similar to climate change. It requires partnership between government, science, business and civil society.

Core Principles for tackling obesities

- A system-wide approach, redefining the nation's health as a societal and economic issue
- Higher priority for the prevention of health problems, with clearer leadership, accountability, strategy and management structures
- Engagement of stakeholders within and outside Government
- Long-term, sustained interventions
- Ongoing evaluation and a focus on continuous improvement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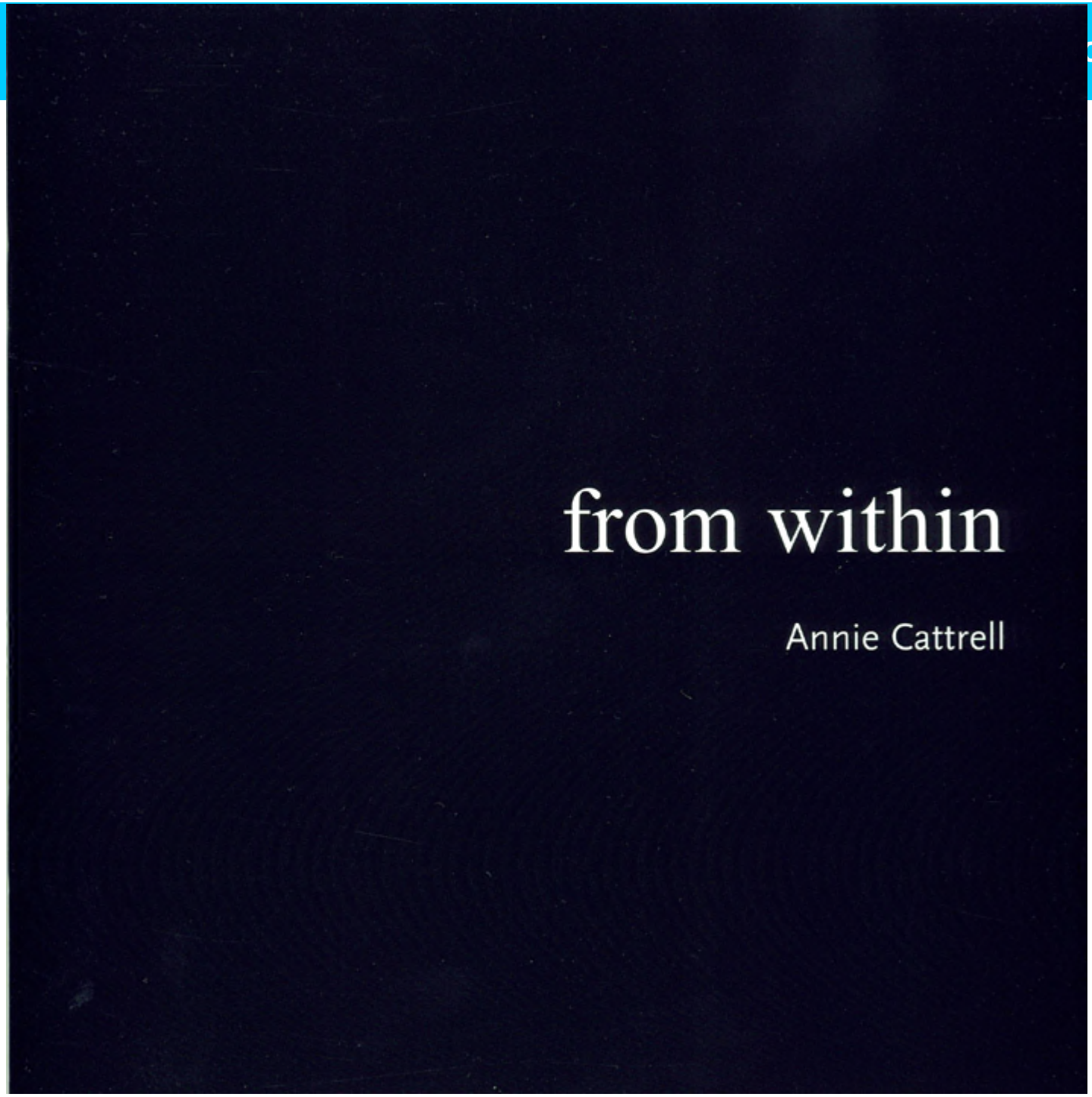

from within
Annie Cattrell

visualising the unseen

art from science exploration

Artist Robert Seaman

Title Collapsing Atmosphere

Media Photographic Collage

Four pictures combined in a collage, showing a subsidence inversion that forms when high up air descends to lower heights and warms.

This collage consists of four photographs taken on an aerial research flight on stratocumulus cloud and subsidence inversions. Energy in the atmosphere causes air containing water vapour to rise and cool condensing into this cloud. Further interaction with the Sun's energy and other moving air gives the cloud its irregular surface. The subsidence inversion traps moisture and pollutants below it and decreases visibility yet, on top it is clear.

visualising the unseen

art from science exploration

Artist Michael Berry

Title See text

Media Digital Image

1. **Chaotic Quantum falling 1**

This shows the wave representing quantum particles thrown upwards-in random direction and then falling under gravity. The intensity of the wave is represented by colour; red is brightest, and the black snakes are the lines of zero probability. The waves rarely reach above a certain height, near which the interference structures are largest. Generated by computer using mathematica.

