

A large flock of birds, possibly starlings, is captured in mid-flight against a dramatic sunset sky. The birds are concentrated in a large, dense V-shape that points towards the top center of the frame. The sky transitions from a deep orange near the horizon to a pale blue at the top. The silhouettes of trees and hills are visible along the bottom edge.

Group Model Building in System Dynamics Modelling of Health and Social Issues

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A bit of science history:



Francis Bacon
Empiricism



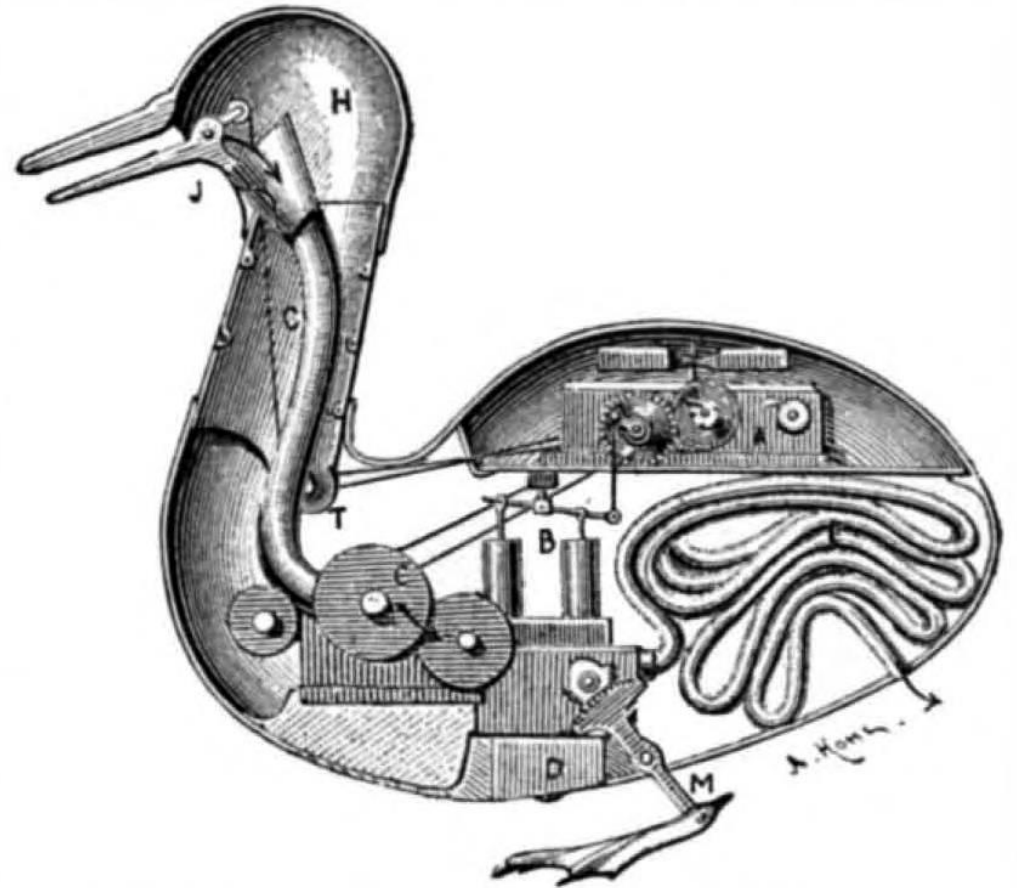
Rene Descartes
Reductionism



Isaac Newton
Differential equations

Descartes: Divide each difficulty into as many parts as is feasible and necessary to resolve it.

Reductionism:



Rene' Descartes, De Homine, 1662

Systems Thinking:

The overarching questions:

What if we loose something in the process of breaking the whole?

What happens to relationships between the things/components?

Wetness of water

Life

Mind and consciousness

Culture

Social capital

Individual and collective identity

Social organizations

Inequalities

.....



Simple vs complex systems (reductionism vs complexity):

Simple systems (machine)

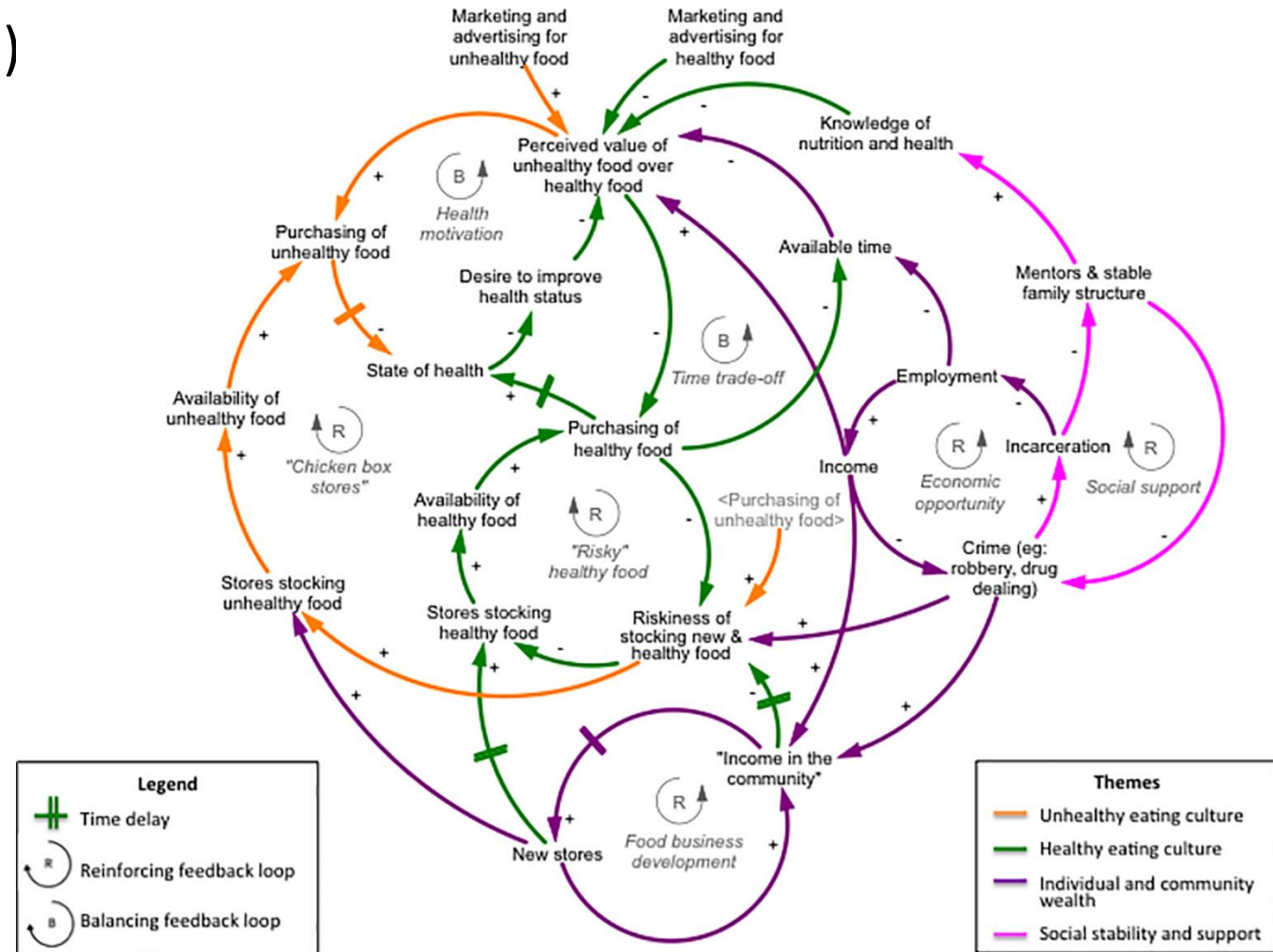
- Static
- Components
- Linear
- Lack of novelty
- Predictable
- Decontextualized
- Generalizable
- Simple cause-effect

Complex systems

- Dynamic
- Relationships/interactions
- Non-linear
- Emergence
- Evolving and emerging
- Context-sensitive
- Locality
- Feedback-loops and circularity

System dynamics:

- Structure $\longrightarrow$ behaviour (function)
- Feedback thinking
- Non-linearity
- Delay
- Dynamism
- Policy resistance
- Endogenous point of view
- Perspective



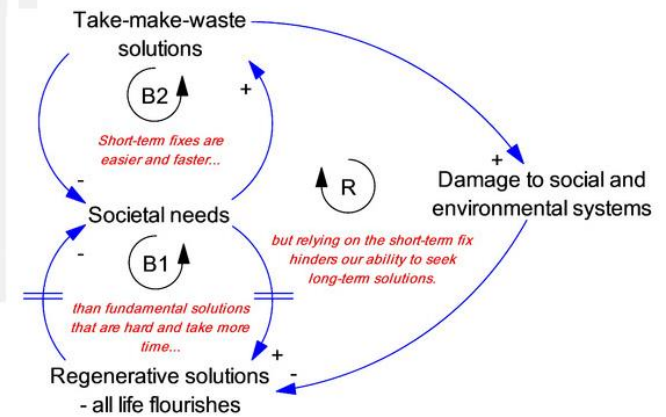
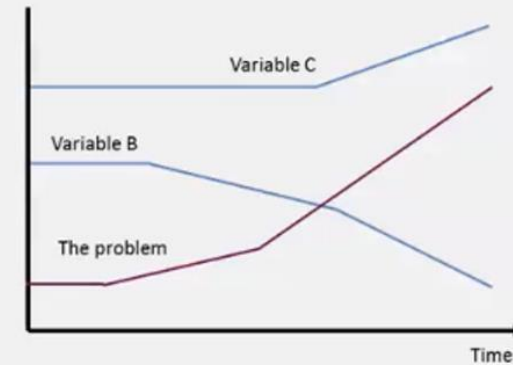


An event

**Patterns of
behaviour
over time**

**Structure of
the system of
variables**

Today's problem

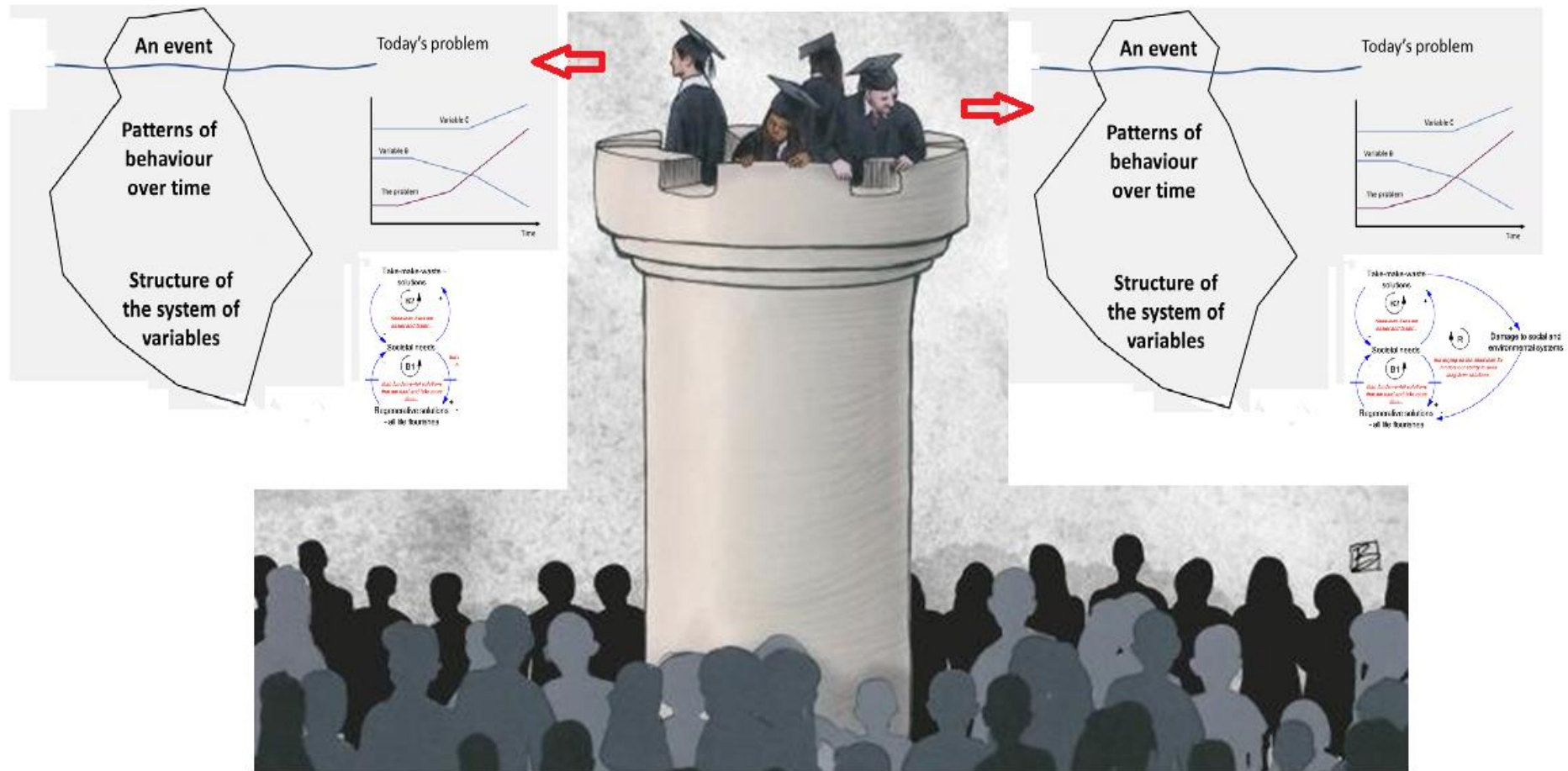


Dynamic problems:

- Wicked problems
- Dynamic problems

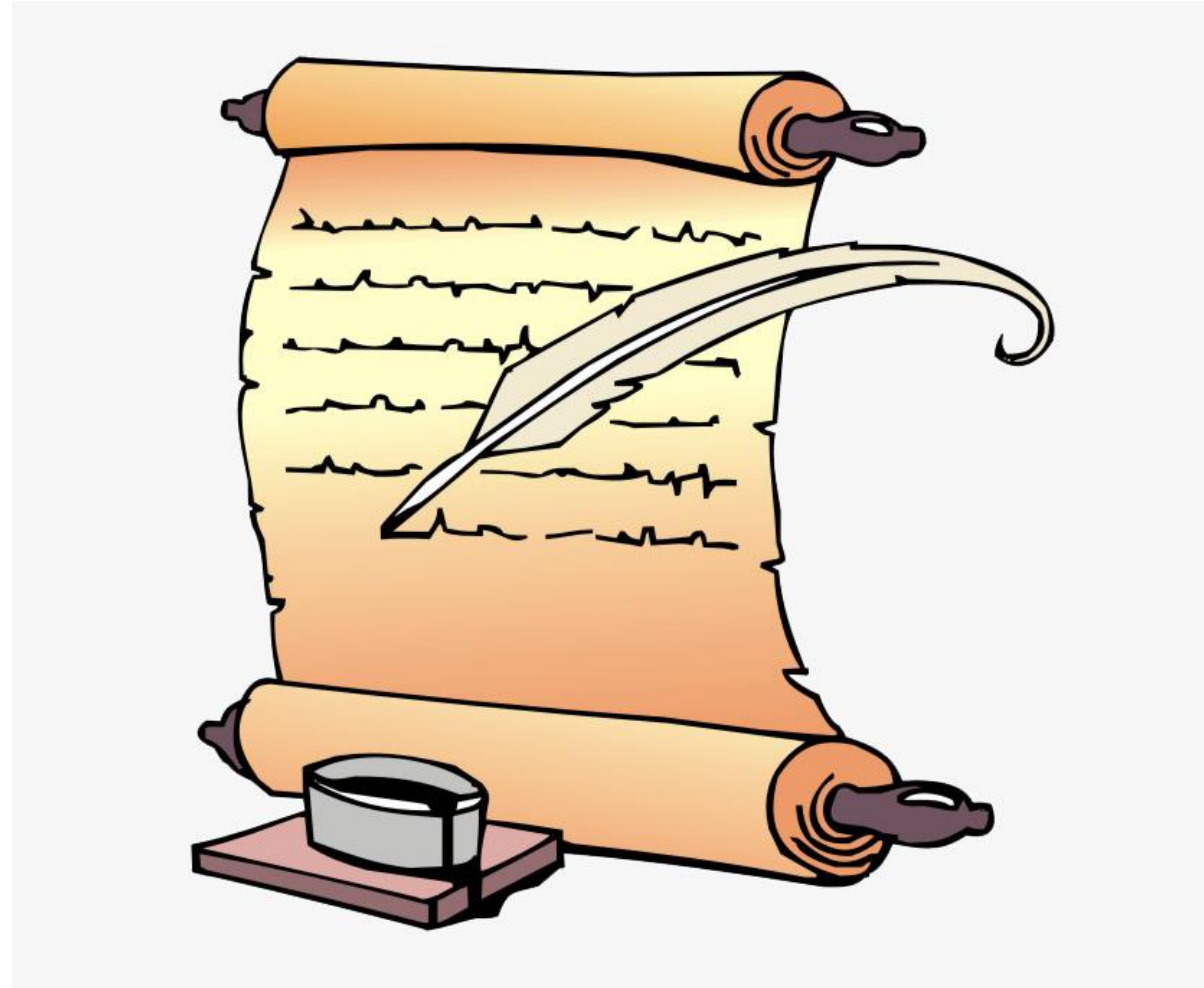
Group Model Building:

“A systems approach begins when first you see the world through the eyes of another” (Churchman, C. W. (1968). The Systems Approach)



Scripts:

- 1- Hopes and Fears script
- 2- Graphs-over-time script
- 3- Dots script
- 4- Connection circles script
- 5- Causal loop diagrams (CLDs) script
- 6- Action ideas script



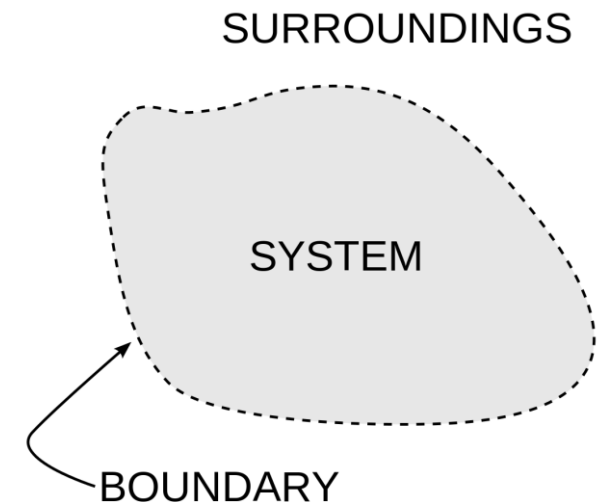
Before the workshop:

A) Problem definition:

- What is a system:

A system is “ a delineated part of the universe which is distinguished from the rest by an imaginary boundary (Bar-Yam, 2018)”

**Don't forget: define the boundary of your system (problem)
before the workshop!**



Example:

Why unhealthy food consumption is more common in this neighbourhood?

Do not over-stretch the boundary, its weight will topple the model!

