Equilibrium

Cluster Interdependency System

Global Hackathon COVID-19

https://covid-global-hackathon.devpost.com/

Pandemic

Author: Simone Domenico

Patent: https://explorer2.callisto.network/tx/<trxidsequence>

0x115ce687adf0cbf19fb668a79e6e3cb36e7b870c261a81072fe01120c9847dc7
0xbe37f0b31988e24767f1513381e23ab31c6c236fbc428b7477c9955cd2ff91ab
0x7b9abc0cdd3457e8dbda5e61cd06e792053e343faecf9a1962a9d8e31f64dd9d
0x12779897e3ac0fbf1df449c4910e62f341ea0bc0842f5e65ba4257621172df10
0xf30cc5893ace0a665e94939b23c57d8e9b20b1b04d5e4d43383bc0c0d5dff459

Use Case – Pandemic scenario

- There’s a way to keep the virus SarsCov2 under control.
  - Social Isolation.
  - But social isolation blocks the economy and life degrades in quality.
  - We should calculate the equilibrium to come into safely contact, to stem infection or apply quarantines by sector.
    - We might control the pandemic indefinitely.

Equilibrium:Simone Domenico

0xa6650333e8005a101267cd07853506696974fdc68c9319beea9e6b0d0acf9580
0x715a753e71f885d88f507f498452fc0e7f3faa36f447080c7cd7662e63ce5dc4
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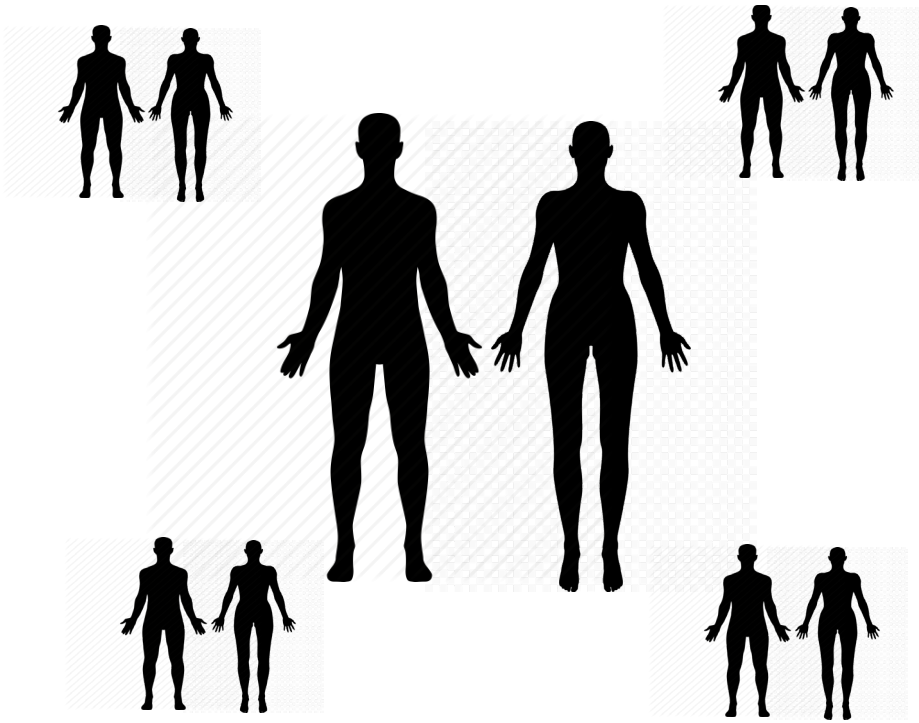
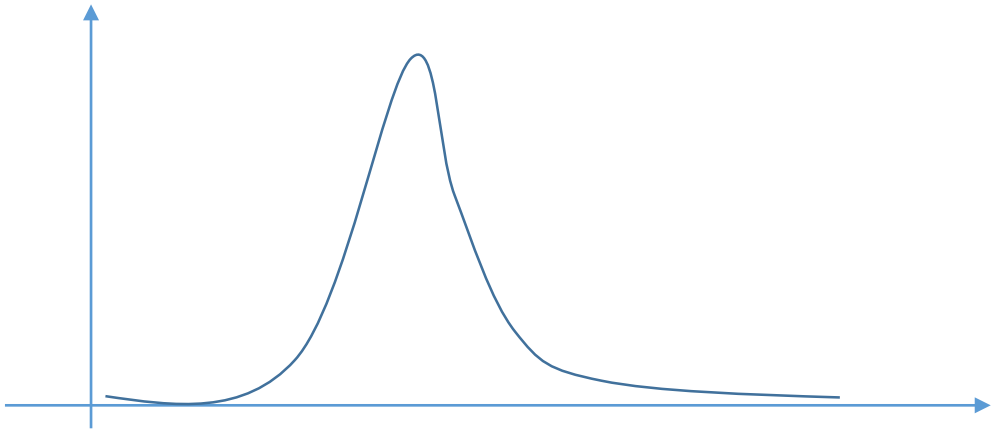
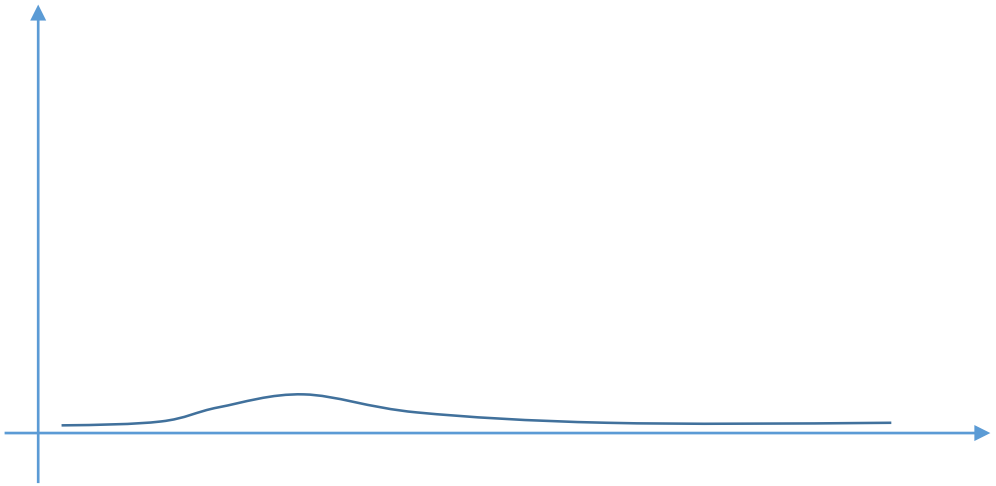
0xdfbeeae37e12496efa4f1178f92eb3c96f831ce8a1c22648e8e4be1021b2b330
0x3beb5a428c179ed5de263edf5c9551c9d255d73cdde557eed65962ca73a04fc8