2. **Colours of dark light**

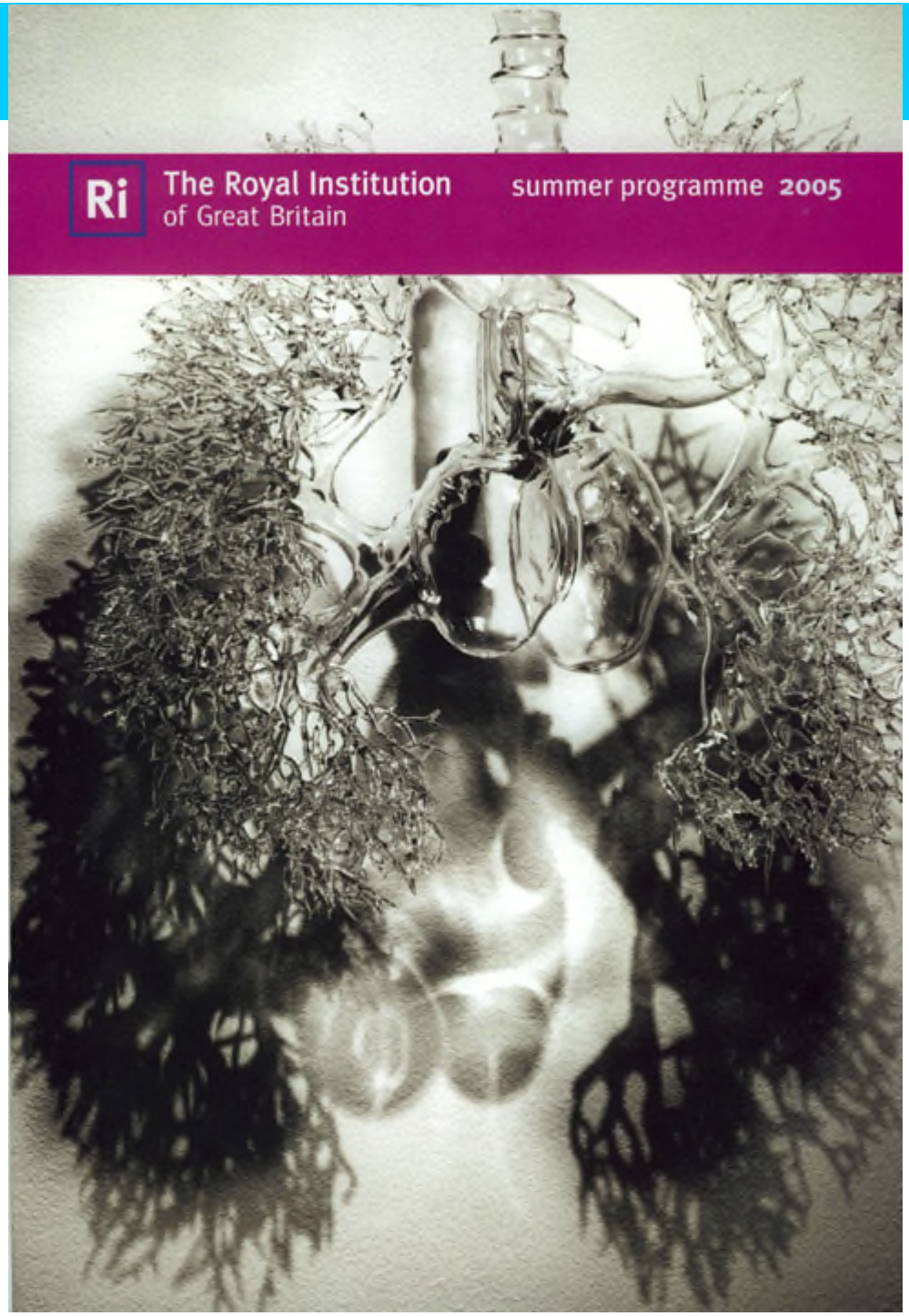
Of the colours of random waves pattern is scaled so as to have same intensity everywhere, characteristic colours are reveals in the dark places. The recently predicted colours have not yet been explored experimentally. Generated by computer using mathematica.

3. **Sky with bulls eye**

Interference rings of polarised light decorate a Bristol; Sky, seen through a 'sandwich' consisting of a sheet of overhead-projector transparency film between two sheets of crossed Polaroid films, and photographed with a Fuji 6800Z digital camera. The transparency film is optically biaxial, and the black brush is a result of the geometric phases common in the physics of waves.