Before the workshop:

B) Participants:

What:

- Perspective
- Stakeholders
- Equity (powerless/inclusiveness/voiceless)

Who:

- Gate-keepers/informants
- Experts



Before the workshop:

C): Language



Before the workshop:

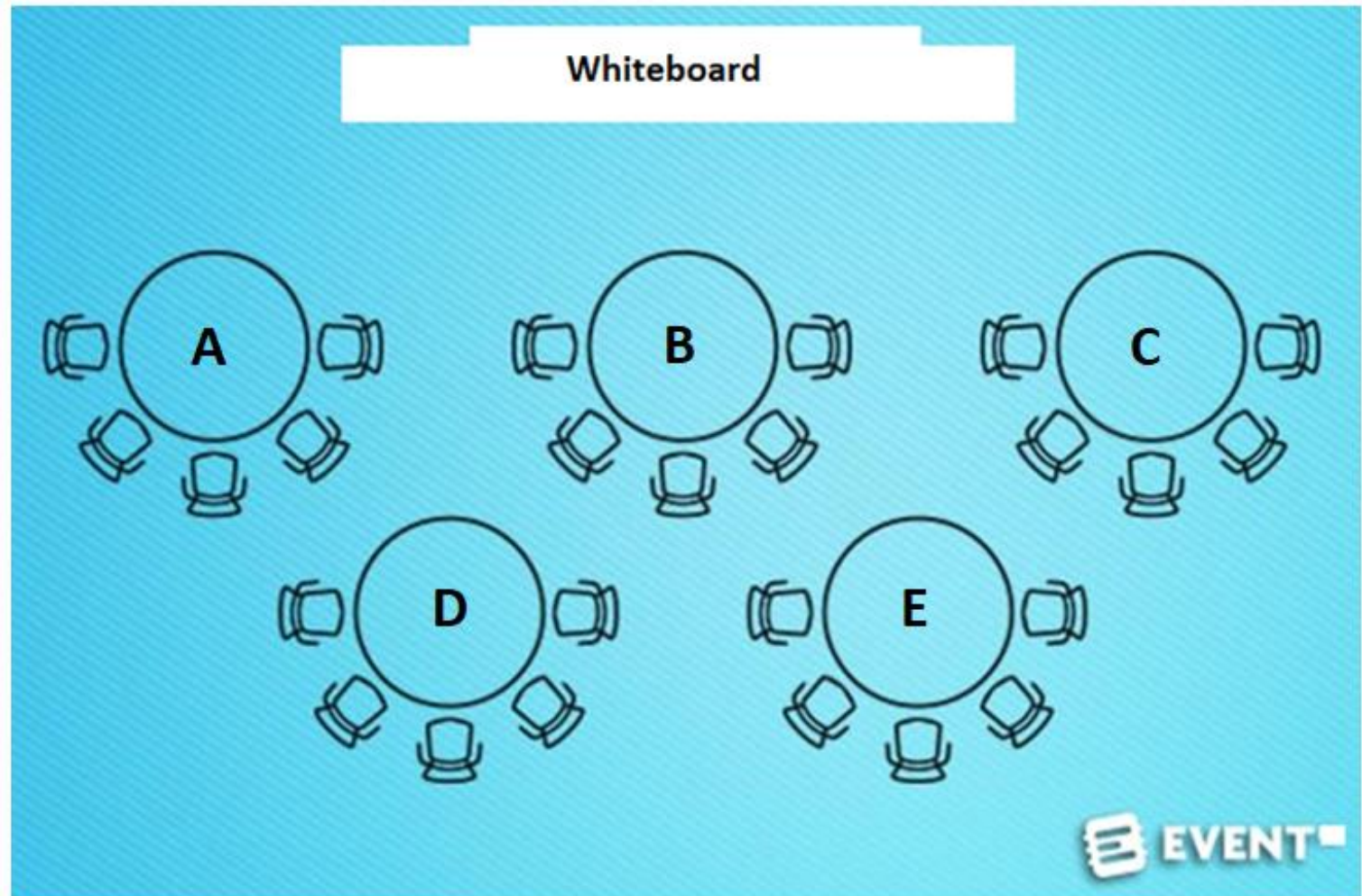
D) Workshop room:

Notes:

- 1- Equal distribution of perspectives across tables
- 2- Write their name on the tables
- 3- Get names for each table (A, B, ...)

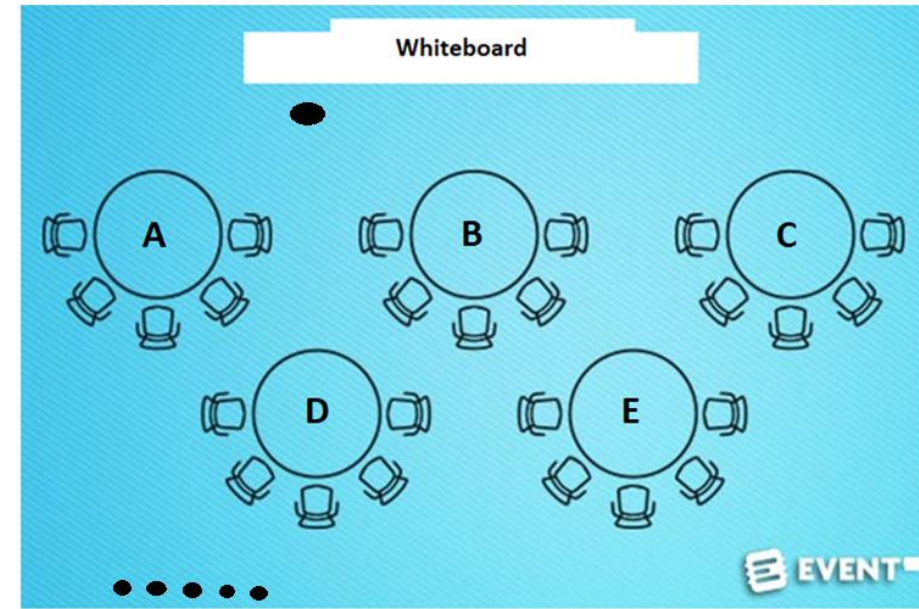
Materials:

- 1- Markers (at least one for each participant)
- 2- Sticky notes
- 3- A5 papers



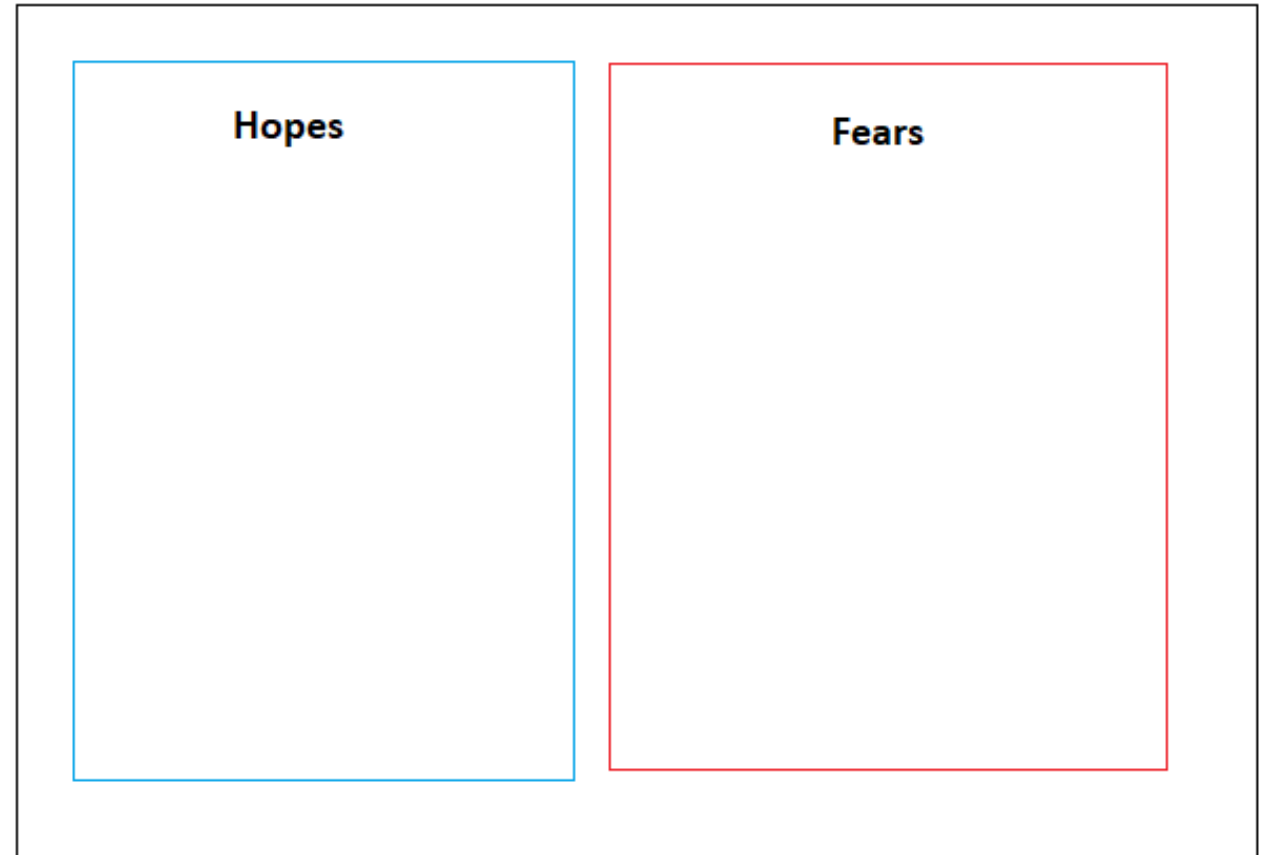
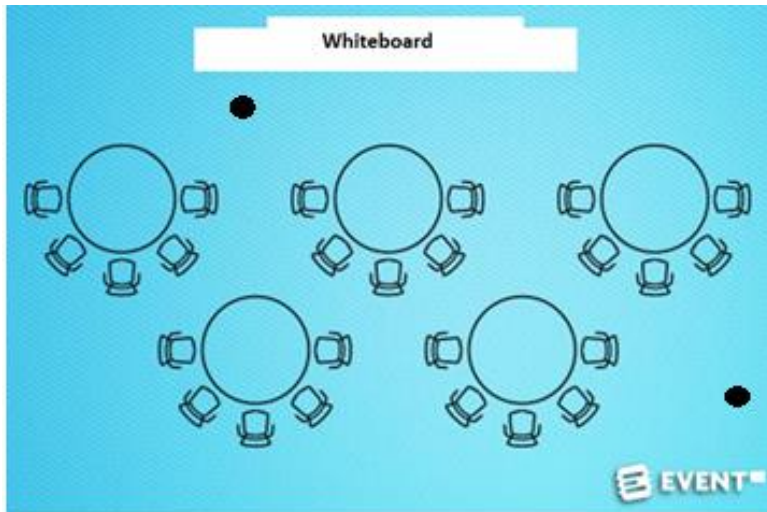
Introduction:

- Introduce yourself
- Introduce your team (workshop facilitators)
- Introduce the problem (system boundary)
- The dynamics of the problem
- Why a workshop with them on this problem
- Thank them for their time and participation
- Let participants introduce themselves



Hopes and Fears script:

20 minutes
10 minutes

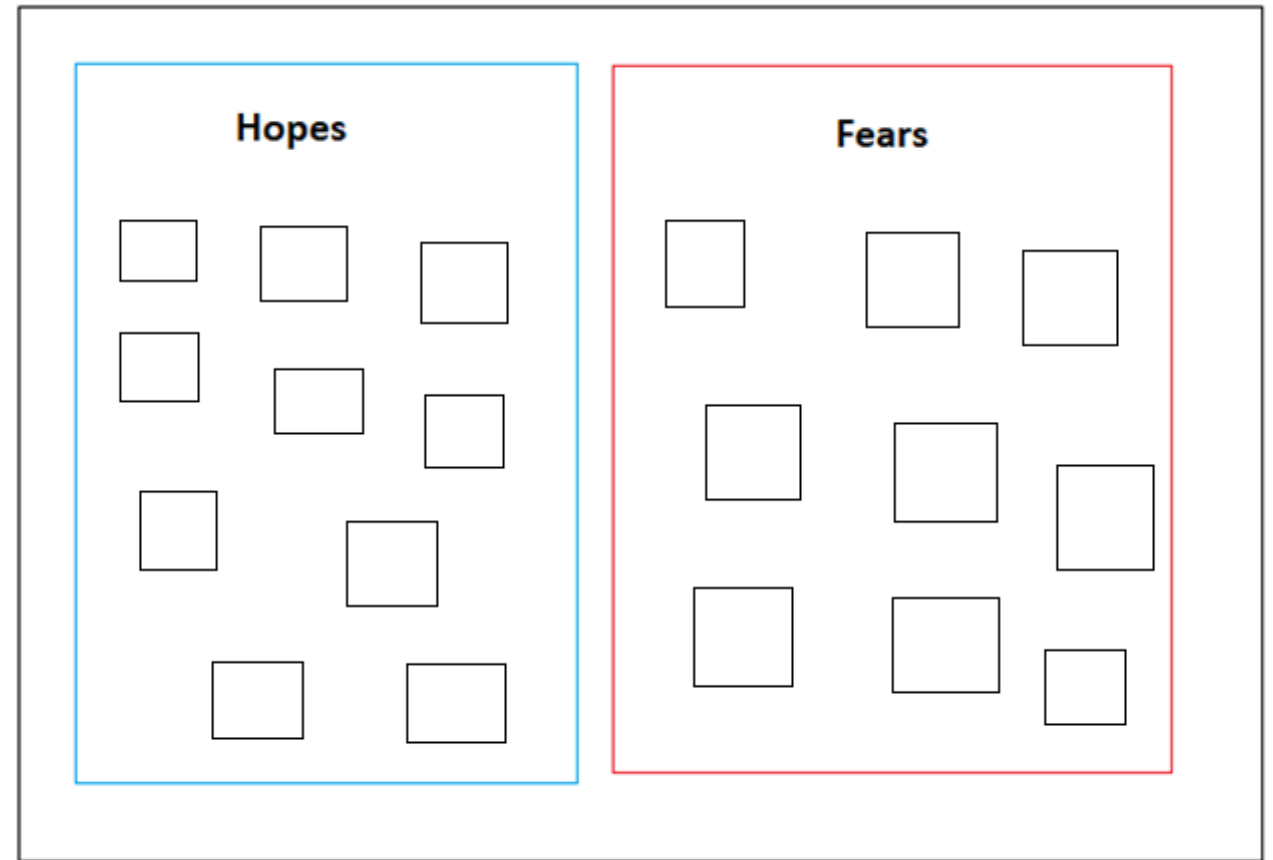
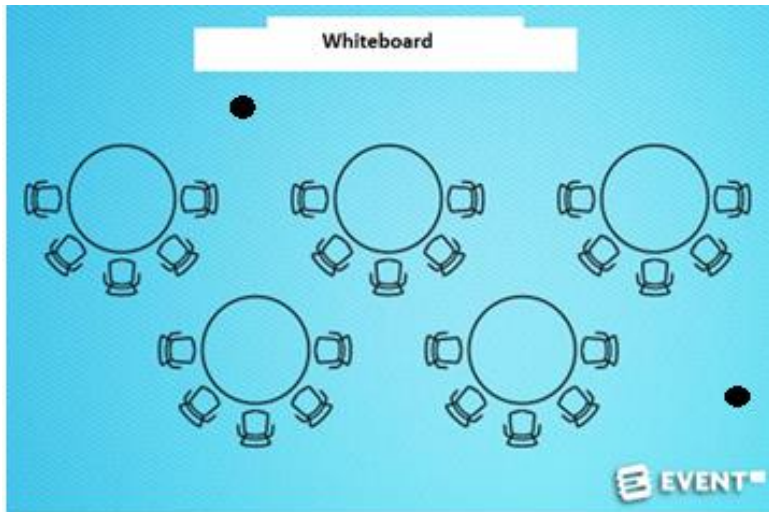


Materials:

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- 2- Sticky notes

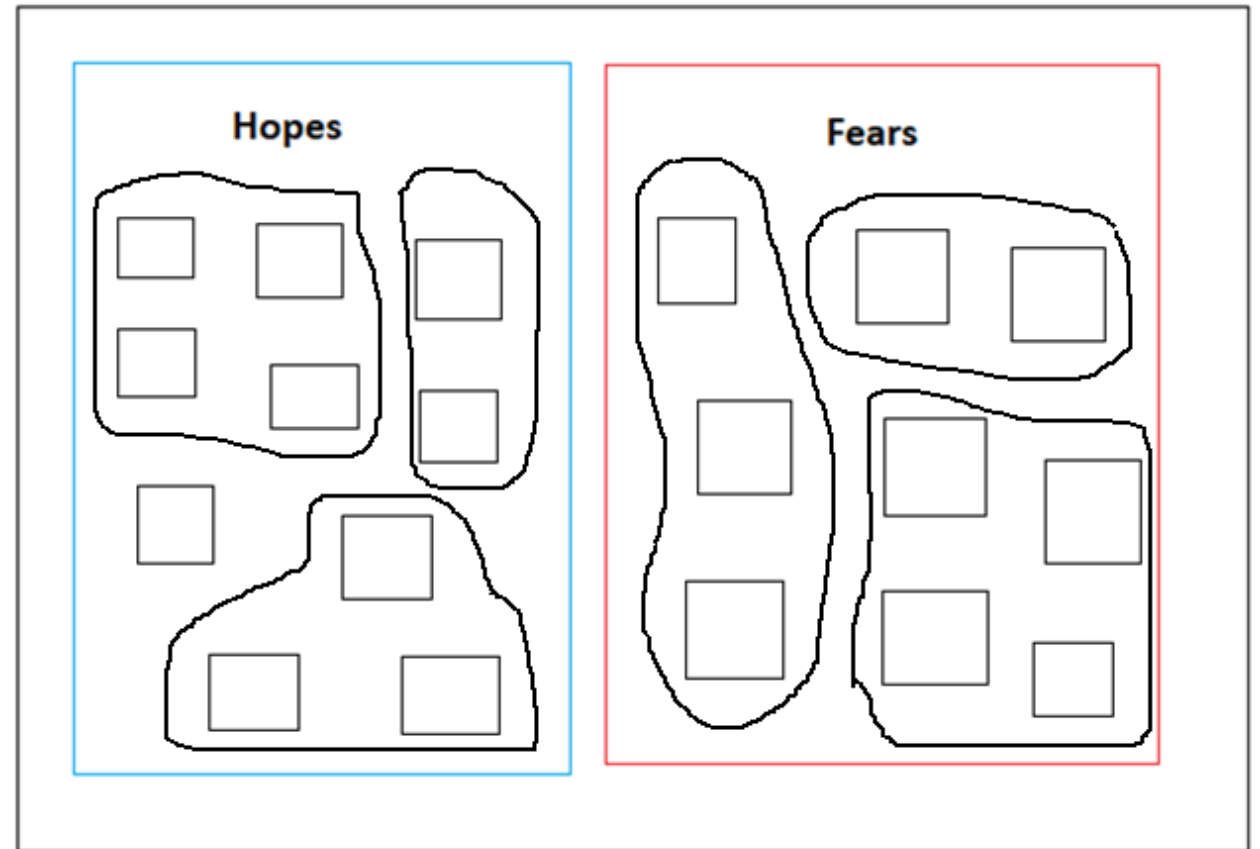
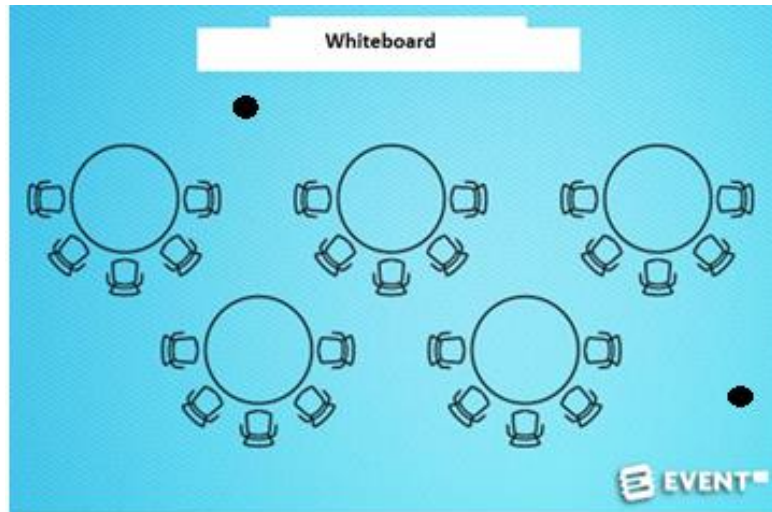
Hopes and Fears script:

20 minutes
10 minutes



Hopes and Fears script:

20 minutes
10 minutes

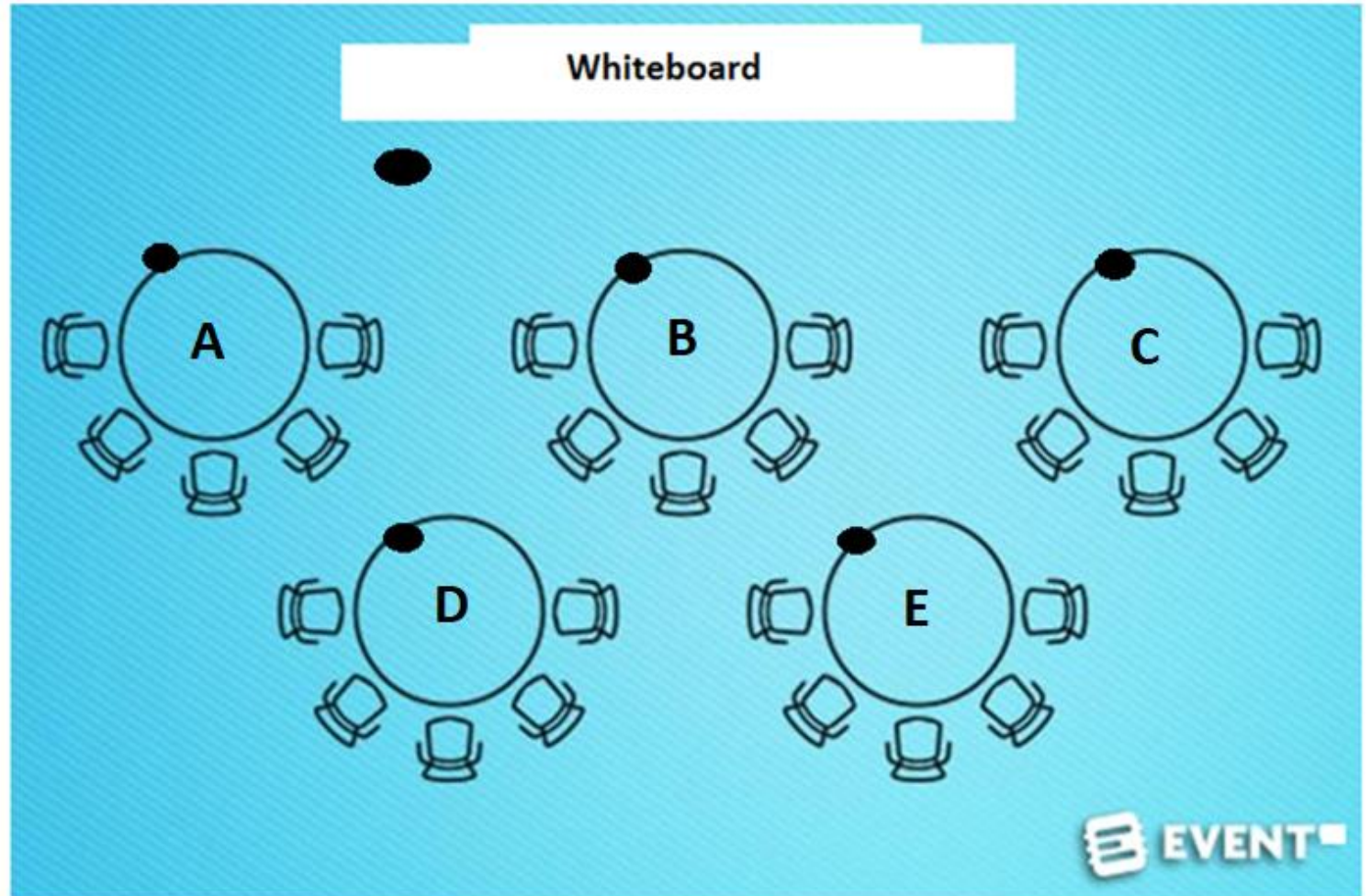


Graphs-over-time script:

40 minutes
20 minutes

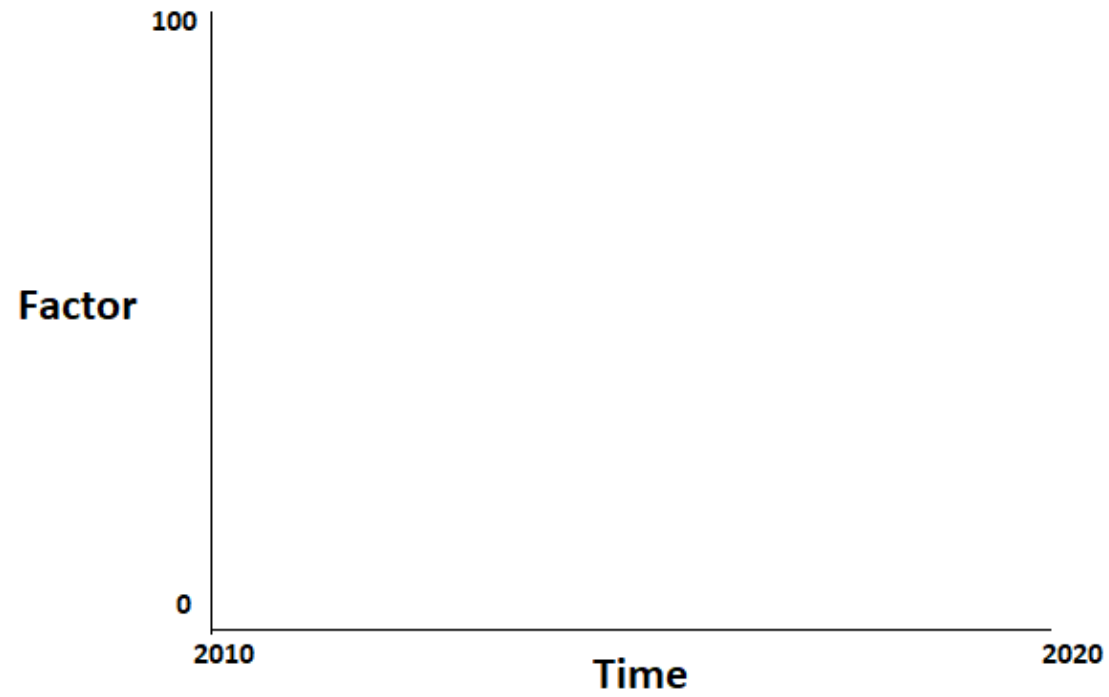
Materials:

- 1- Markers (at least one for each participant)
- 2- A5 papers



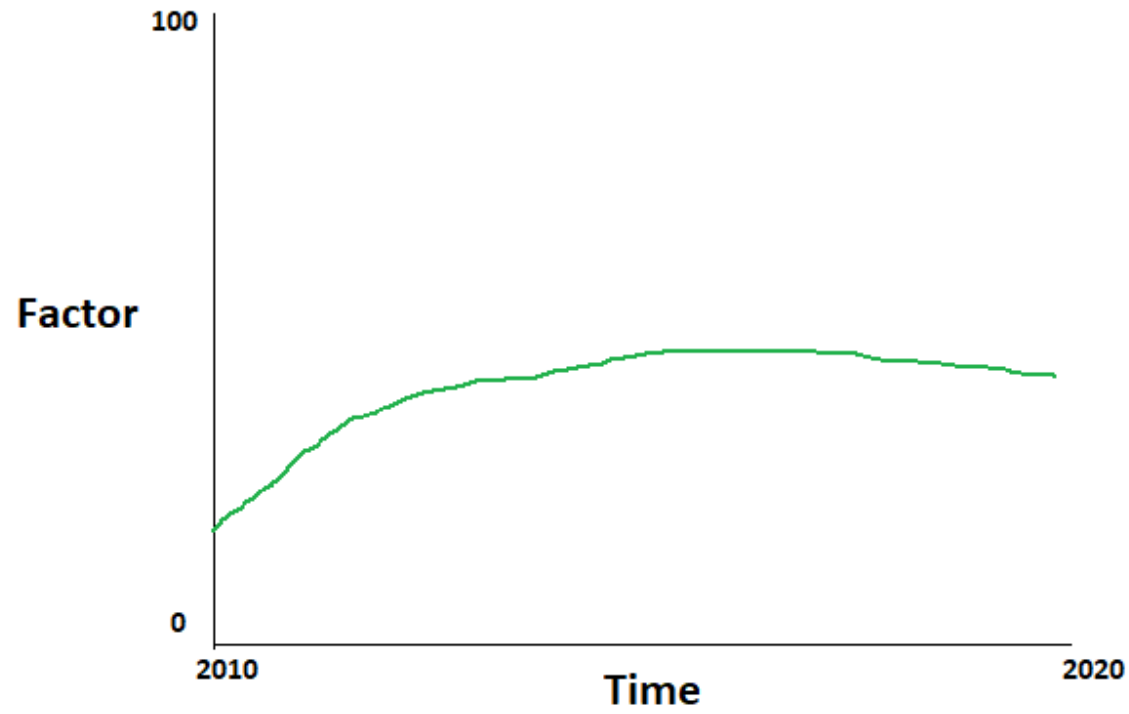
A5

Factor (reason):



A5

Factor (reason): **Employment rate**



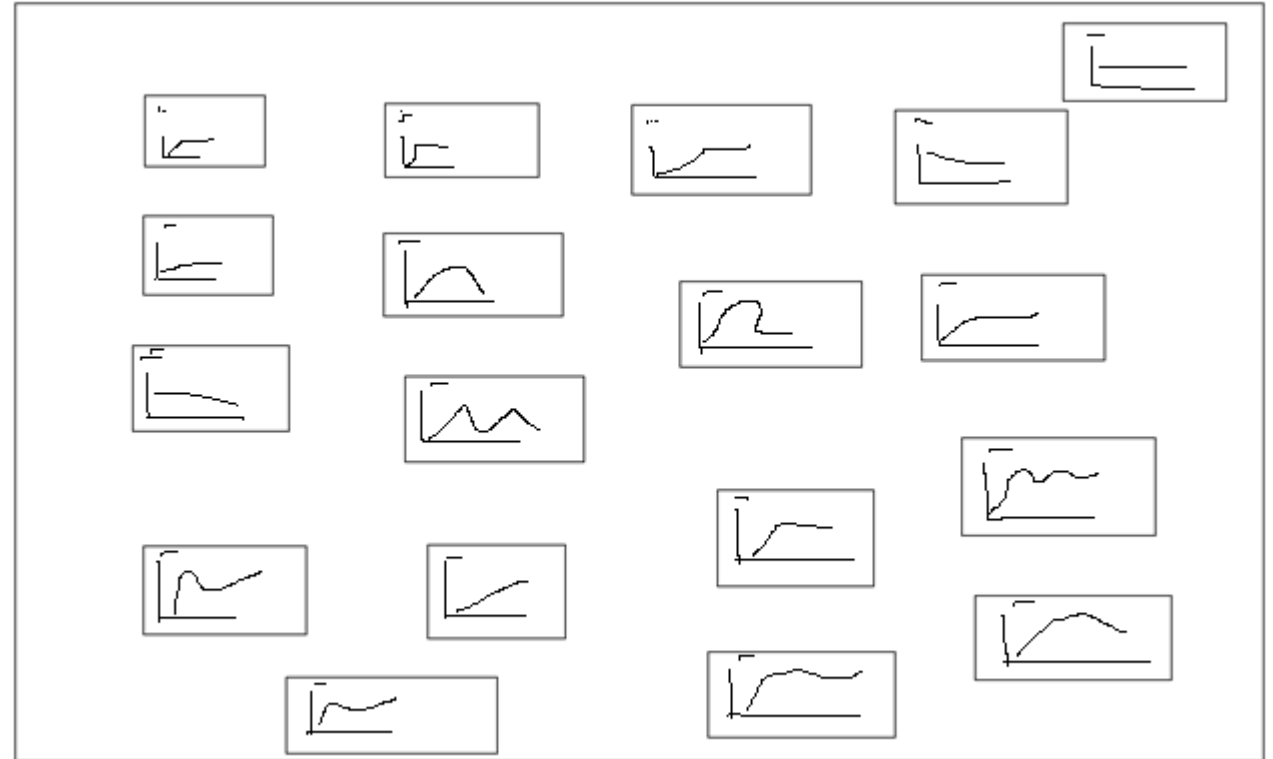
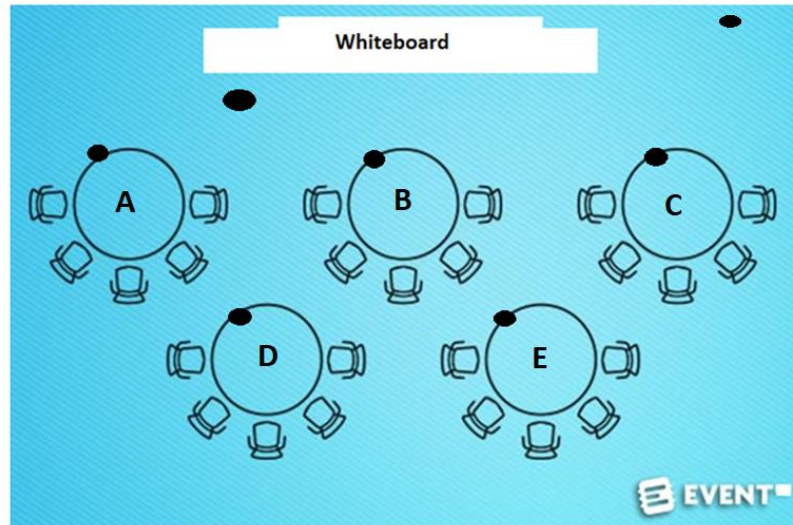
Note for facilitators:

- 1- Don't forget the system boundary!
- 2- Encourage every one to speak
- 3- Help them to specify the factors (reasons)
- 4- Help them to use names (not verbs)

Graphs-over-time script:

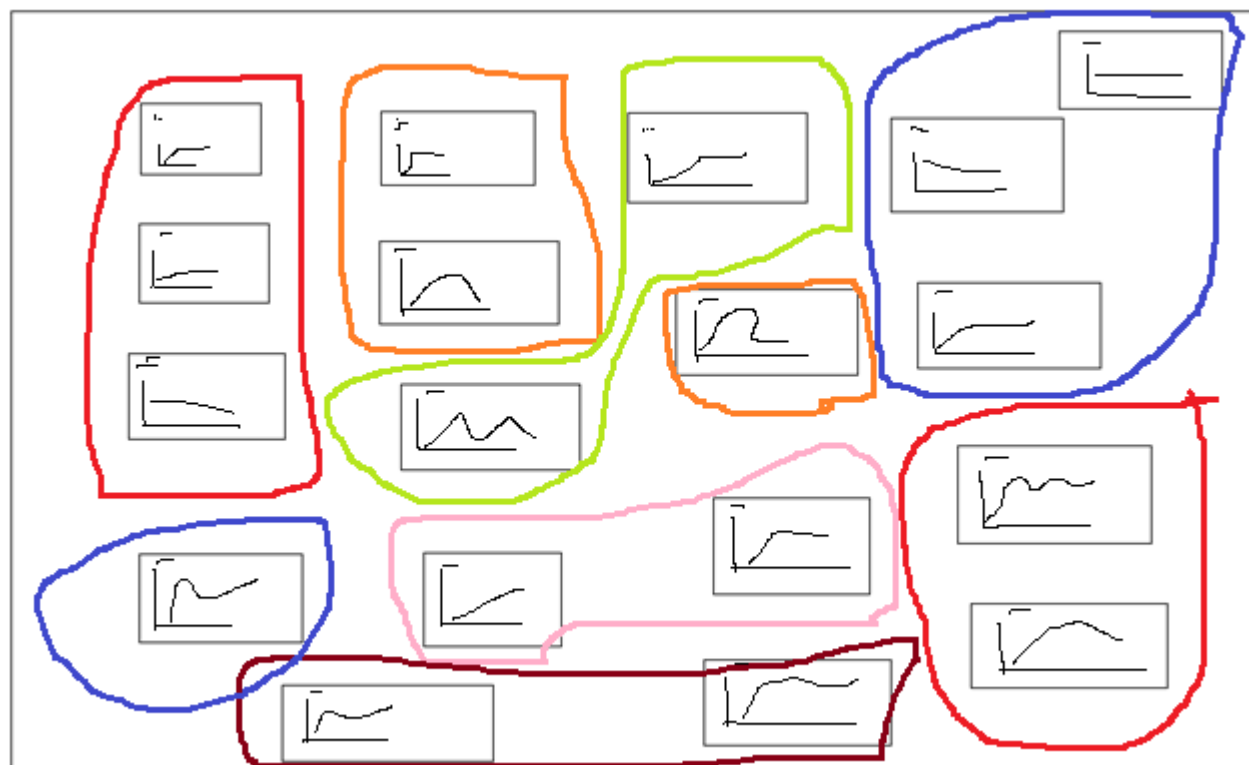
40 minutes

20 minutes

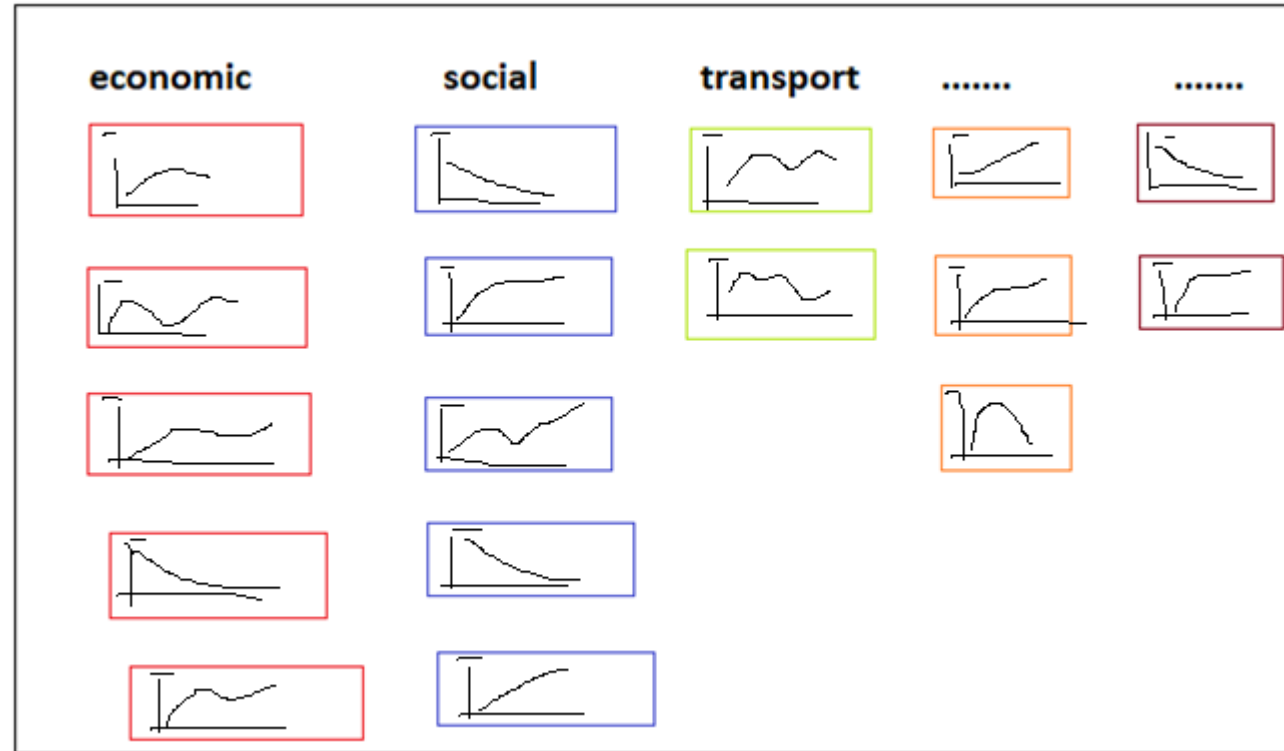


15 minutes Break for participants

Behind the scene:



Behind the scene:

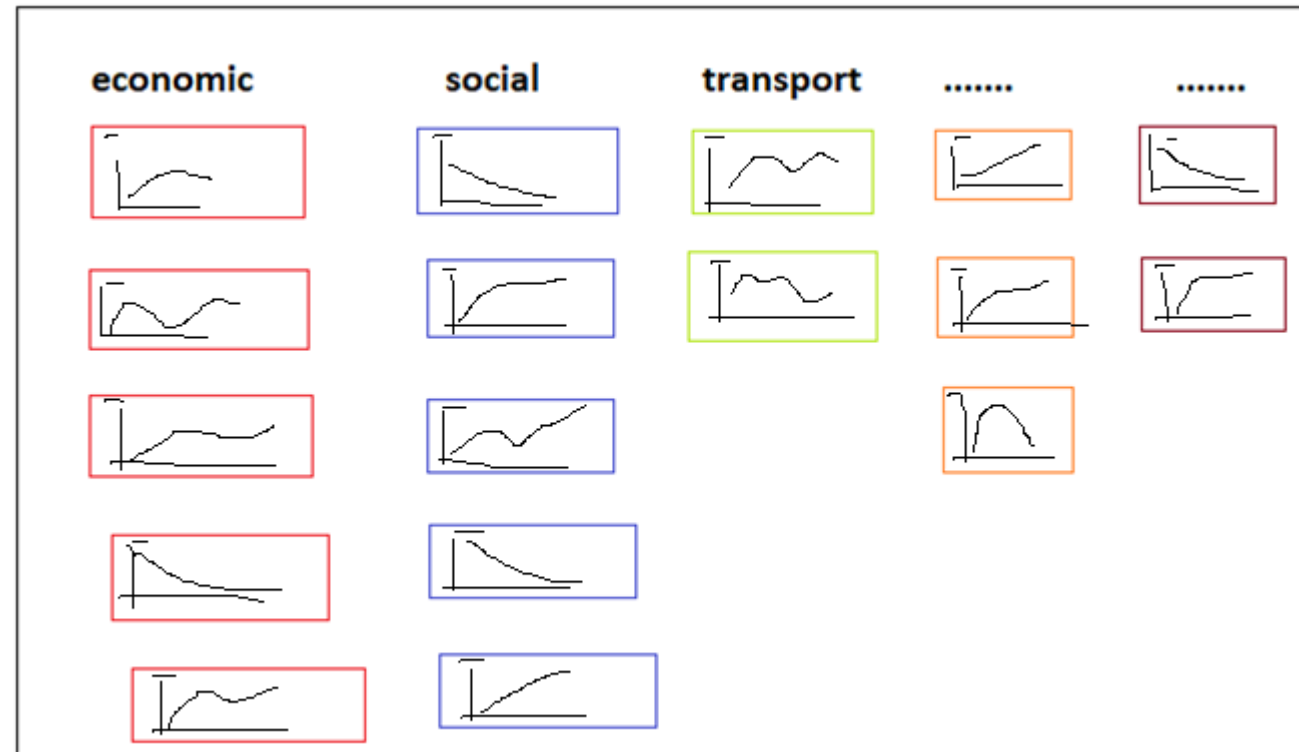


Dots Script:

15 minutes

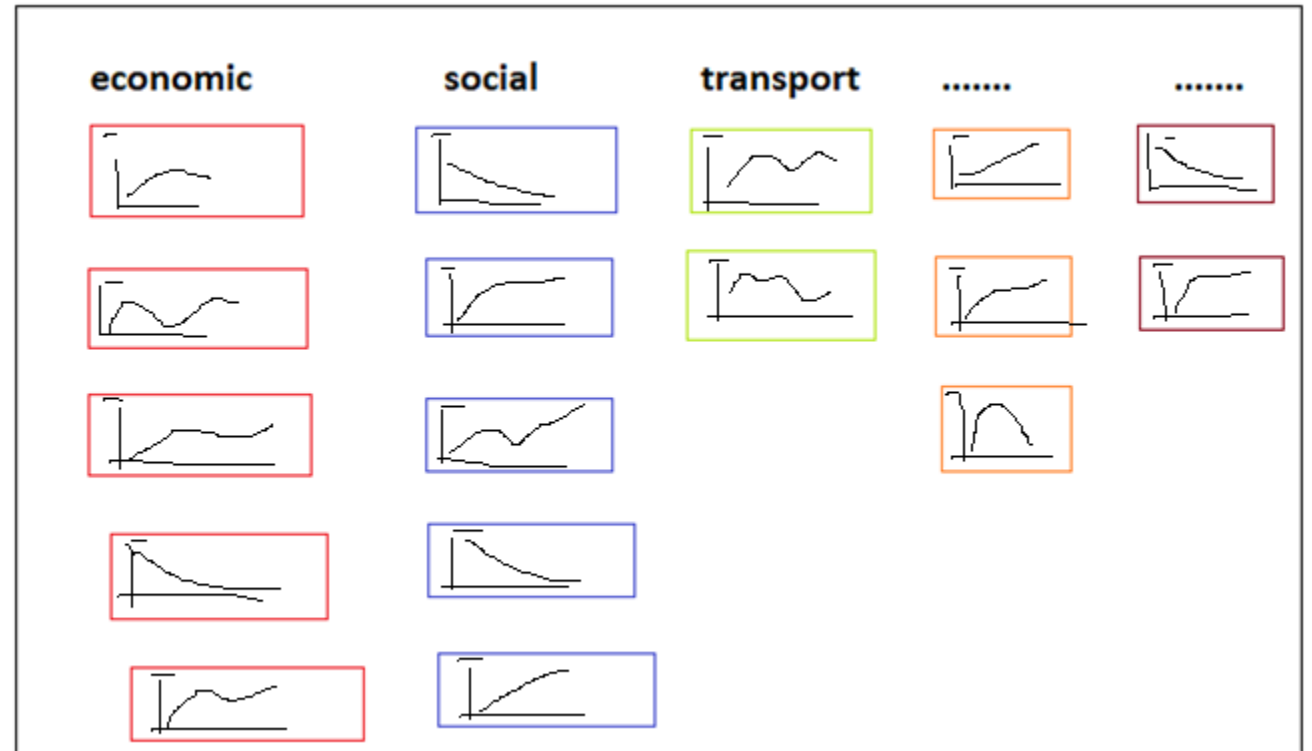
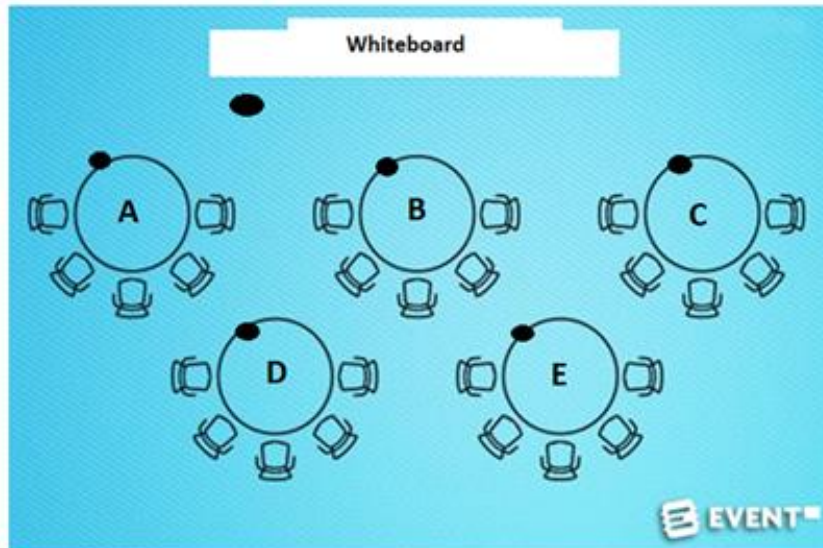
Materials:

1-Sticky dots (10 for participant)



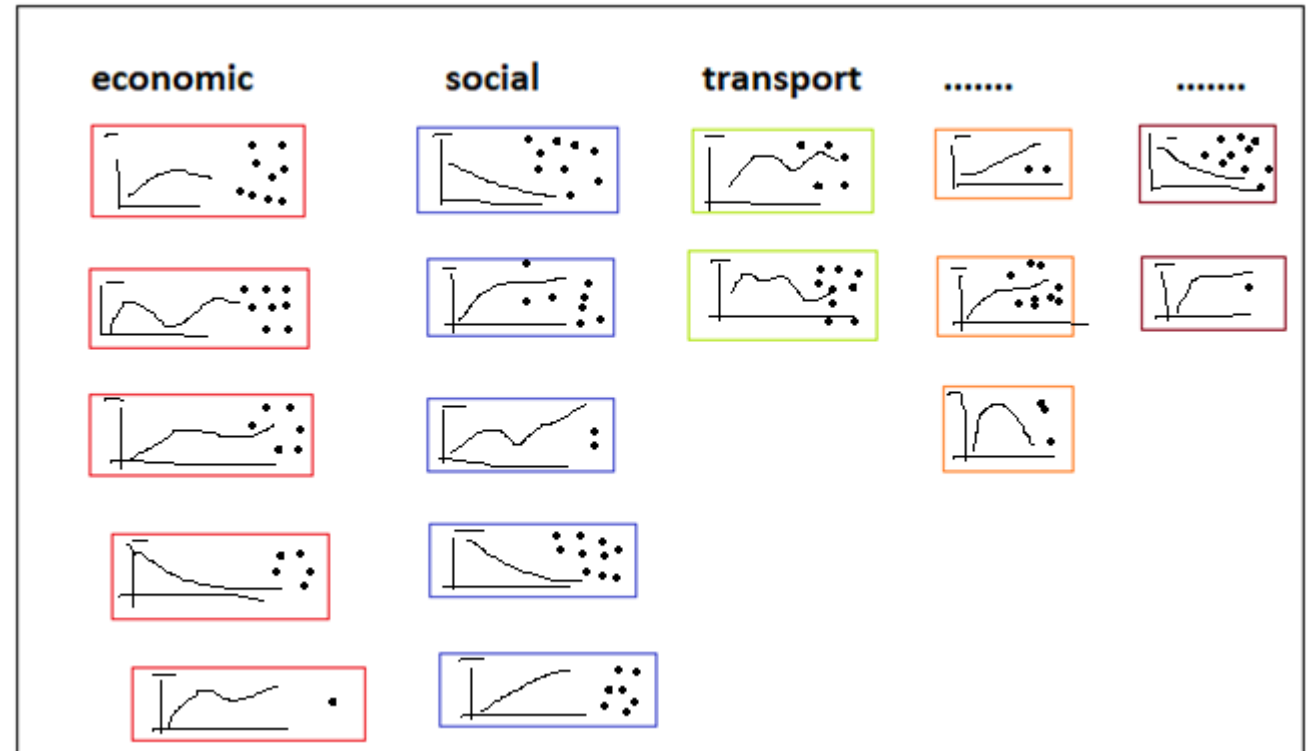
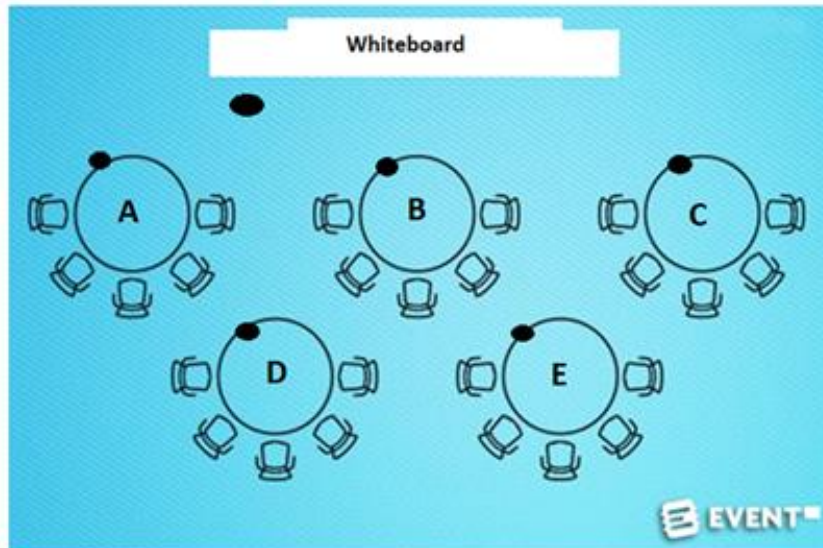
Dots Script:

Order: one table at a time

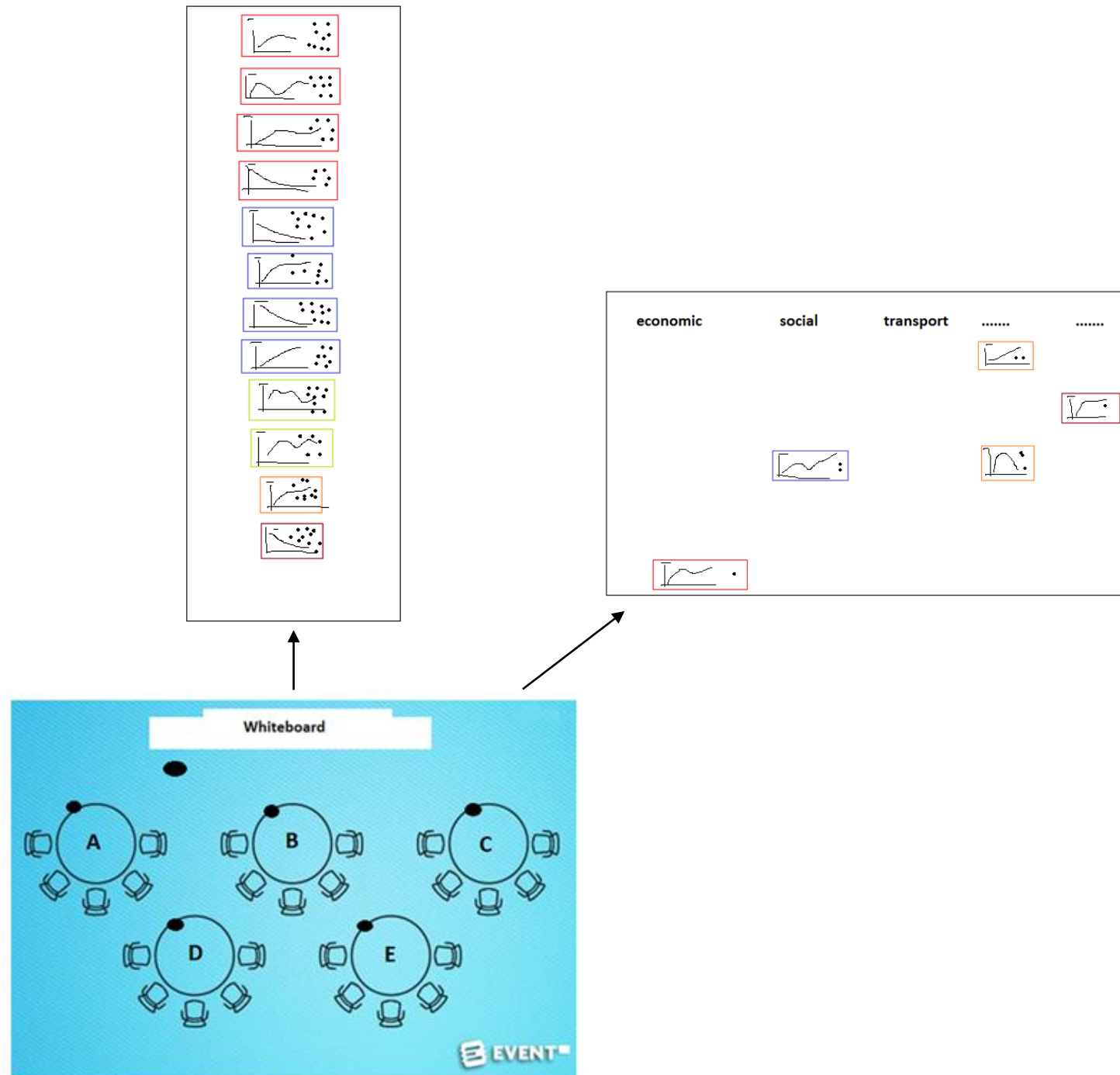


Dots Script:

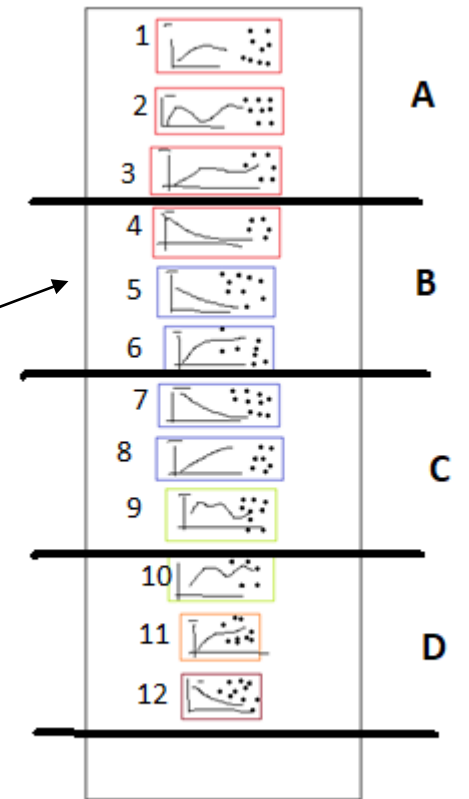
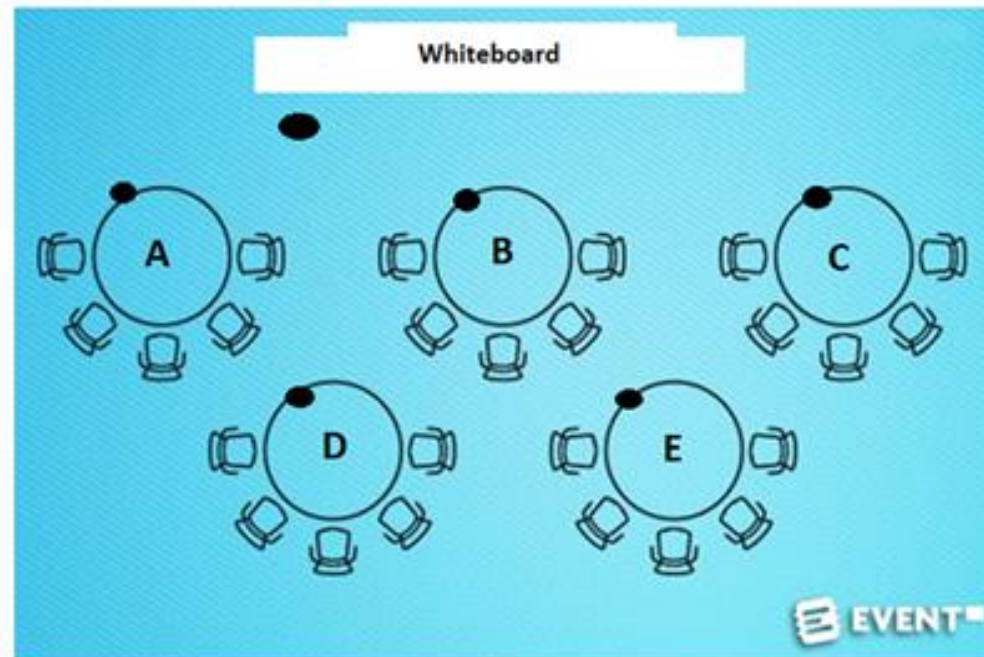
Order: one table at a time



Dots Script:



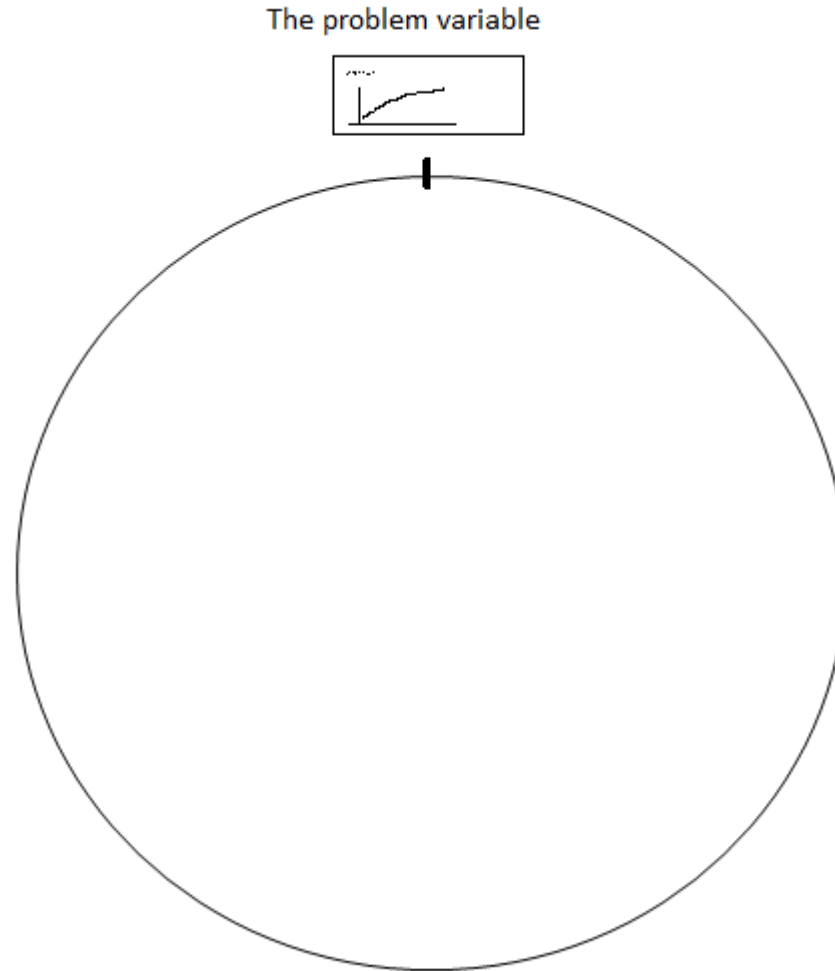
Connection circles script:

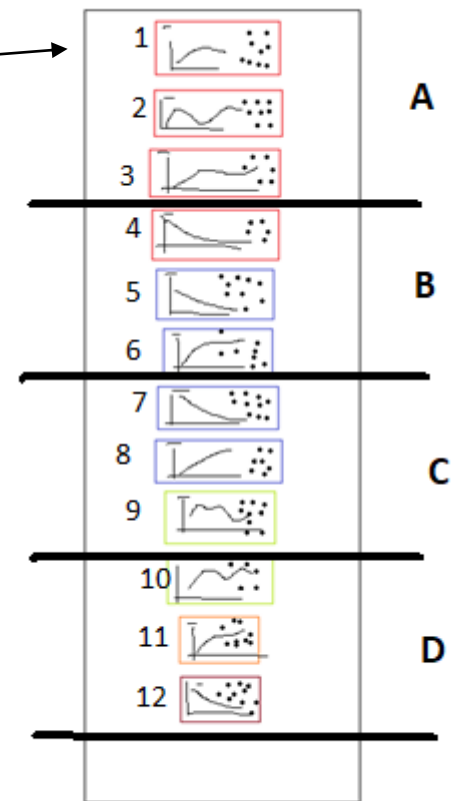
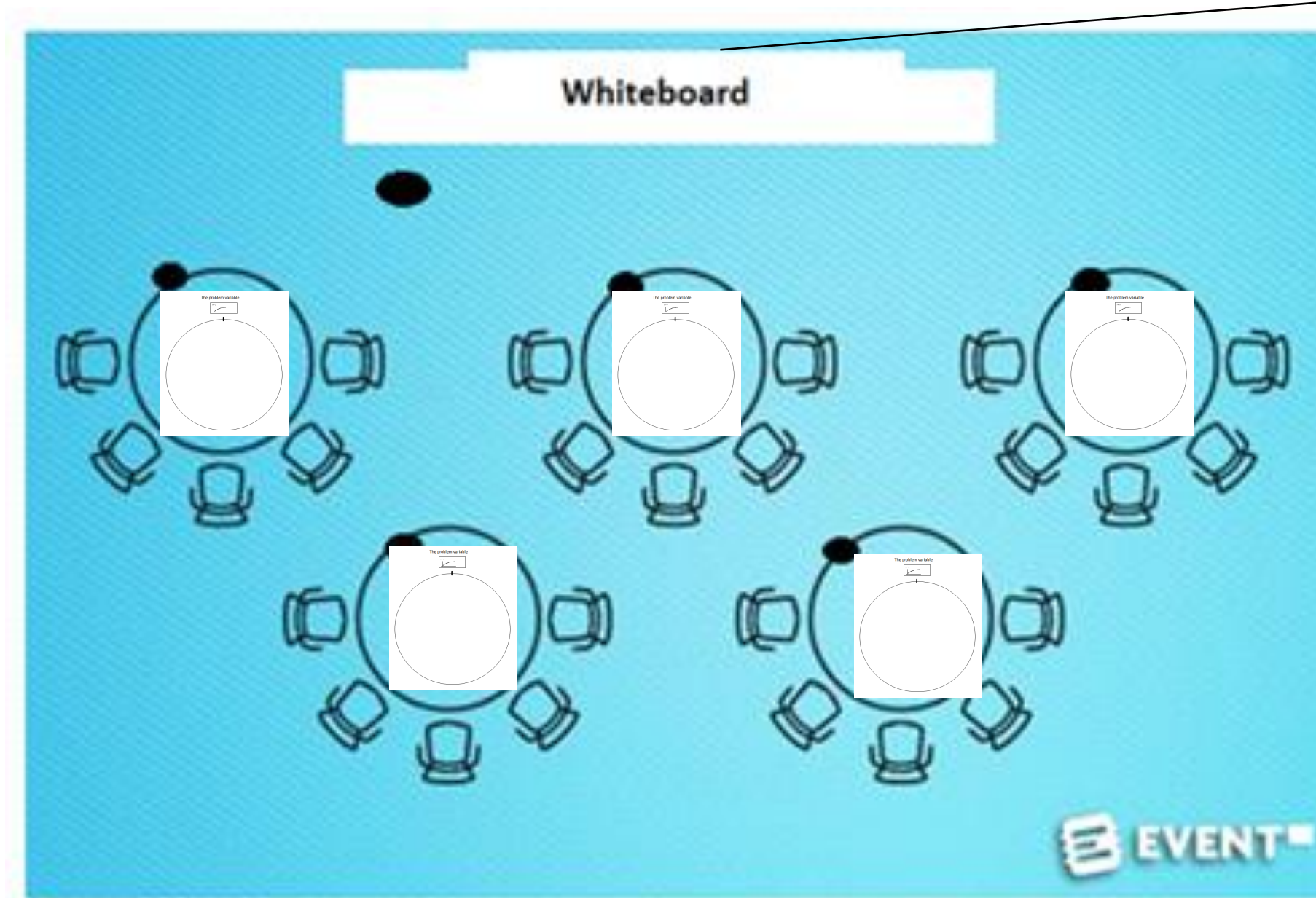


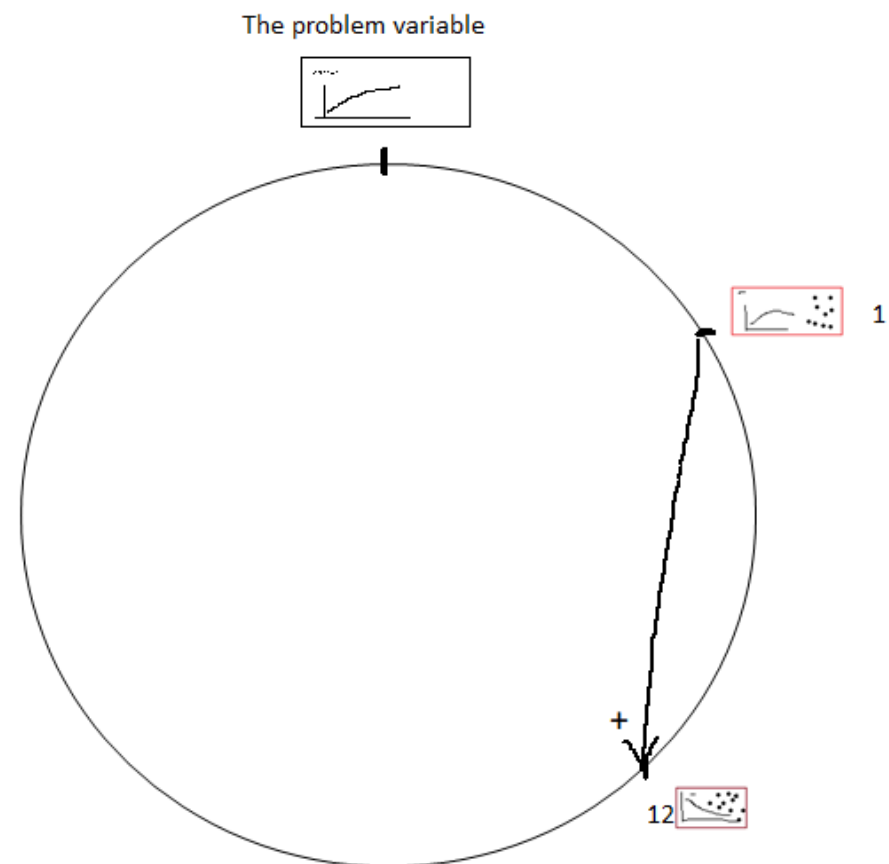
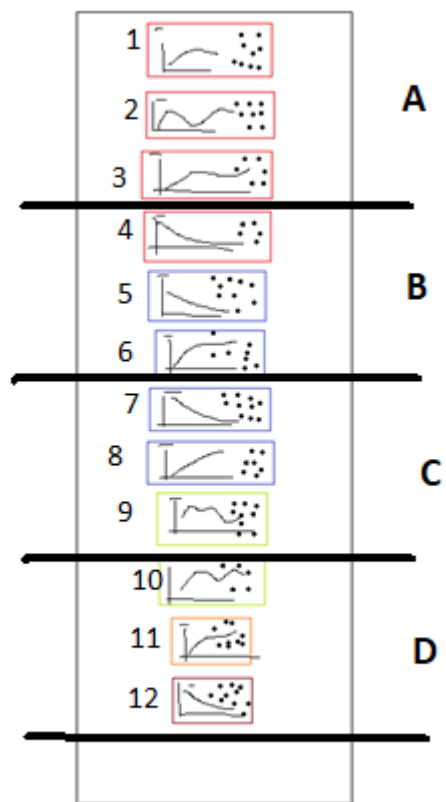
Connection circles script:

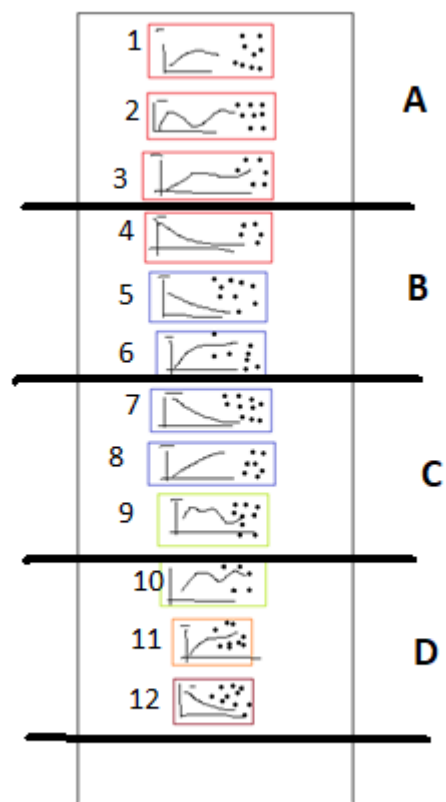
Materials:

- 1- Markers
- 2- Pre-prepared connection circles

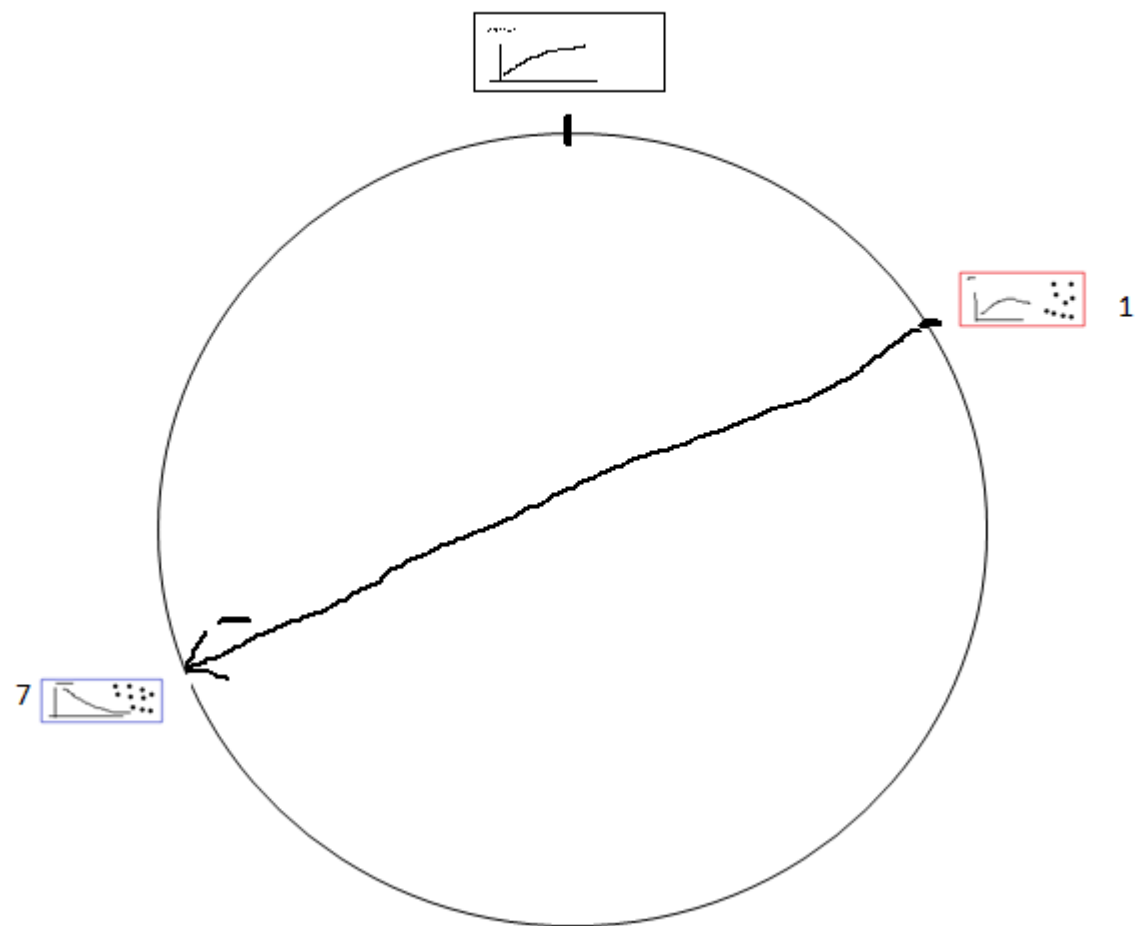


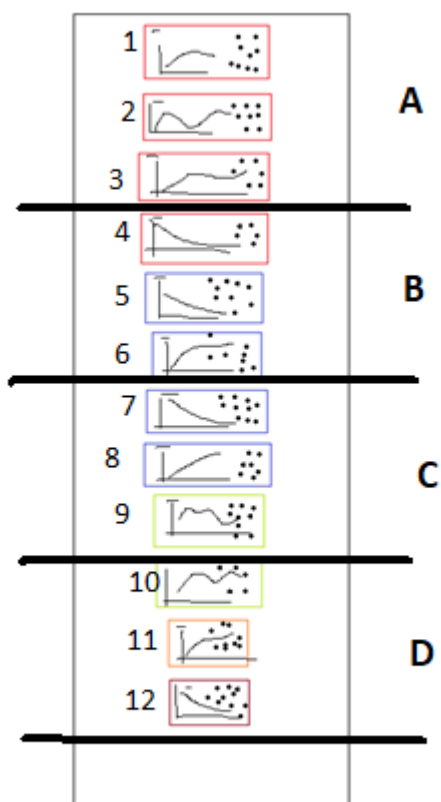






The problem variable





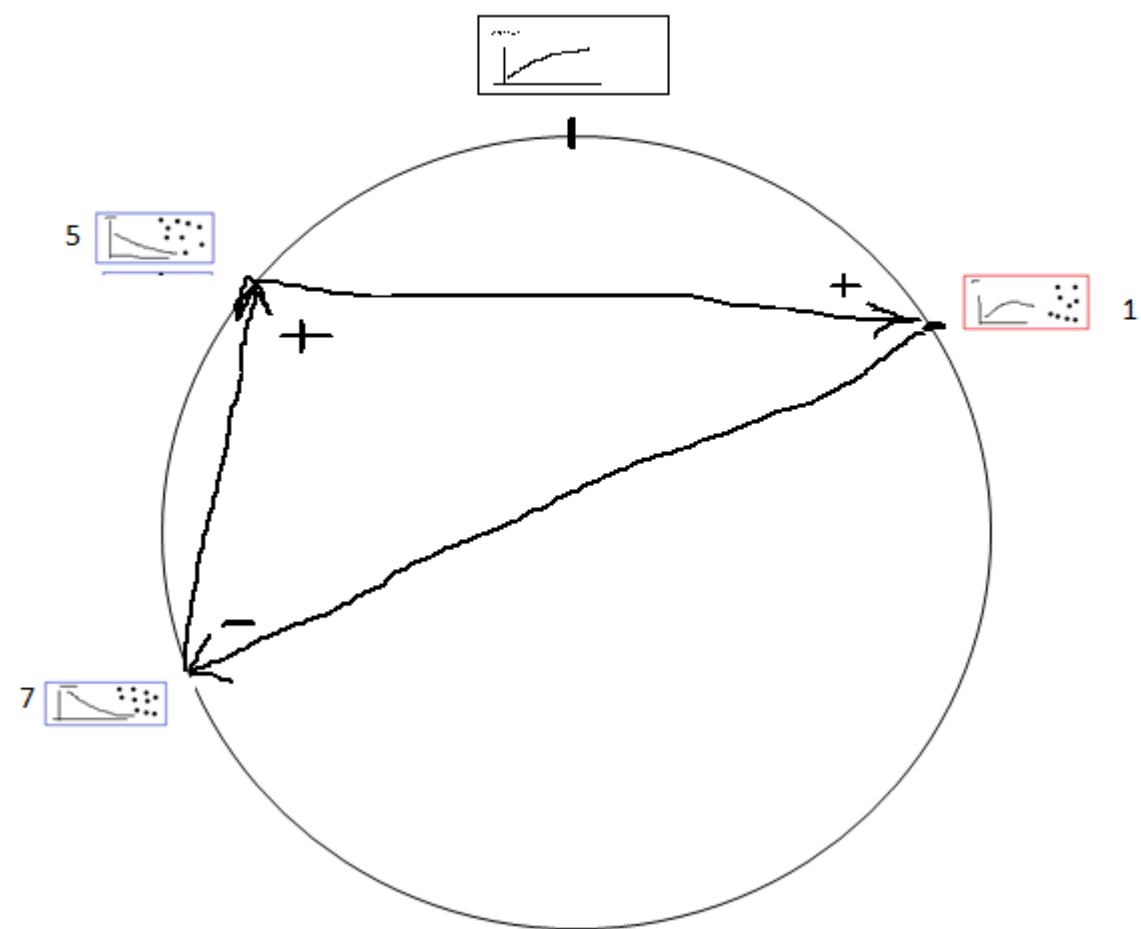
A

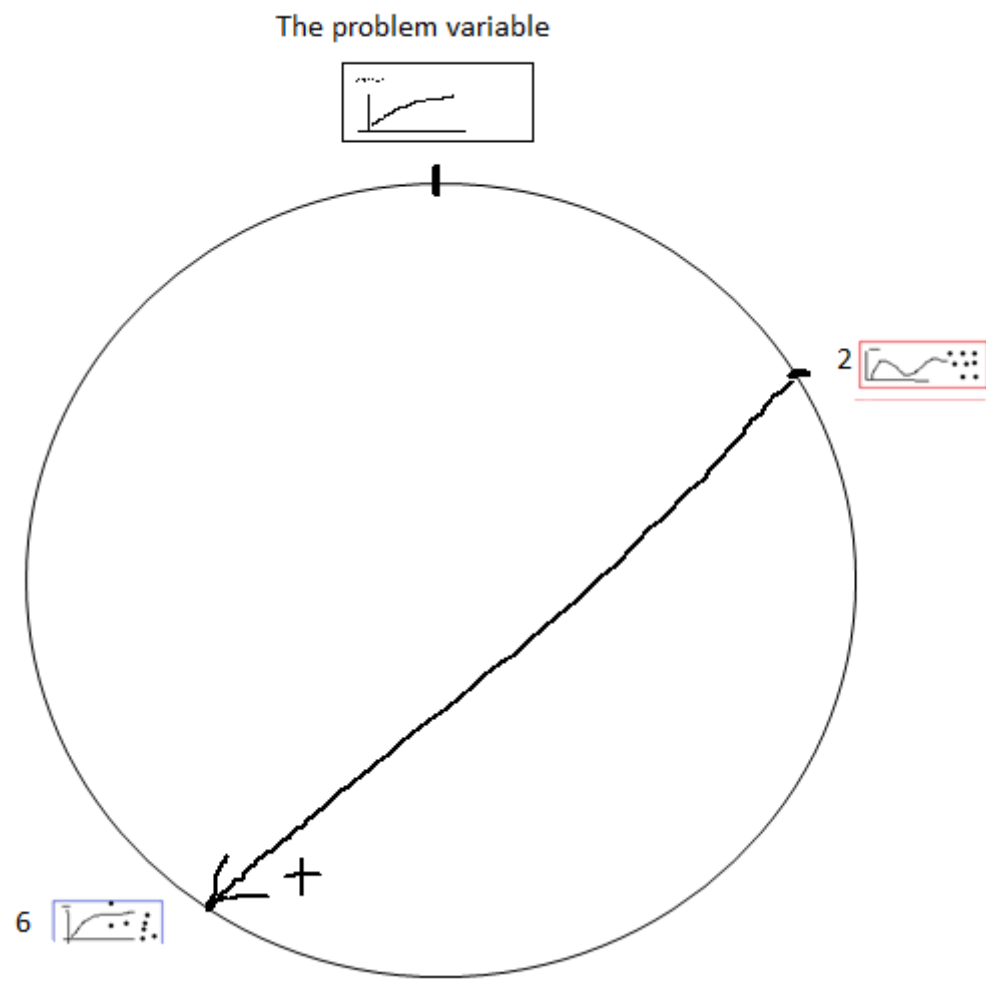
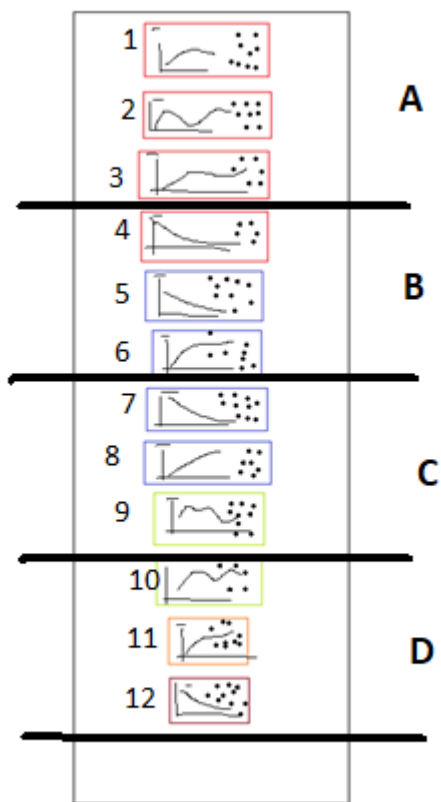
B