Abstract

The model is based on the correct amount of circulation of the population in reference to the geolocalized parameters and type of cluster interdependency by population under monitoring. We consider the normal circulation as “full people movement” and as such the maximum probability of contagion obtainable, we consider the quarantine as the “no people movement”, that is the maximum probability of non contagion. We can define intermediate scenarios for containment of the various contagion curves.







Equilibrium:Simone Domenico

0xa1e8b9db5638030c3279f8e39ec9bd002137aa0830cc3b4a7b849187593c918d
0xa27508803b227cf60135fc30d39d7fe0a0640812097ce5680aaea932b6058d7e
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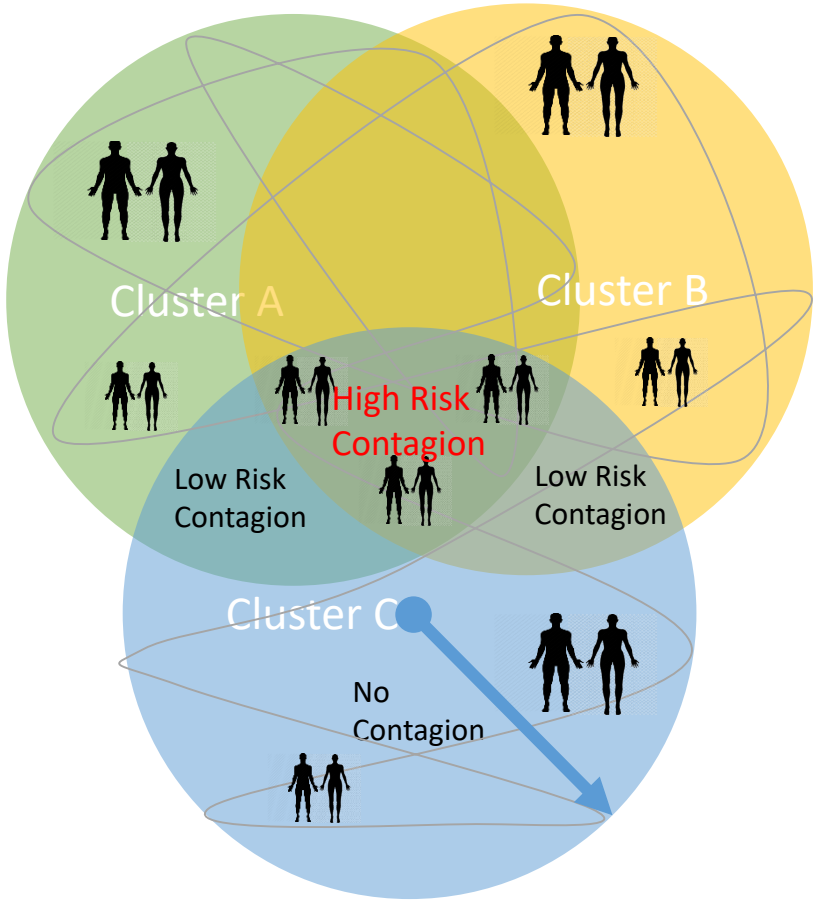
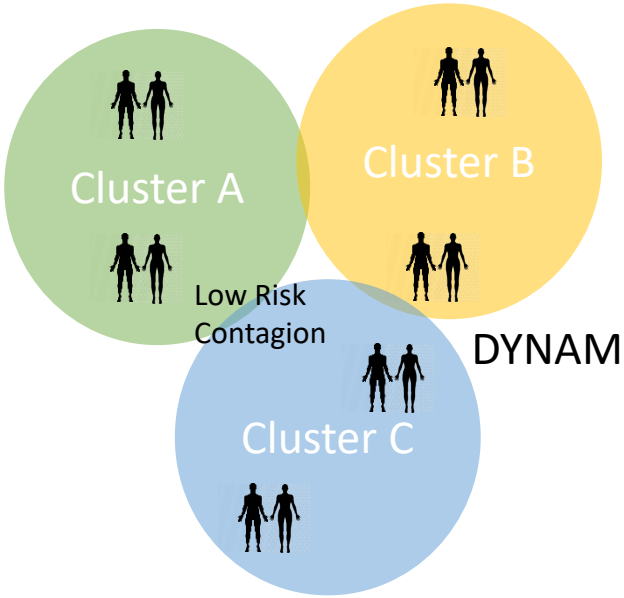
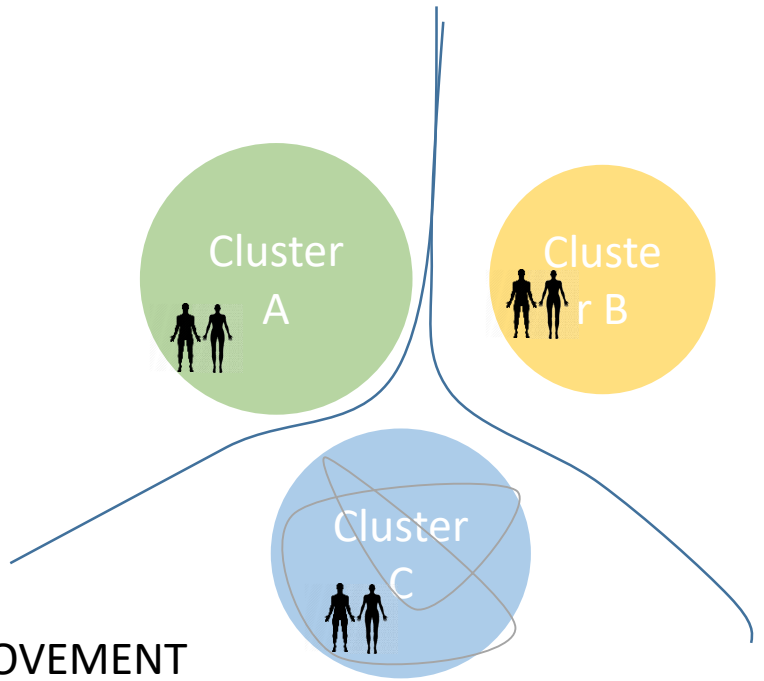
Data Model



