



# **Systems thinking – breaking out of our mental traps**

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CIHT – SORSA East Midlands

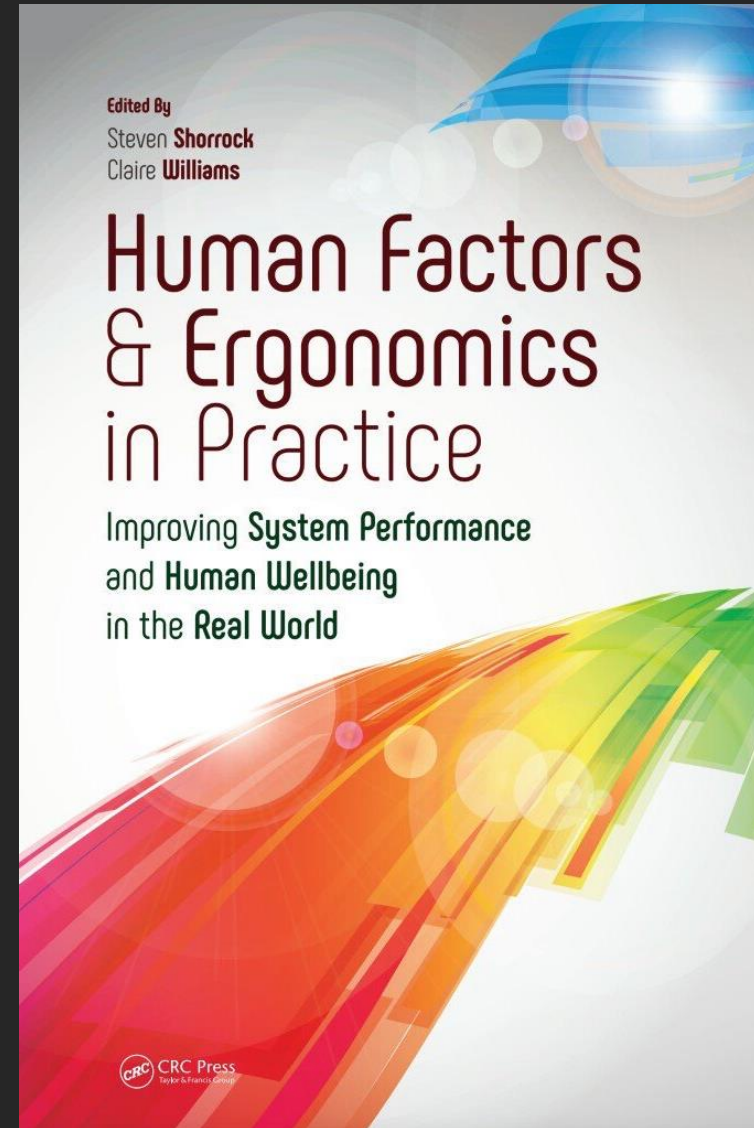
Dr Claire Williams, Feb 29<sup>th</sup>, 2024  
Claire@williamsconsultants.co.uk

# Who am I?

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Dr Claire Williams

Human Factors  
and Behaviour  
Change Specialist

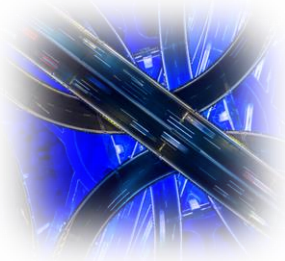


# Structure for today

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Systems thinking – What is it?



Roads as designed vs Roads as used – Looking at things differently



Is the Safe Systems approach the same as systems thinking?



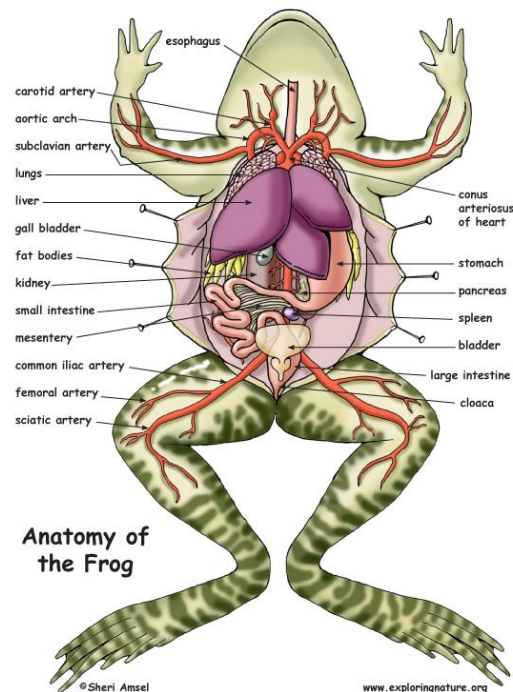
# Systems Thinking

– WHAT IS IT?



# An alternative to reductionism...

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Sweet is the lore which Nature brings;  
Our meddling intellect  
Mis-shapes the beauteous forms of things:—  
We murder to dissect.

*William Wordsworth, The Tables Turned...*







# Systems Thinking – what is it?

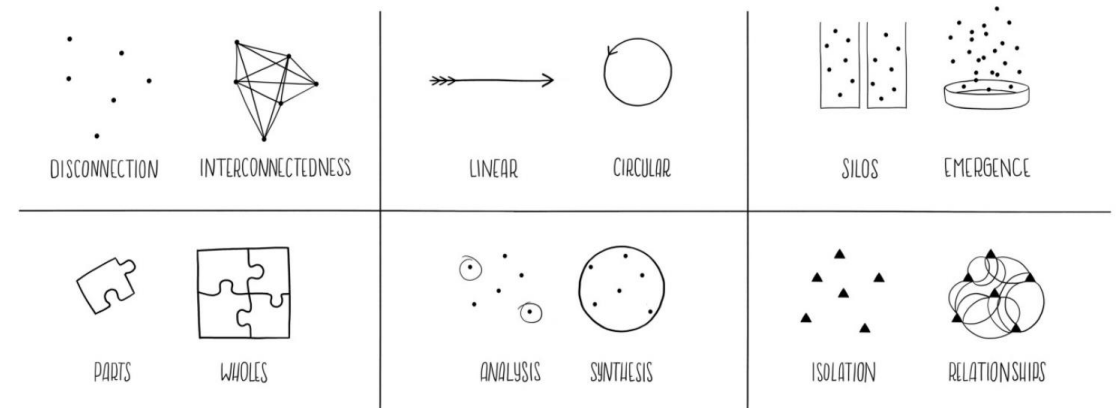
A broad term used to describe a different way of thinking

Aided by a set of approaches, methods and tools that focus on whole systems rather than **only** parts...

It is particularly useful for complex problems...

