The Behaviour Change Wheel: a new method for characterising and designing behaviour change interventions

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KT Canada November 2015

UCL Centre for Behaviour Change

This talk

- Implementation as behaviour
- The Behaviour Change Wheel
  - Making a behavioural diagnosis using COM-B
  - Linking diagnosis to intervention functions and policies
  - Linking to specify behaviour change techniques
- Examples of guideline implementation
  - Improving hospital staff hand hygiene
  - Local government

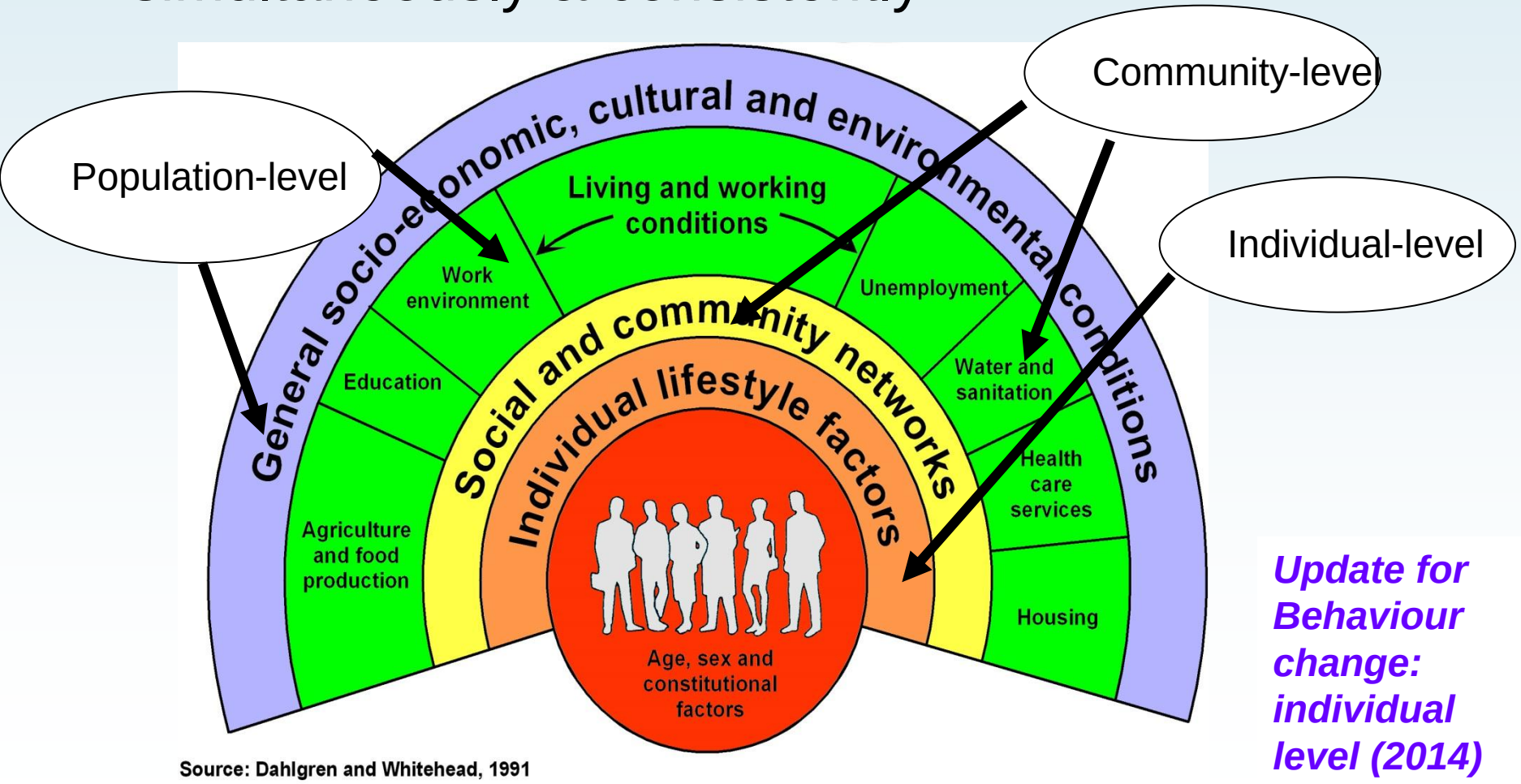
Why focus on behaviour?

- Interventions to improve implementation of evidence-based practice
  - have achieved modest and variable success
- Improving implementation depends on changing the behaviour of
  - professionals,
  - managers,
  - commissioners and
  - others working within and with the care system

Effective interventions

- Intervene at many levels
- simultaneously & consistently

NICE Guidance for Behaviour change at population, community and individual levels (2007)



Update for Behaviour change: individual level (2014)

How to design an intervention that is likely to be effective?

Traditional approaches to intervention design

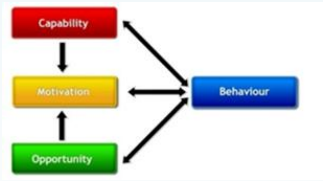
Martin Eccles, implementation researcher, UK

A systematic method …

1. Understand the behaviour you are trying to change
2. Use a framework that points to the types of intervention that are likely to be effective
3. Consider the full range of options open to you
4. Use a systematic method for selecting behaviour change techniques

Key steps in intervention design…

1. Identify your target behaviour precisely
   - Who need to do what, when, where, how
2. Recognise that behaviours are part of a system
   - of other behaviours within and between people
3. Make a "behavioural diagnosis"
   - A good behavioural diagnosis is more likely to lead to effective interventions
4. The most effective interventions target many levels simultaneously
   - The *Behaviour Change Wheel* is a comprehensive framework for designing interventions



Example …. hand hygiene in hospital staff

- Nurses and doctors
  - Cleaning han… …ons
- Infectio…
  - …g pack
- S… …or distributing alc… …drub
  - E…suring that dispensers contain alcohol handrub

For each of these, **who** needs to do
- **what,**
- **when,**
- **where,**
- **how?**

1. Which behaviour to start with?

- Questions to ask yourself
  - If I change this, what is the likely impact?
  - How easy is it to bring about change?
  - Preference, acceptability, cost?
  - Spillover/generalisability to other behaviours and people?

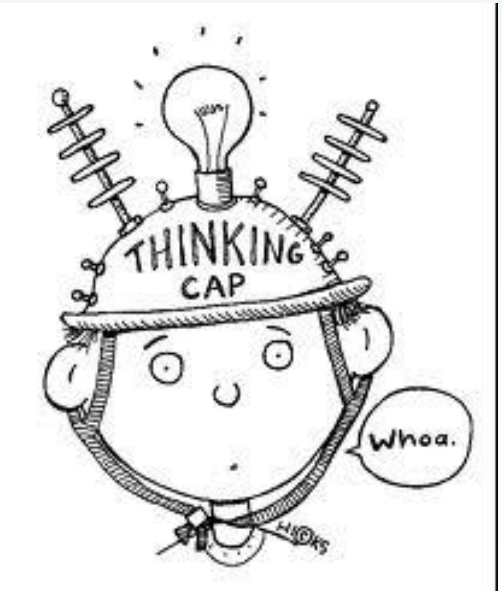
2. Understand the behaviour in context

- Why are behaviours as they are?
- What needs to change for the desired behaviour/s to occur?