FULL PEOPLE MOVEMENT



DYNAMIC PEOPLE MOVEMENT

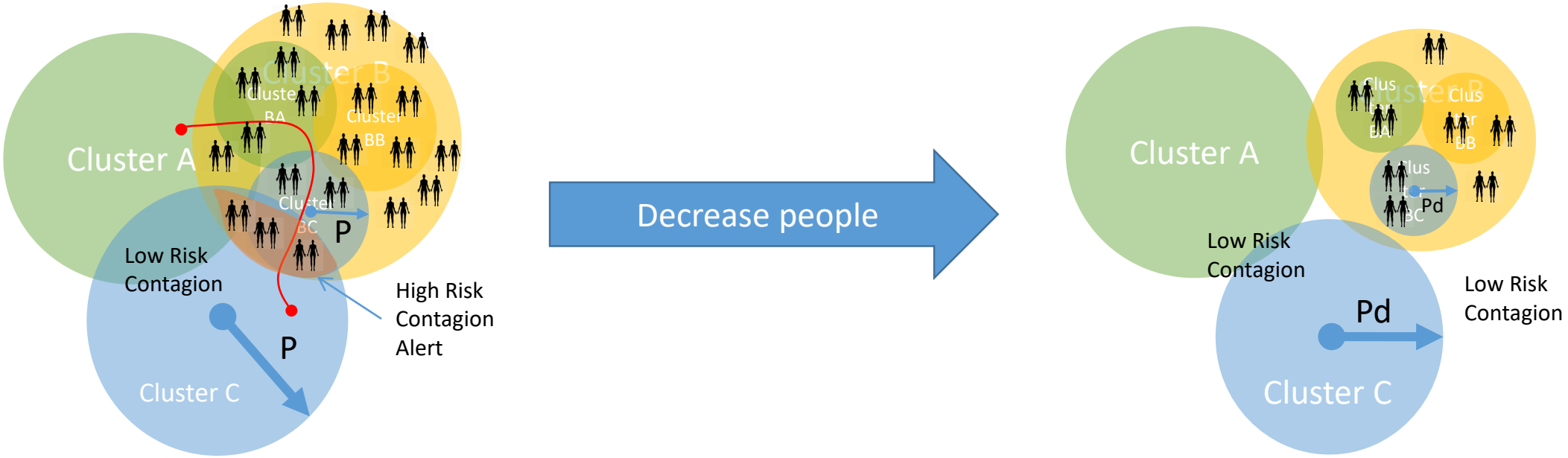


NO PEOPLE MOVEMENT

Equilibrium:Simone Domenico

0x68b7b8ea05b9327cc7e1da2e9ede4a1c0b17d97406c486a593dfaa8d9a70396e
0x4727c68f994e8e00b9ef4efb5eb612a3efc7695ca8740e2dffd7f533f881537b
0x785f466420f1b20f86dead55176dd813fd9c3c66057c0b6d0831e16999d58d4a