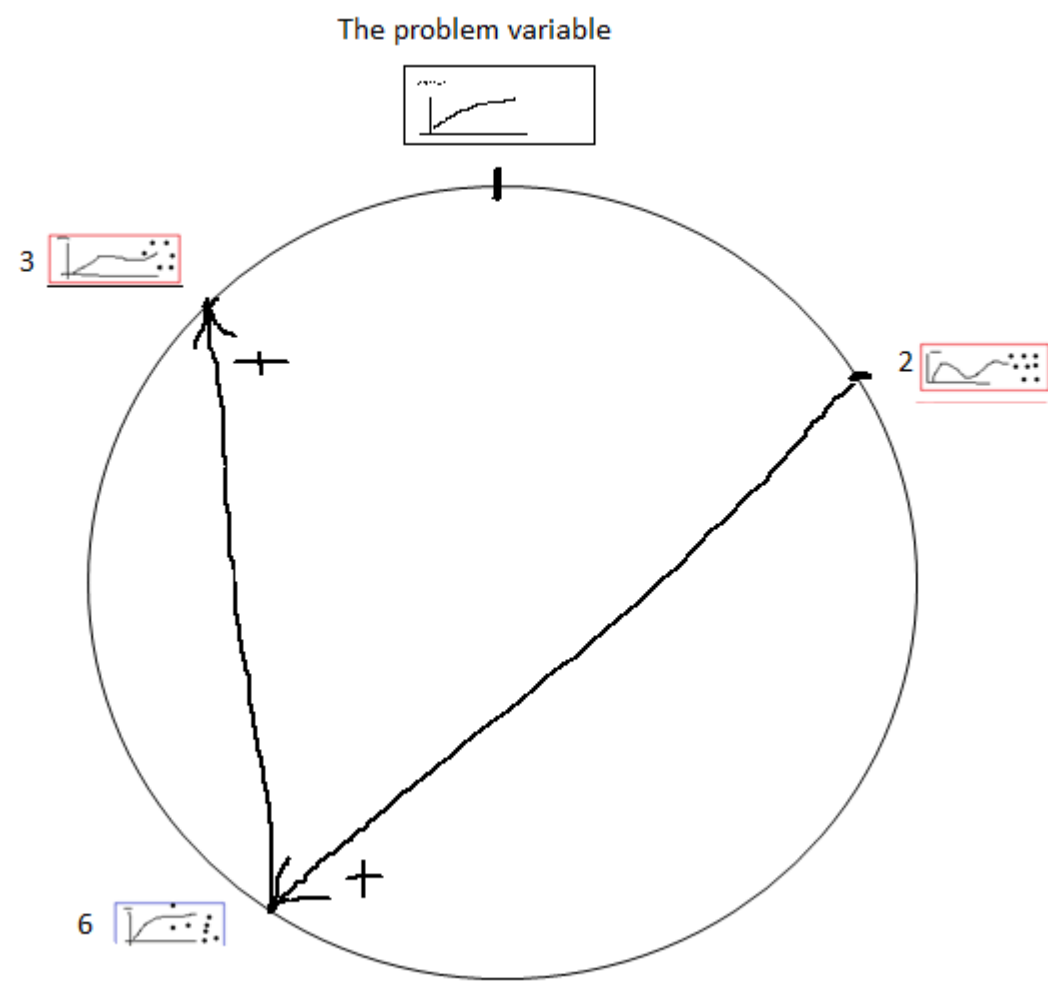
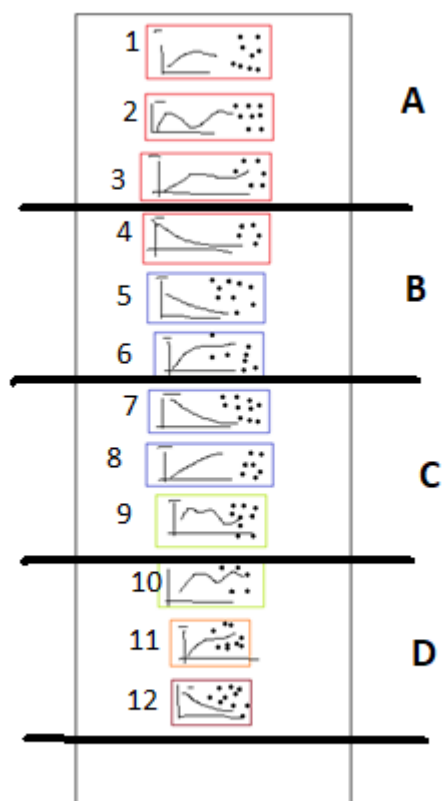
C

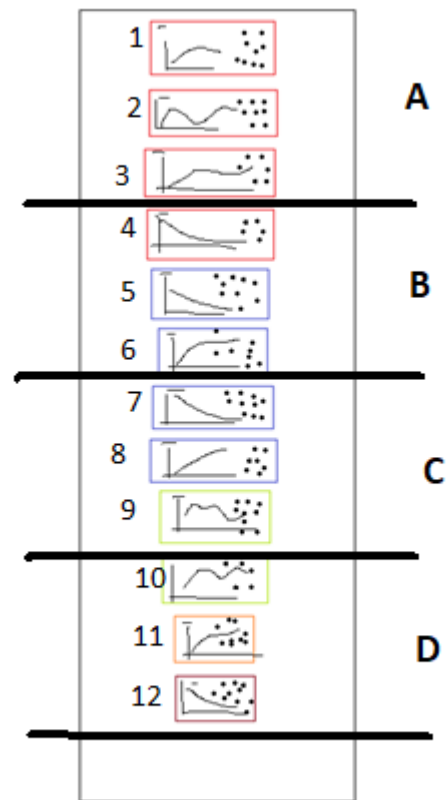
D

The problem variable

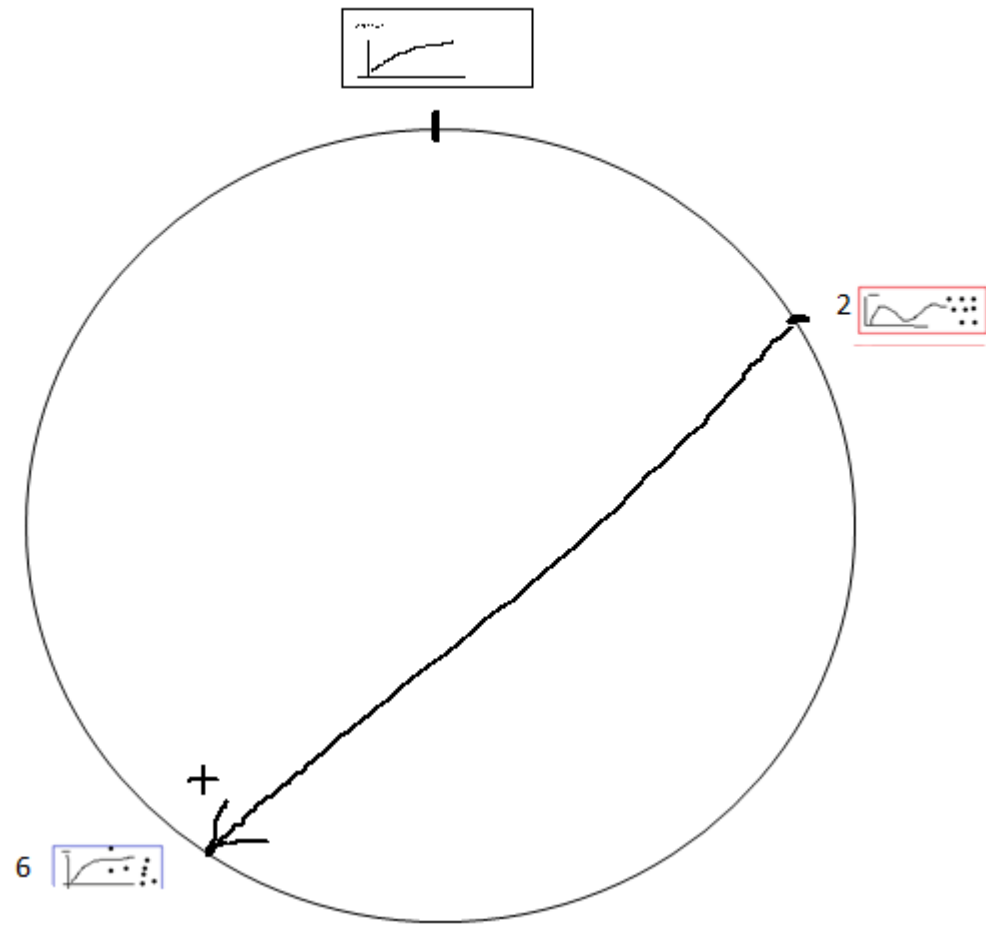


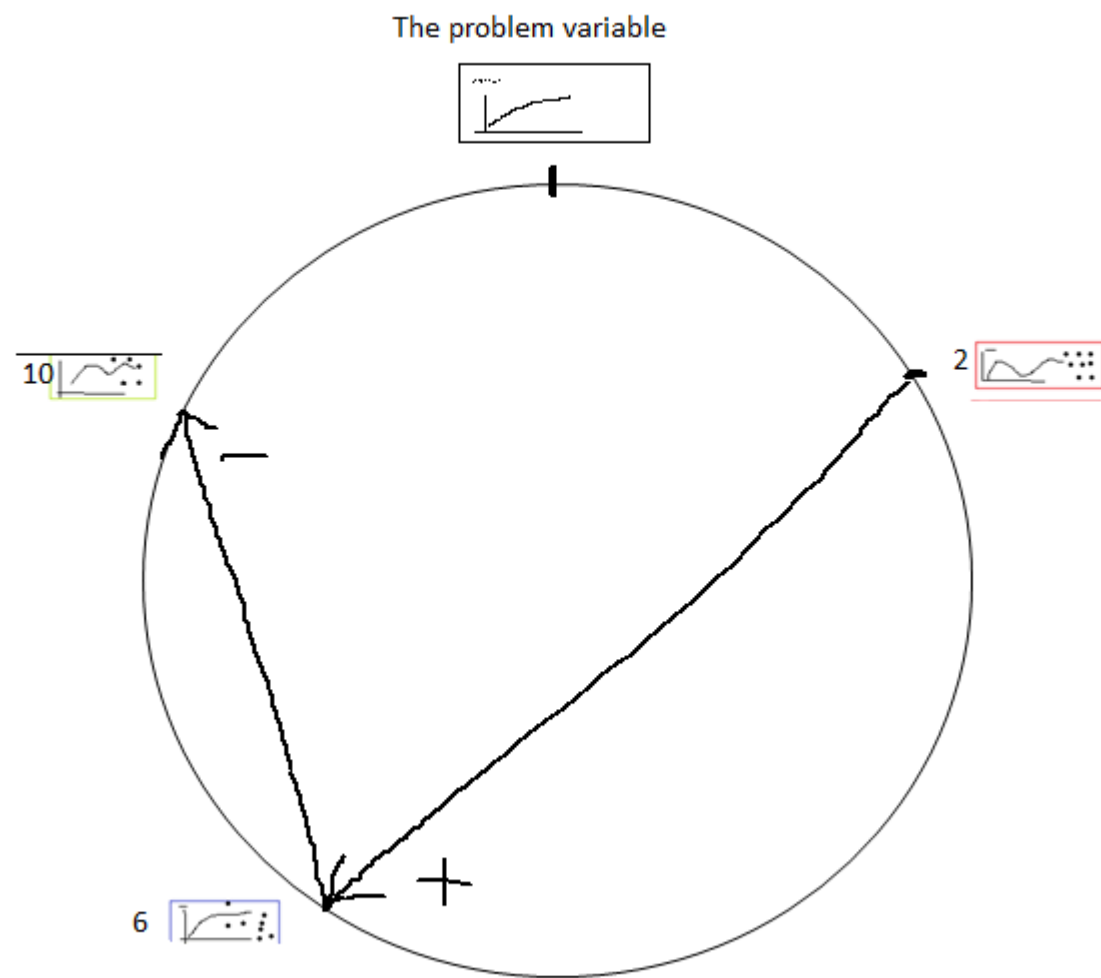
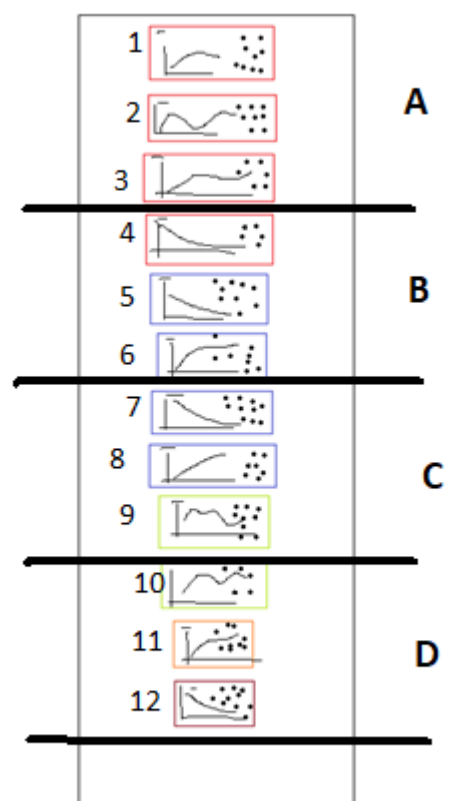


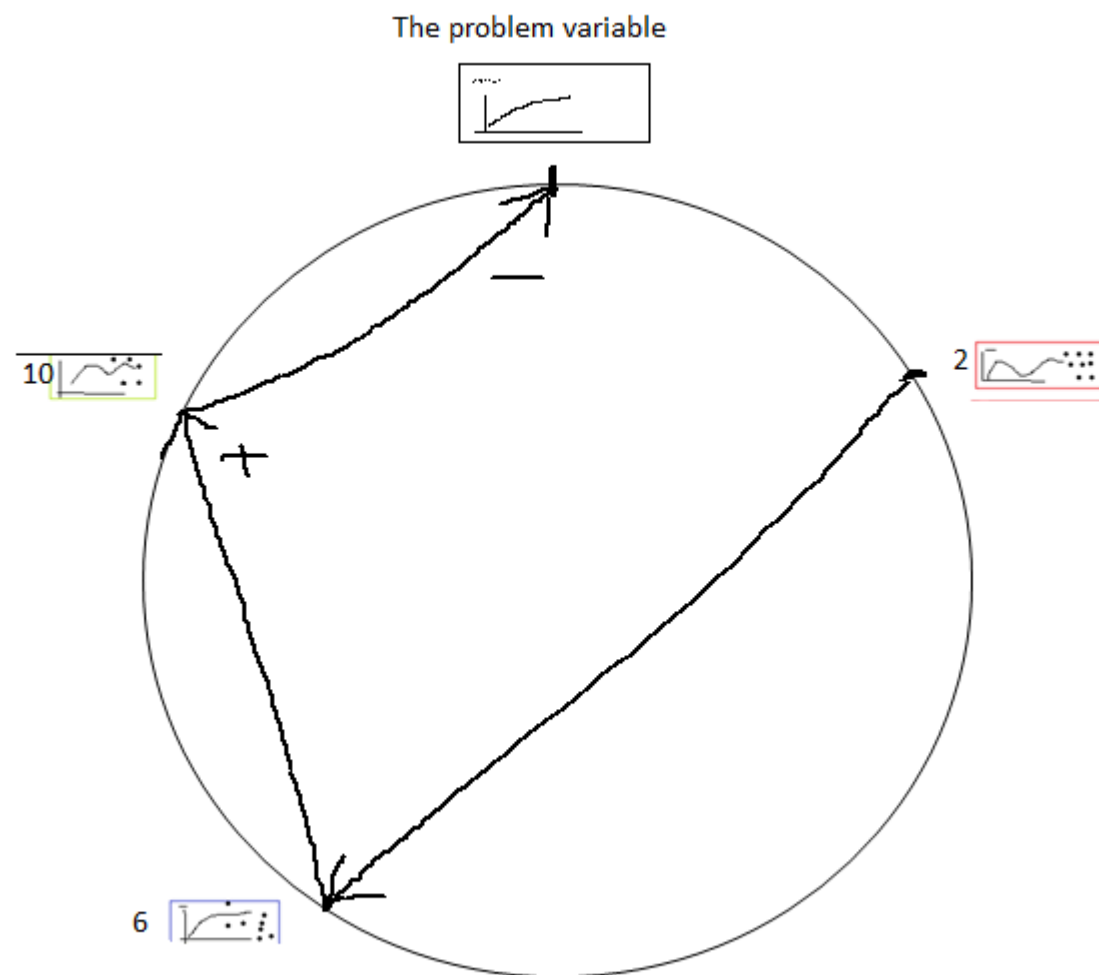
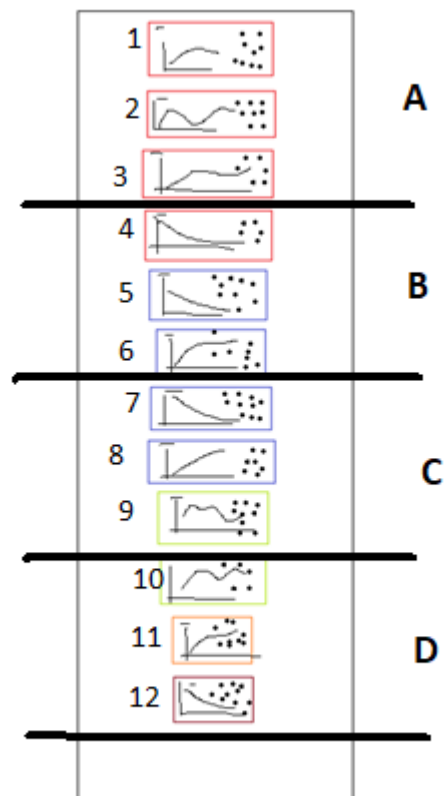