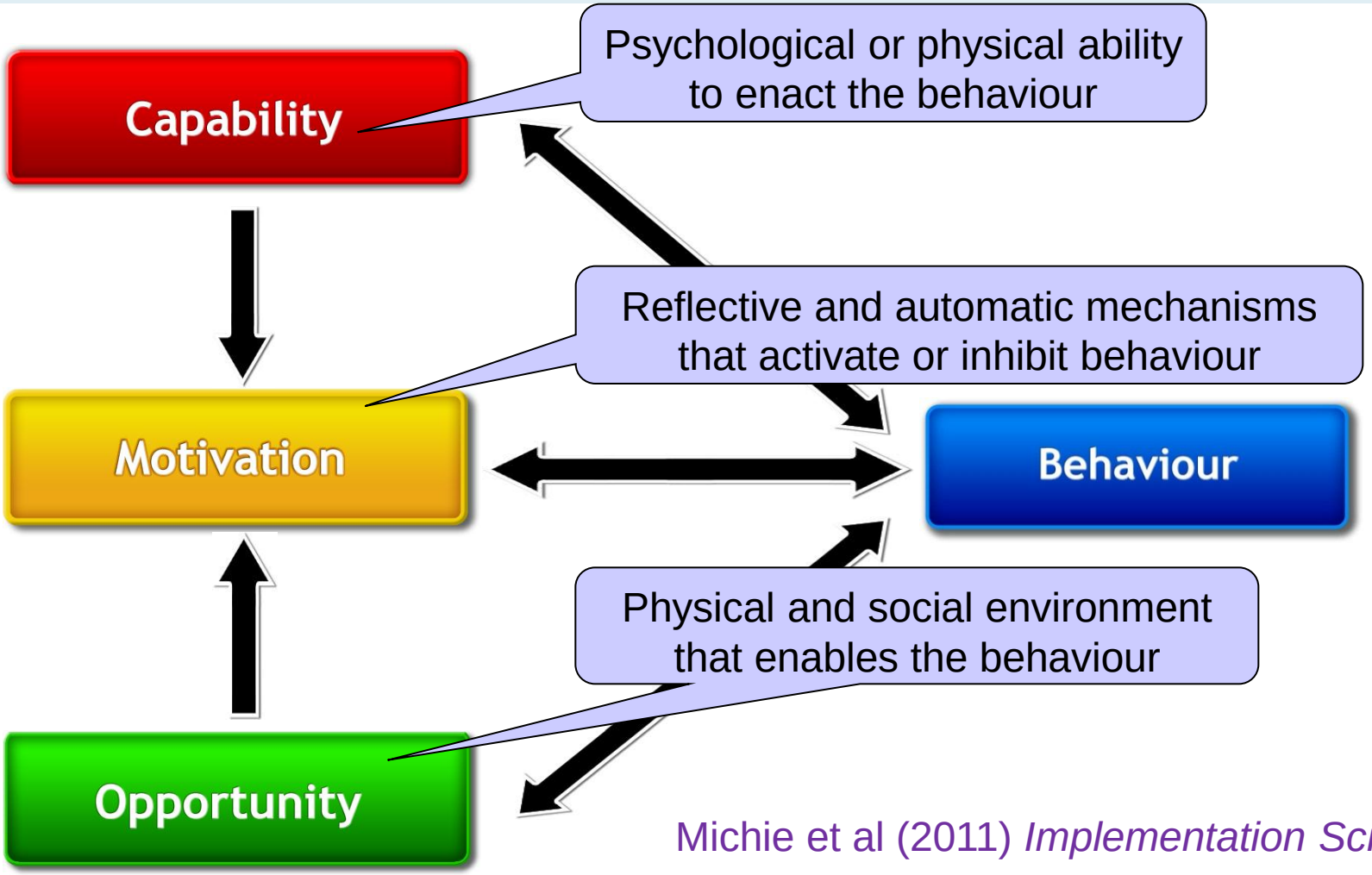
- Answering this is helped by a model of behaviour
  - COM-B
  - Behaviour is part of a system and itself is a system

A thought experiment

For behaviour to change, what three conditions need to exist?



The COM-B system: Behaviour occurs as an interaction between three necessary conditions



Michie et al (2011) *Implementation Science*

cleanyourhands© campaign

2004-2011

led by Sheldon Stone

- **Opportunity**
  - Alcohol hand rub beside every bed
- **Motivation**
  - Persuasive posters
  - Encouraging patients to ask
- **Capability**
  - No intervention

Capability

- Nurses have the capability to clean their hands
  - But not to
    - pay attention to this behaviour over other competing behaviours
    - develop routines for noticing when the behaviour does not occur, and plans for acting in future
- Train staff to set goals, observe their behaviour, develop action plans on the basis of feedback
    - *Developed at UCL, based on behavioural theory*

Understand target behaviour

1. Define problem in behavioural terms
2. Select target behaviour (what you will change to address the problem)
3. Specify target behaviour (what, where, when, how, with whom, in what context…)
4. Understand what needs to change to achieve target behaviour (COM-B and TDF)

Design intervention

Identify:

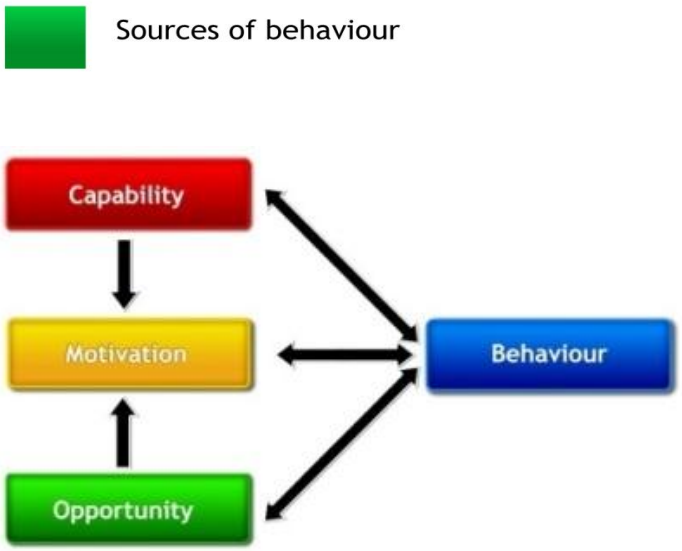
5. Intervention functions
6. Behaviour Change Techniques

Deliver intervention

Select:

7. Mode of delivery
8. Policy categories

3. Make the “behavioural diagnosis”



4. Intervening: Consider all the options

- Frameworks make life easier
  - good frameworks make you more
- Need a framework that i
  - Comprehensive
    - So you don't … e effective
  - Coheren…
    - So … tematic method for intervention design
  - Lin… …odel of behaviour
    - So that you can draw on behavioural science

Useable by, and useful to, policy makers, service planners and intervention designers

Do we have such a framework?

- Systematic literature review identified 19 frameworks of behaviour change interventions
  - related to many domains e.g. health, environment, culture change, social marketing
- None met all these three criteria
- So …. Developed a synthesis of the 19 frameworks

Michie et al (2011) The Behaviour Change Wheel: a new method for characterising and designing behaviour change interventions, *Implementation Science*