How it works



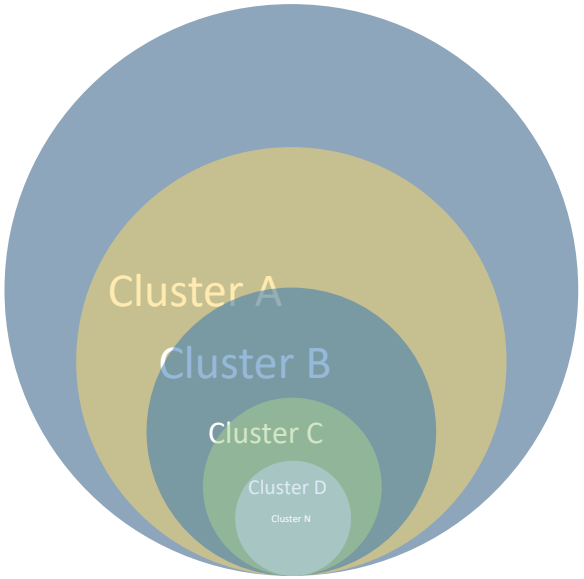
P: POPULATION TOTAL

Pd: POPULATION DECREASED

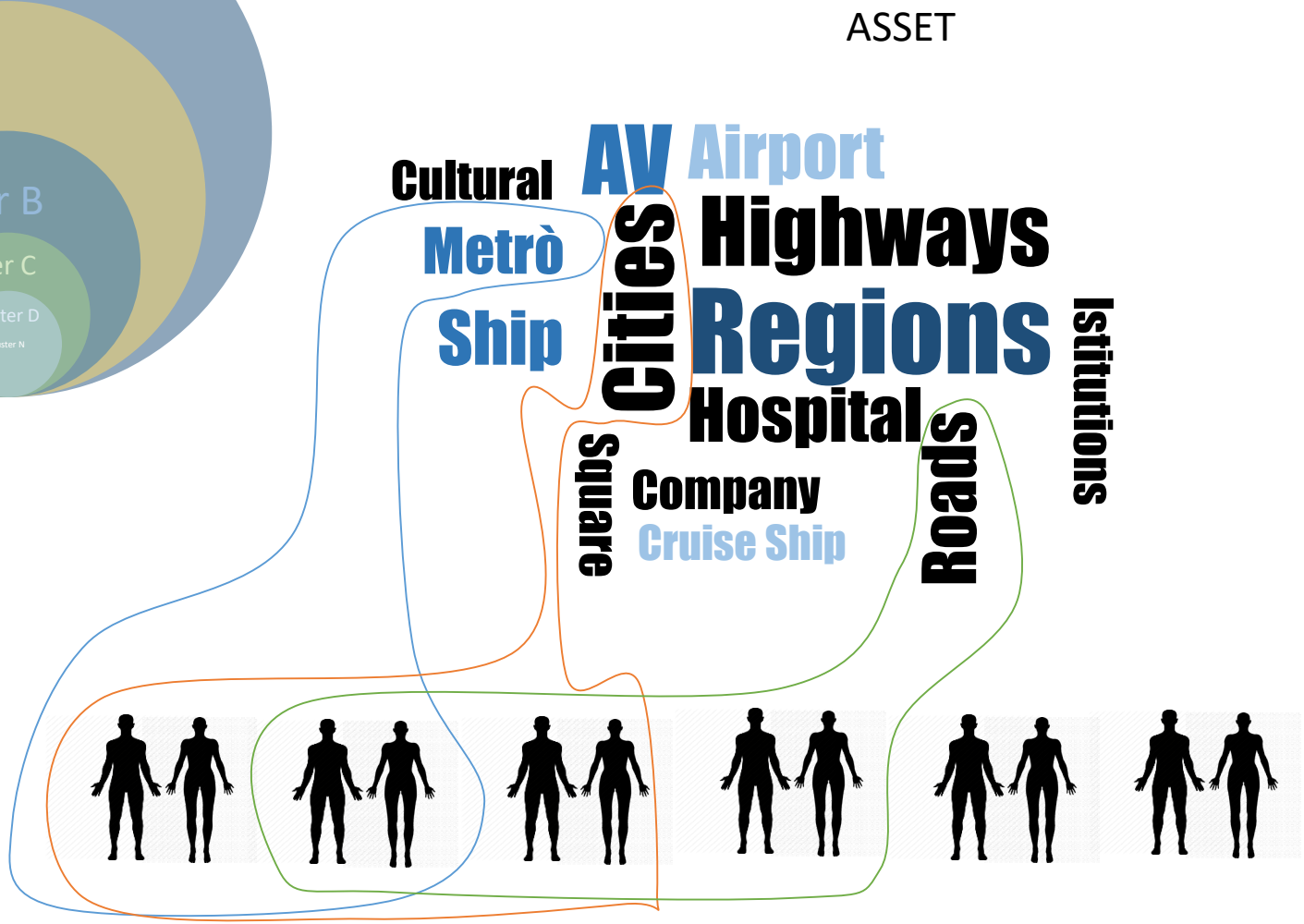
Equilibrium:Simone Domenico

0xca4e3d6e16d698abb16fb5892f5ca596bbf625189839205a16a6cdc44ff32147
0x59c49b7e404bf5d278859724be378e6109c02b0d2e92884cf865c6b930c60a4b
0x5bfdb1a8c4a143147d89f7e699388feb24e1b492d29531baa7a3063f43ff94d9

Cluster **Interdependency** Definition



How Many people can authorize to stay on shared asset to prevent the curve contagion?

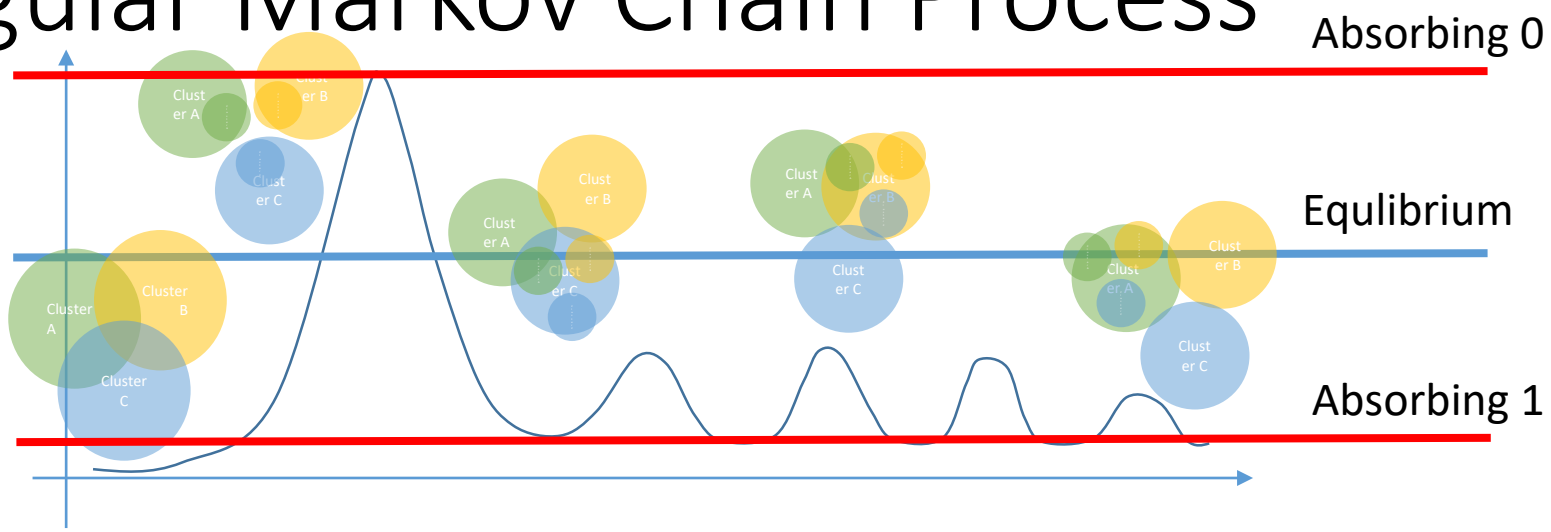


Equilibrium:Simone Domenico

0x598fcdb67f161ec1967a391c5c476fdceceea9177efb4a1b811cab6b61253713
0x3fa69cb0bec602767c02a6647444a4b63417a45cfcba037d72624bdc8d438260
0xdbf154a1fb59400184bd88f63d379631a7c6c2ff7c56746cf93790cd63b42d57
0x0c307b549a4990f1708ab8031cdc0be0c32d72b7b194e6d09d5dd5326032e640
0xadd9394268b0cf82d6060f037c5ec483deeaad0fad8f5e3d50daf9cb5533902d

Abstract – Regular Markov Chain Process

New State = F (Old State, noise)



A **Markov chain** is a stochastic model describing a sequence of possible events in which the probability of each event depends only on the state attained in the previous event.
The assumption is that different phenotypes determine different clusters that make an ecosystem under agent-based simulation. Different phenotypes, therefore operating at every social level, also considering different demographic levels: families, communities, companies, regions, states. By controlling the balance of people in each phenotype, for example in the issue of self-certification, symptoms, and positive COVID-19 patient, we can regulate all clusters by state of population movement, for the correct simulation of people management in movement and in quarantine preventive.