4. **Knotted nothings**

The trefoil knot and the twisted chain surrounding it are lines of zero probability to find an electron in a hydrogen atom. In this unusual representation, the zero lines form a 'skeleton' of a complicated quantum wave-like the grin of Lewis Carroll's Cheshire cat. Generated by computer using mathematica, and rendered in Adobe Illustrator and Photoshop.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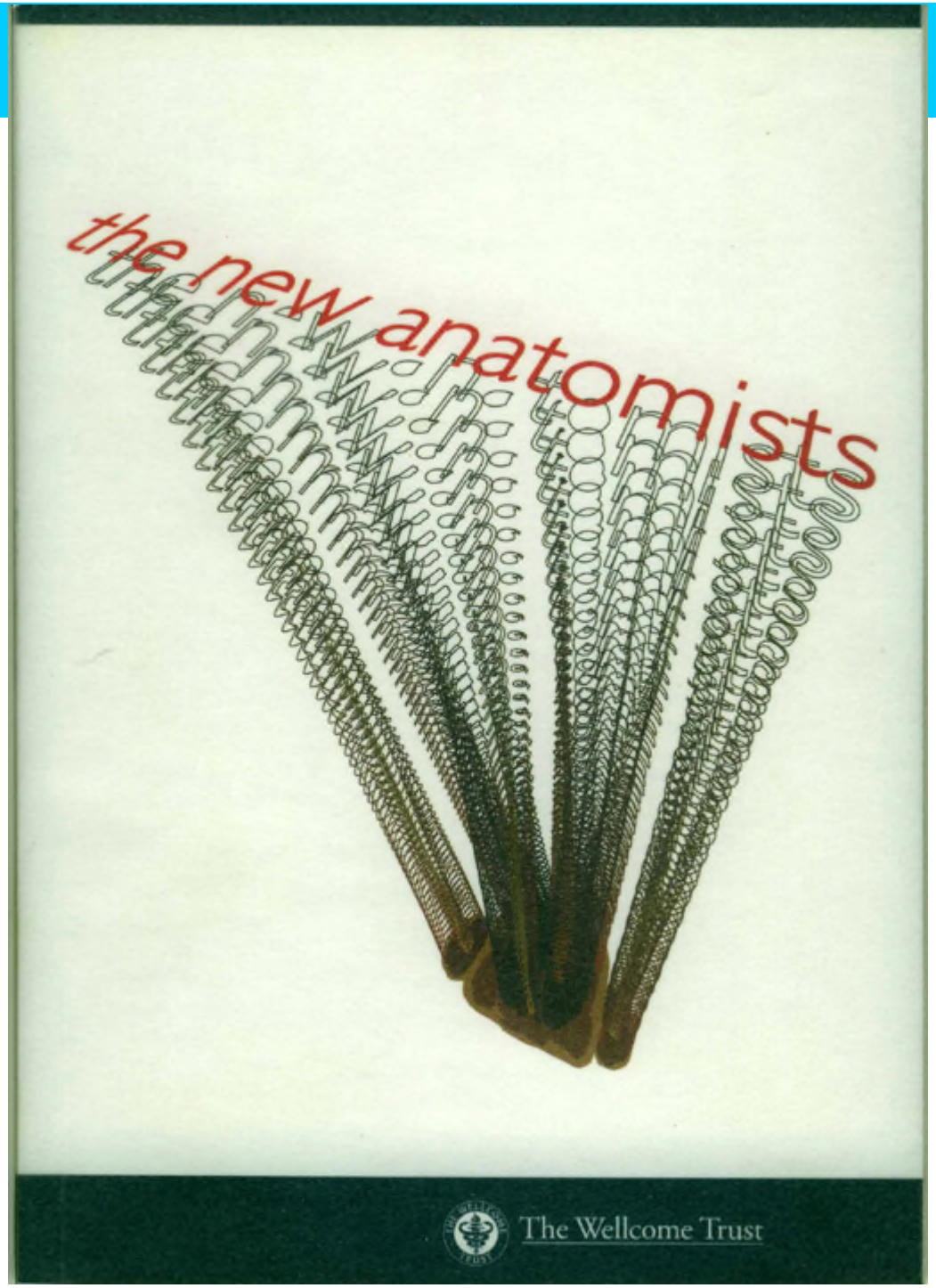
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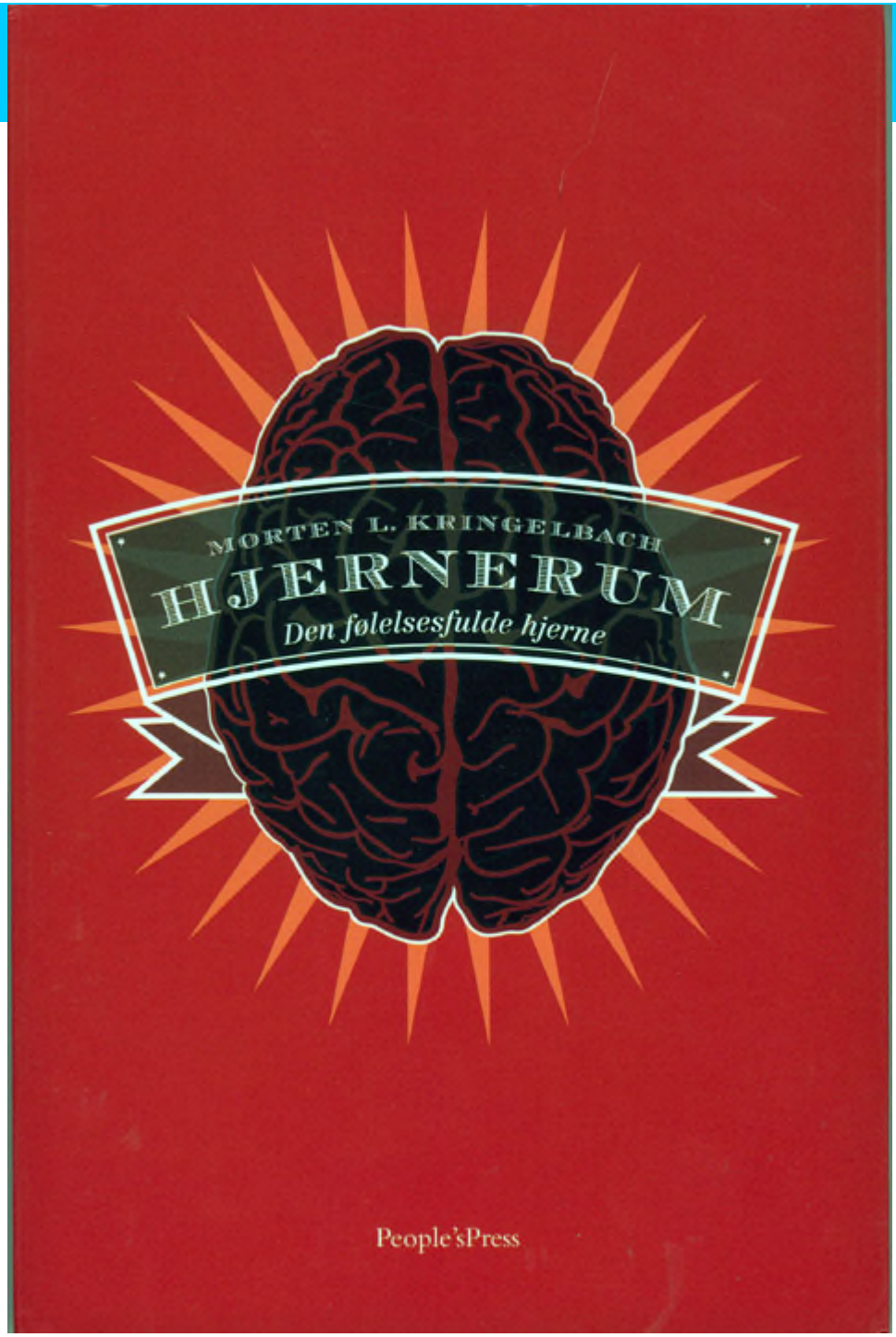
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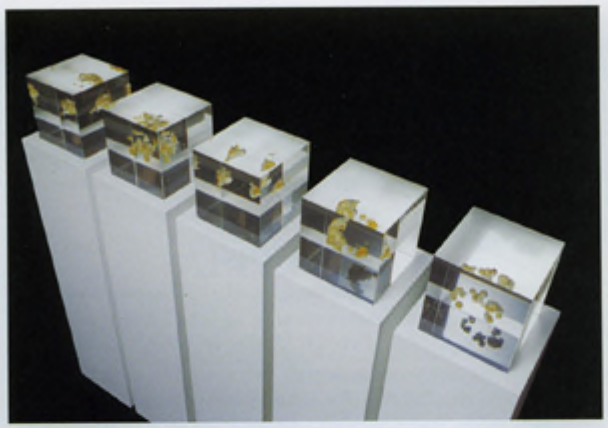