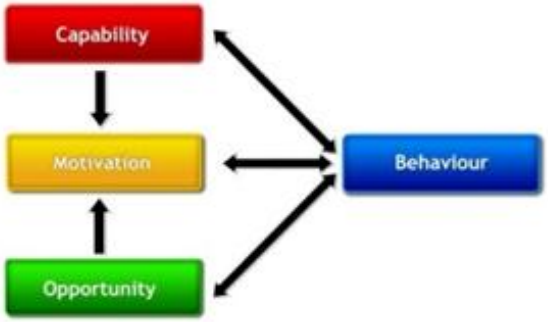
www.behaviourchangewheel.com

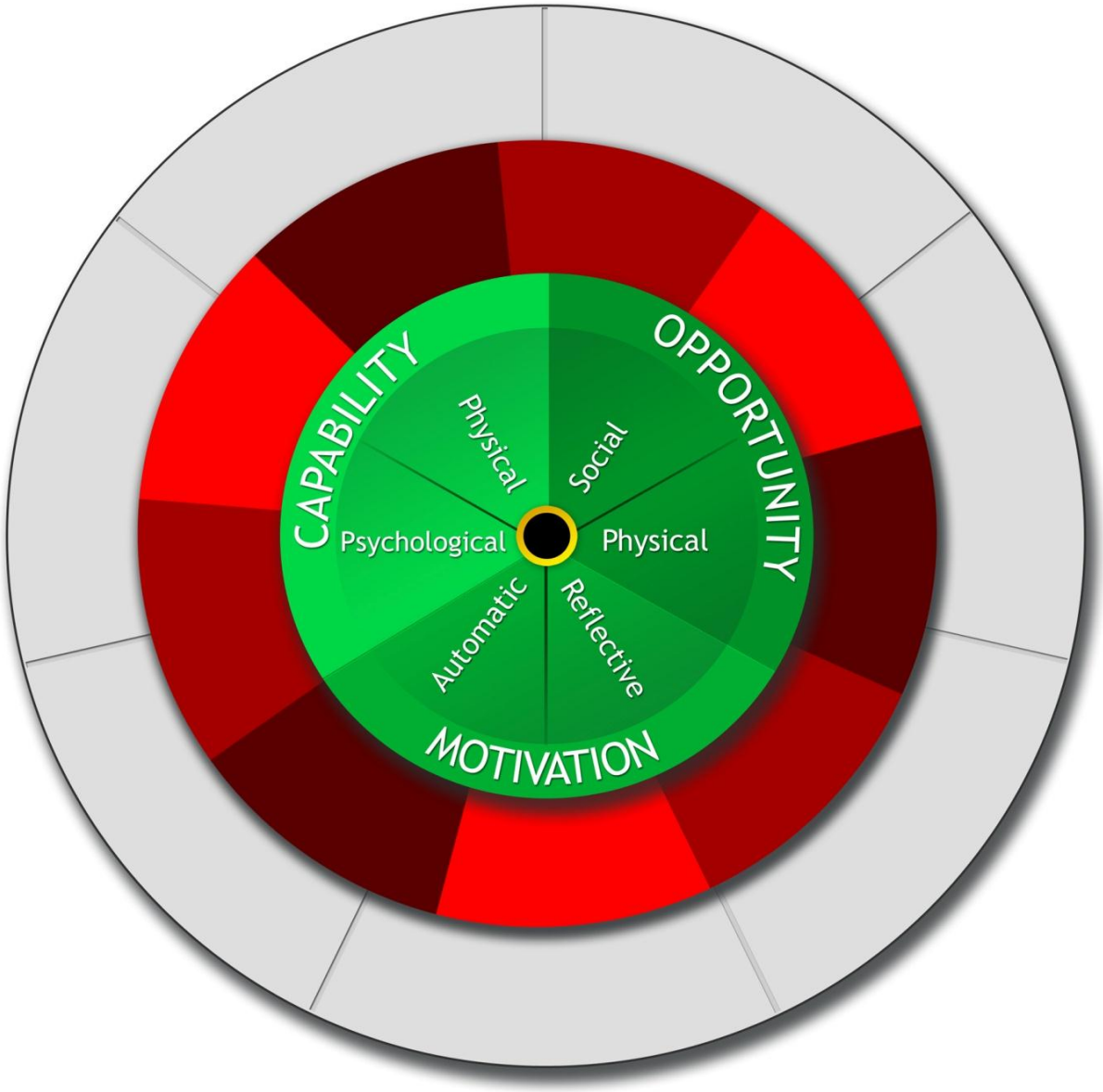
Behaviour at the hub …. COM-B

Sources of behaviour

Intervention functions

Policy categories





Interventions

Sources of behaviour

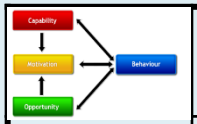
Intervention functions

Interventions: activities designed to change behaviours

From diagnosis to intervention

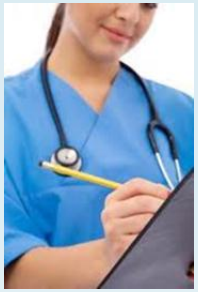
- Make a 'diagnosis' of the problem i.e. the behaviour to be changed
  - Profile of what needs to change using COM-B
- Identify intervention functions
  - using matrix of COM-B x 9 intervention functions
- Identify policy categories
  - using matrix of intervention functions x policy categories
- Select specify behaviour change techniques

Design: which intervention functions to use?



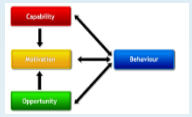
	Educ	Pers	Incen	Coer	Train	Restr	Envir	Mod	Enabl
Cap Phys					■				■
Cap Psych	■				■				■
Opp Phys						■	■		■
Opp Social						■	■		■
Mot Auto		■	■	■			■	■	■
Mot Reflec	■	■	■	■					

Hand Hygiene example: Capability

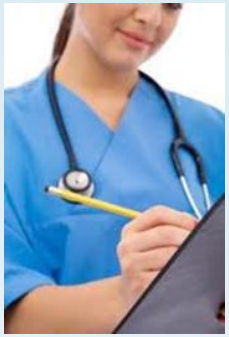


- Nurses have the capability to clean their hands
  - But not to
    - pay attention to this behaviour over other competing behaviours
    - develop routines for noticing when the behaviour does not occur, and plans for acting in future

Selecting relevant intervention functions

	Intervention functions								
	Education	Persuasion	Incentivisation	Coercion	Training	Restriction	Environmental restructuring	Modelling	Enablement
Physical capability									
Psychological capability	✓				✓				✓
Physical opportunity									
Social opportunity									
Automatic motivation									
Reflective motivation									

Intervention to increase: Capability



- Train staff to
  - set goals and
  - make action plans
- Enable:
  - observe their behaviour and give feedback
  - support development of action plans

- *Based on behavioural theory (Control Theory)*

MONTHLY FEEDBACK INTERVENTION

Co-ordinated by infection control team

= individual level component

Observe two staff member's behaviour for 20 minutes → Give immediate verbal feedback → *Full compliance* = certificate for use at staff appraisal

OR

< full compliance = immediate goal-setting and action planning regarding observed non-compliance **&** repeat observation next month

MONTHLY FEEDBACK INTERVENTION

Co-ordinated by infection control team

= individual level component

= group level component

Observe two staff member's behaviour for 20 minutes → Give immediate verbal feedback → *Full compliance* = certificate for use at staff appraisal **OR** *< full compliance* = immediate goal-setting and action planning regarding observed non-compliance **&** repeat observation next month

Observe one group of staff members for 20 minutes → Feedback displayed, and given at ward meeting → Praise for compliance **OR** *< full compliance* = ward level goal-setting and action planning regarding observed non-compliance/s

