

# EFFICIENT UNFOLDING OF COLOURED PETRI NETS WITH INTERVAL DECISION DIAGRAMS

SCHWARICK - ROHR - LIU - ASSAF - CHODAK - HEINER

BRANDENBURG TECHNICAL UNIVERSITY COTTBUS-SENFTEMBERG  
COMPUTER SCIENCE INSTITUTE

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# EFFICIENT UNFOLDING OF COLOURED PETRI NETS WITH INTERVAL DECISION DIAGRAMS

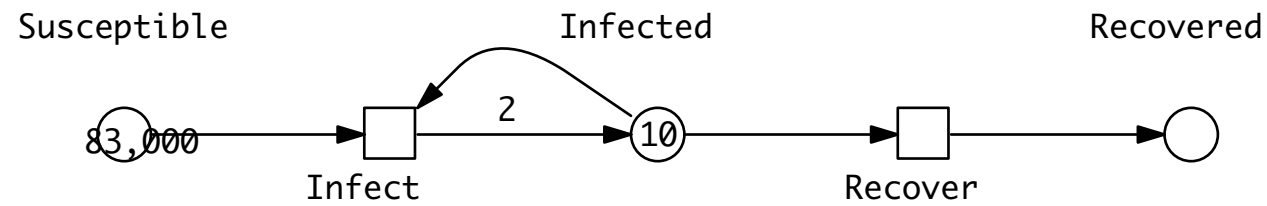
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COMPUTER SCIENCE INSTITUTE

# COLOURED PETRI NETS

**WHAT FOR ?**

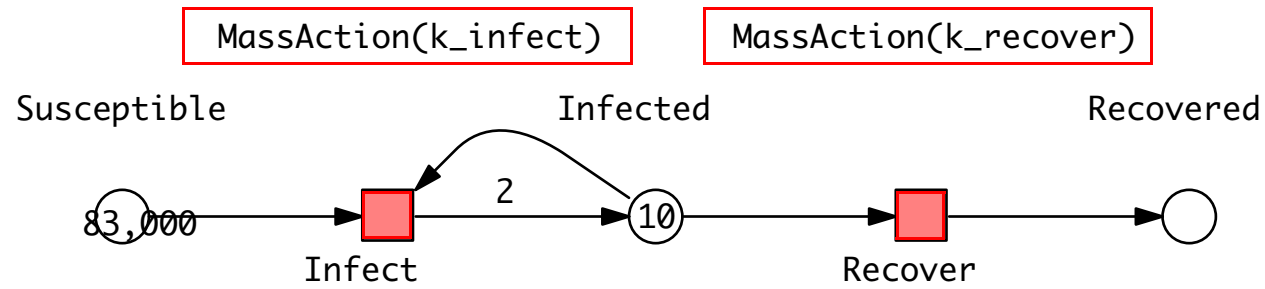
## THE SIR MODEL

[ [https://en.wikipedia.org/wiki/Compartmental\\_models\\_in\\_epidemiology#The\\_SIR\\_model](https://en.wikipedia.org/wiki/Compartmental_models_in_epidemiology#The_SIR_model) ]