Fig 10-4. Hjerneportrætter. Resultatet af et samarbejde med kunstneren Annie Cattrell om at lave fem skulpturer af hjerneaktiviteten i forbindelse med de fem sanser. Skulpturerne er lavet ved hjælp af en teknik kaldet rapid prototyping, og er blandt andet blevet udstillet på The Royal Institution i London. Disse skulpturer kan betragtes som en radikal nyfortolkning af tidligere tiders portrætkunst.

diverse smarte teknologiske indretninger, men i det lange løb, så er det, der betyder noget for artens overlevelse, at der bliver produceret nye børn, og at disse får noget at spise.

Delvist som følge af vores teknologi bliver vi stadig flere mennesker på denne klode. Hvorvidt vi formår at løse dette problem med eller uden teknologi – eller om det løser sig selv – er som tidligere nævnt svært at spå om. Men det er sikkert, at vi har brug for viise beslutninger taget på det bedst mulige grundlag.

Det er værd at huske, at intet problem er så svært, at det ikke kan løses med tålmodighed. Tag for eksempel hummerspisning, der sædvanligvis er noget værre snavs, men som for nylig tog en hjernekirurg to timers slid og en stor portion tålmodighed at gennemføre uden det ringeste svineri.

einfach komplex

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Bildbäume und Baumbilder in der Wissenschaft

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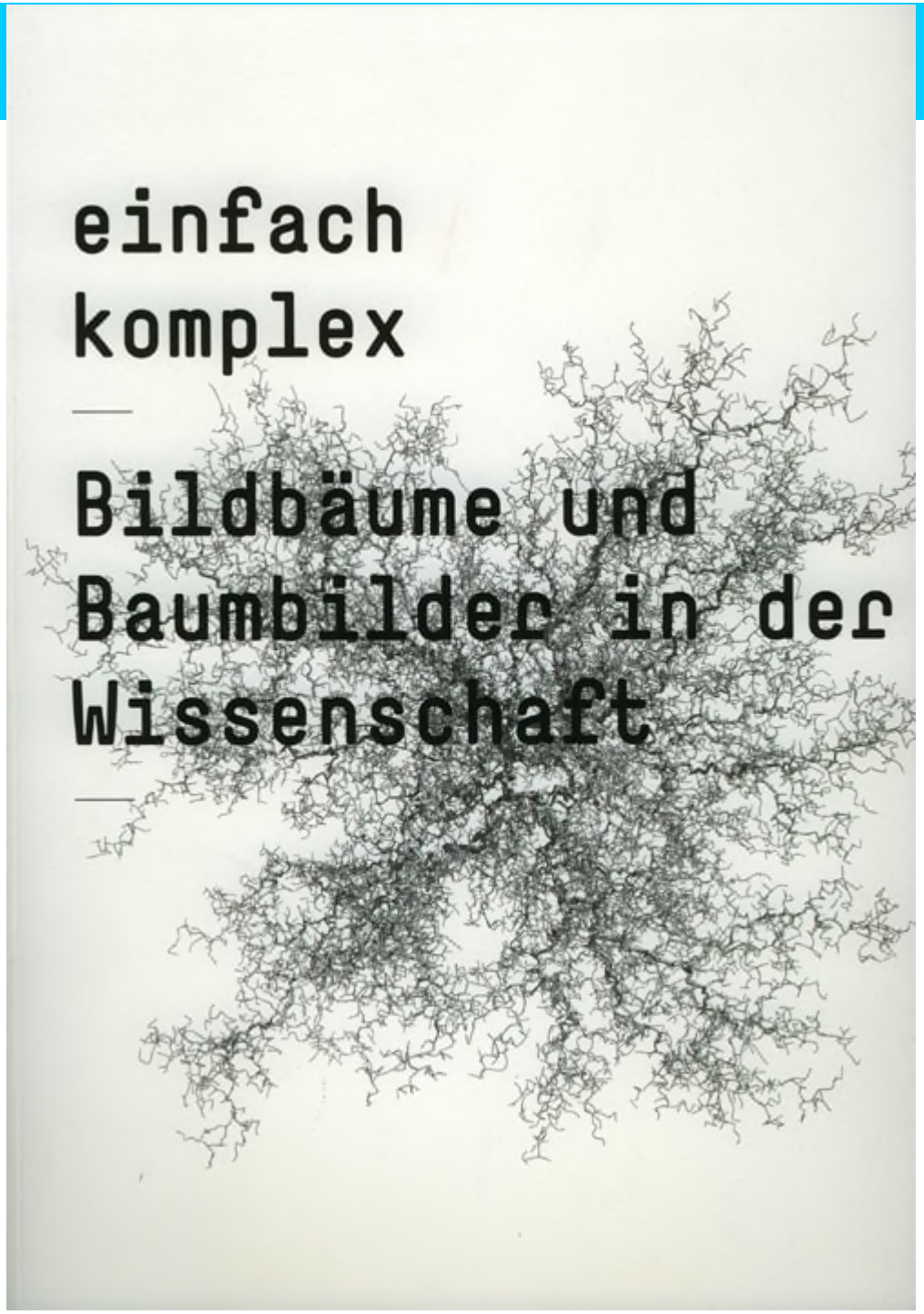