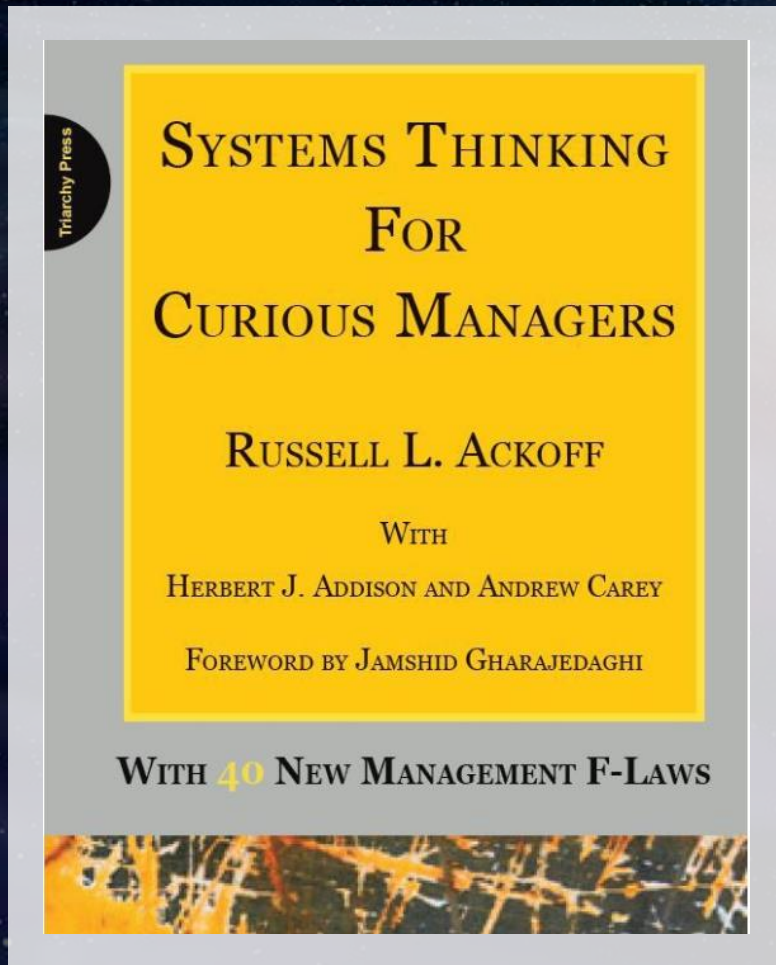
...to help understand and **dissolve** them...

## TOOLS OF A SYSTEM THINKER



<https://medium.com/disruptive-design/tools-for-systems-thinkers-the-6-fundamental-concepts-of-systems-thinking-379cdac3dc6a>

# Russell Ackoff's 4 'Solves' ...



1. **Absolution** - absolving is the way we treat most problems, we ignore hoping it will go away.
2. **Resolution** - resolving means we look at what we did last time, using common sense to find an approach which is “good enough”.
3. **Solution** – solving is what we were taught in school. We look for the “optimal solution”, the best thing to do in the current situation. But, no problem ever stays solved in a dynamic environment and every solution creates new problems, so it’s a temporary and ineffective way to treat a problem.
4. **Dissolving a Problem** is the best way to create lasting change. We can only dissolve a problem through design. More specifically, "by **redesigning the system** that has it, so that the problem no longer exists". Give a hungry man a fish...vs teach a hungry man to fish...

Adapted from: Systems thinking for curious managers – Russell L. Ackoff with H.J Addison and Andrew Carey and <http://www.human-current.com/blog/2016/1/22/dr-russell-ackoff-design-is-the-answer>



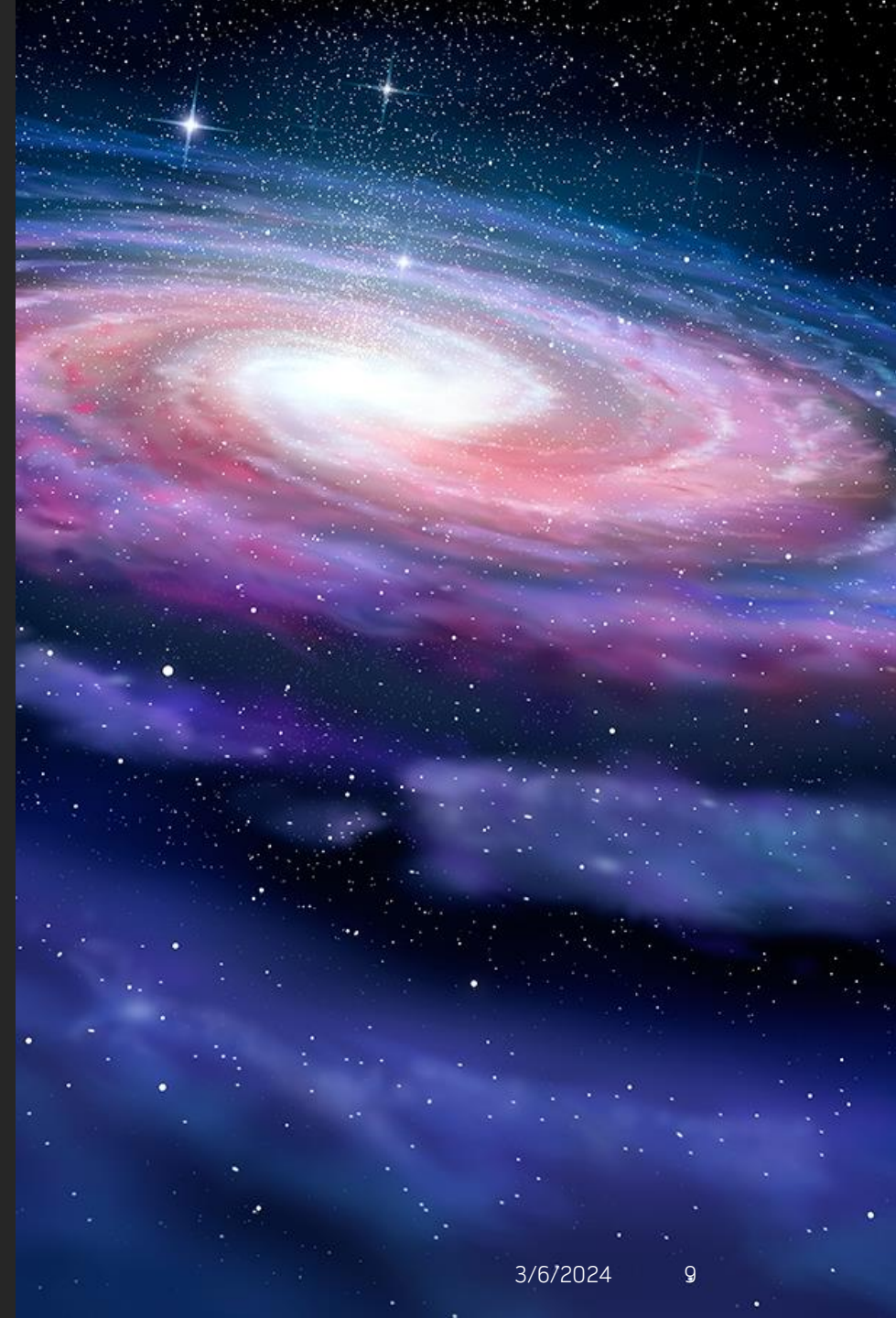
# How would I recognise a systems thinker?

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Sees the **whole picture** because she/he/they:

- Makes systems **visible through maps and models**
- **Changes perspectives** to see new leverage points in complex systems
- Looks for **interdependencies**
- Considers how **mental models** create futures
- **Goes wide** to see complex cause and effect relationships
- Finds where **unanticipated consequences** emerge

Adapted from The systems thinking playbook – Linda Sweeney and Dennis Meadows, page 2







Pen exercise –  
changing  
perspective...

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# Systems thinking - What is it

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It's a different way of thinking  
– complementary

- It's hard
- It takes practice
- It's worth it
- Useful for 'finding out/understanding' as well as intervening





# Systems Thinking

– WHAT IS IT?

Questions...