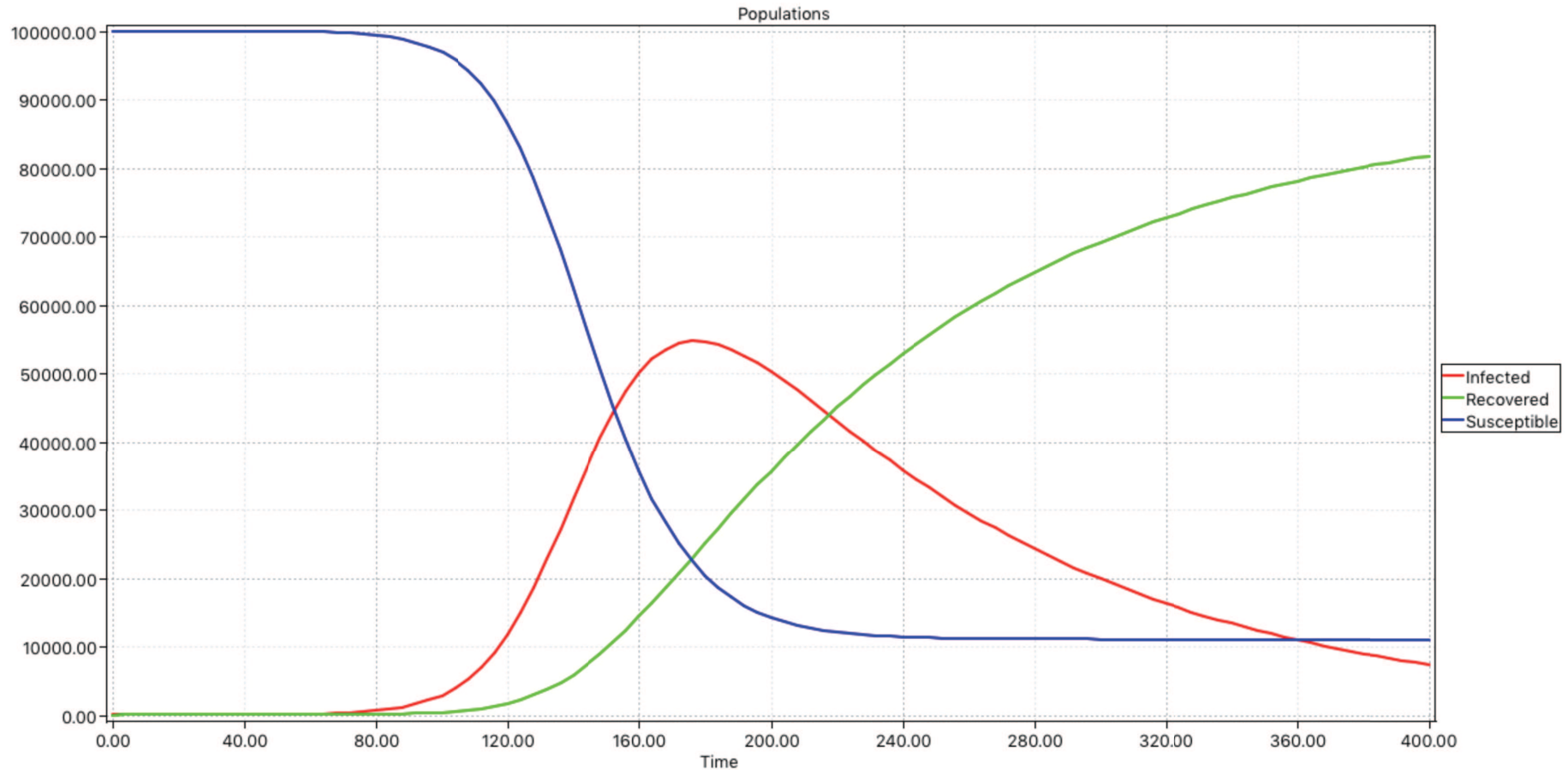
## THE SIR MODEL

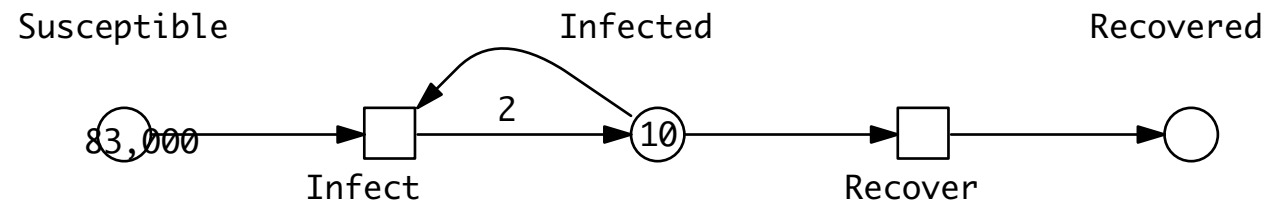
[ [https://en.wikipedia.org/wiki/Compartmental\\_models\\_in\\_epidemiology#The\\_SIR\\_model](https://en.wikipedia.org/wiki/Compartmental_models_in_epidemiology#The_SIR_model) ]



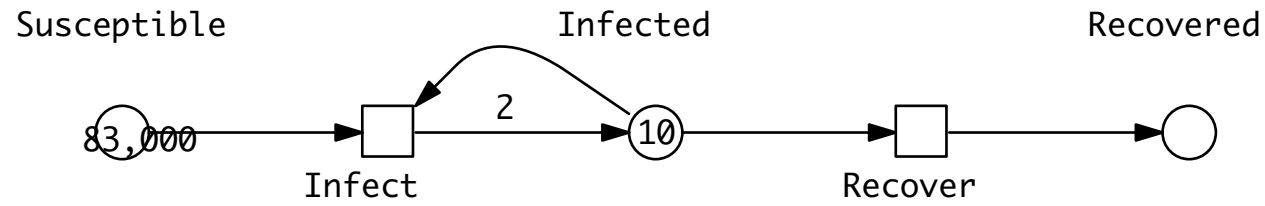
## THE SIR MODEL

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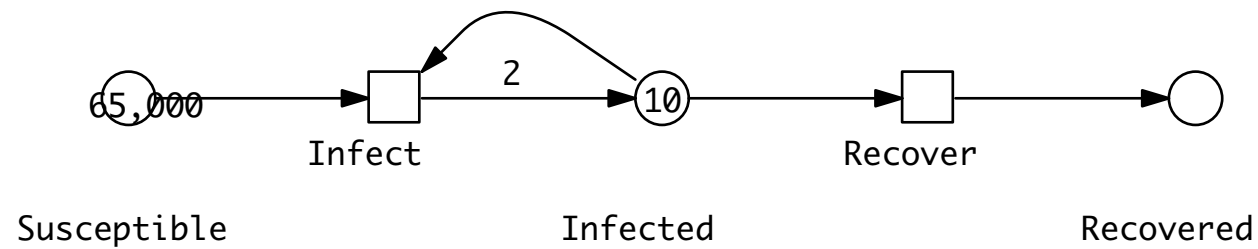
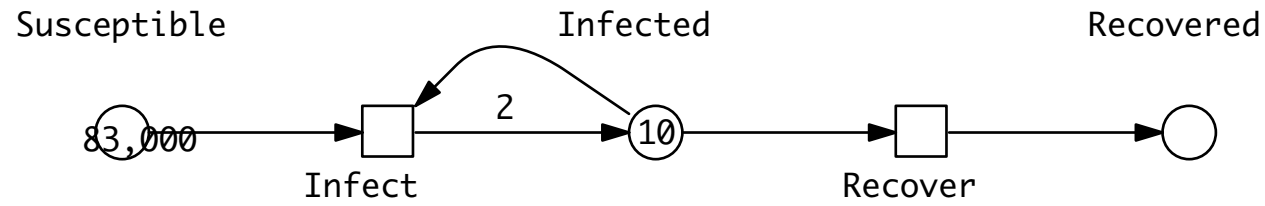


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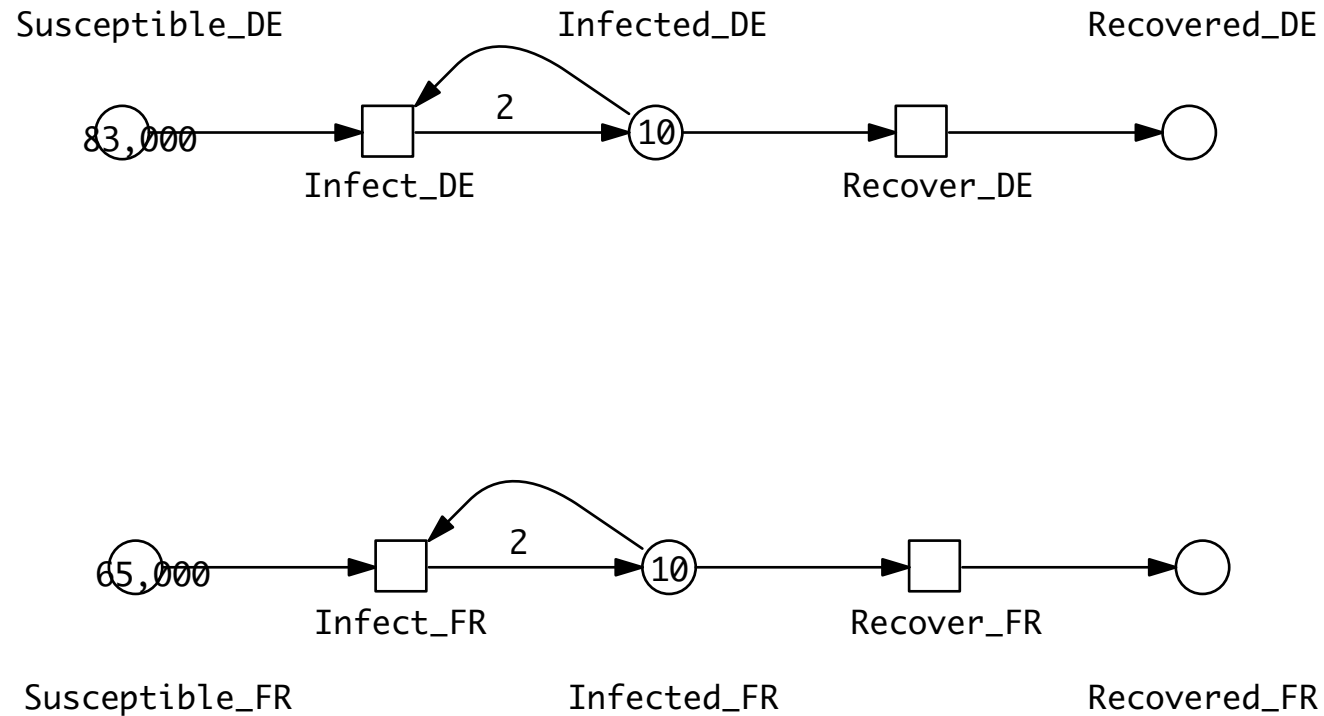