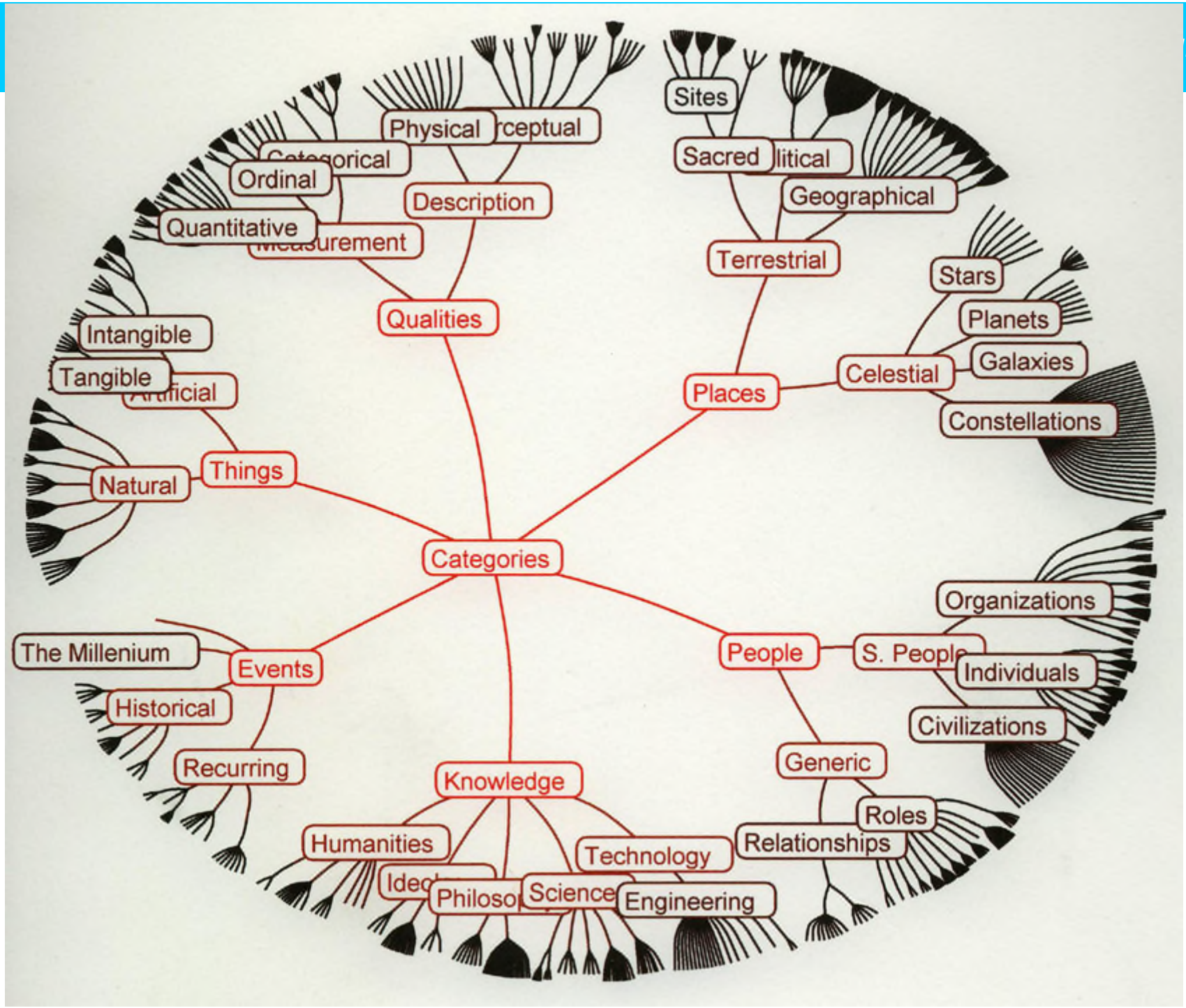
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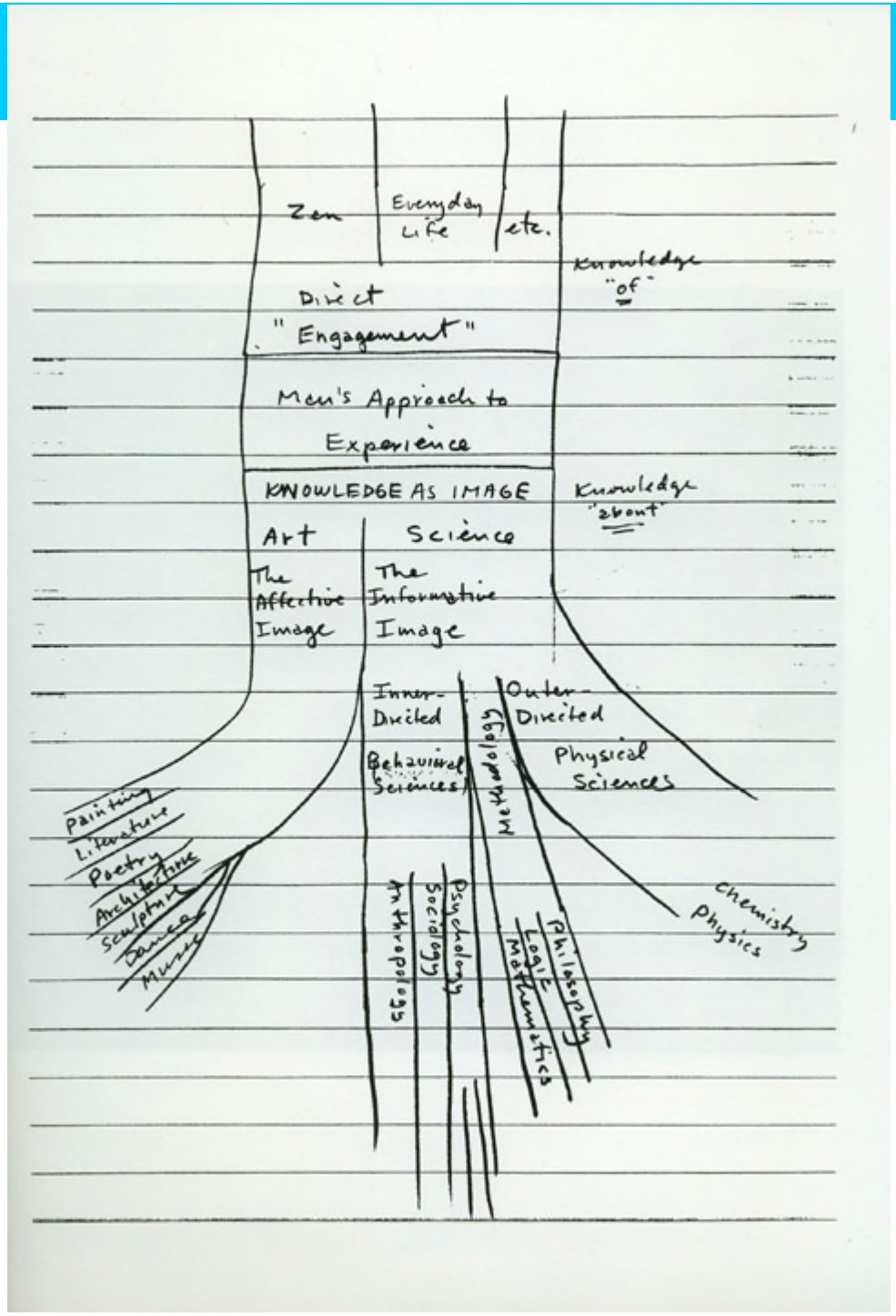
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Science in culture