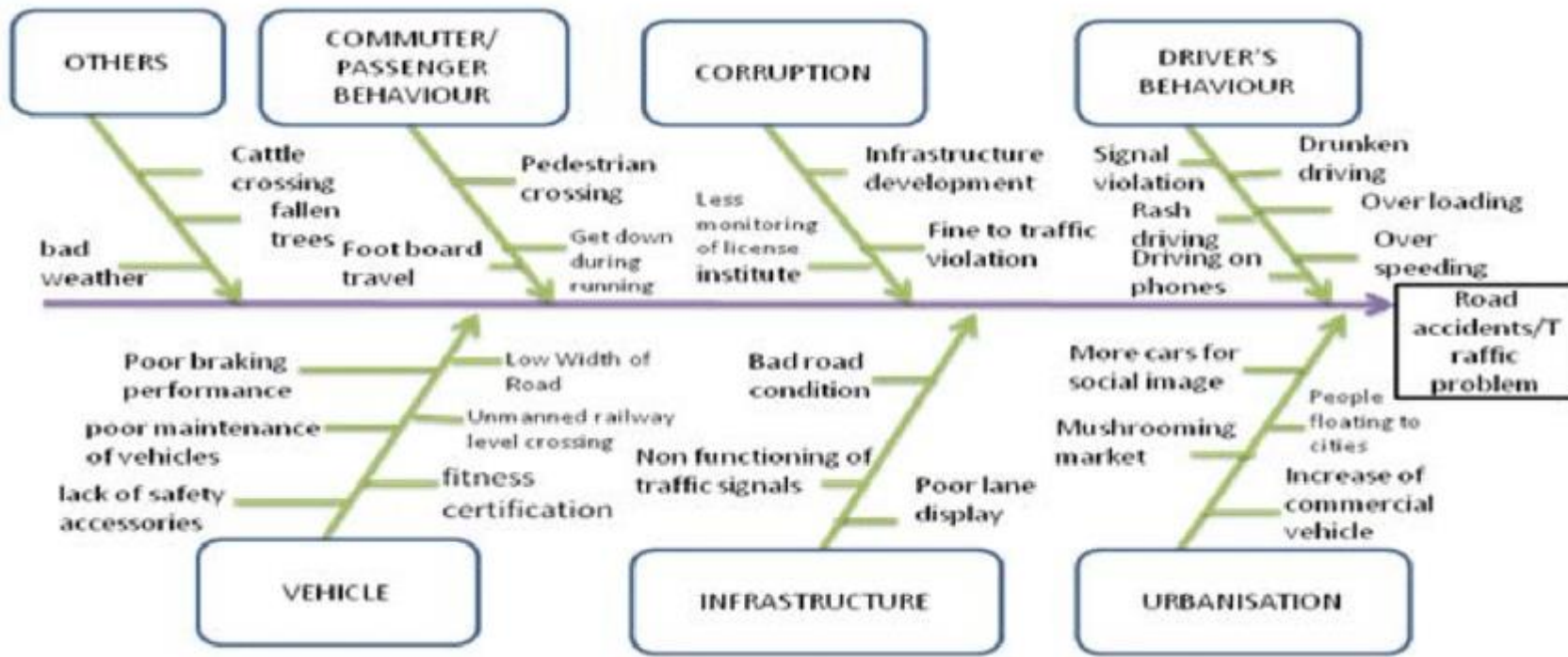
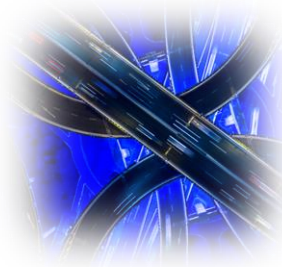


# Roads as designed vs roads as used

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LOOKING AT THINGS DIFFERENTLY USING SYSTEMS MAPS [AND ICEBERG MODELS]





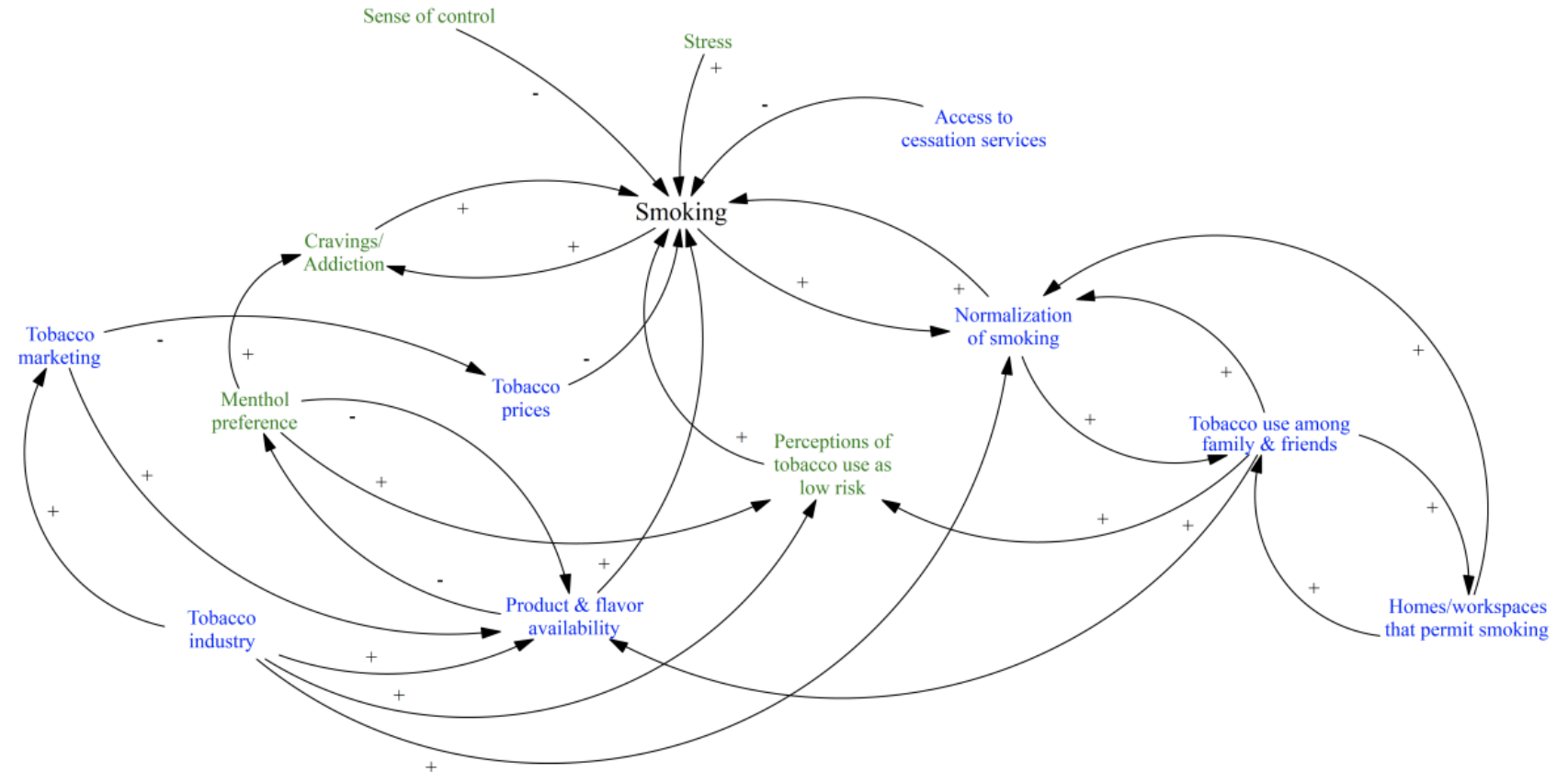
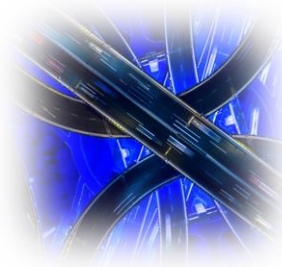
Implementation of DMAIC Principle -Six Sigma Technique on Road Safety