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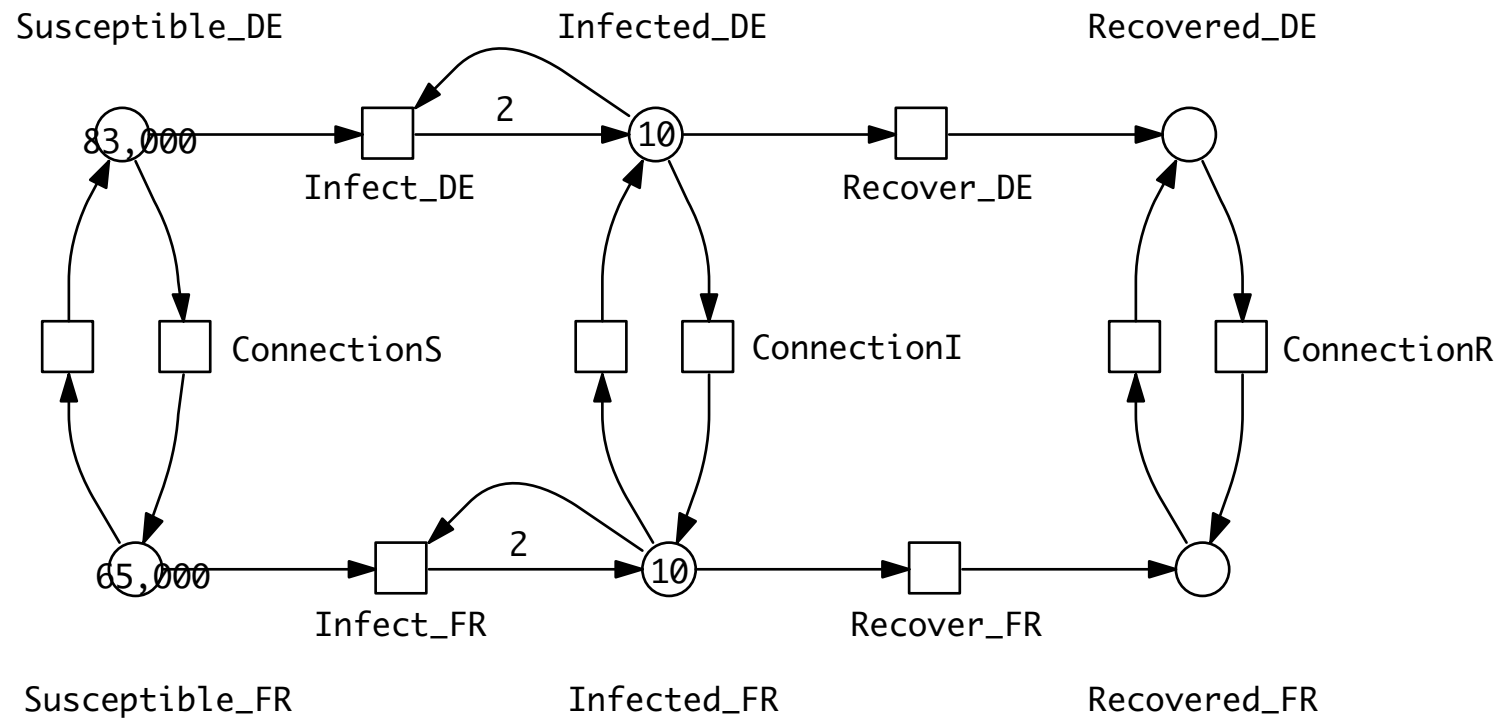