Seeing sense

Annie Cattrell's sculptures of the five senses are on display at the Royal Institution in London.

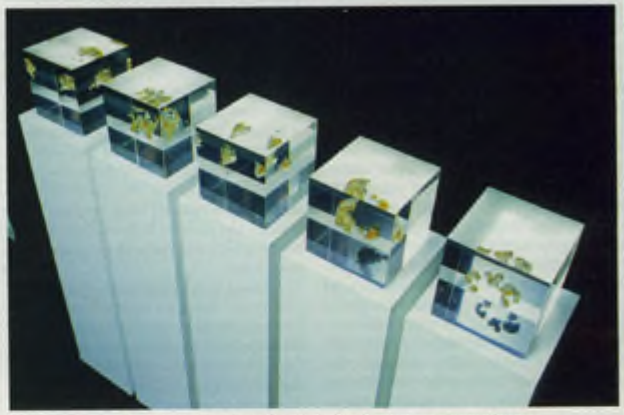
Martin Kemp

The mission of the Royal Institution, founded in 1799, focuses on the aspiration to "diffuse knowledge, and, through philosophical lectures and experiments, apply science for the common purposes of life". Visual demonstration has always been central to this aim, not least through the popular discourses delivered by Michael Faraday in the nineteenth century. Faraday was apprenticed to a book-binder before rising to become the greatest hands-on scientist of his generation.

Among the visual wonders that Faraday demonstrated at the Royal Institution were the first exhibited 'photogenic drawings' (early photographs) by William Henry Fox Talbot. Their rushed display in January 1839 was triggered by the startling French announcement at the Academy of Sciences two weeks earlier of Louis-Jacques-Mandé Daguerre's 'invention' of what came to be called photography.

Fittingly, the exhibition "From Within" by Annie Cattrell, the Royal Institution's artist in residence last year, includes photograms (direct exposures) in the manner of Talbot. She has made images of a sectioned human skull, created by exposing the skull and its cranial cap directly over photographic paper and flooding its interior with light from a hand-held torch. The negative reversal inherent in these photograms eerily maps the contours and orifices of the cranium against a black substratum, and seems to reveal its cavernous interior as a radiant source of mental illumination. In the spirit of Faraday, Cattrell has also prepared a video of magnetized iron filings, ingenious visualizations in cut paper of frictional forces, and a small installation of images of water placed between the faces of cut diamonds and subjected to extreme pressures.

The brain itself is the subject of Cattrell's most sustained exploration of how abstract visualizations in science can be turned into tangible reality. Her set of cubic sculptures *The Five Senses* is the culmination of three years of intense research. Two of the sculptures were finished in time for the "Head On" exhibition at the Science Museum in London last year, and now all five are complete. They rework a long-standing iconographical theme, which proved particularly popular in prints from the Renaissance onwards.



In *The Five Senses*, **Annie Cattrell explores the physical underpinnings of consciousness.**

Among the texts that Cattrell studied was *The Human Brain* by Susan Greenfield, the Royal Institution's current director. Cattrell also discussed the work and collaborated with various brain scientists, including Steve Smith and Morten Kringelbach of the University of Oxford, and Mark Lythgoe of the Institute of Child Health in London, who granted her access to brain activity data generated by functional magnetic resonance imaging. The technique of rapid prototyping, courtesy of Californian company 3D Systems, translated the data into three-dimensional form.