Equilibrium:Simone Domenico

Markov Chain

ABSORBING MARKOV CHAINS

⊛ A state in a Markov chain is called an absorbing state if once the state is entered, it is impossible to leave.

⊛ Like regular Markov chains, absorbing Markov chains have the property that the powers of the transition matrix approach a limiting matrix.

$$P = \begin{array}{c} \\ A \\ B \\ C \end{array} \begin{array}{c} \begin{array}{ccc} A & B & C \end{array} \\ \begin{bmatrix} 1 & 0 & 0 \\ .3 & .7 & 0 \\ 0 & .2 & .8 \end{bmatrix} \end{array}$$

A is an absorbing state!
B is NOT!
C is NOT!

$$P = \begin{array}{c} \\ A \\ B \\ C \end{array} \begin{array}{c} \begin{array}{ccc} A & B & C \end{array} \\ \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix} \end{array}$$

A is NOT
B is an absorbing state!
C is NOT an absorbing state!

P, P^2, P^3, P^4, etc... Never approach a limiting matrix

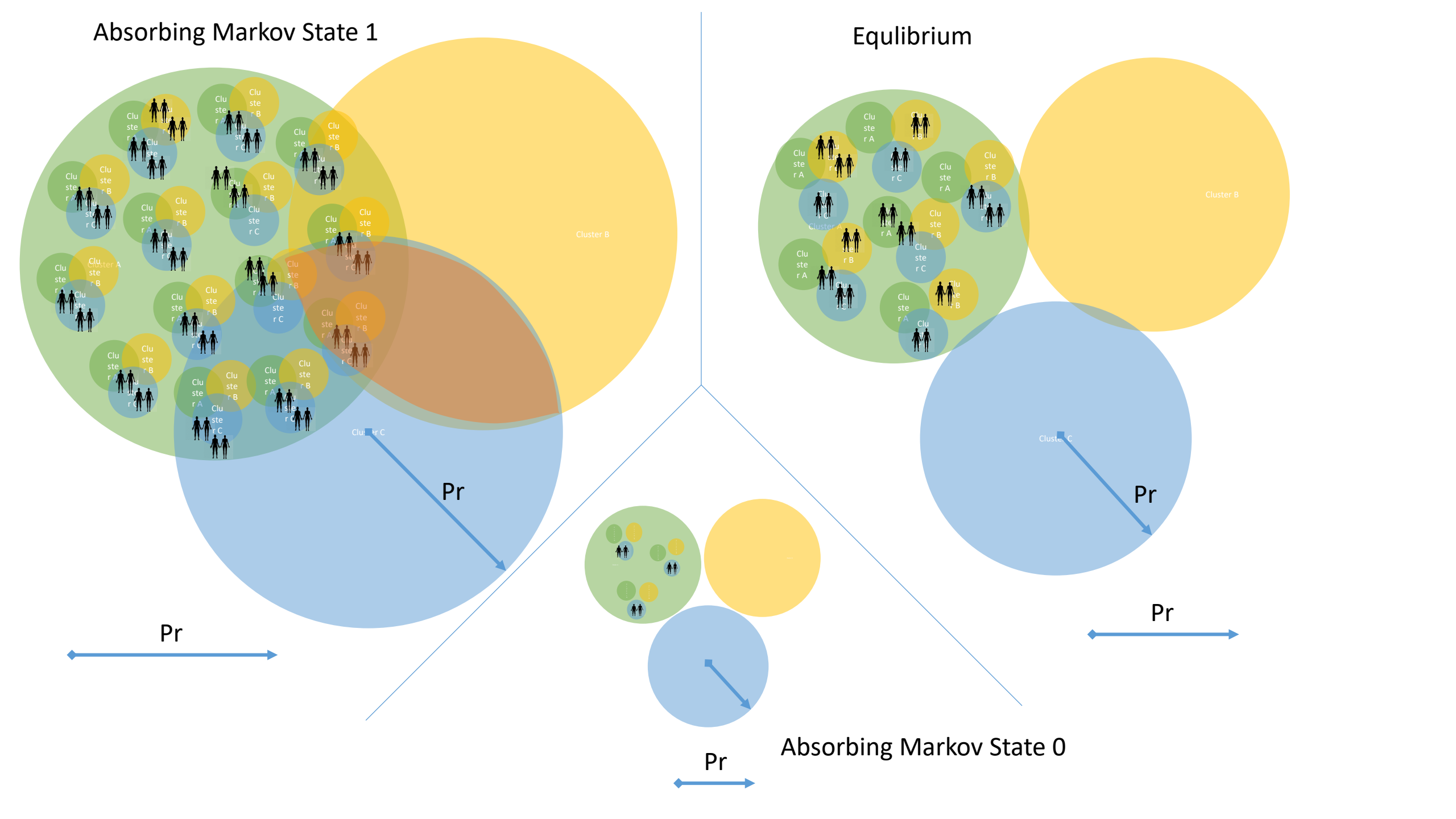
For transition matrices for Markov chains with one or more absorbing states to have limiting matrices, we need one additional condition:

ABSORBING MARKOV CHAINS

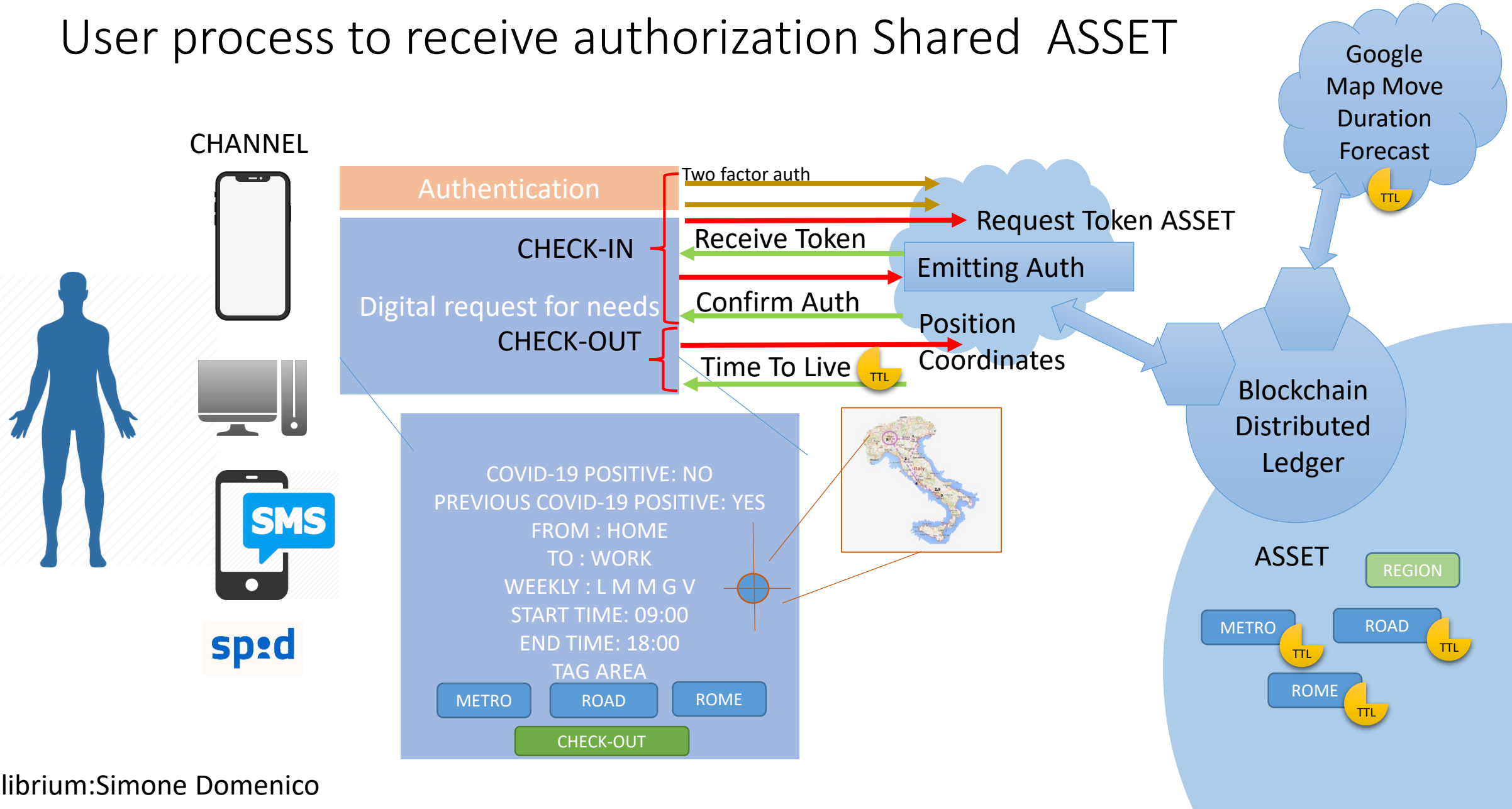
A Markov chain is an absorbing chain if:

1) There is at least one absorbing state.

2) It is possible to go from each non-absorbing state to at least one absorbing state in a finite number of steps.


Absorbing Markov State 1
Equlibrium
Cluster B
Cluster A
Cluster C
Pr
Pr
Pr
Pr
Absorbing Markov State 0

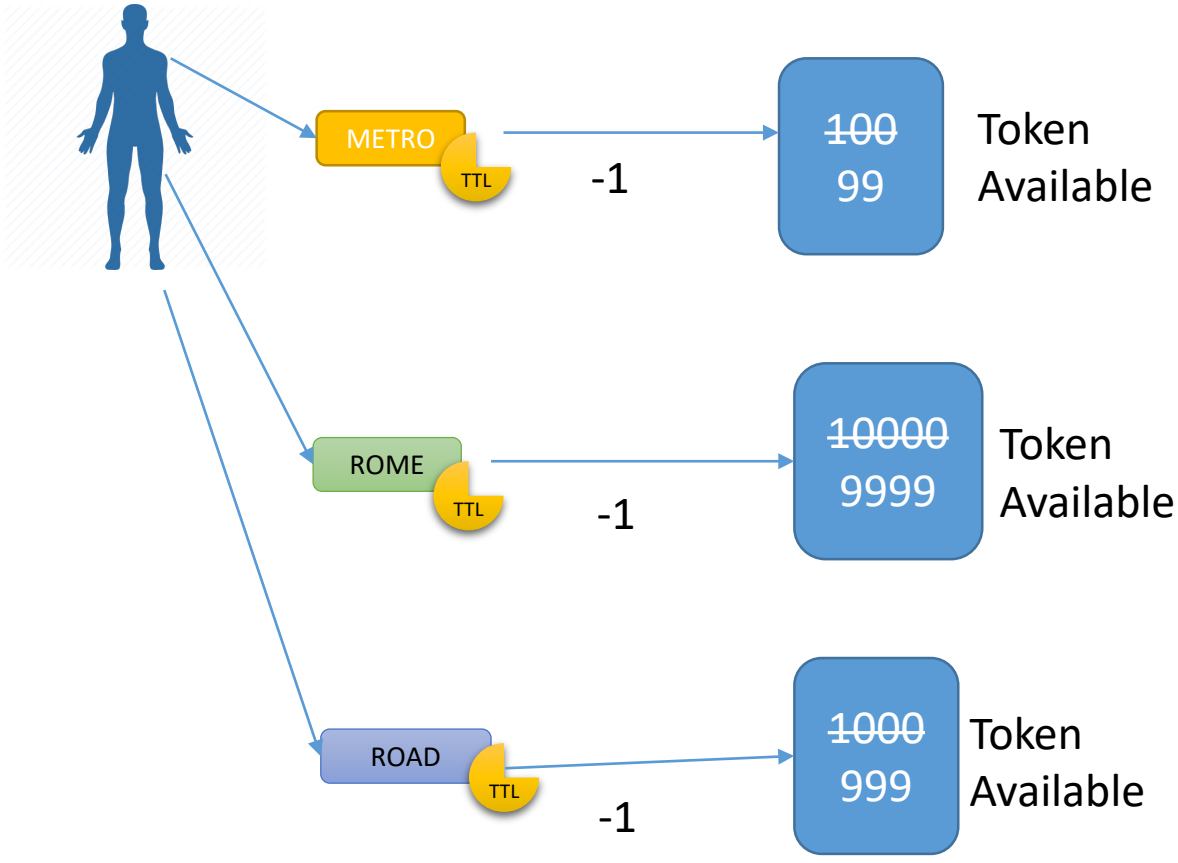
User process to receive authorization Shared ASSET