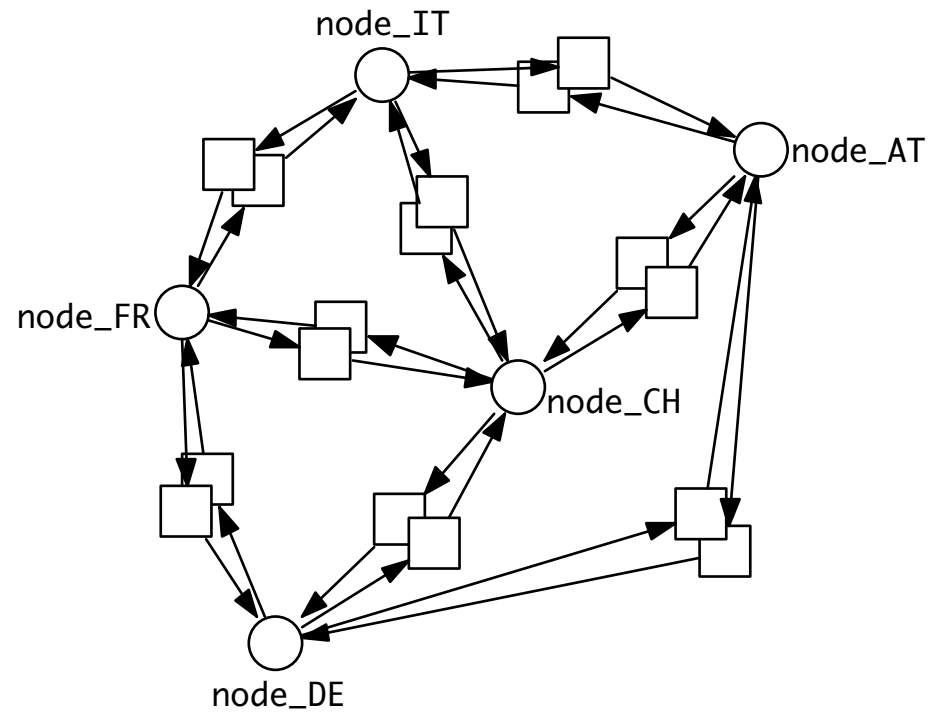
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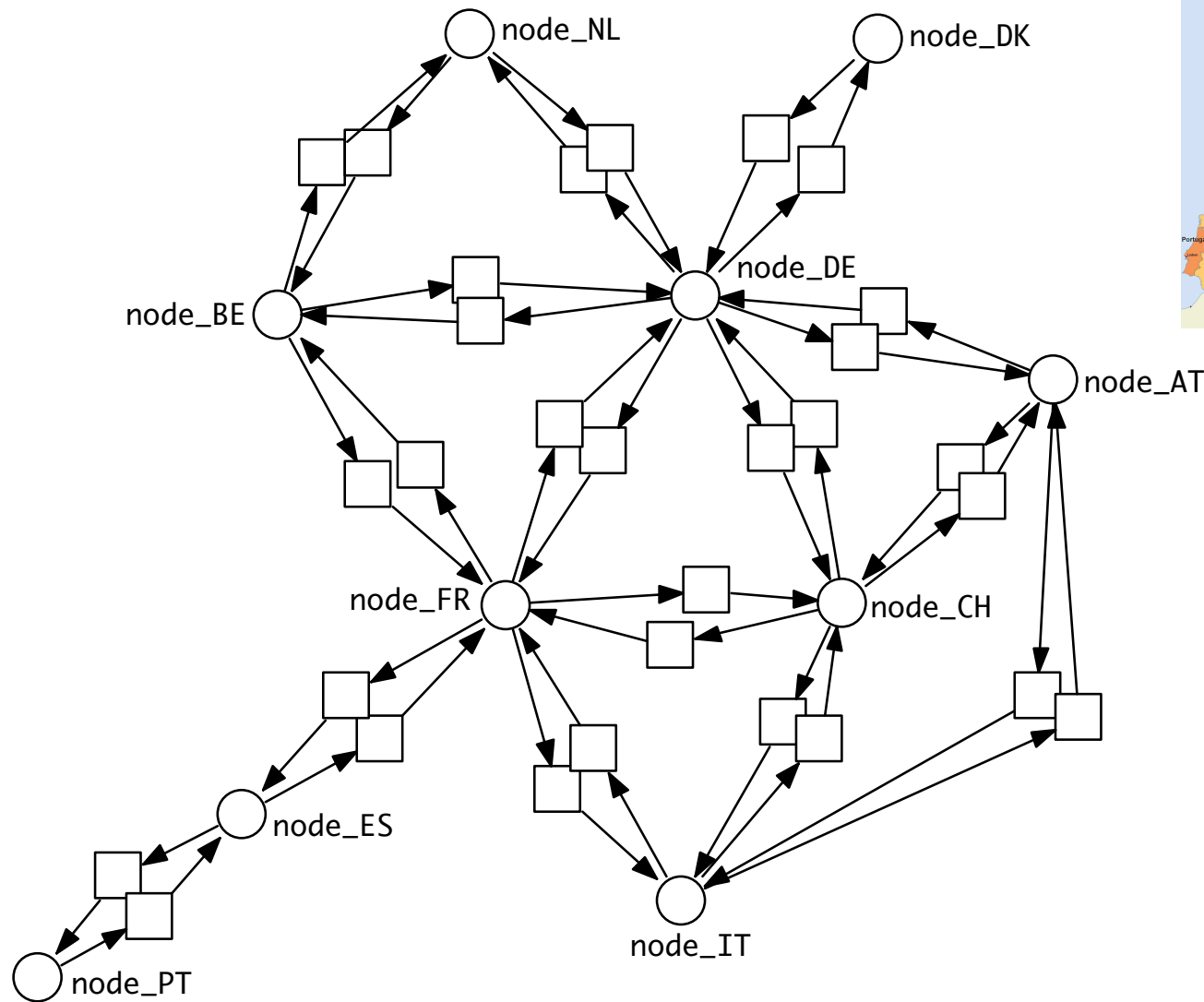


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**AT,  
CH,  
DE,  
FR,  
IT**

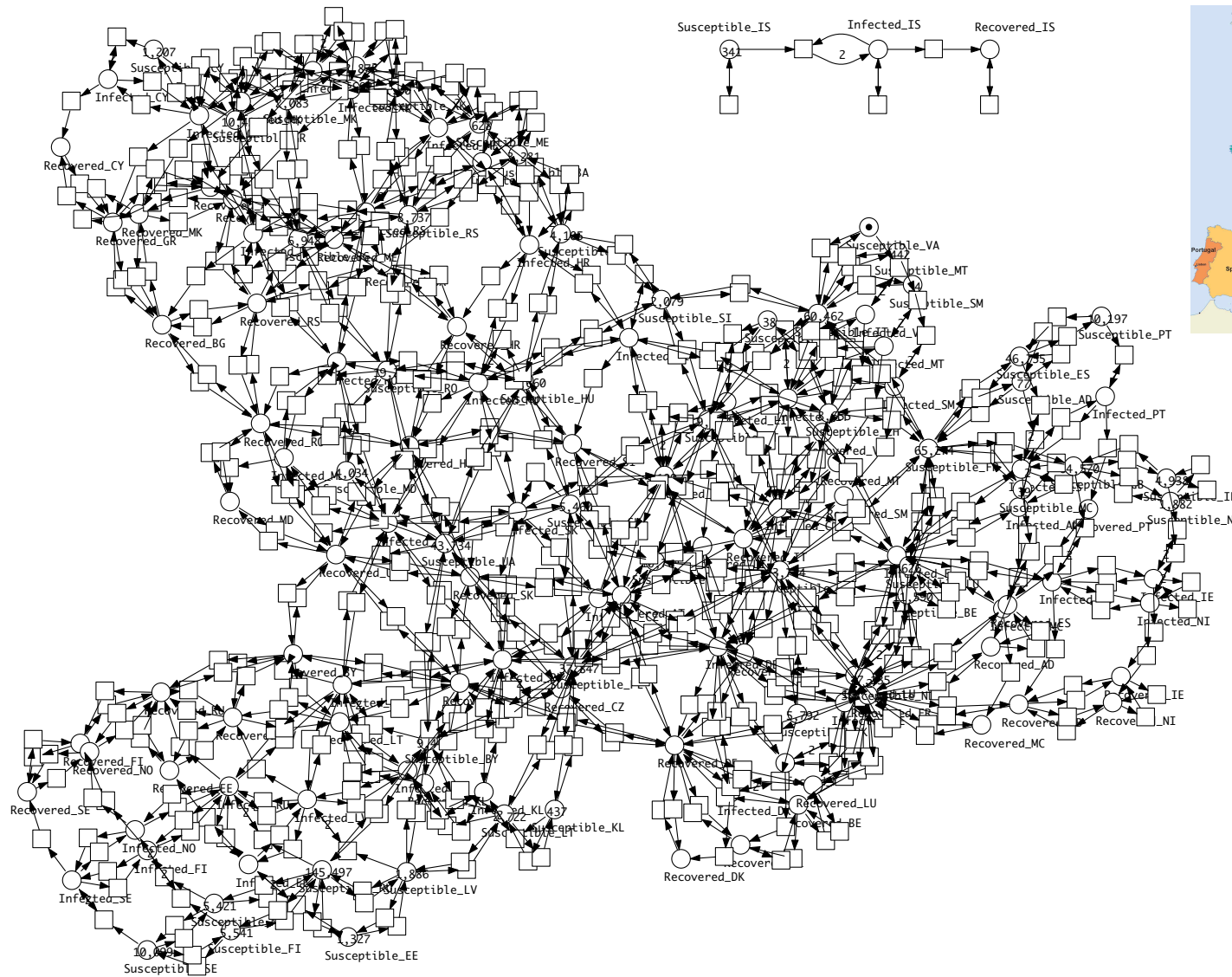
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**WESTERN  
EUROPE**