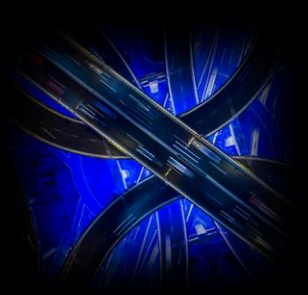
M. Subburaj, S.Prabhakaran, T.Prabhuram, 2010

Creating a virtual environment for practical driving tests Kristián Čulík, Alica Kalašová, Veronika Harantová, Aug 2019



# Conventional Systems Map of Smoking





# Brief interruption...

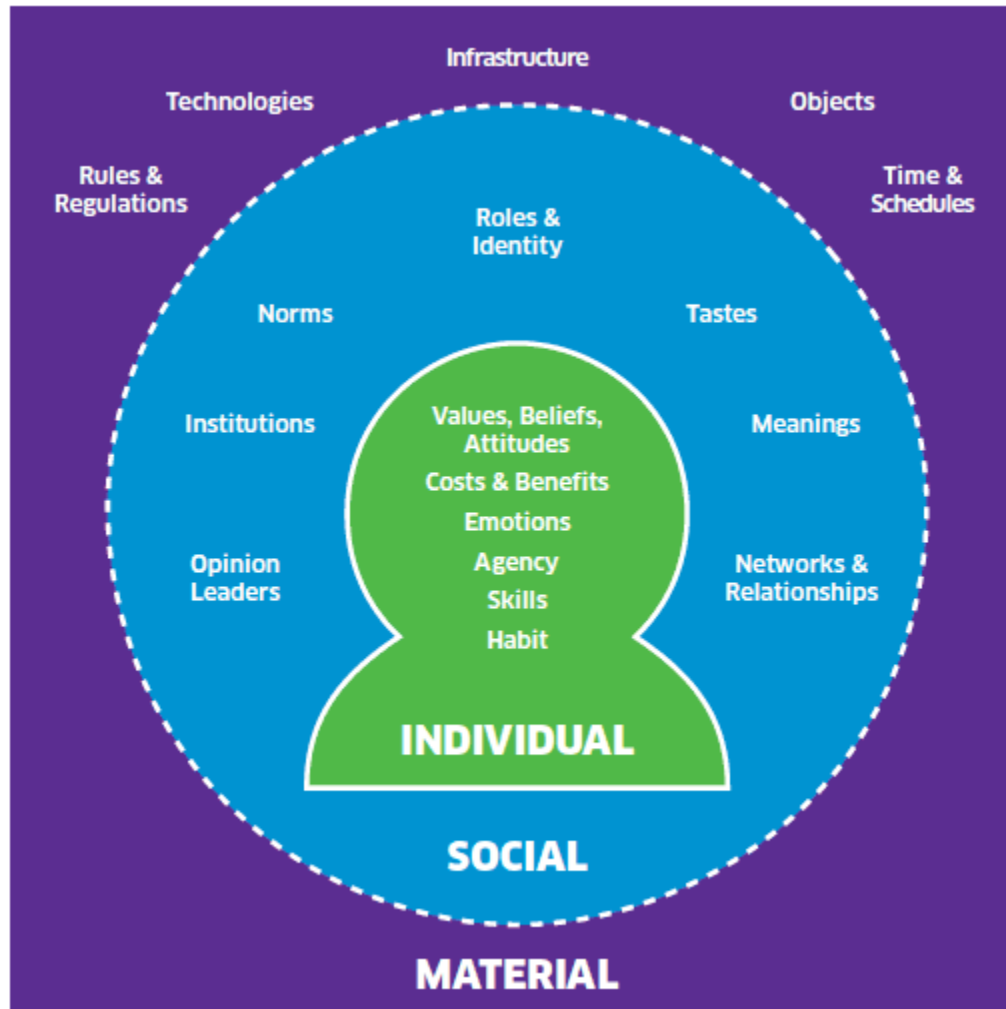
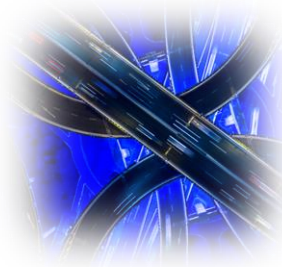
ICEBERGS CAME  
NEXT AS WE  
WORKED  
TOGETHER...

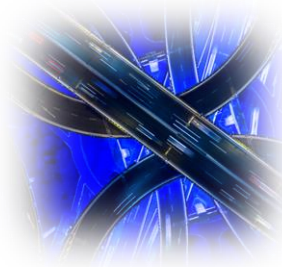


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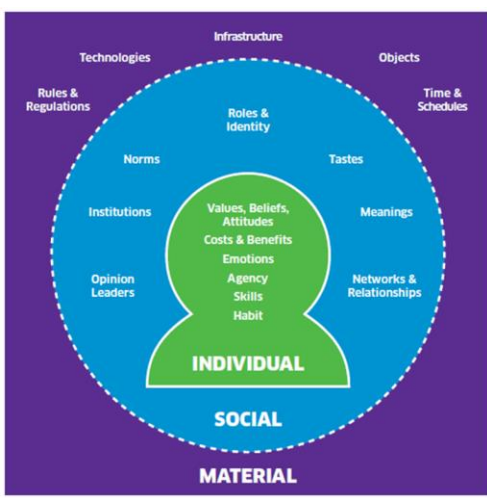
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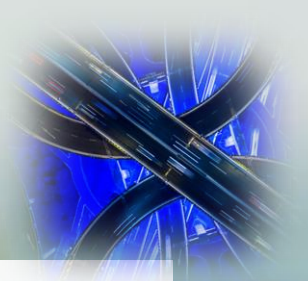






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## Systems mapping - Breaking out of our linear thinking...

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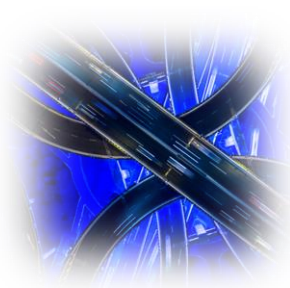
Moved from a focus on an event to a focus on outcomes...

Allowed for circular rather than just linear thinking...

Encouraged the surfacing of messiness and connections...

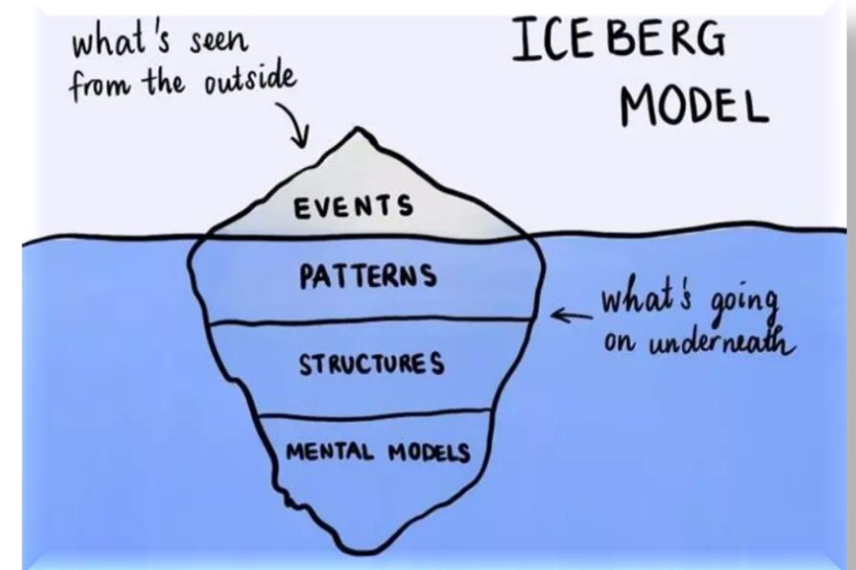
Used the process as much as the final map to inform us...