Cattrell is seeking to grasp the "physicality of consciousness" by exploring the "delicate dialogue between the exterior world and our individual blueprint". She models this dialogue by casting in resin the morphological patterns of brain activity that correspond to the stimulation of each of the five senses. Neural activity is transformed into glistening apparitions that float in the cranial cavity like a kind of mental plasma. The refractive and reflective crystalline cubes, within which the skull is by implication inscribed, optically slice the golden configurations into shifting interplays of plans and elevations as the spectator moves past them.

In imaging the brain by casting and modelling, Cattrell stands in a long line going back to Leonardo da Vinci, who cast the ventricles of an ox brain, believing that the fluid in the ventricles was the medium within which the mental faculties operated. Of particular fascination to Cattrell are the almost unbelievably refined creations of the great wax modellers of the eighteenth and nineteenth centuries, including wax brains created by Joseph Towne that are in the Gordon Museum at Guy's Hospital, London. But whereas Towne's demonstrations can be characterized as pedagogy charged with beauty, Cattrell is in no sense working as an illustrator. Rather, as an artist she imaginatively translates the technical data, in all its awesome detail, into perceptible and beautiful forms that do full justice to the scientists' own excitement in creative visualization.

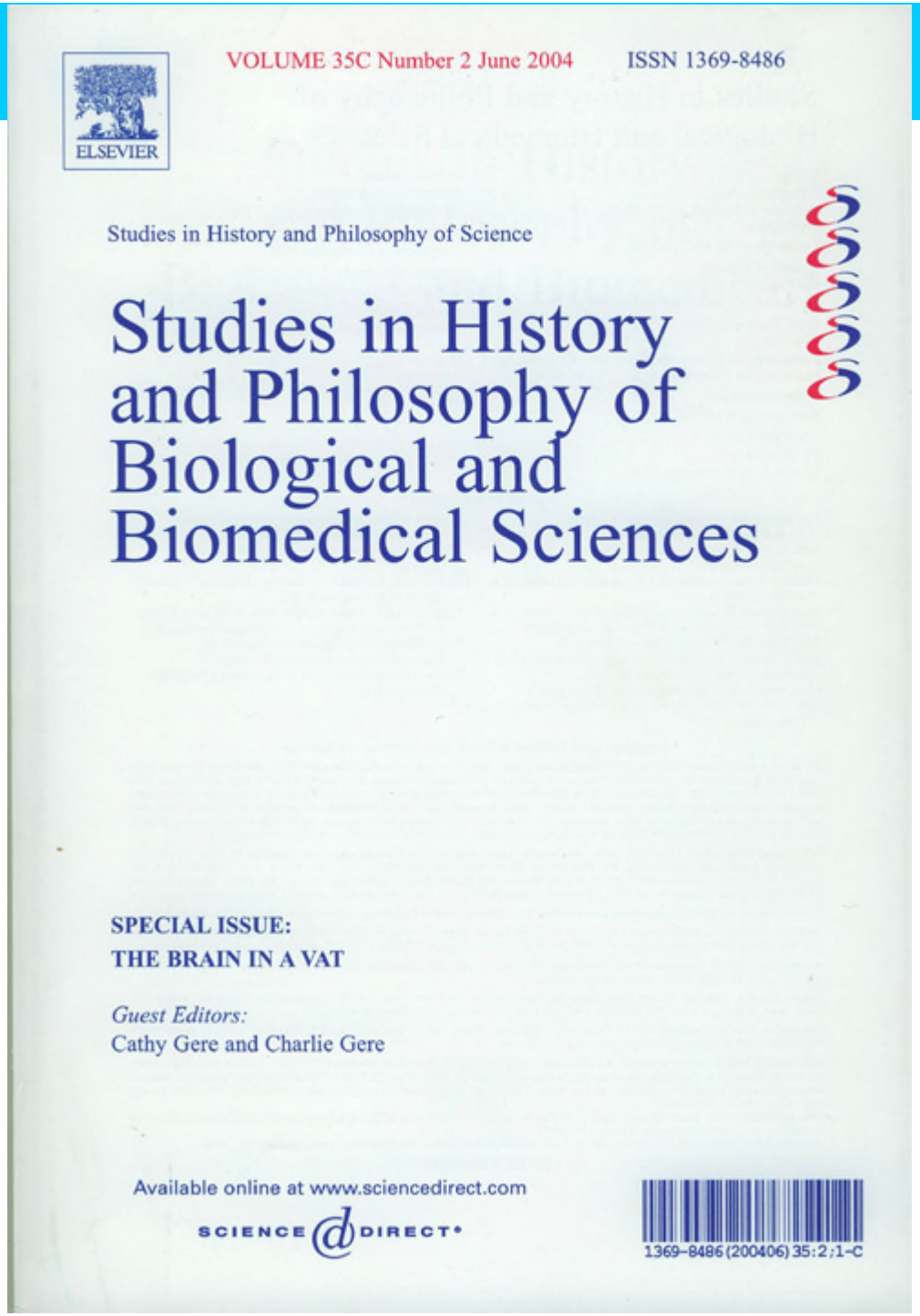
Martin Kemp is professor of the history of art at the University of Oxford and co-director of Wallace Kemp/Artakt.

Annie Cattrell's exhibition "From Within" can be seen at the Faraday Museum of the Royal Institution, London, until mid-September.

of hegemony', 'diffusion in the east' (which has nothing to do with gases), or 'brain drains and paperclip operations'. 'Standard model' discusses GUTs and TOEs but not body parts (TOEs being 'theories of everything' and GUTs referring to 'grand unified theories'). The value of the thematic listing is shown by finding 'tacit knowledge' as a subheading of 'Epistemology and methodology', which, in turn, is an entry under 'The body of scientific knowledge'.