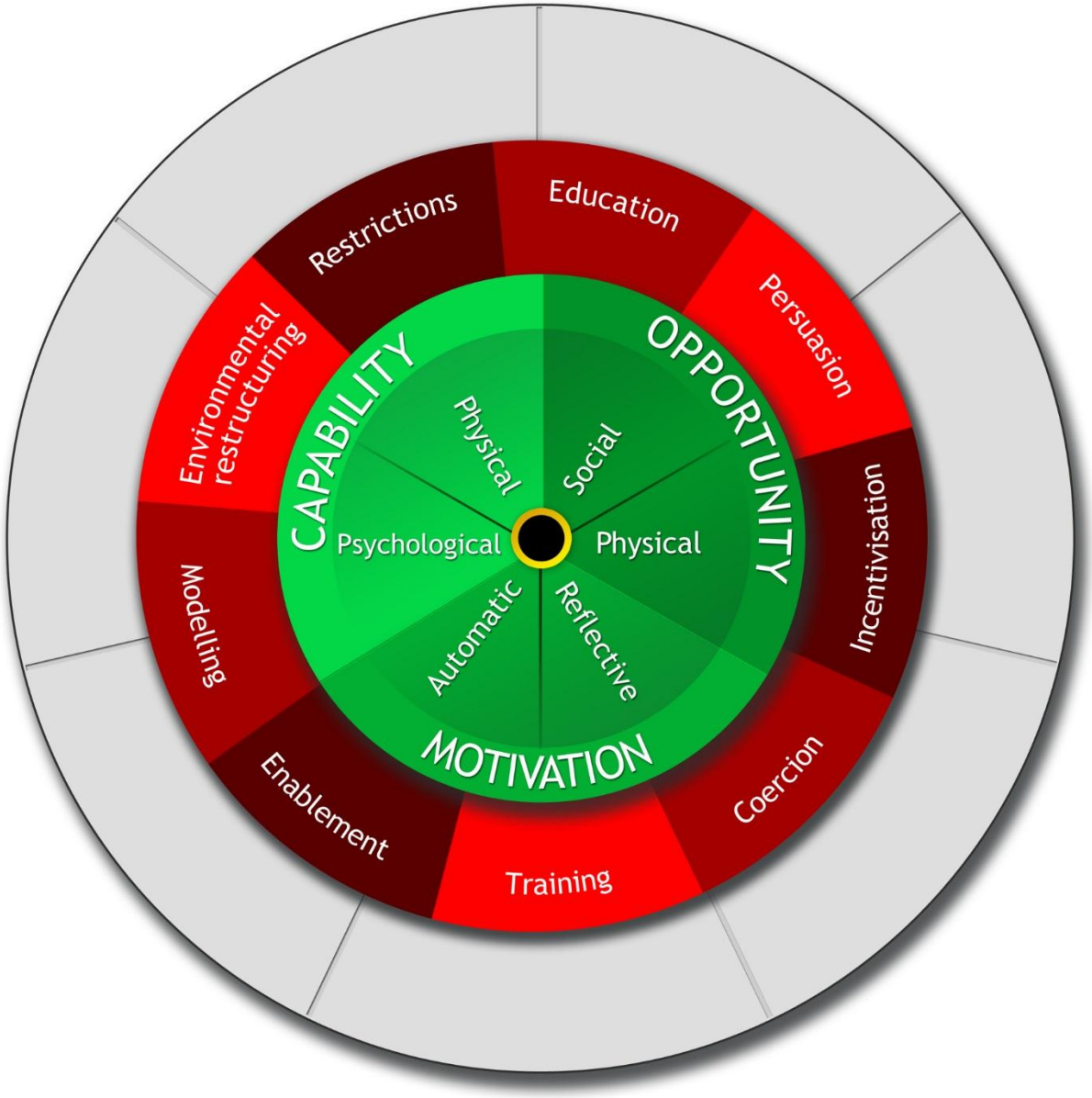
Findings: 60 wards in 16 hospitals in England

- Use of soap and alcohol hand rub tripled from 21.8 to 59.8 ml per patient bed day
- Rates of MRSA bacteraemia and C difficile infection decreased
  - *Stone, Fuller, Savage, Cookson et al, BMJ, 2012*
- Giving 1-1 feedback led to staff being 13-18% more likely to clean their hands
  - *Fuller, Michie, Savage, McAteer et al, PLoS One, 2012*

Sources of behaviour

Intervention functions

Policy categories

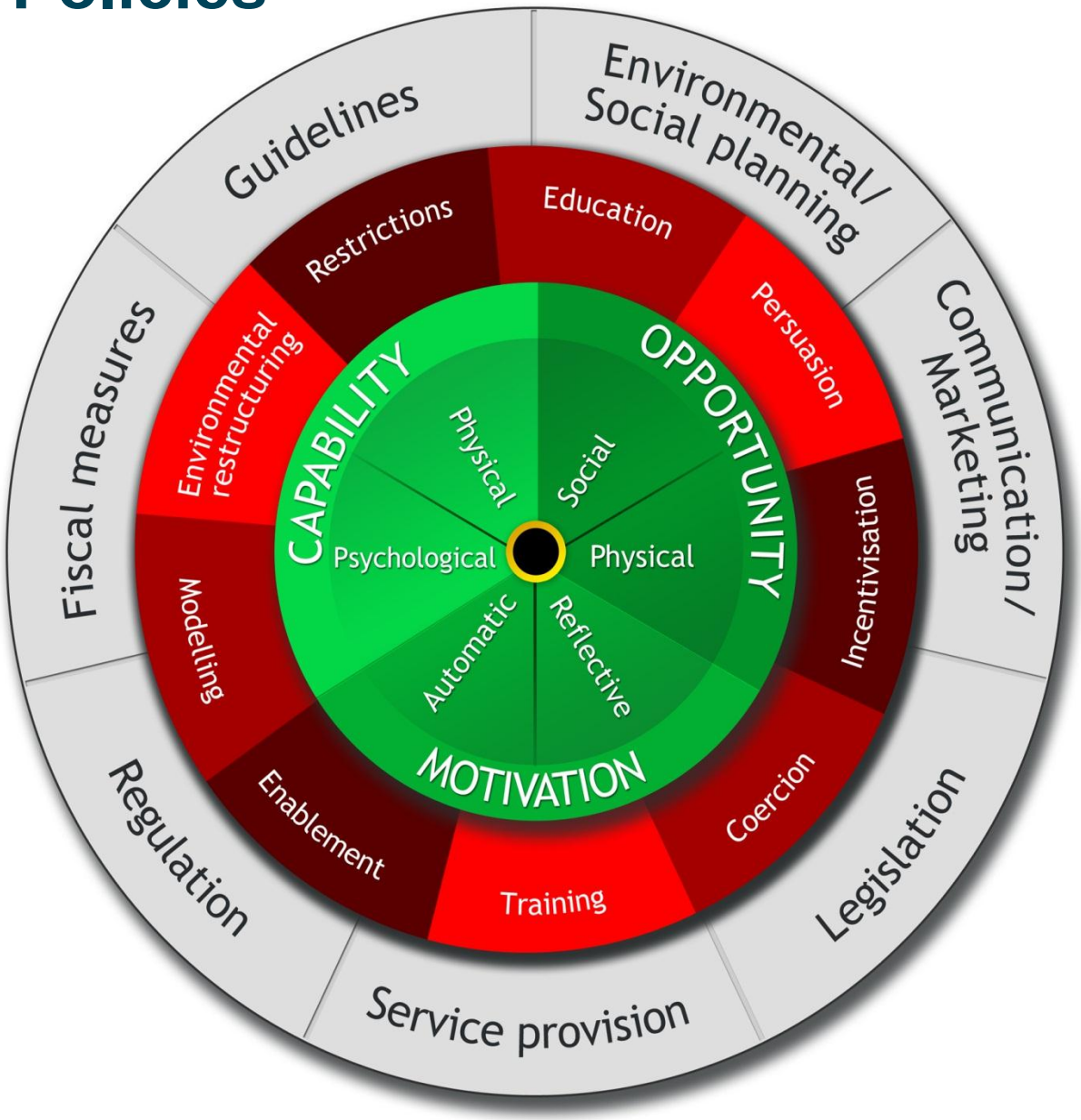


Policies

Sources of behaviour

Intervention functions

Policy categories



Policies: decisions made by authorities concerning interventions

Michie et al (2011) The Behaviour Change Wheel: a new method for characterising and designing behaviour change interventions *Implementation Science*

Which policy categories should be used?