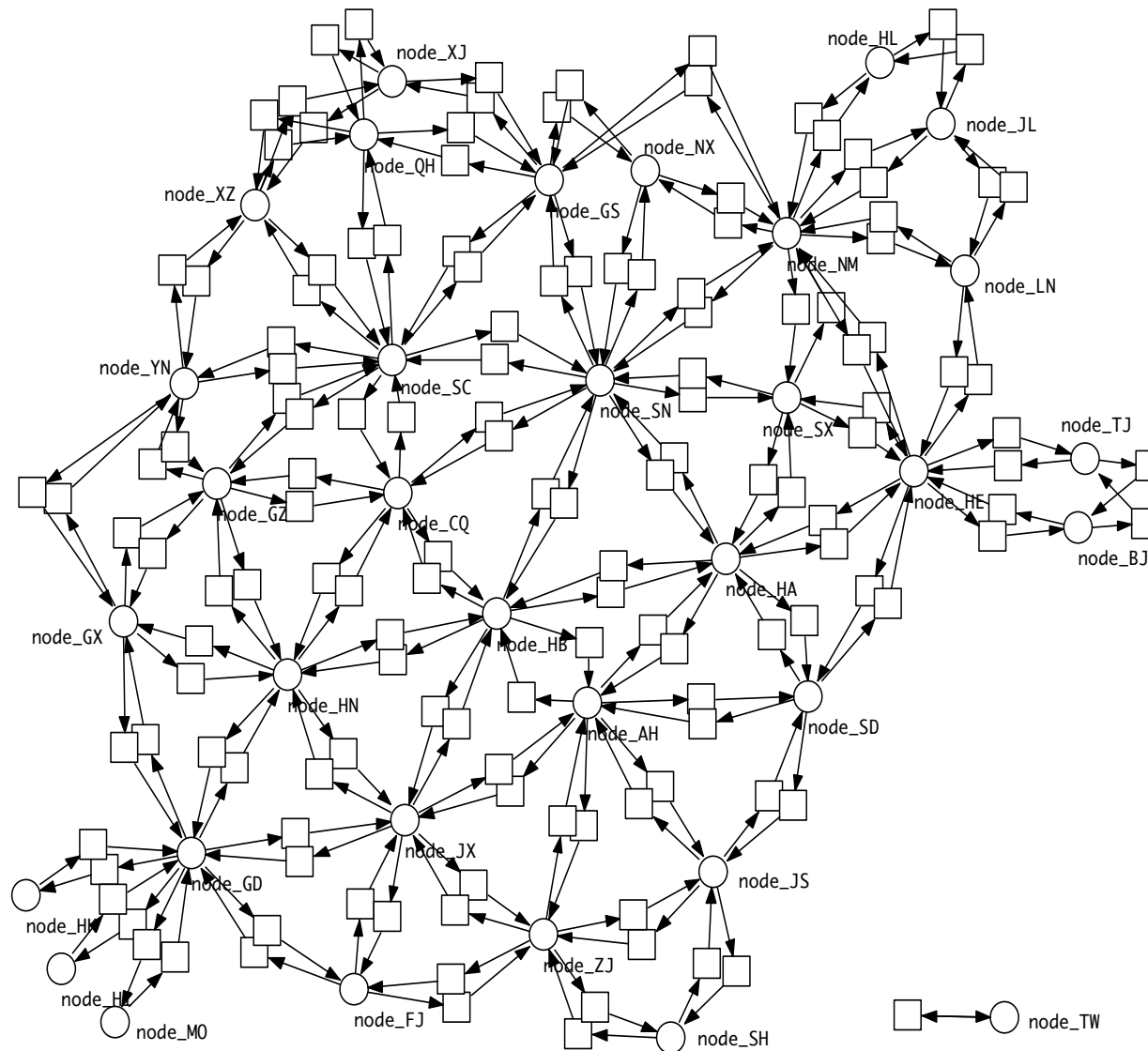
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# EPIDEMIC -> PANDEMIC MODELLING