# Iceberg Models



**What is it?** - A model which illustrates various levels of a given problem - from observable events to underlying patterns that generate these, to the supporting structures and ultimately the mental models of the people in the system.

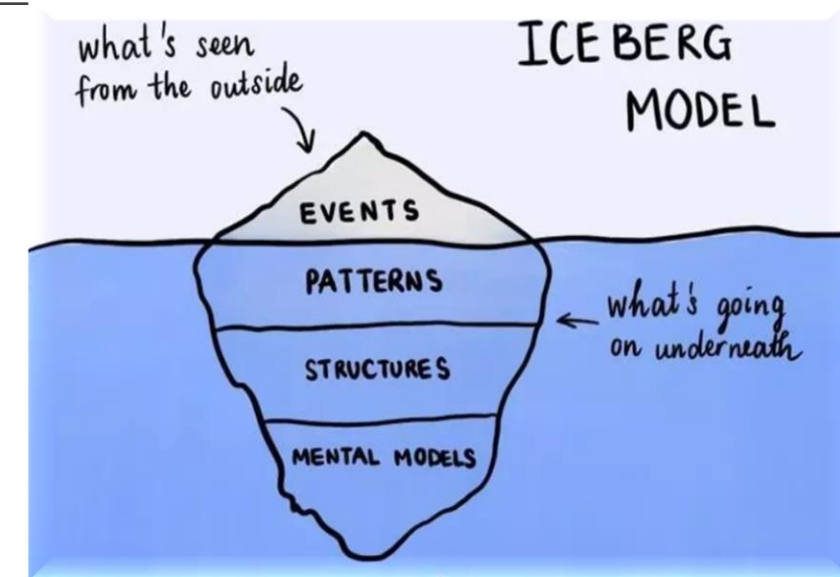
**Why would we use it?** Helps us see a situation within the context of the whole system and not limit ourselves to looking at just a single activity or event. Helps us imagine different levers for change at different levels.

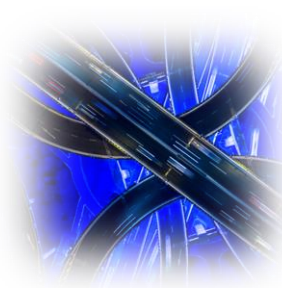




# The layers...

- **Events** represent the components and actions we see at a given point in time.
- **Patterns** can be trends in events over **time** and/or in **closely associated factors** to the events.
- System **structures** describe factors that influence and drive the patterns.
- **Mental models** support everything else in the system through the beliefs, values, and assumptions shaping people's perceptions.
- **Leverage points for change** - The lower we go in the iceberg, the more leverage we have for transforming the system.





# How did all of this help us?

Gave us a way of talking about things – shared understanding – physical artefacts...

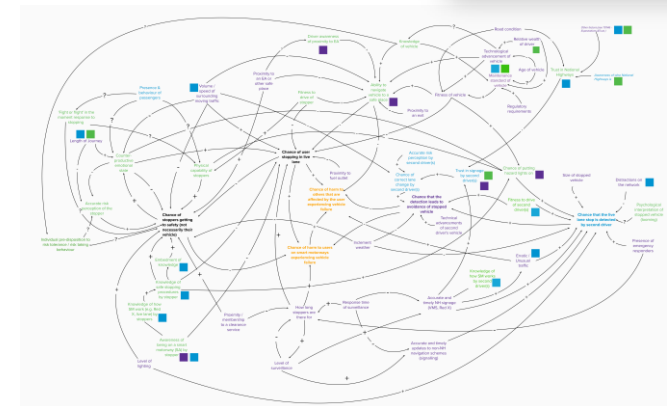
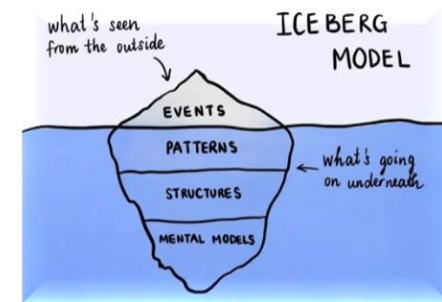
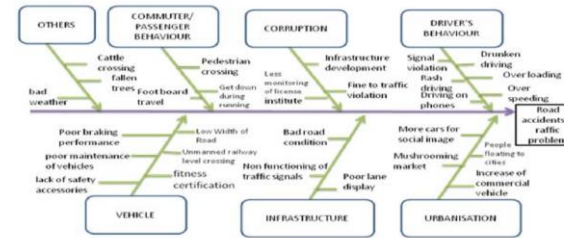
Helped us go deeper and wider...

Helped us see other perspectives...

Allowed us to focus on the things we could control but also begin to think about what we could not (so we did not ignore it)...

Moved us from linear to circular...

Allowed us to join in people from other areas...