	Intervention Functions								
	Educ	Persuas	Incent	Coerc	Train	Restric	Envir	Model	Enabl
Comm	■	■	■	■				■	
Guid	■	■	■	■	■	■	■		■
Fiscal			■	■	■		■		■
Regul	■	■	■	■	■	■	■		■
Legisl	■	■	■	■	■	■	■		■
Enviro							■		■
Service	■	■	■	■	■			■	■

Elaboration of COM-B: Theoretical Domains Framework

Michie et al (2005) Making psychological theory useful for implementing evidence based practice: a consensus approach, *Quality and Safety in Health Care*

Cane et al (2011) Validation of the theoretical domains framework for use in behaviour change and implementation research, *Implementation Science*

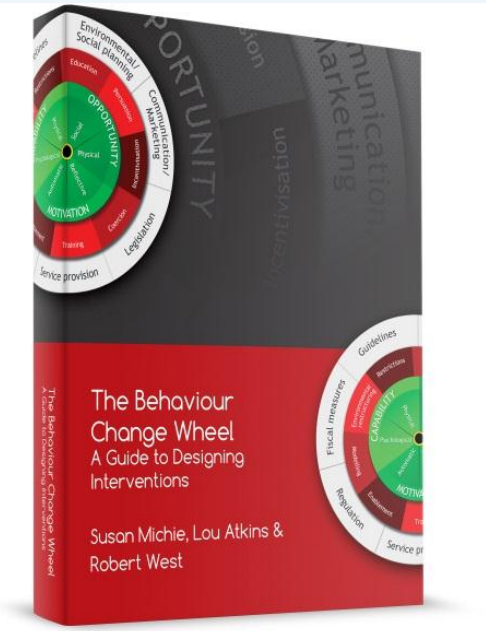
Sources of behaviour

TDF Domains

Soc - Social influences
Env - Environmental Context and Resources
Id - Social/Professional Role and Identity
Bel Cap - Beliefs about Capabilities
Opt - Optimism
Int - Intentions
Goals - Goals
Bel Cons - Beliefs about Consequences
Reinf - Reinforcement
Em - Emotion
Know - Knowledge
Cog - Cognitive and interpersonal skills
Mem - Memory, Attention and Decision Processes
Beh Reg - Behavioural Regulation
Phys - Physical skills

Use the Behaviour Change Wheel to …

1. Design interventions and policies
   - COM-B links to intervention functions link to behaviour change techniques
2. "Retrofit" – identify what is in current interventions and policies
3. Provide a framework for evaluation
   - How are interventions working?
4. Structure systematic reviews



Some applications of Behaviour Change Wheel

India
- Smartphone app to reduce cardiovascular disease risk

Kenya
- Improve paediatric health care

Netherlands
- An organisational intervention tool

Thailand
- Preventing melioidosis

USA
- Improving colorectal cancer screening
- Providing long-acting reversible contraception to adolescents
- Improve parenting practices for children with challenging behaviour

UK
- Smartphone app for parents of overweight children
- Promote recycling behaviours in university staff and students
- Reduce cardiovascular disease risk in people with severe mental illness
- Improve management of postnatal depression
- Smartphone app to promote attentive eating
- Internet intervention to promote condom use

International Red Cross
- Train volunteers

Understand target behaviour

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Interventions are made up of many behaviour change techniques

= discrete, low-level components of interventions that on their own have potential to change behaviour

An early reliable taxonomy to change frequently used behaviours

1. General information
2. Information on consequences
3. Information about approval
4. Prompt intention formation
5. Specific goal setting
6. Graded tasks
7. Barrier identification
8. Behavioural contract
9. Review goals
10. Provide instruction
11. Model/ demonstrate
12. Prompt practice
13. Prompt monitoring
14. Provide feedback

1
1
1
2
22. Prompt self talk
23. Relapse prevention
24. Stress management
25. Motivational interviewing
26. Time management

Involves detailed planning of what the person will do including, at least, a very specific definition of the behaviour e.g., frequency (such as how many times a day/week), intensity (e.g., speed) or duration (e.g., for how long for). In addition, at least one of the following contexts i.e., where, when, how or with whom must be specified. This could include identification of sub-goals or preparatory behaviours and/or specific contexts in which the behaviour will be performed.

The person is asked to keep a record of specified behaviour/s. This could e.g. take the form of a diary or completing a questionnaire about their behaviour.

Abraham & Michie, 2008, *Health Psychology*

ann. behav. med.
DOI 10.1007/s12160-013-9486-6

ORIGINAL ARTICLE

The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions

Susan Michie, DPhil, CPsychol · Michelle Richardson, PhD · Marie Johnston, PhD, CPsychol · Charles Abraham, DPhil, CPsychol · Jill Francis, PhD, CPsychol · Wendy Hardeman, PhD · Martin P. Eccles, MD · James Cane, PhD · Caroline E. Wood, PhD

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Abstract

Background CONSORT guideli… …gredients in an open- reporting of behavior chang… …ment amongst six researchers ous methods of cha… …ition descriptions by BCTs was tions with pr… …s This resulted in 93 BCTs clustered into 16 groups. *Objec*… Of the 26 BCTs occurring at least five times, 23 had adjusted kappas of 0.60 or above.

Conclusions "BCT taxonomy v1," an extensive taxonomy of 93 consensually agreed, distinct BCTs, offers a step change as a method for specifying interventions, but we anticipate further development and evaluation based on international, interdisciplinary consensus.

Electronic supplementary material The online version of this article (doi:10.1007/s12160-013-9486-6) contains supplementary material, which is available to authorized users.

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93 item BCT Taxonomy v1, Annals of Behavioral Medicine, 2013

BCT Taxonomy v1: 93 items in 16 groupings

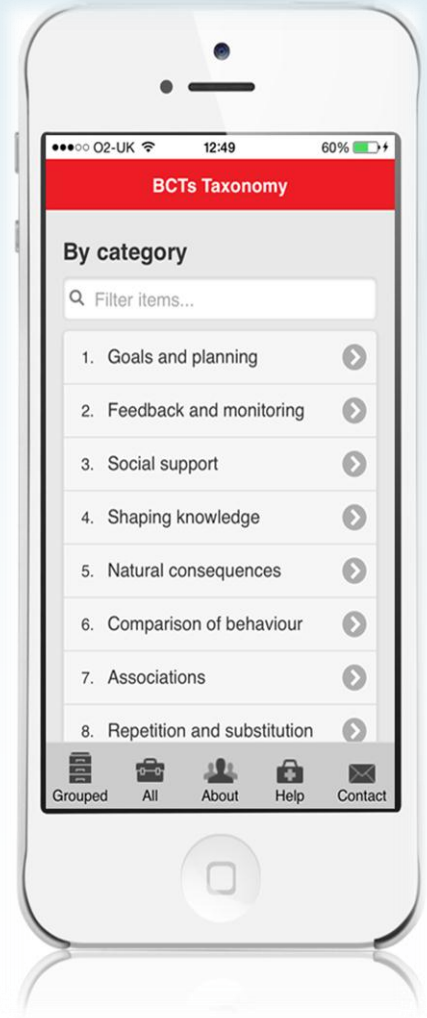
Page	Grouping and BCTs	Page	Grouping and BCTs	Page	Grouping and BCTs
1	**1. Goals and planning**	8	**6. Comparison of behaviour**	16	**12. Antecedents**
	1.1. Goal setting (behavior) 1.2. Problem solving 1.3. Goal setting (outcome) 1.4. Action planning 1.5. Review behavior goal(s) 1.6. Discrepancy between current behavior and goal 1.7. Review outcome goal(s)		6.1. Demonstration of the behavior 6.2. Social comparison 6.3. Information about others' approval		12.1. Restructuring the physical environment 12.2. Restructuring the social environment 12.3. Avoidance/reducing exposure to cues for the behavior 12.4. Distraction 12.5. Adding objects to the
		9	**7. Associations**		
			7.1. Prompts/cues		

No.	Label	Definition	Examples
1. Goals and planning			
1.1	***Goal setting (behavior)***	Set or agree on a goal defined in terms of the behavior to be achieved *Note: only code goal-setting if there is sufficient evidence that goal set as part of intervention; if goal unspecified or a behavioral outcome, code* ***1.3, Goal setting (outcome)****; if the goal defines a specific context, frequency, duration or intensity for the behavior, also code* ***1.4, Action planning***	Agree on a daily walking goal (e.g. 3 miles) with the person and reach agreement about the goal Set the goal of eating 5 pieces of fruit per day as specified in public health guidelines