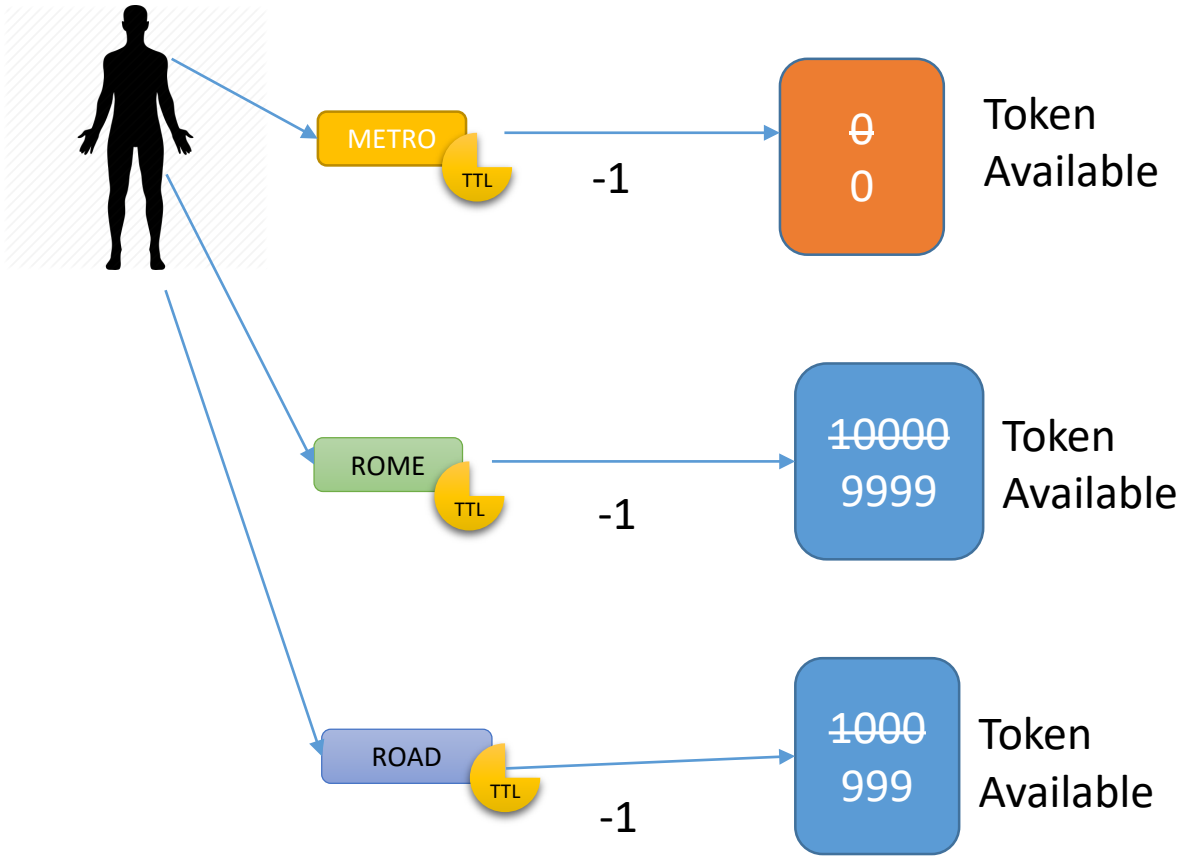
Equilibrium:Simone Domenico

Process To reduce or increase population for release authorization and generated exception of people in quarantine.