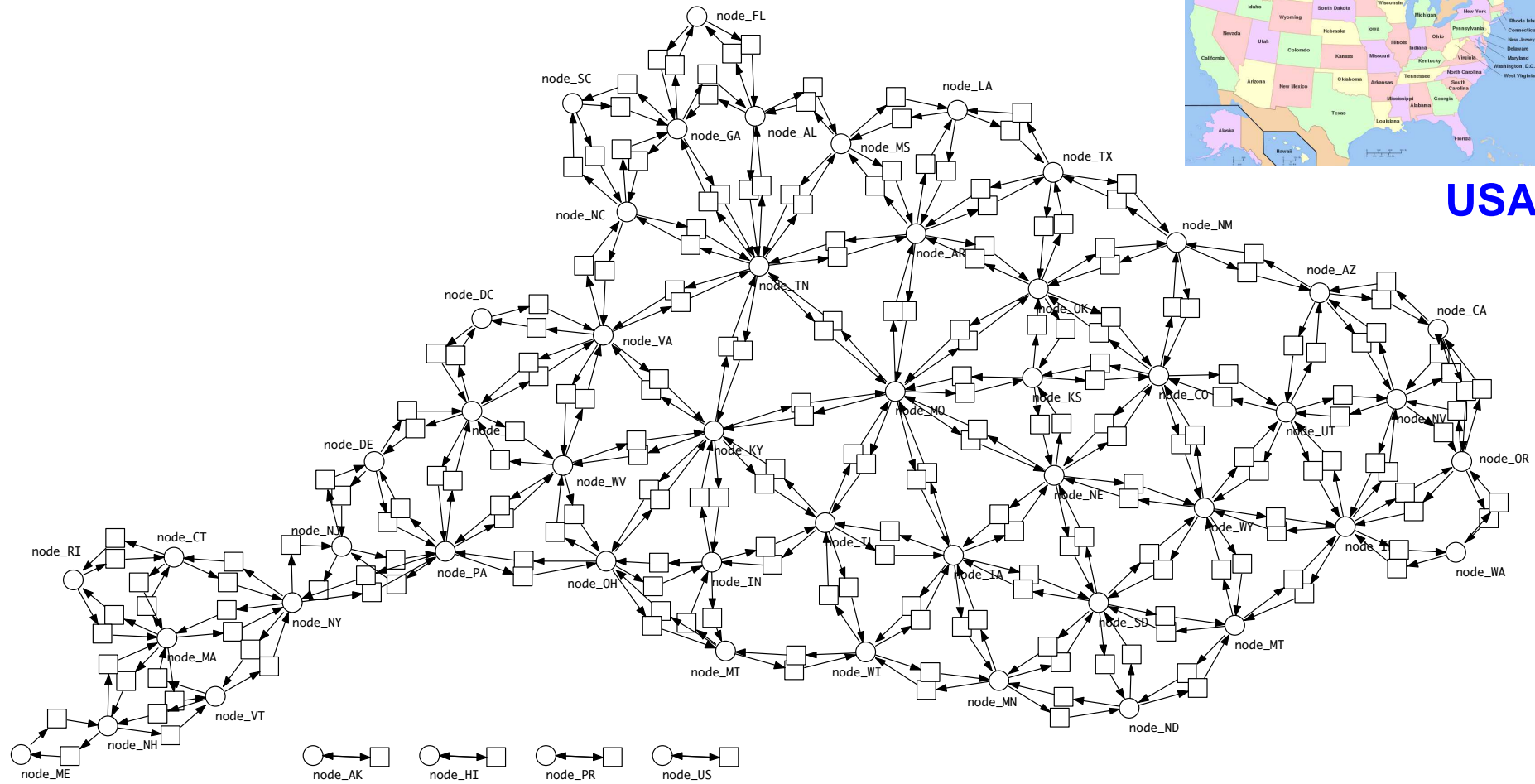
EUROPE

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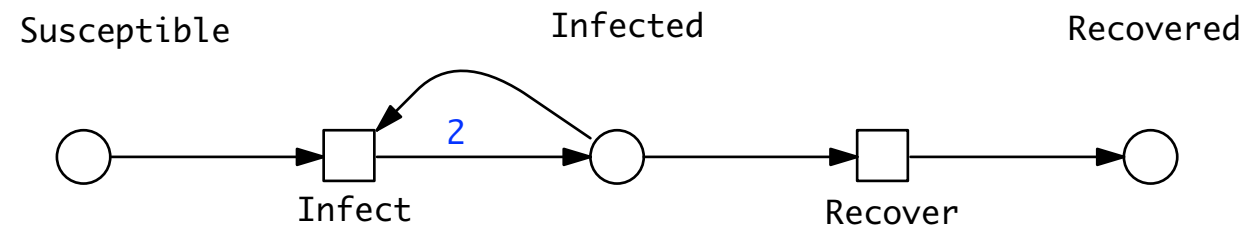
# EPIDEMIC -> PANDEMIC MODELLING



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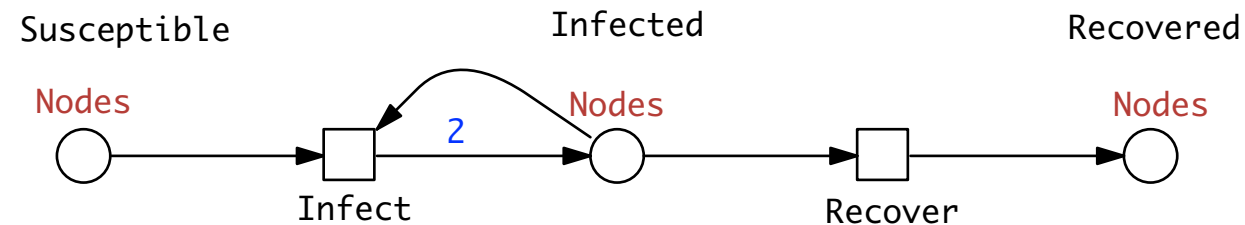
AND THEN THERE WAS COLOUR



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**colorsets:**

```
enum Nodes = {AT, CH, DE, FR, IT};
```



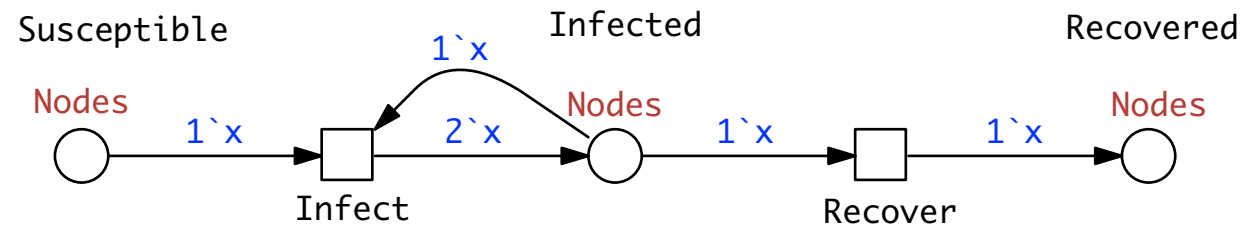
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## colorsets:

```
enum Nodes = {AT, CH, DE, FR, IT};
```

## variables:

```
Nodes : x;
```



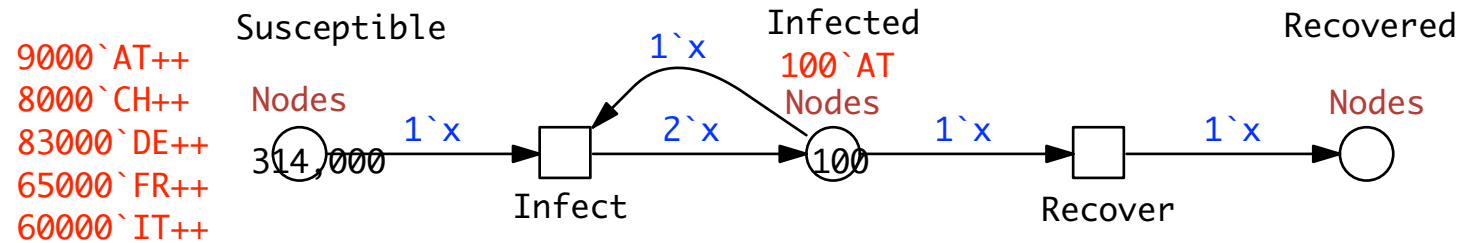
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## colorsets:

```
enum Nodes = {AT, CH, DE, FR, IT};
```

## variables:

```
Nodes : x;
```



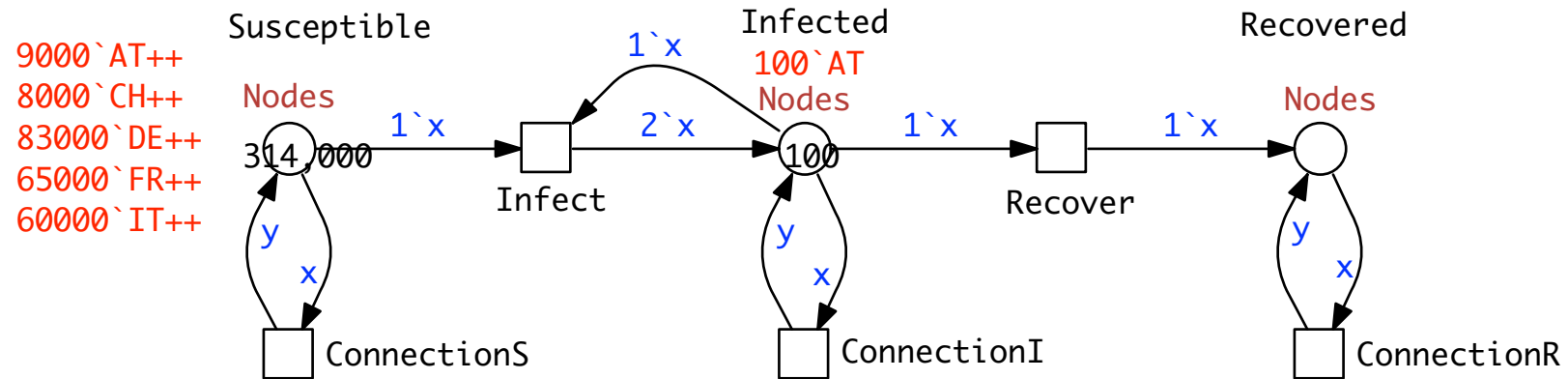
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## colorsets:

```
enum Nodes = {AT, CH, DE, FR, IT};
```