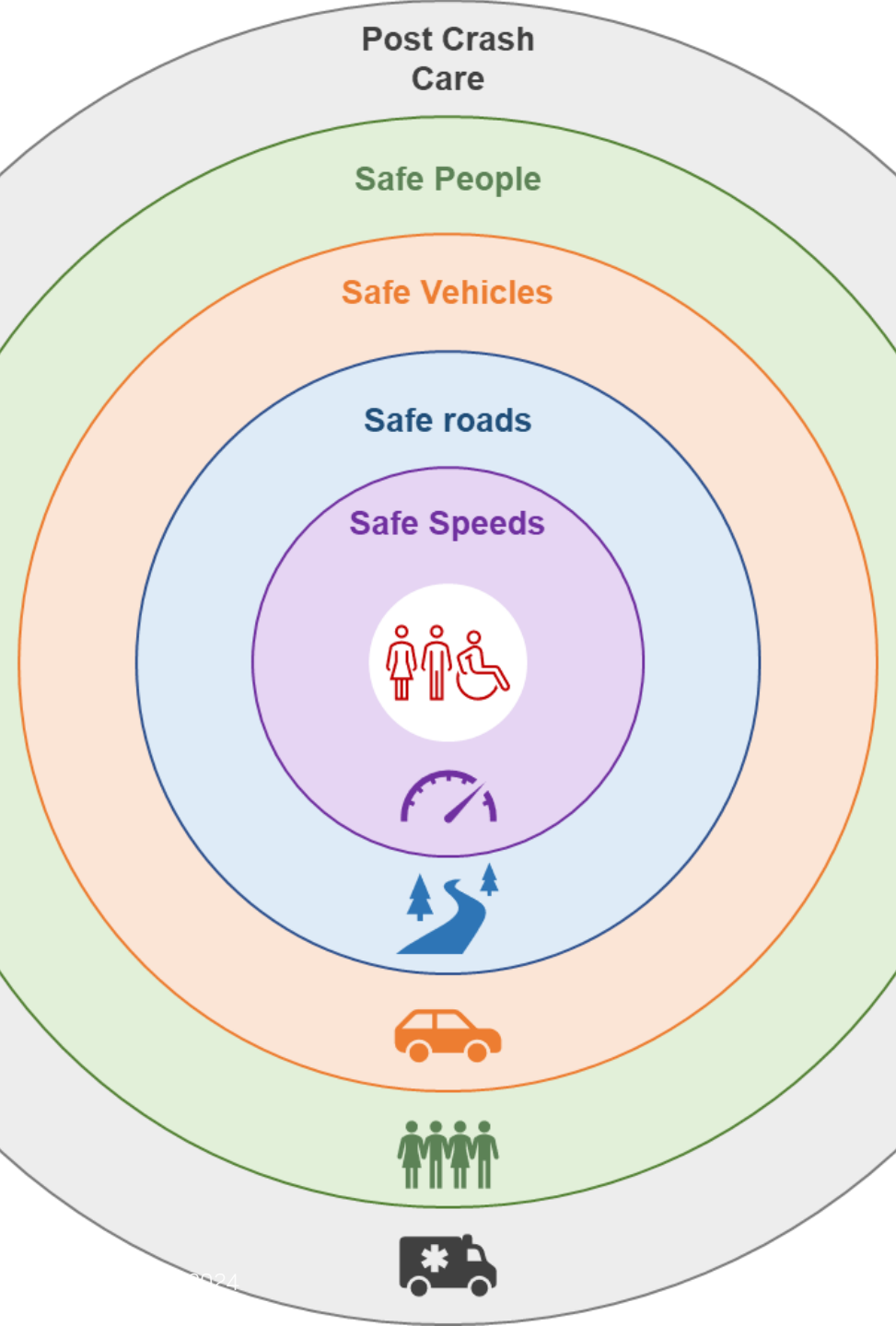




Roads as  
designed vs  
roads as  
used

Thoughts and Q & A





# The Safe Systems approach

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IS DRAWING CIRCLES ENOUGH?

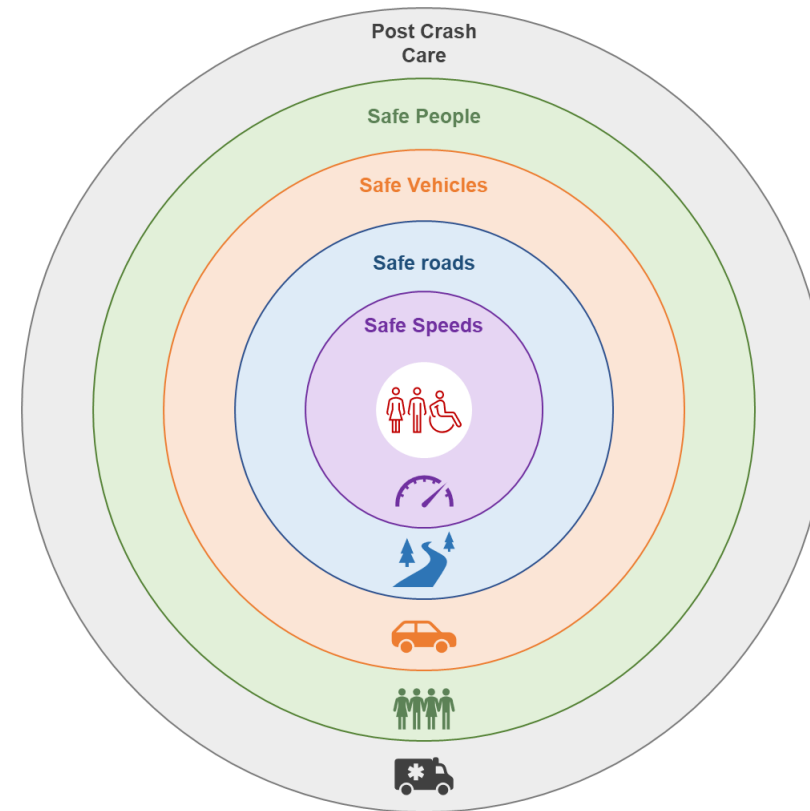


# Is drawing circles enough...

Safe system example...

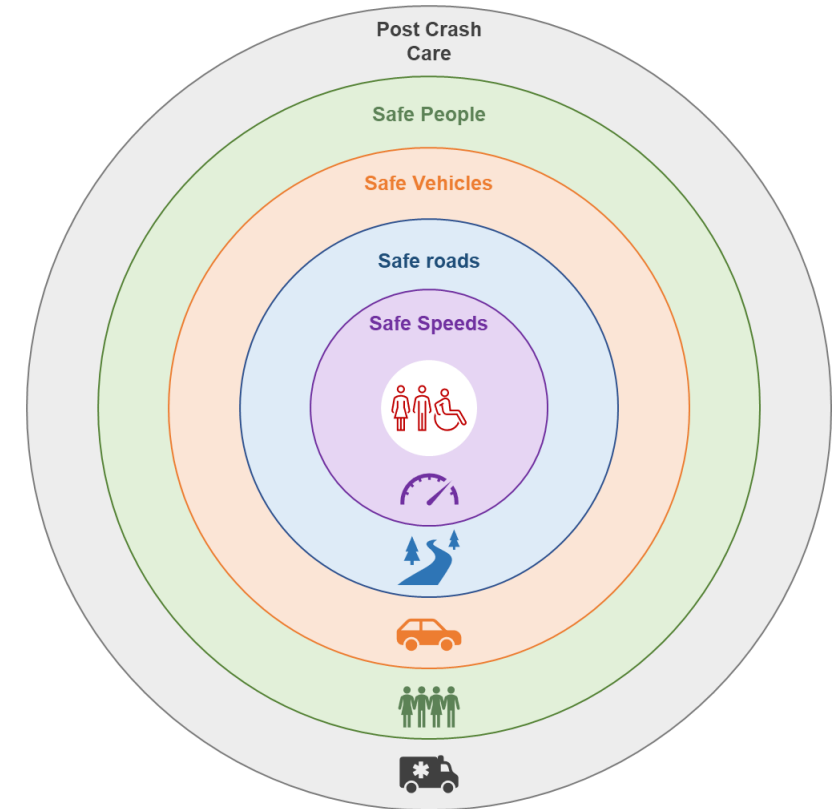
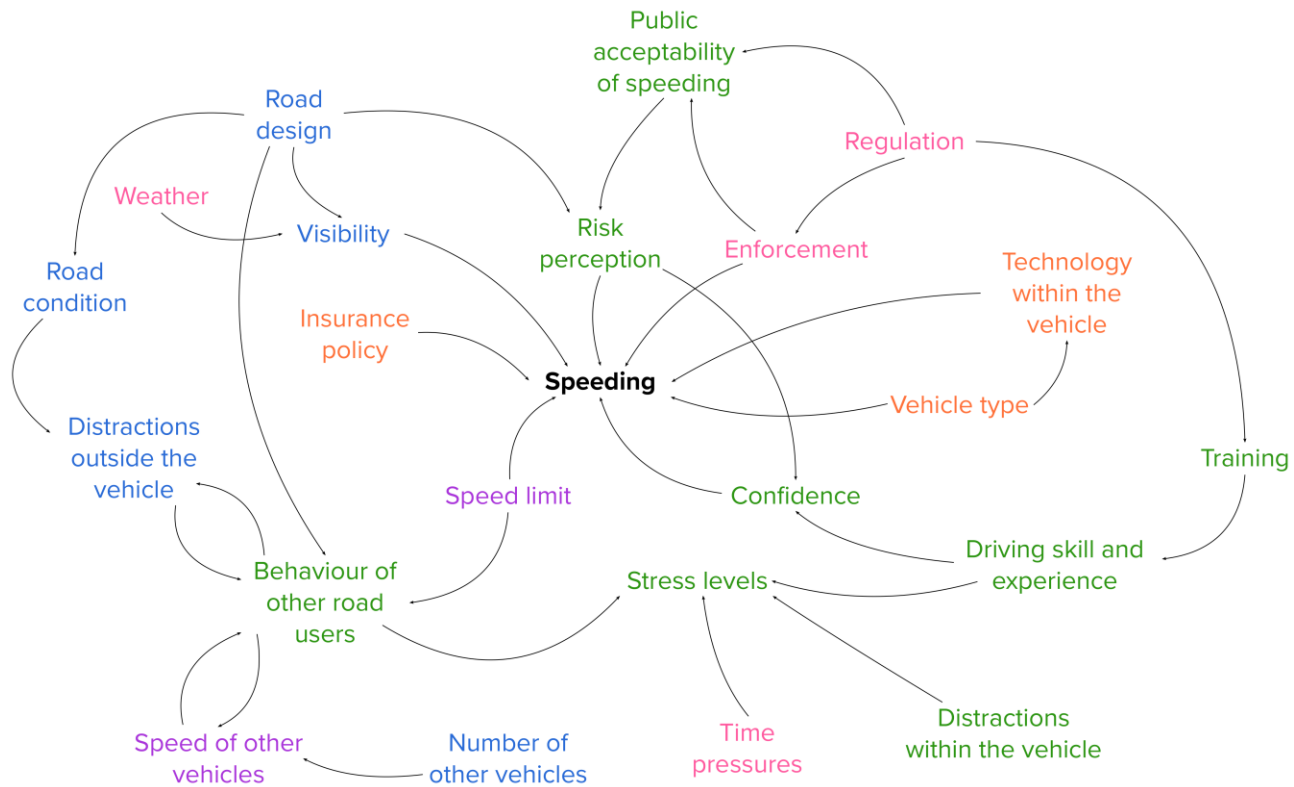
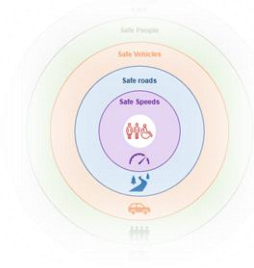
Pillars/issues – multifactorial