First User Request the token to go to work

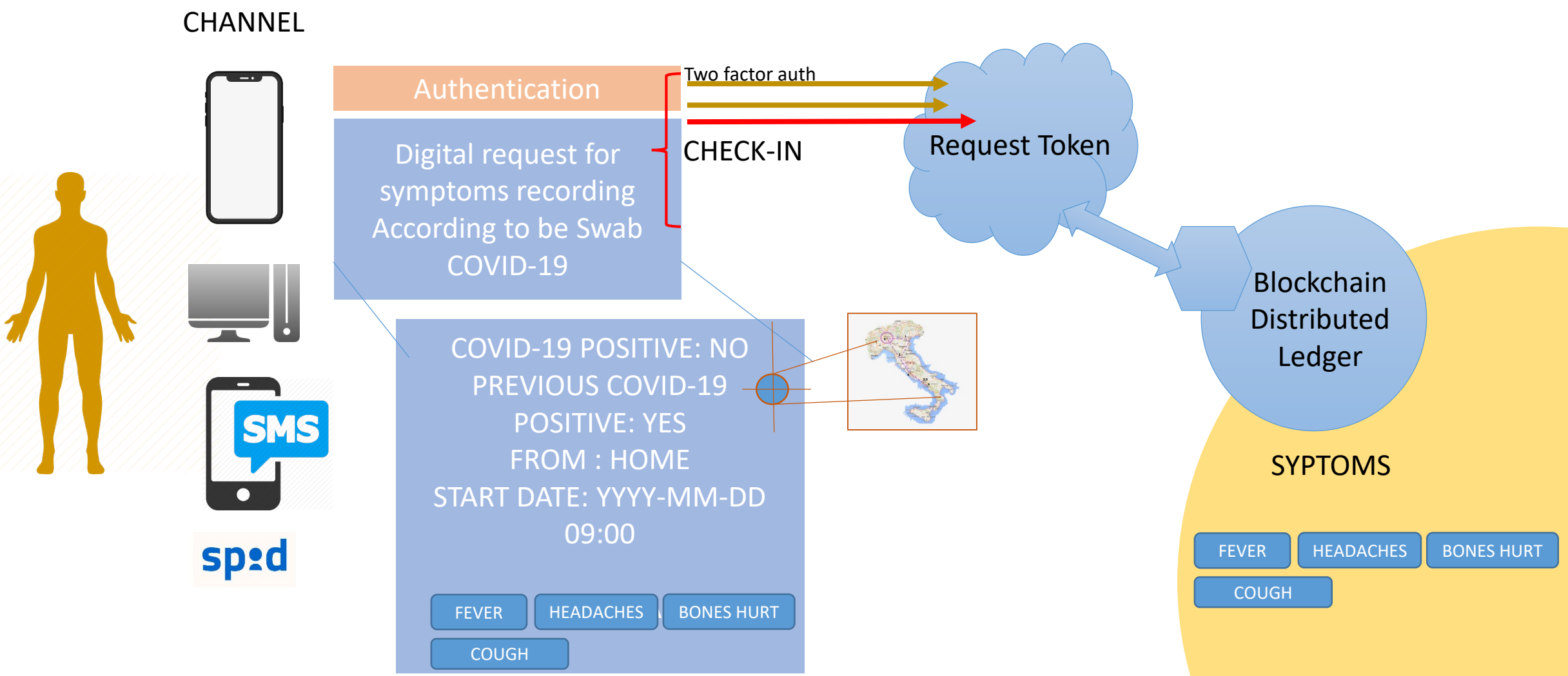


N User Request the token to go to work



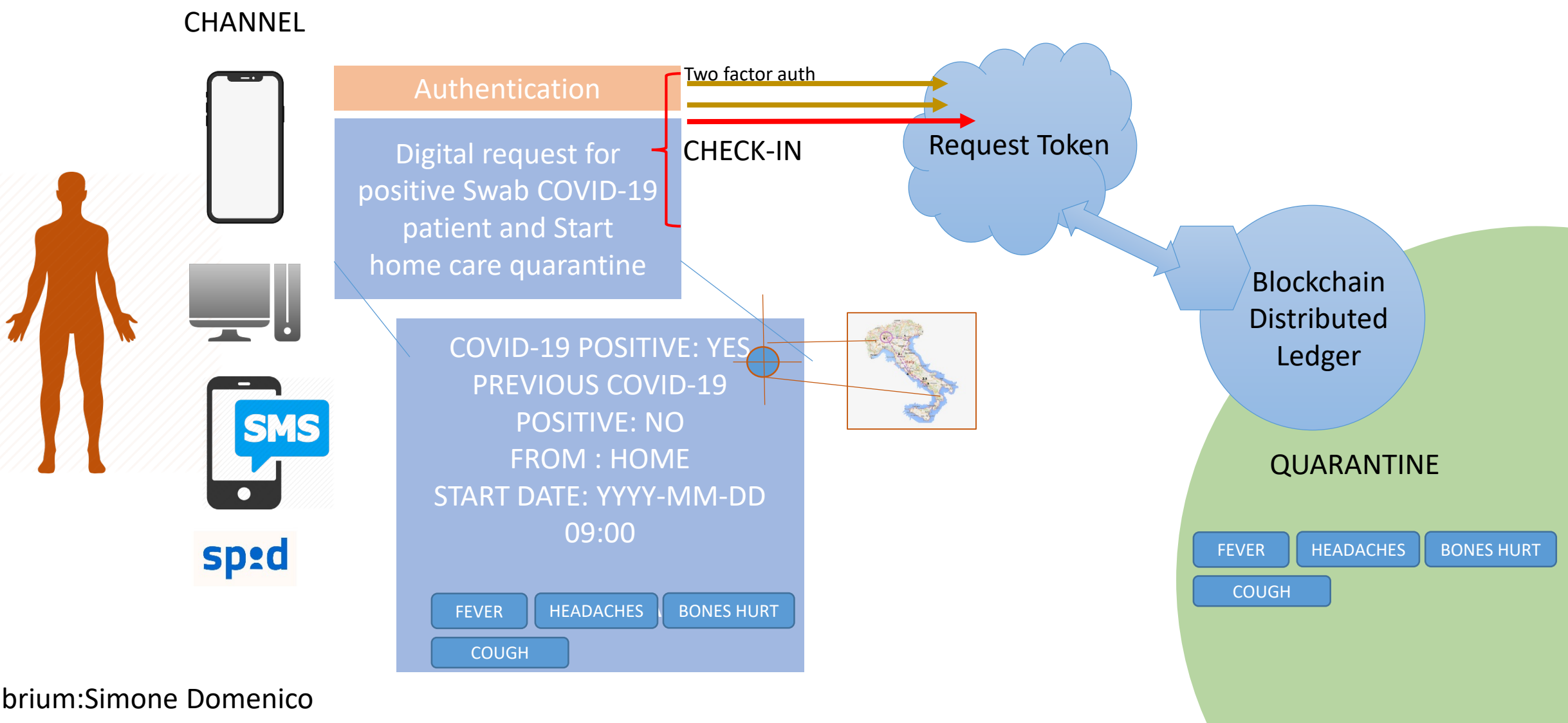
TTL Time To Live of Token lock

User process to recording symptoms to be Swab



Equilibrium:Simone Domenico

User process to recording Start of Quarantine home care



Equilibrium:Simone Domenico