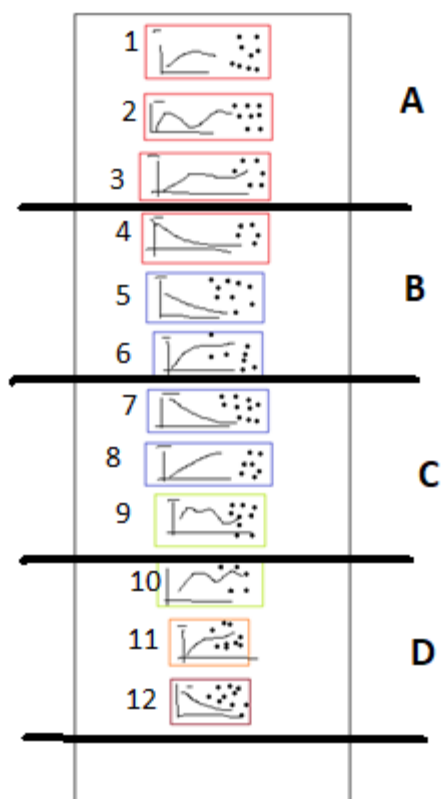


The problem variable









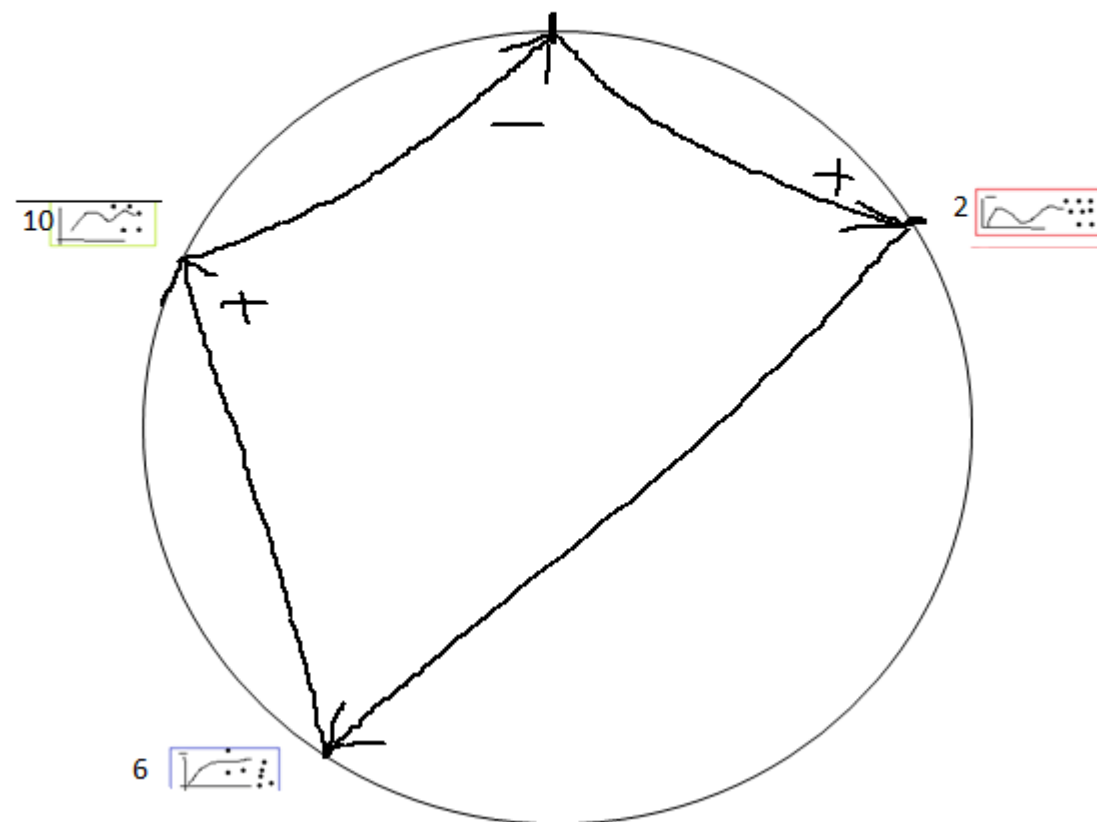
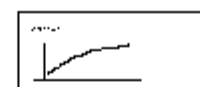
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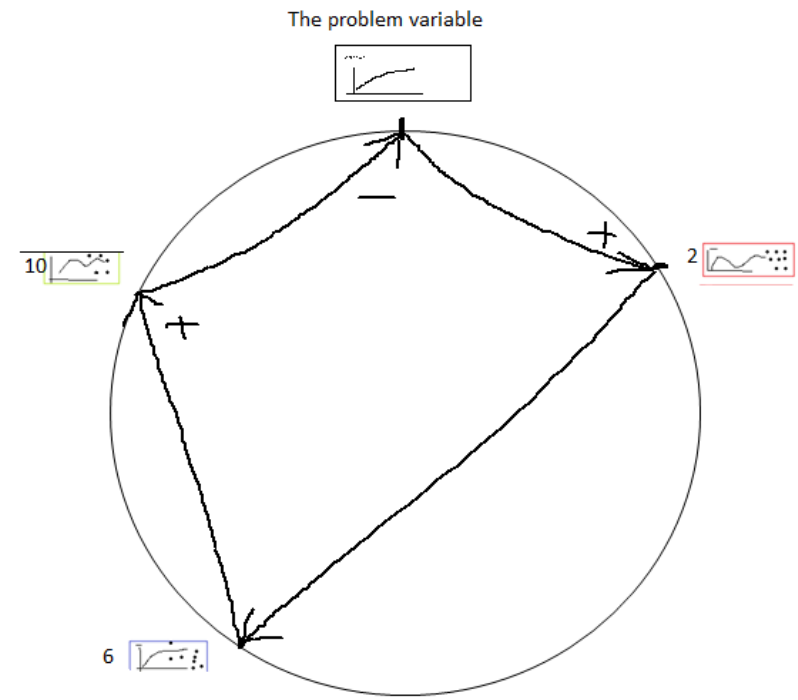
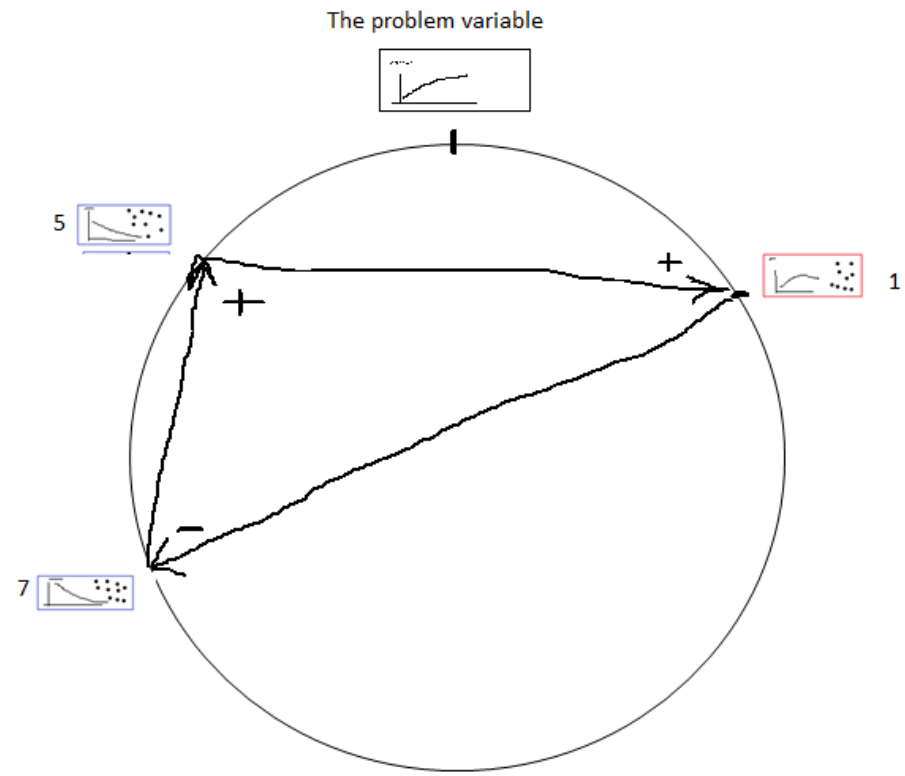
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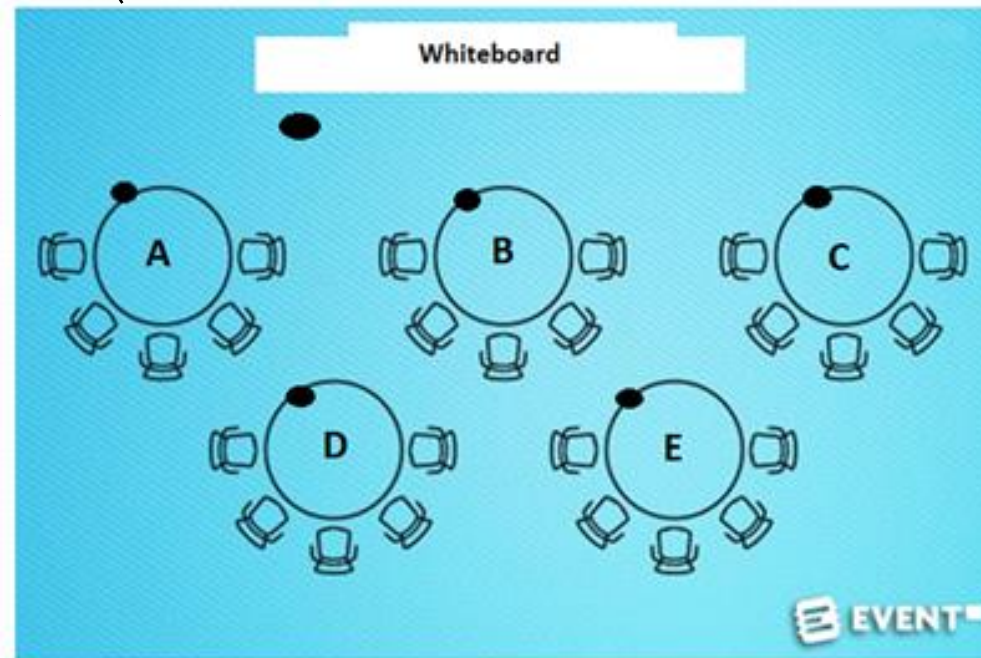
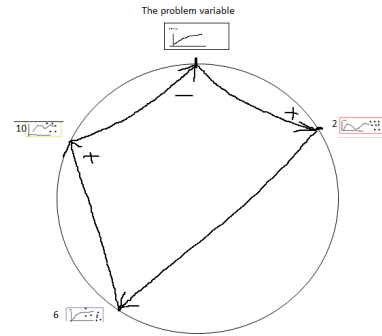
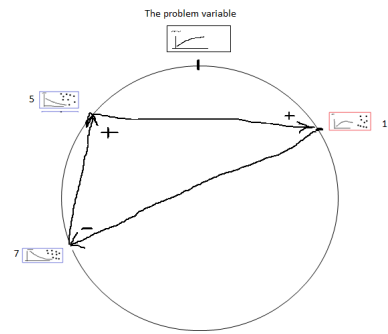
C

D

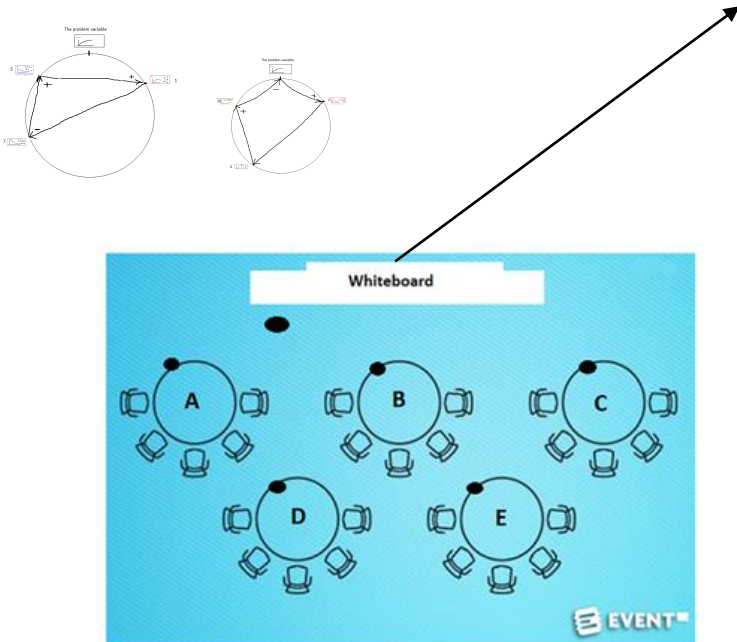
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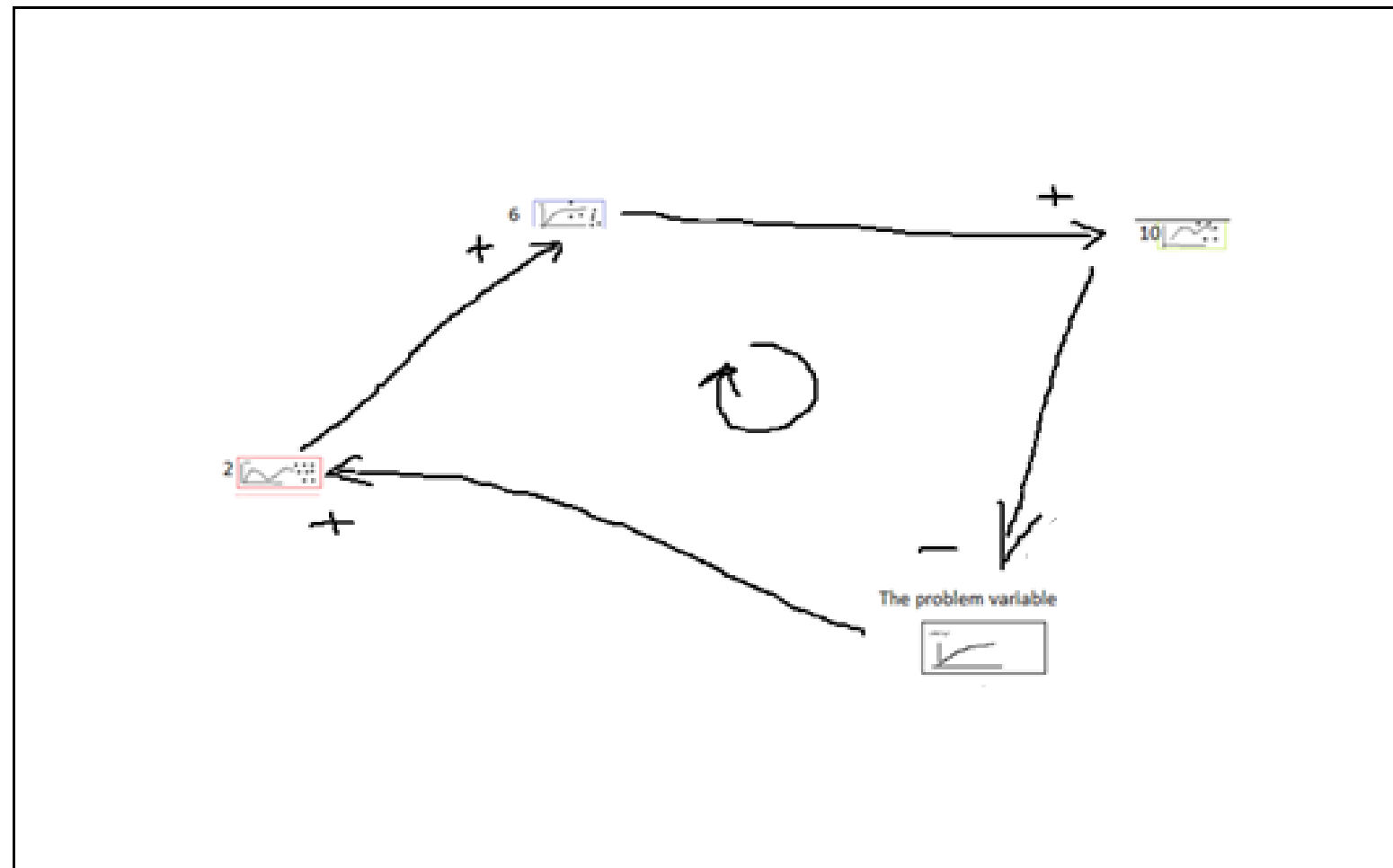
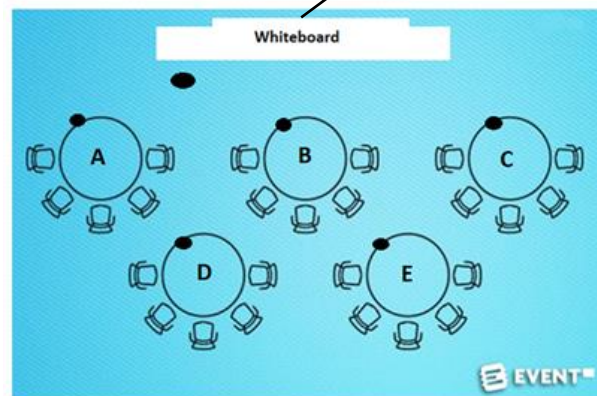
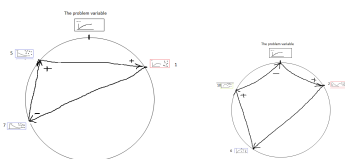


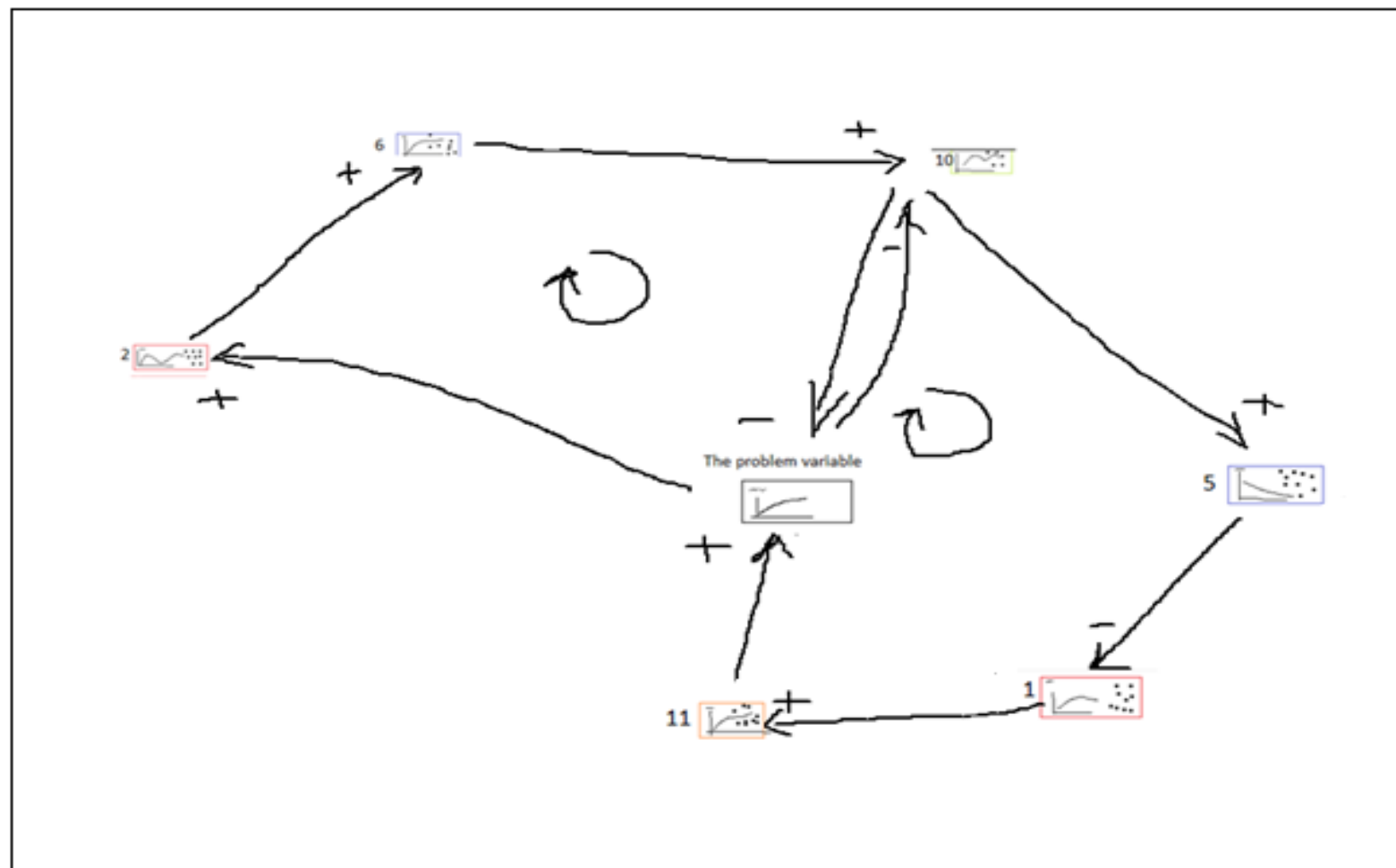
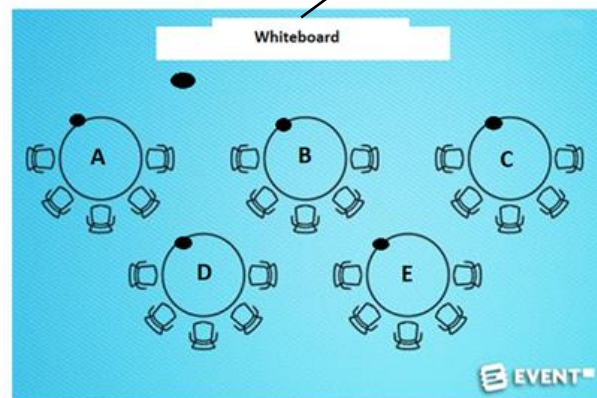
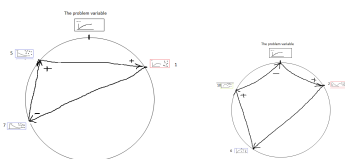


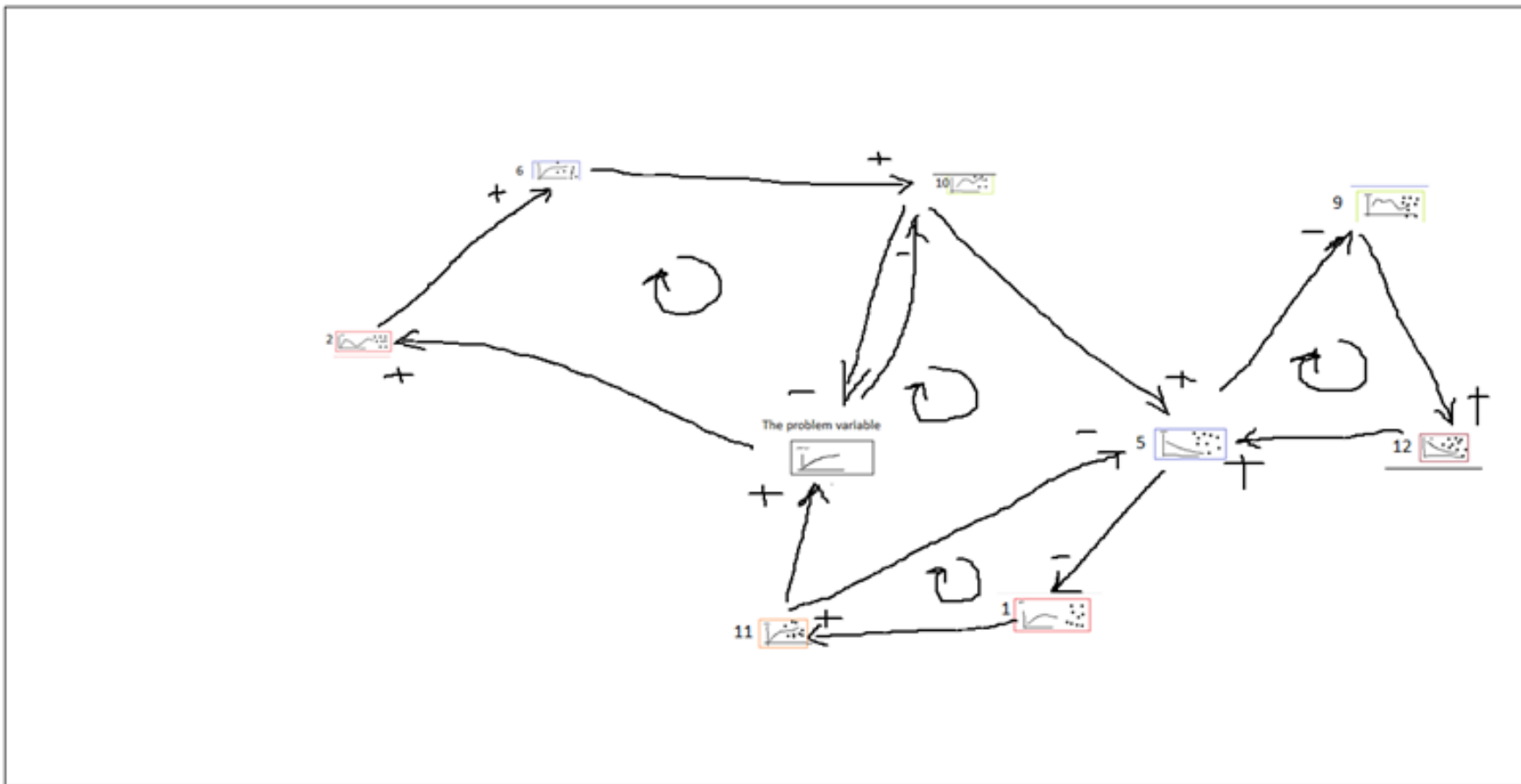
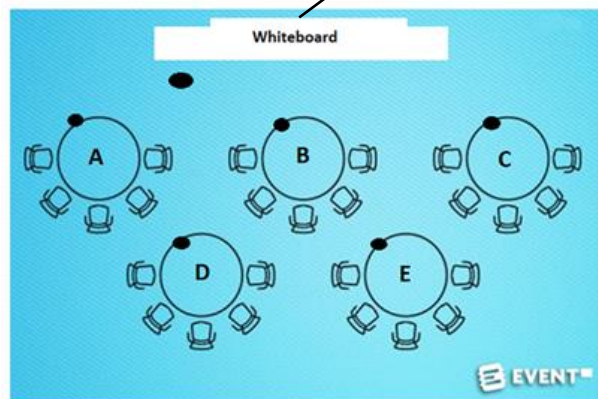
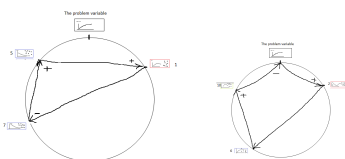