BCT methodology provides an agreed, standard method to

- Describe interventions as accurately as possible
  - Replicate interventions in research to build evidence
  - Implement effective interventions
- Design interventions
  - Translate general intervention functions into specific BCTs
- Evaluate e.g. in factorial designs
  - Identify active ingredients (what)
  - Investigate mechanisms of action (how)
- Synthesise published reports in systematic reviews

The BCTTv1 smartphone app



- Fully searchable version of BCTTv1
- Search by BCT label, BCT grouping or alphabetically
- Increases familiarity with the taxonomy
- Increases speed and recall of BCT labels and definitions

Search for: BCTs

Search for: BCTs*

bcts.23.co.uk*

bcts.23.co.uk*

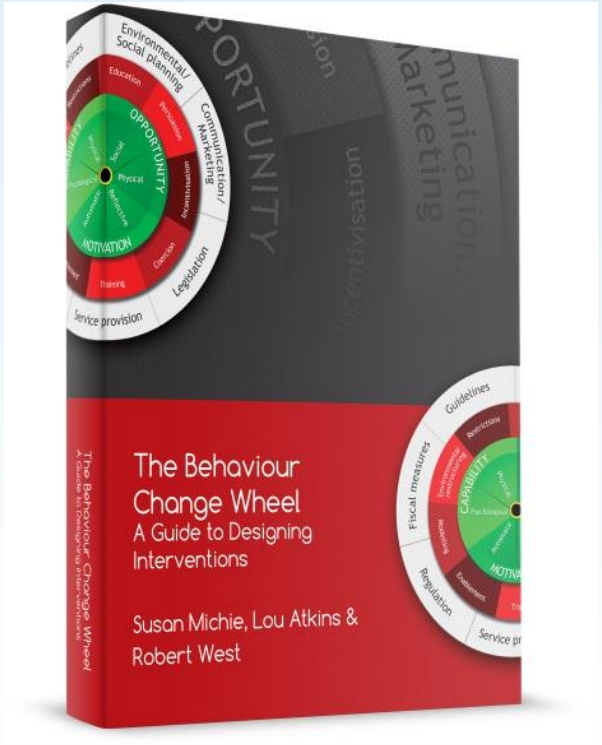
* You'll need an internet connection to use the app

www.bct-taxonomy.com

Which behaviour change techniques to select?

Local context: The APEASE criteria

- **A**ffordability
- **P**racticability
- **E**ffectiveness/cost-effectiveness
- **A**cceptability
  - public
  - professional
  - political
- **S**ide-effects/safety
- **E**quality



www.behaviourchangewheel.com

Maintaining behaviour change

- Changing behaviour is hard
  - Maintaining that change is harder
- Effective strategies
  - Don't rely on individual choice and decision-making
  - Do rely on the environment and making behaviour automatic
    - environmental support and prompts
    - building routines
    - feedback
    - rewards and incentives

How is local government using evidence?

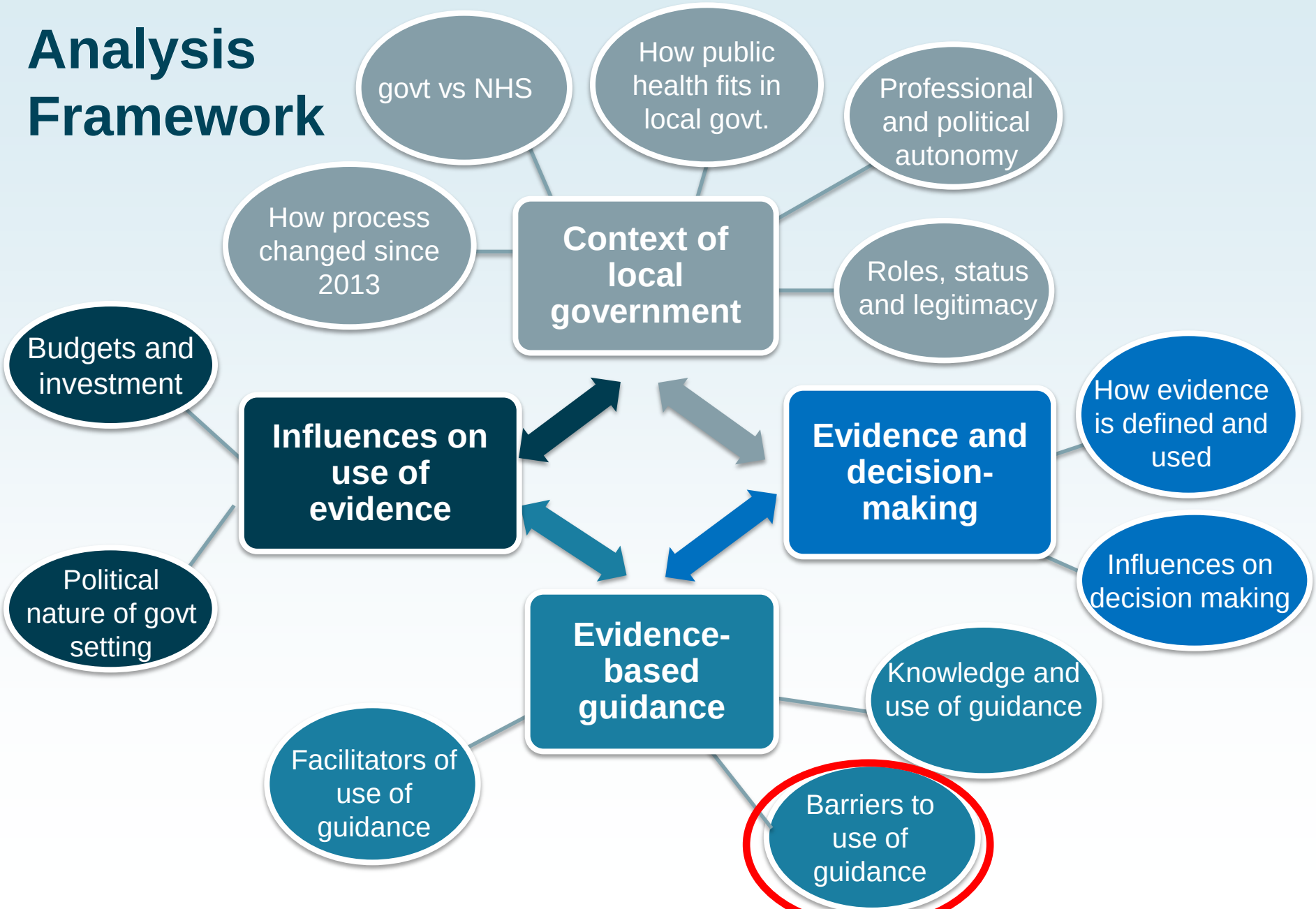
Aims

1. To investigate how evidence-based guidelines are received and implemented in local government
2. To identify institutional, individual and systemic barriers and facilitators to implementation
3. To investigate data and mechanisms for monitoring and evaluating the process of implementation

NICE National Institute for Health and Care Excellence

Local Government Association

Analysis Framework



Barriers to the use of NICE guidance – COM-B

Capability

- Lack of awareness/knowledge
- Evidence lacks detail to support expenditure decisions

"I felt it was incumbent on NICE to say, not only do we think this is cost effective but we realise you've got a fixed budget… we think this is more cost-effective than something you currently do… And they never did that." *Director of PH, C*

Opportunity

- Volume of evidence difficult to digest
- Guidance not applicable or specific enough for local context
- Need for translation to local context

"I get a bit embarrassed, to go to somebody, and they go, well show me what the guidance is like, and I'm like, I'm looking at it, thinking, how can I condense this, so that it looks less?" *PH Officer, B*

Motivation

- View that research doesn't apply in real world
- Premium not given to evidence-based guidance

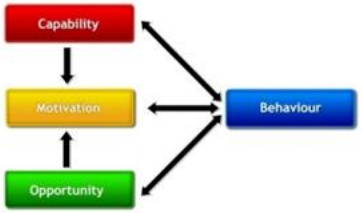
"There's not the same premium put on use of evidence as there used to be… there's other factors that trump evidence in decision making." *PH Officer, D*

Guideline implementation: "reversing the pipeline"

- Evidence-based medicine model
  - Research evidence → recommendations → implementation
- UK study of evidence in local government (2014-15)
  - Little culture of using research evidence
  - Culture of localism
  - Political incentives, short-termism
- For evidence to inform practice, need to reverse engineer the process
  - Local needs → types of recommendation → relevant evidence suitably presented → implementation

In summary …. To change behaviour ….