This volume is the culmination of much scholarship and enormous effort (one rare error is a reference to the "noble" prize in the preface). The result is delightful to browse, but it is difficult to see how the book could be used systematically. It is of no help, for example, in tracing the history of anaesthesia. Unintentional insight into the planned use of the book is perhaps given by repeated phrases such as "depicts for a general audience", indicating an emphasis more on seeing and hearing than on reading. Indeed, I cannot escape a feeling that the time for print publication of such texts is passing. Electronic publication would provide easier searching and updating, and could more easily accommodate changing fashions. In short, this is one of those useful books for which it may be hard to find a use. ■

Ryan J. Huxtable is professor emeritus in the Department of Pharmacology, University of Arizona, Tucson, Arizona 85724, USA.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Thought in a vat: thinking through Annie Cattrell

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Abstract

This essay reflects on some aspects of the brain in a vat problem through a consideration of the work of the sculptor Annie Cattrell. Cattrell's series of sculptures 'Sense' render in three dimensions MRI scans of different sensory functions in the human brain. These objects—which could be said to represent thought itself stilled and suspended in a transparent medium—make dramatically visible the doctrine of the localization of brain function. The essay argues that the brain in a vat problem in philosophy is an outcome of the same neural 'mapping' project as made Cattrell's 'thought in a vat' possible. An interview with the artist reveals a moral dimension to her preoccupation with the localization of function. The article therefore goes on to consider the brain in a vat in the context of some of the history and ethics of the localizationist paradigm.

Keywords: Annie Cattrell; Brains in vats; Localization of function; Magnetic resonance imaging

1. Introduction: 'Hearing' and 'Seeing'

> Forget about Ptolemy; forget about Galileo. Your *head* is the centre of the universe. The sun and sky, the moon and the stars, the people and objects that make up your world, all revolve around your head. Indeed, the world you live in is created by your head—by the myriad nerve cells in your brain. (Blakemore's introduction in Albano et al., 2002, p. 3)

With these words, the Professor of Physiology at Oxford University, Colin Blakemore, introduced the catalogue of a recent exhibition at the Science Museum

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Stroke prevention
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Media reviews Medical research: an artistic, observational study

An art exhibition in a book, *NanoScopic Culture* is the work of artists who have undertaken the UK National Institute of Medical Research's (NIMR) art programme residencies. The artwork is informed by the wide range of research done by, and the cultural milieu of, the NIMR, and by public perceptions of science. The intention of the NIMR programme is to move art away from its perceived subordinate position with respect to science—as a mere mediator and illustrator—to a more equal and autonomous position.

NIMR is the largest UK medical research centre. Its art programme, in existence now for more than 5 years, allows artists to work at the institute for as little as 3 days or for as long as several months. The artists are given the opportunity to develop dialogues with scientists with no expectation of a specific outcome. Rather, the programme aims to enable conversation, analytical suggestion, and new perspectives. As Simon Gould, NIMR art programme curator, writes in the book's preface: "Their tools and their products may be very different, but contemporary artists and research scientists are both question-askers, researchers and experimenters, and producers of stuff." Drawing from Thomas Kuhn's *The Structure of Scientific Revolutions* (University of Chicago Press, 1970) the curator of *NanoScopic Culture*, Maria Swain, points out the close similarities between the paradigm shifts or discontinuous leaps that both science and art can make in the development of new concepts.

The book format allows the viewer to see the artworks in situ without the constraints of visiting a gallery during the specific timespan normally associated with an art exhibition. It is a flexible and universal object that is familiar and accessible to all. The rectangular, spiral-bound publication has been designed to enable the artists and writers to interleave their contributions—some sequentially, and others interspersed throughout. Many of the exhibits use specific types of paper, adding individuality, scale, and depth to the overall structure of the book's physical space: from folded, glossy photography paper that opens out to six times the size of the rest of the book to layers of semitranslucent tracing paper.

In *Thew!!!* Invertebrate (a group of four artists) have extracted lines from the leading characters in films made between the 1930s and 1960s about the "mad scientist": Frankenstein, Dr Jekyll, and the Invisible Man, among others. They have reordered the lines spoken by the scientists and interspersed them into a new fusion of narrative, thereby creating a fictitious, and often comic, conversation. This narrative, with its standard Hollywood archetypes of the obsessively driven scientist working alone at night beyond the control of anyone, brings into focus society's fears about scientific discoveries and the way that they can be exploited.

Janice Kerbel's *Coniferous Deciduous* (from part of a series entitled *Studies for Small Islands*) draws up meticulous coded plans, printed on layers of tracing paper, for a fictitious island. Here, all possible flora that share a similar set of conditions for survival from far-flung stretches of the world are planted. These plantations overlay a backdrop of precisely laid-out deciduous and coniferous trees. Kerbel spoke with botanists at NIMR to research the details of how the plants live, survive, and manifest themselves through the seasons. This island is intentionally purely theoretical, but obsessively grounded in the realities and protocols of scientific authenticity.

The most subtle and thought-provoking contribution is that of Ansuman Biswas, who concerns himself with long-term potentiation—how a firing neuron remains sensitised—and the ancient Abhidhamma scripts that underpin vipassana meditation and the understanding of consciousness. On a flick book, for which the parts and assembling instructions are given, a sequence of firing neurons is generated. Each image has on its reverse side a vipassana-inspired quotation, providing a meeting of eastern and western attitudes towards the understanding of the mind.

NanoScopic Culture
David Burch, Ansuman Biswas, Invertebrate, Janice Kerbel, Lucy Pedlar, Shellburne Thurber, Emily Wardill, Gabriel Orozhead.
London: NIMR, 2003.
ISBN 0 9546302 0 3.

Seemingly more immediate, *Are You Here?* by Lucy Pedlar shows three pages printed on both sides using the blueprint plans of the different floor levels within the NIMR building. Pedlar asked eight members of staff to mark their movements around the building for a day. By making each staff member an experiment, and graphing their activity, the person's professional and social position within this highly structured purpose-built edifice is revealed.

Likewise, Shellburne Thurber's phonographic work uses the space of the NIMR canteen as an anthropological observation post of the scientific community. He set up his camera in a

Field, 2004
By Richard Bliss. Photograph by Stuart Bunce.