Causal loop diagrams (CLDs) script:

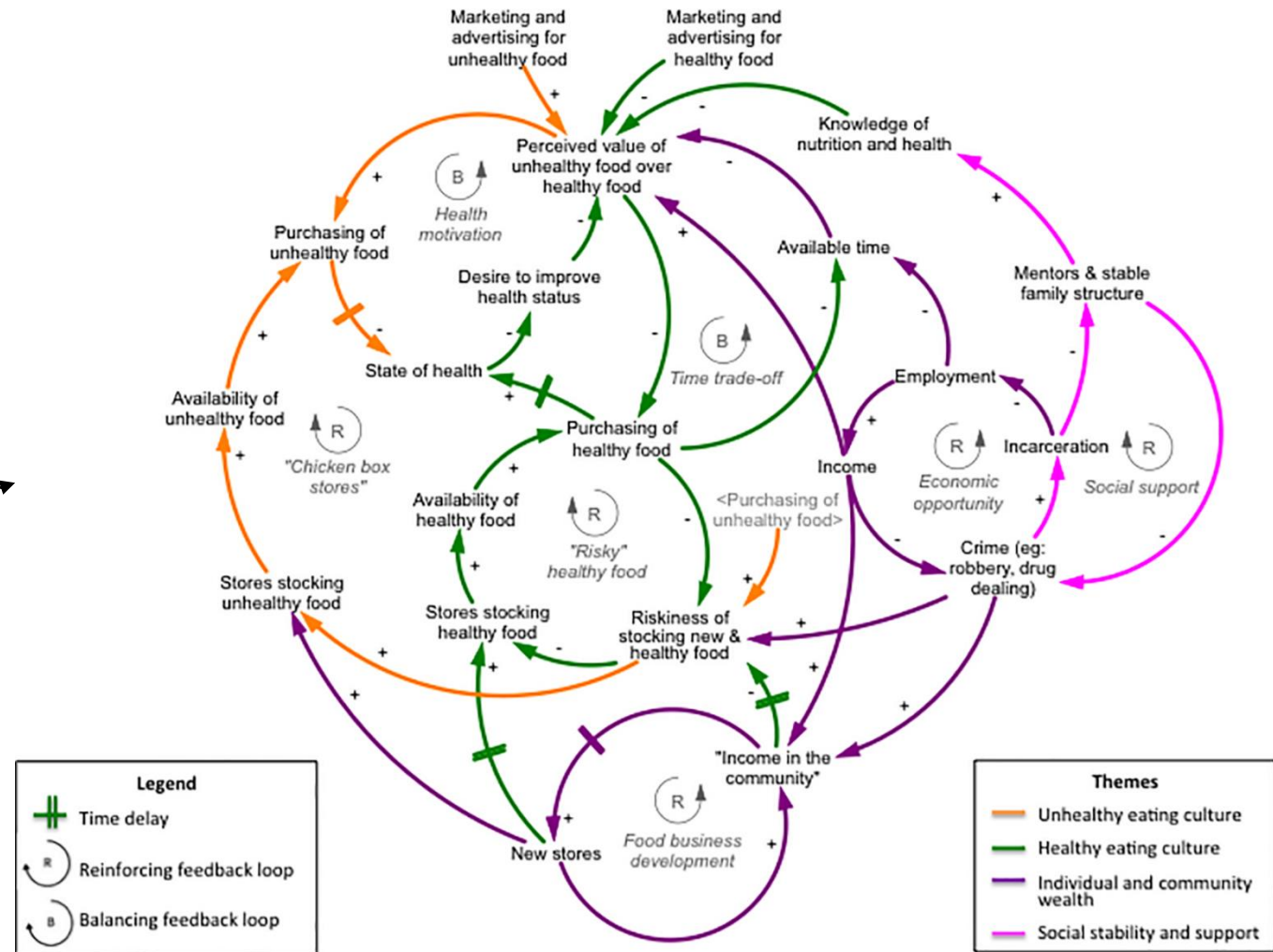
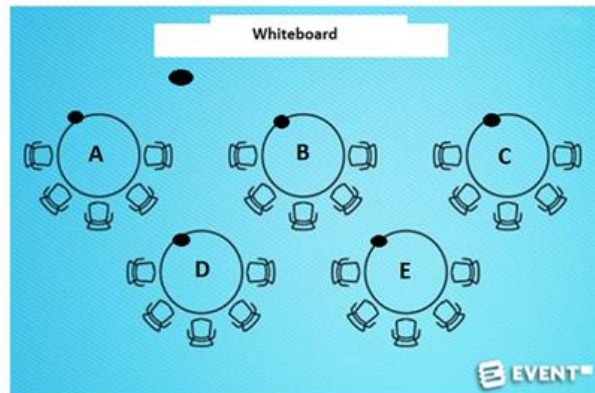
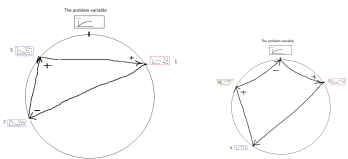




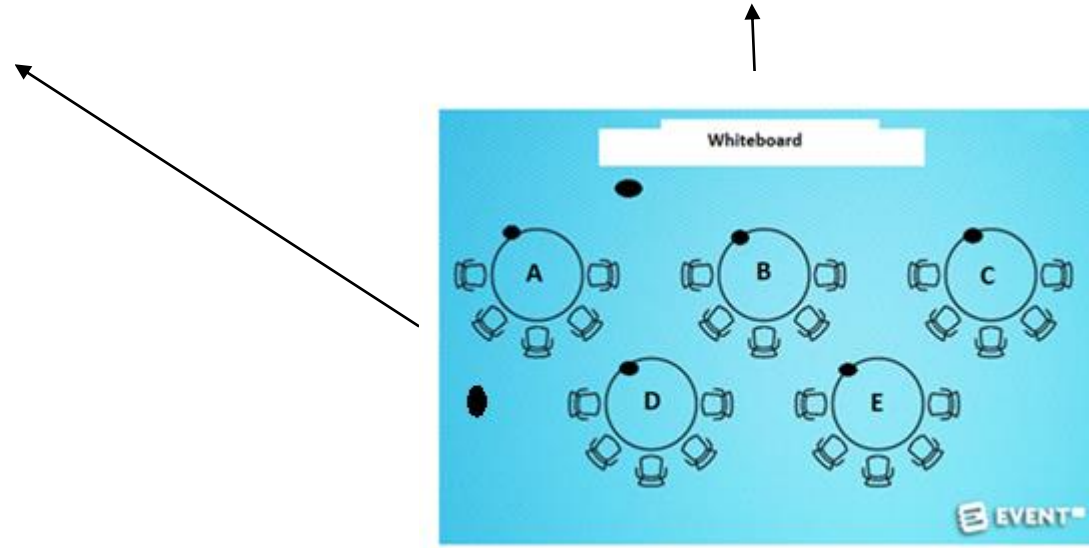
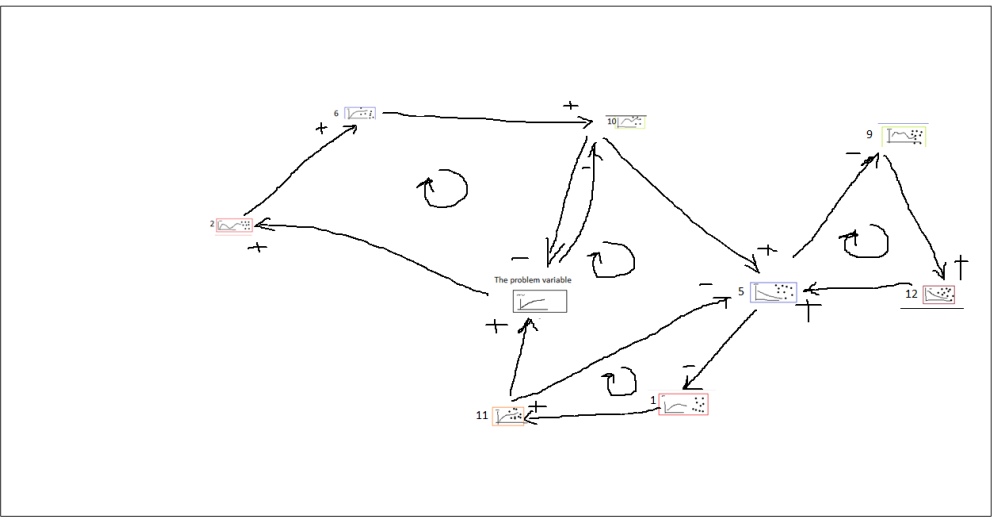
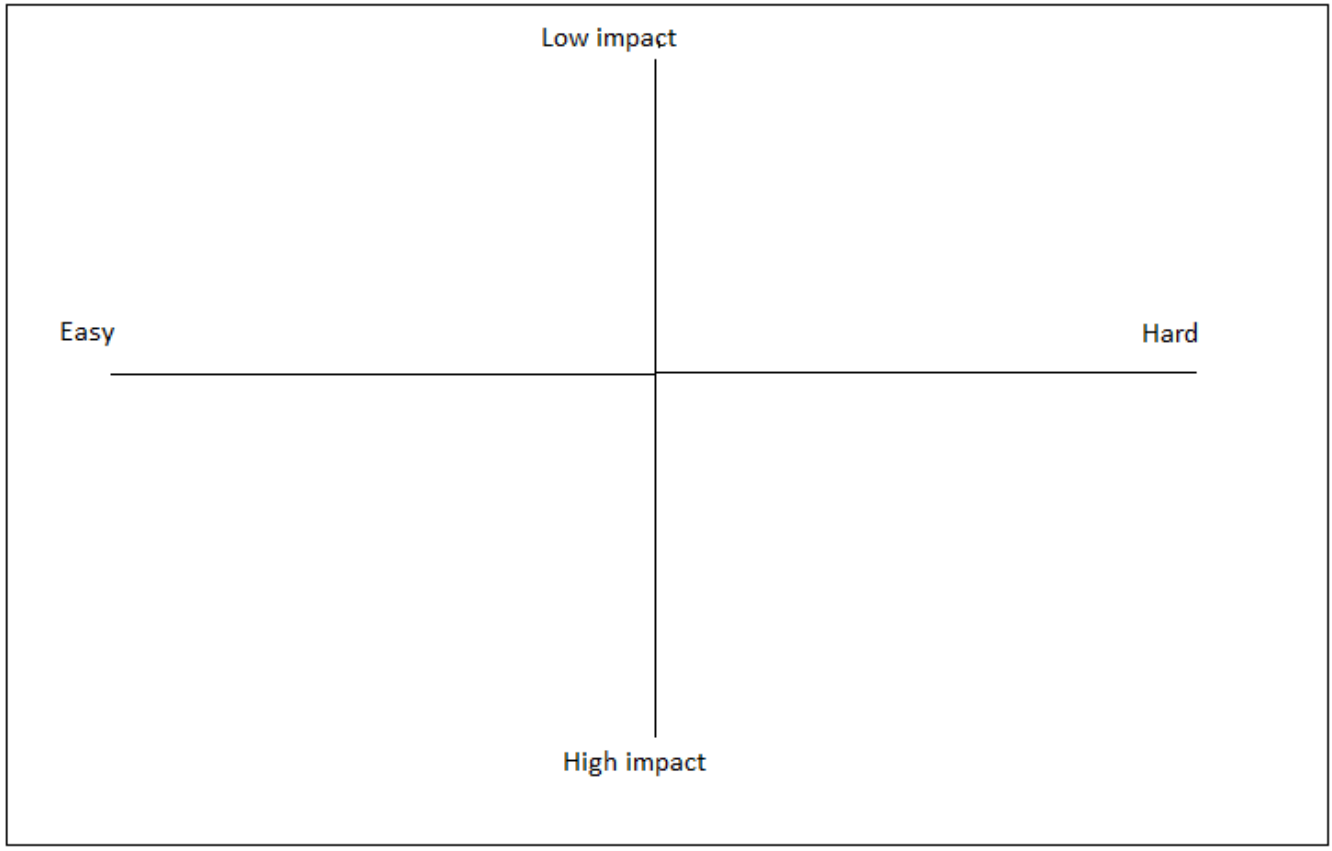




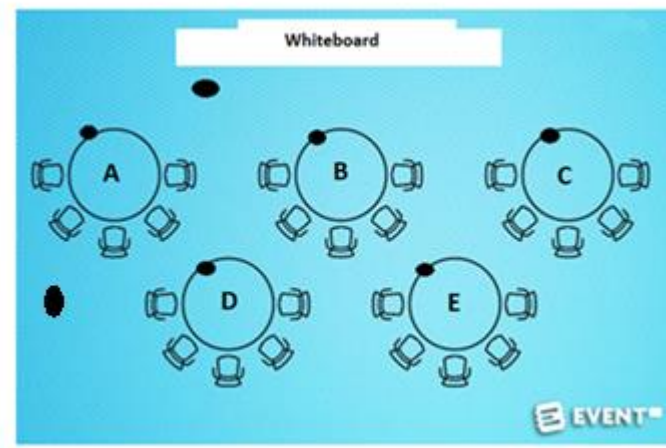
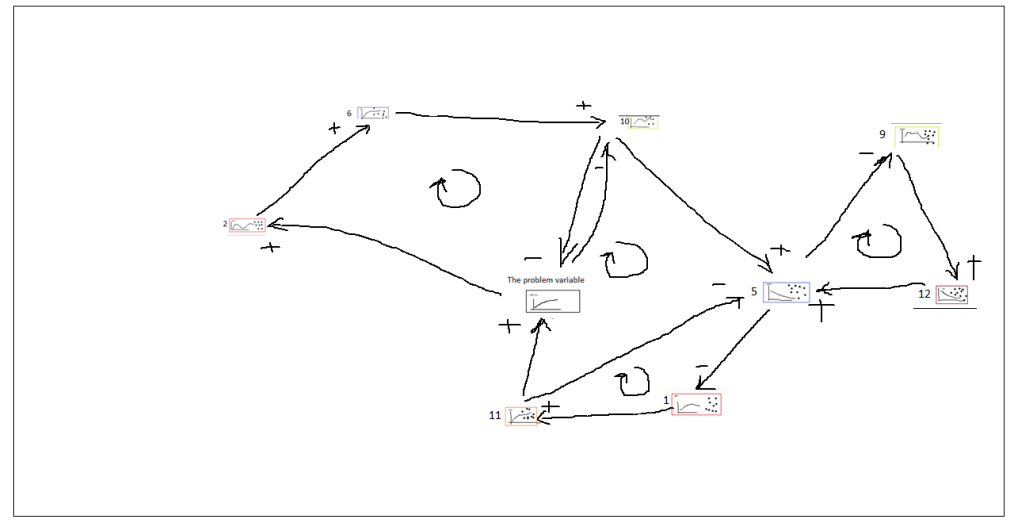
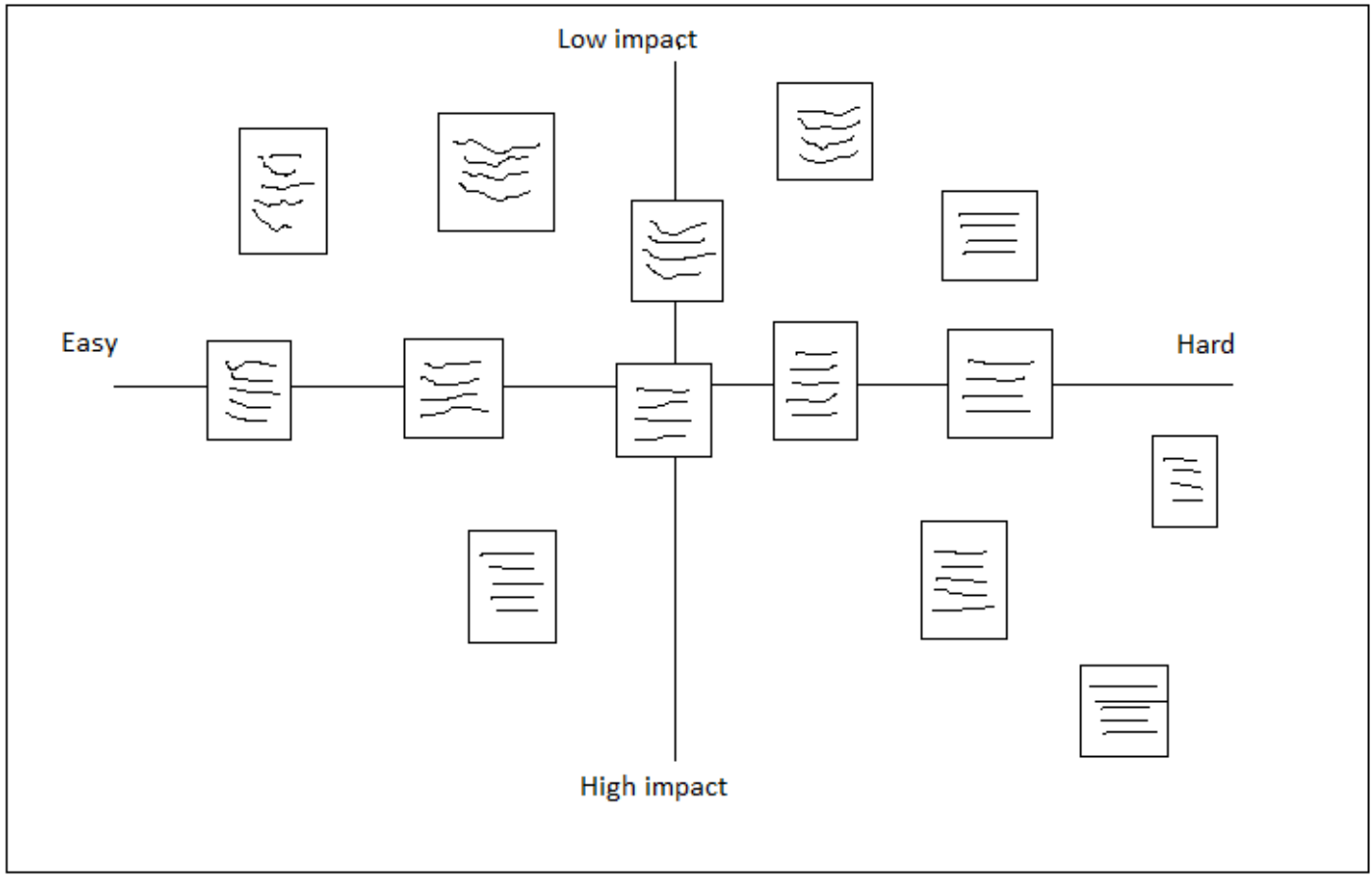
Causal loop diagrams (CLDs) script:



Action ideas script:



Action ideas script:



Outcome.....

- 1- A systemic understanding of the a problem through the eyes of others (community)
- 2- Provision of a new way of looking at the world to the community
- 3- A portfolio of community solutions (systemic policy)
- 4- Provision of an opportunity for the community to enjoy collaborative learning

Next steps:

- 1) Produce a policy brief (options) based on the model
- 2) Simulate the model
- 3) Publish the model and the way it was produced
- 4) Invite the community to solve the problem based on that systemic understanding