Interactions and emergent behaviours

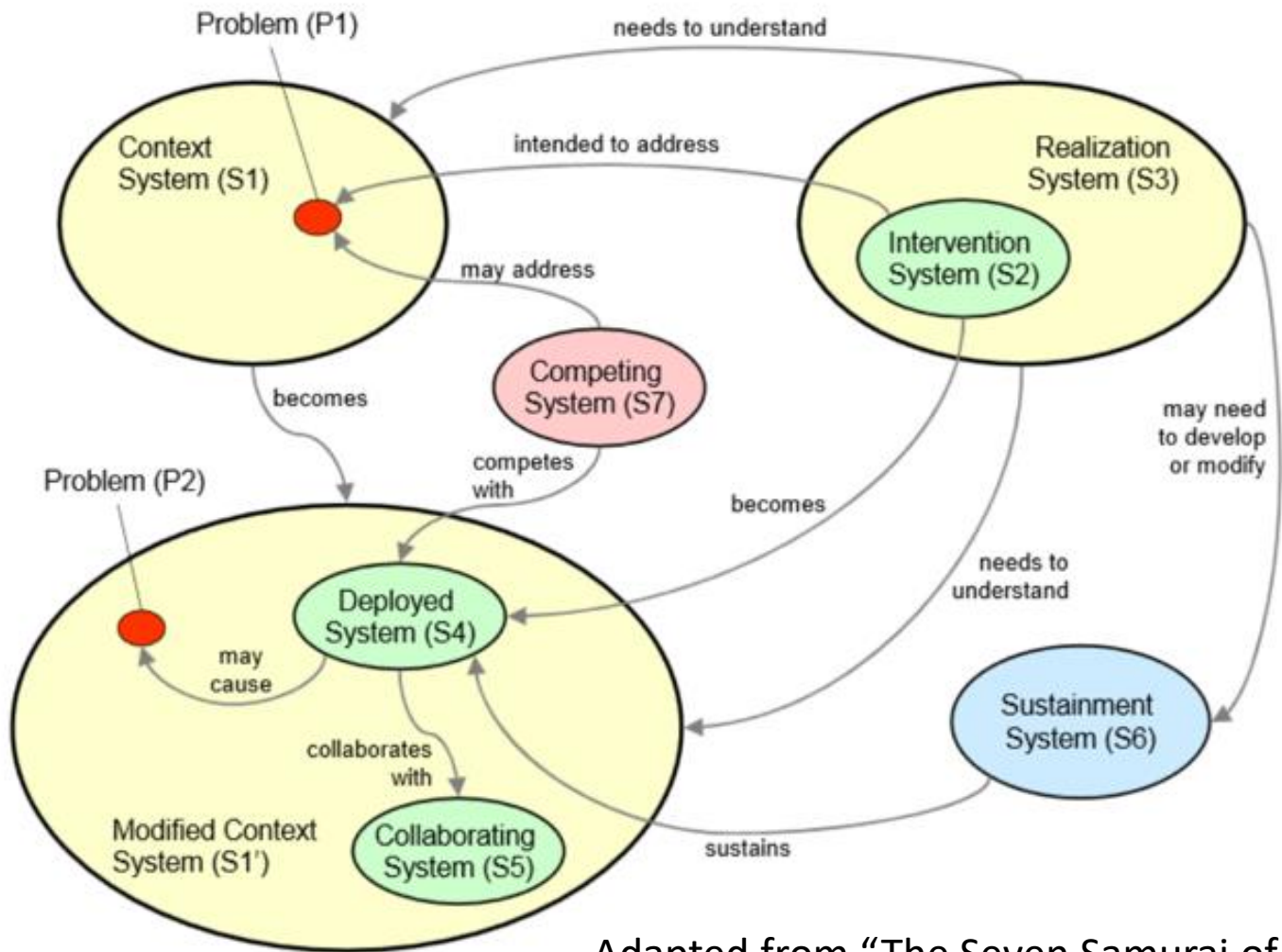




# Systems thinking



Adapted from 'Driving Ambitions' – article in the September 2022 *Ergonomist* – A. Brand, J.P Doherty, C. Williams