- Start by understanding the problem
  - Identify the behaviours to change
    - Who, what, where, when
  - Understand the behaviours
    - COM-B
    - ***Before*** designing the intervention
- Consider the full range of effective interventions and supporting policies
- Select and implement appropriate behaviour change techniques



And evaluate ……

- ….. so it is possible to accumulate evidence to inform future interventions
- Plan evaluation in advance using a theoretical framework to increase understanding of
  - mechanisms of action
  - reasons for variation

Acknowledgements

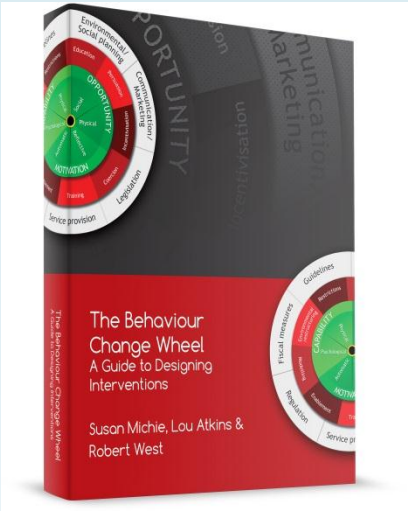
- Key collaborators in this work
  - Prof Robert West, UCL
  - Prof Marie Johnston, Aberdeen
  - Health Psychology Research Group
- Key funders

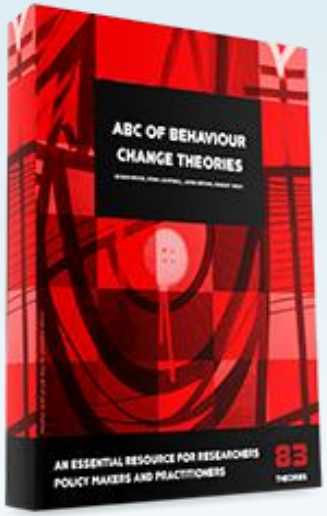
MRC Medical Research Council

NHS National Institute for Health Research

CANCER RESEARCH UK

For more information





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  - www.behaviourchangetheories.com

- UCL Centre for Behaviour Change
  - www.ucl.ac.uk/behaviour-change

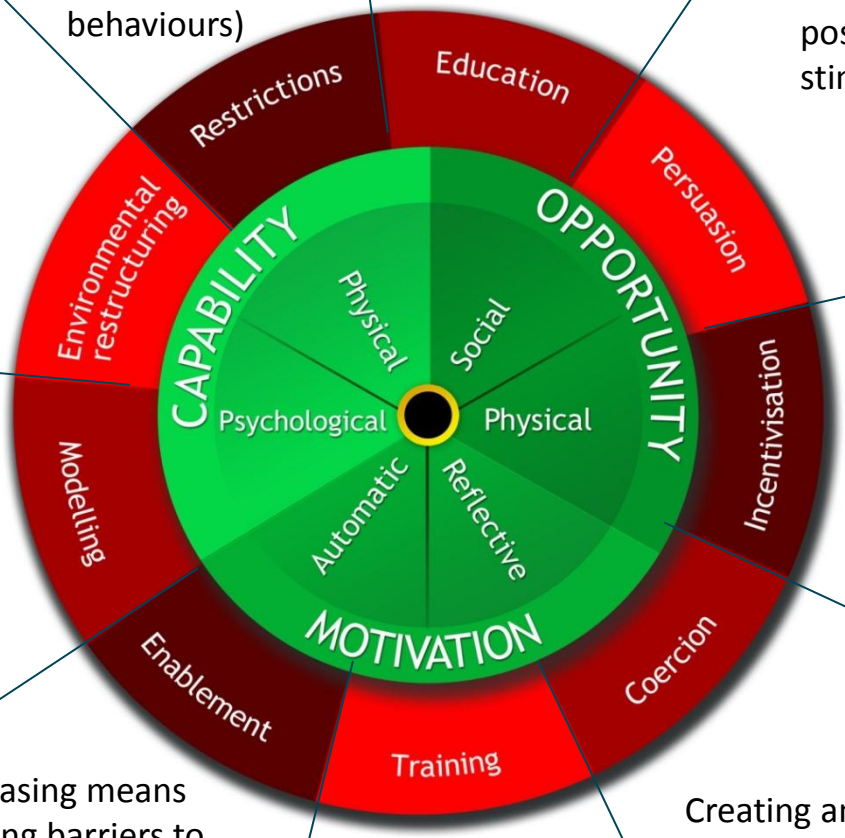
All proceeds from CBC teaching, training, books and products go to further development

ADDITIONAL SLIDES IF NEEDED

Frameworks included in systematic review

- **1. Epicure taxonomy** West (2006) Taxonomy of approaches designed to influence behaviour patterns
- **2. Culture capital framework** Knott *et al.* (2008) Framework of knowledge about culture change, offering practical tools for policymaking
- **3. EPOC taxonomy of interventions** Cochrane Effective Practice and Organisation of Care Review Group (EPOC) (2010) Checklist to guide systematic literature reviewers about the types of information to extract from primary studies
- **4. RURU: Intervention implementation taxonomy** Walter *et al.* (2003) Taxonomy covering a wide range of policy, practice and organisational targets aimed at increasing impact of research
- **5. MINDSPACE** Institute for Government and Cabinet Office (2010) Checklist for policy-makers aimed at changing or shaping behaviour
- **6. Taxonomy of behaviour change techniques** Abraham *et al.* (2010) Taxonomy of behaviour change techniques grouped by change targets
- **7. Intervention Mapping** Bartholomew *et al.* (2011) Protocol for a systematic development of theory- and evidence-based interventions
- **8. People and places framework** Maibach *et al.* (2007) Framework that explains how communication and marketing can be used to advance public health
- **9. Public health: ethical issues** Nuffield Council on Bioethics (2007) Ladder of interventions by government, industry, organisations and individuals to promote public health.

- **10. Injury control framework** Geller *et al.* (1990) Heuristic framework for categorising and evaluating behaviour change strategies aimed at controlling injuries
- **11. Implementation taxonomy** Leeman *et al.* (2007) Theory-based taxonomy of methods for implementing change in practice
- **12. Legal framework** Perdue *et al.* (2005) Conceptual framework for identifying possible legal strategies used for preventing cardiovascular diseases
- **13. PETeR** White (in prep.) Comprehensive and universally applicable model or taxonomy of health
- **14. DEFRA's 4E model** DEFRA (2008) Process model for policy makers aimed at promoting pro-environmental behaviours in accordance with social marketing principles
- **15. STD/ HIV framework** Cohen and Scribner (2000) Taxonomy to expand the scope of interventions that can be used to prevent STD and HIV transmission
- **16. Framework on public policy in physical activity** Dunton *et al.* (2010) Taxonomy aimed at understanding how and why policies successfully impact on behaviour change
- **17. Intervention framework for retail pharmacies** Goel *et al.* (1996) Framework that presents factors that may affect retail pharmacy describing and strategies for behaviour change to improve appropriateness of prescribing
- **18. Environmental policy framework** Vlek (2000) A taxonomy of major environmental problems, their different levels and global spheres of impact, and conceptual modelling of environmental problem- solving
- **19. Population Services International (PSI) framework** PSI (2004) A conceptual framework to guide and help conduct research on social marketing interventions