# Seven Samurai...

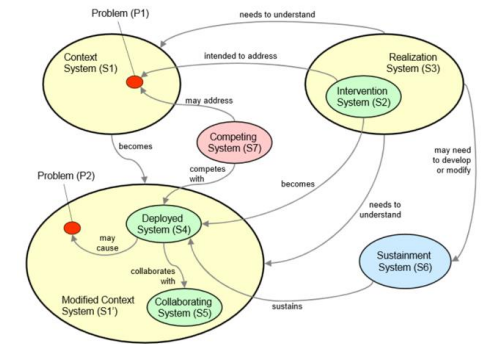
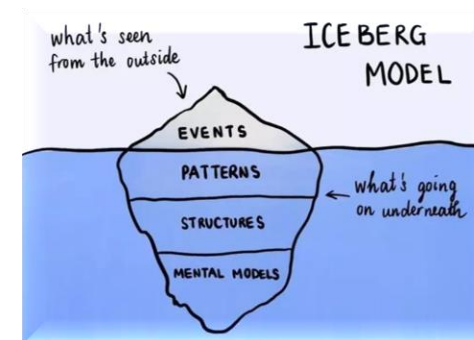
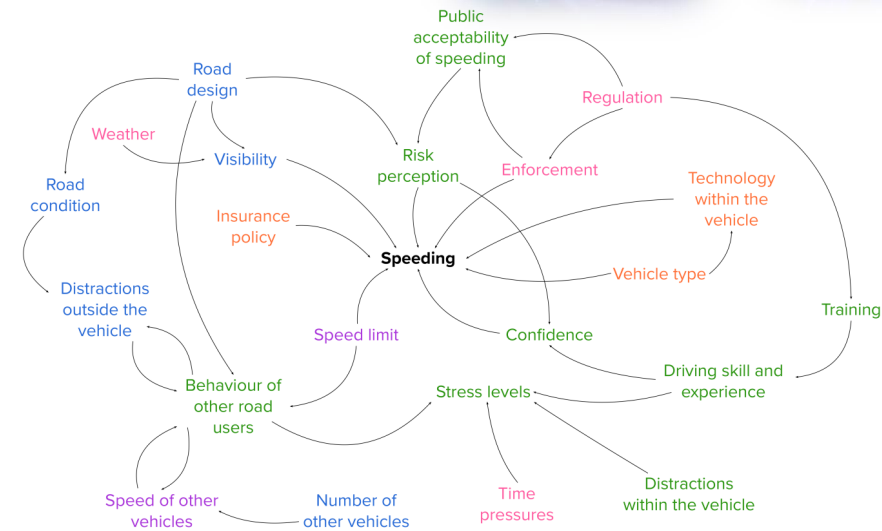
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Adapted from “The Seven Samurai of Systems Engineering: Dealing with the Complexity of 7 Interrelated Systems,” James Martin, 2004

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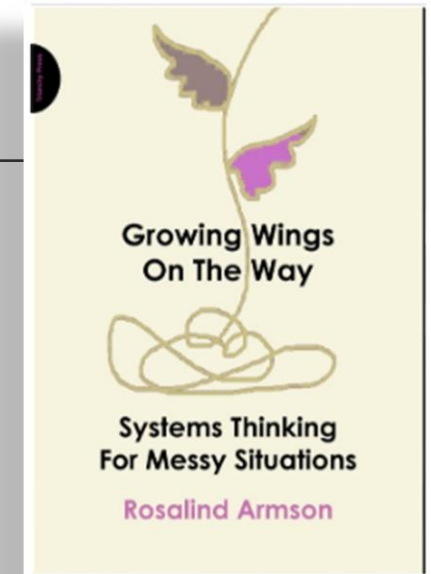
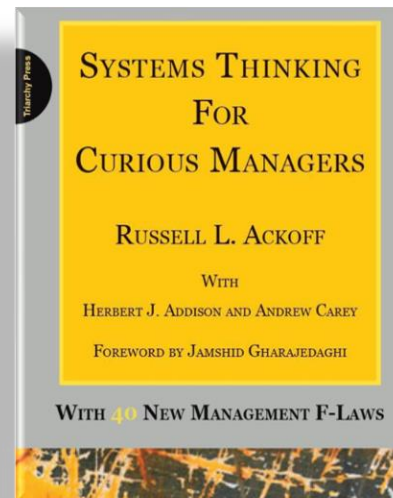
# Further information...

Growing wings on the way – Rosalind Armson

The Open University – various courses

Safe Systems article from *The Ergonomist*

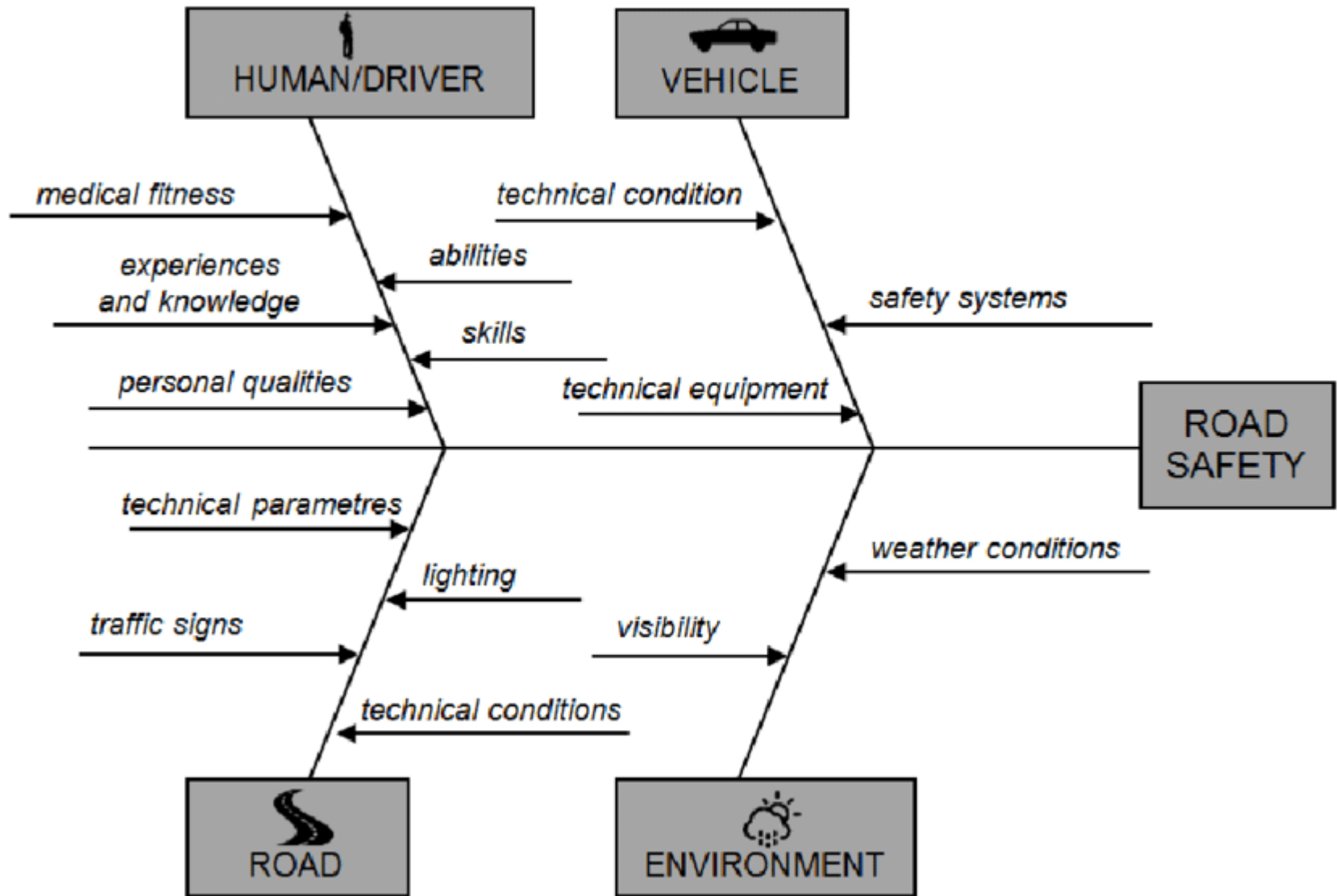
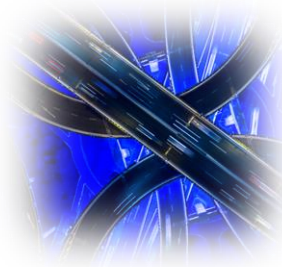
Russell L Ackoff





The End.





Creating a virtual environment for practical driving tests Kristián Čulík, Alica Kalašová, Veronika Harantová, Aug 2019