Using rules to reduce the opportunity to engage in the behaviour (or to increase behaviour by reducing opportunity to engage in competing behaviours)

Increasing knowledge or understanding

Using communication to induce positive or negative feelings to stimulate action

Changing the physical or social context

Creating an expectation of reward

Provide an example for people to aspire to or emulate

Creating an expectation of punishment or cost

Increasing means or reducing barriers to increase capability (beyond education or training) or opportunity (beyond environmental restructuring)

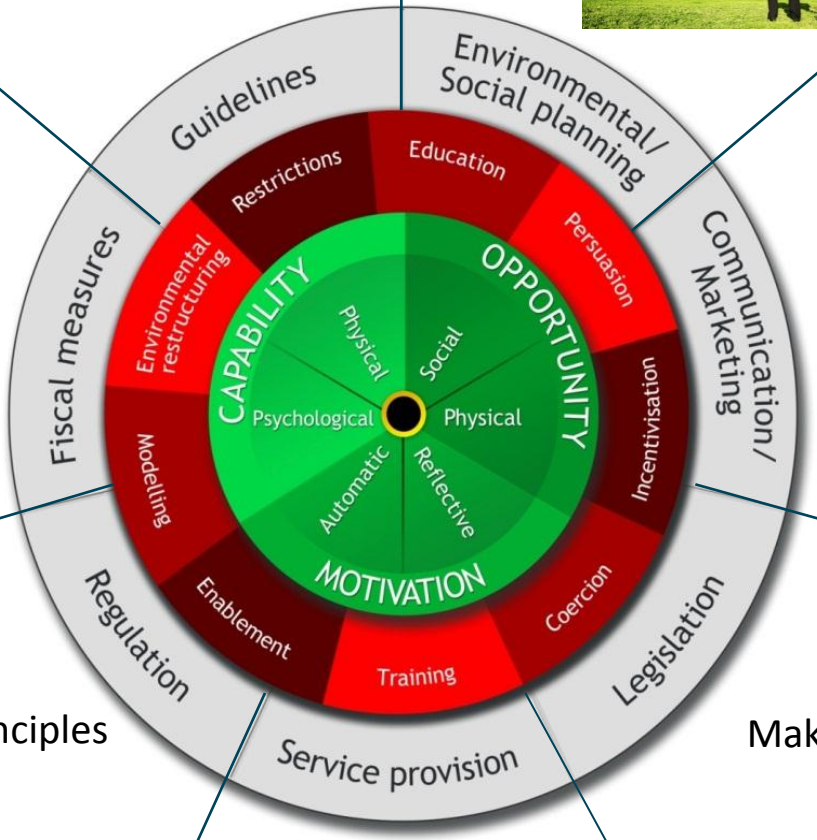
Imparting skills

Creating documents that recommend or mandate practice. This includes all changes to service provision

Designing and/or controlling the physical or social environment

Using print, electronic, telephonic or broadcast media

Using the tax system to reduce or increase the financial cost



Establishing rules or principles of behaviour or practice

Delivering a service

Making or changing laws

Selecting interventions and policies

	INTERVENTION FUNCTIONS								
	Restric-tion	Environ-mental restructuring	Modelling	Persuasion	Incentivi-sation	Coercion	Education	Training	Enable-ment

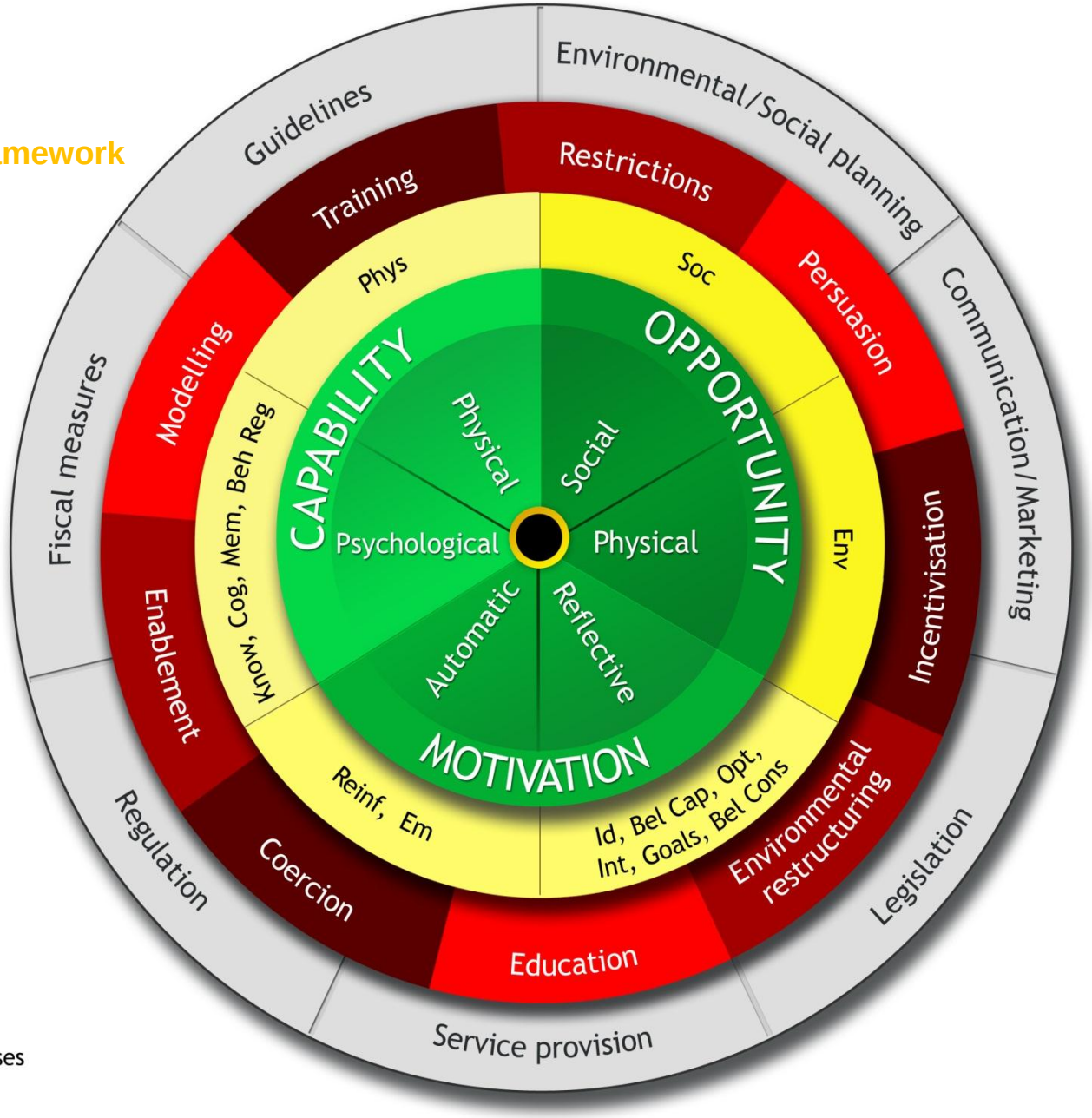
COM-B	Theory Domains
Physical capability	Physical skills
Psychological capability	Knowledge
	Cognitive and Interpersonal skills
	Memory, Attention and Decision processes
	Behavioural regulation

Sources of behaviour

Theoretical Domains Framework

Intervention functions

Policy categories



Soc - Social influences
Env - Environmental Context and Resources
Id - Social/Professional Role and Identity
Bel Cap - Beliefs about Capabilities
Opt - Optimism
Int - Intentions
Goals - Goals
Bel Cons - Beliefs about Consequences
Reinf - Reinforcement
Em - Emotion
Know - Knowledge
Cog - Cognitive and interpersonal skills
Mem - Memory, Attention and Decision Processes
Beh Reg - Behavioural Regulation
Phys - Physical skills