## variables:

```
Nodes : x; Nodes : y;
```



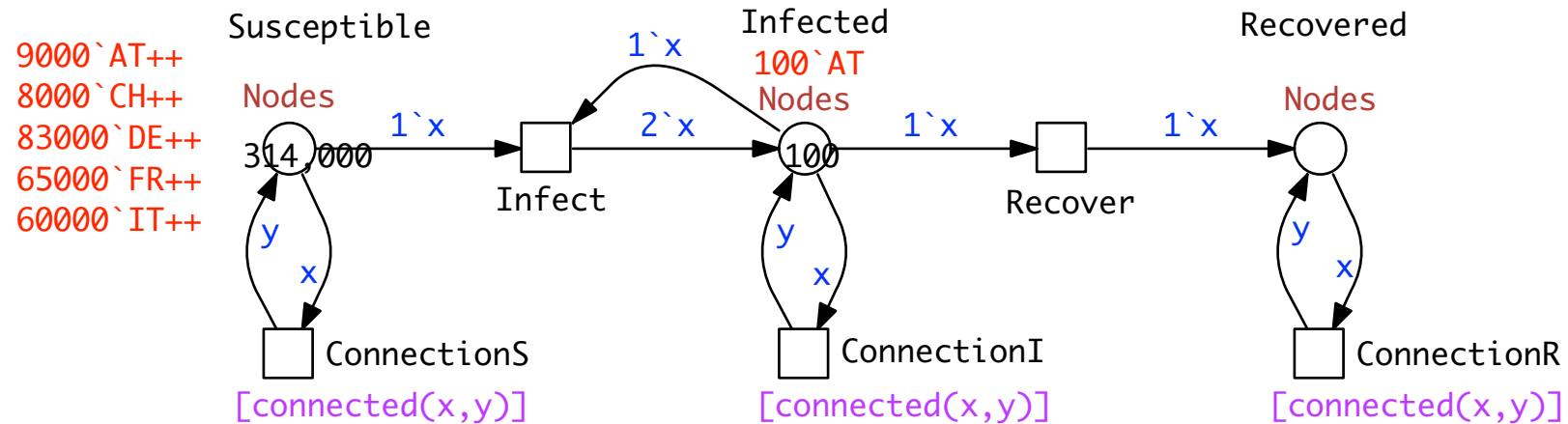
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## colorsets:

enum Nodes = {AT, CH, DE, FR, IT};

## variables:

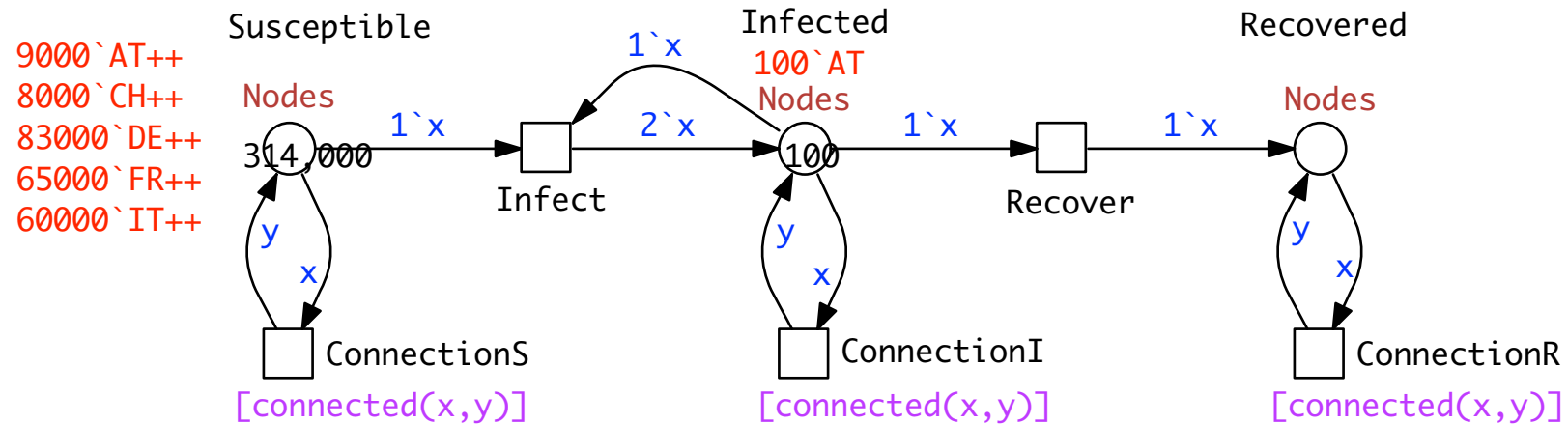
Nodes : x; Nodes : y;



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## colorsets:

```
enum Nodes = {AT, CH, DE, FR, IT};
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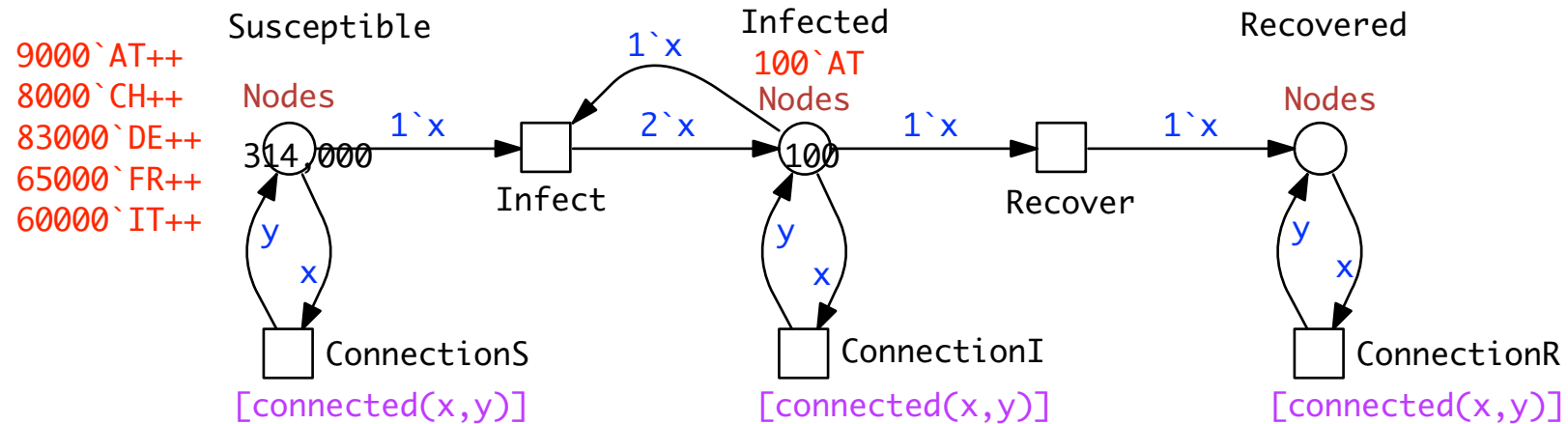


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## colorsets:

```
enum Nodes = {AT, CH, DE, FR, IT};  
Matrix = PROD (Nodes, Nodes);
```



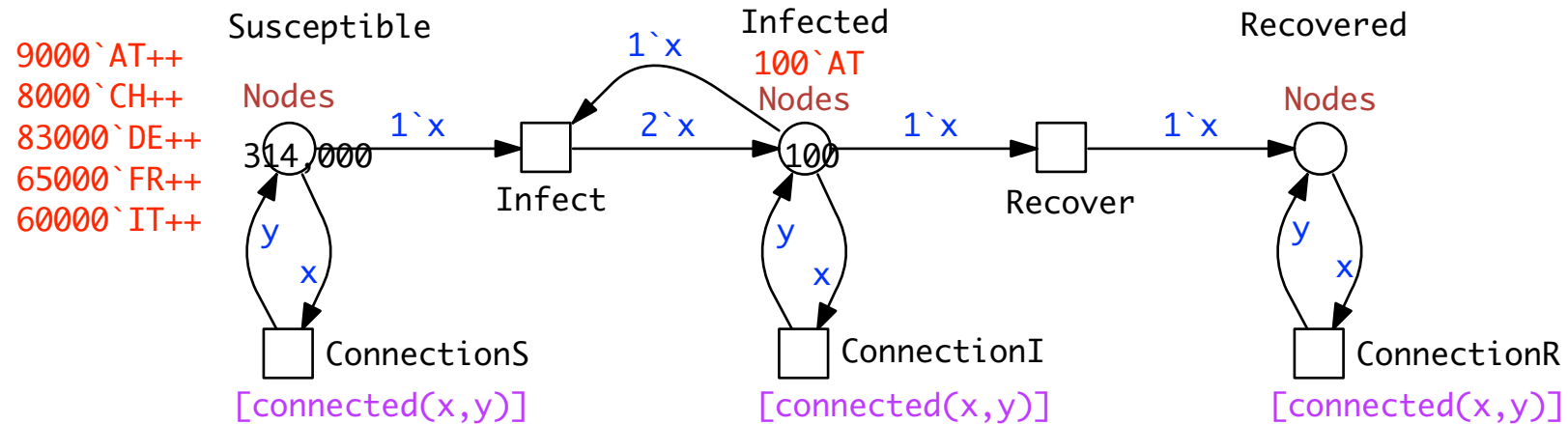
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## colorsets:

```
enum Nodes = {AT, CH, DE, FR, IT};
```

```
Matrix = PROD (Nodes, Nodes);
```

```
Connections = Matrix [ (x=AT & (y=CH | y=DE | y=IT) |  
                        (x=CH & (y=AT | =E | y=FR | y=IT) | ... );
```



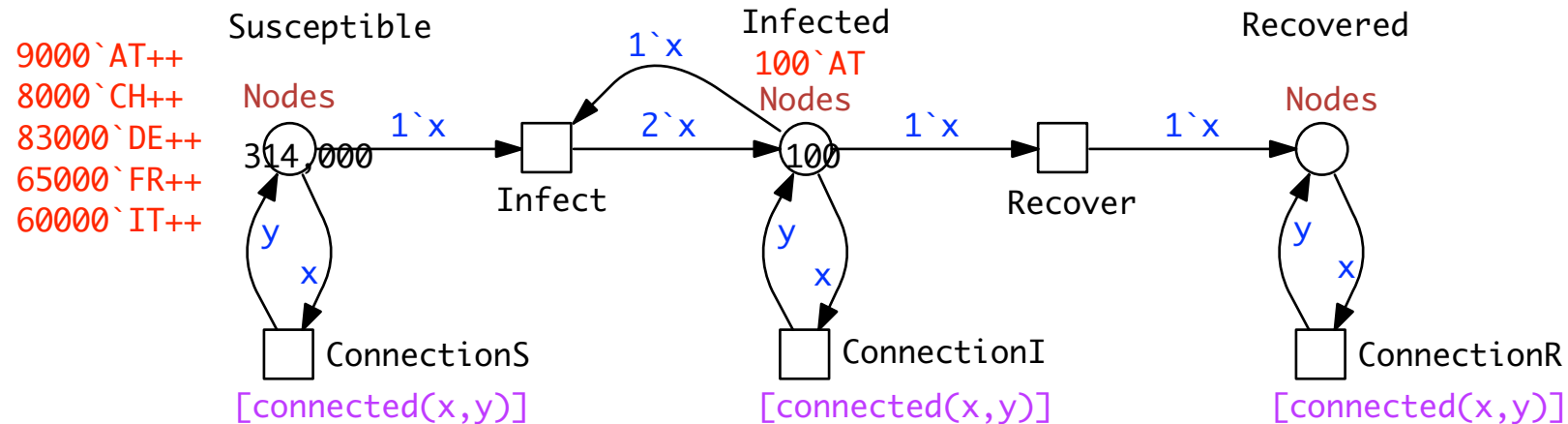
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## colorsets:

```
enum Nodes = {AT, CH, DE, FR, IT};
```

```
Matrix = PROD (Nodes, Nodes);
```

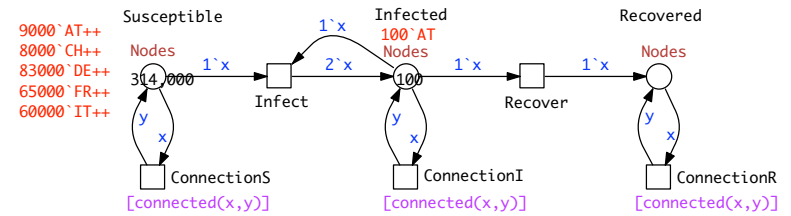
```
Connections = Matrix [ (x=AT & (y=CH | y=DE | y=IT) |  
                        (x=CH & (y=AT | =E | y=FR | y=IT) | ... );
```



## colorfunction:

```
bool connected (Nodes p, Nodes q) { (p,q) elemOf Connections };
```

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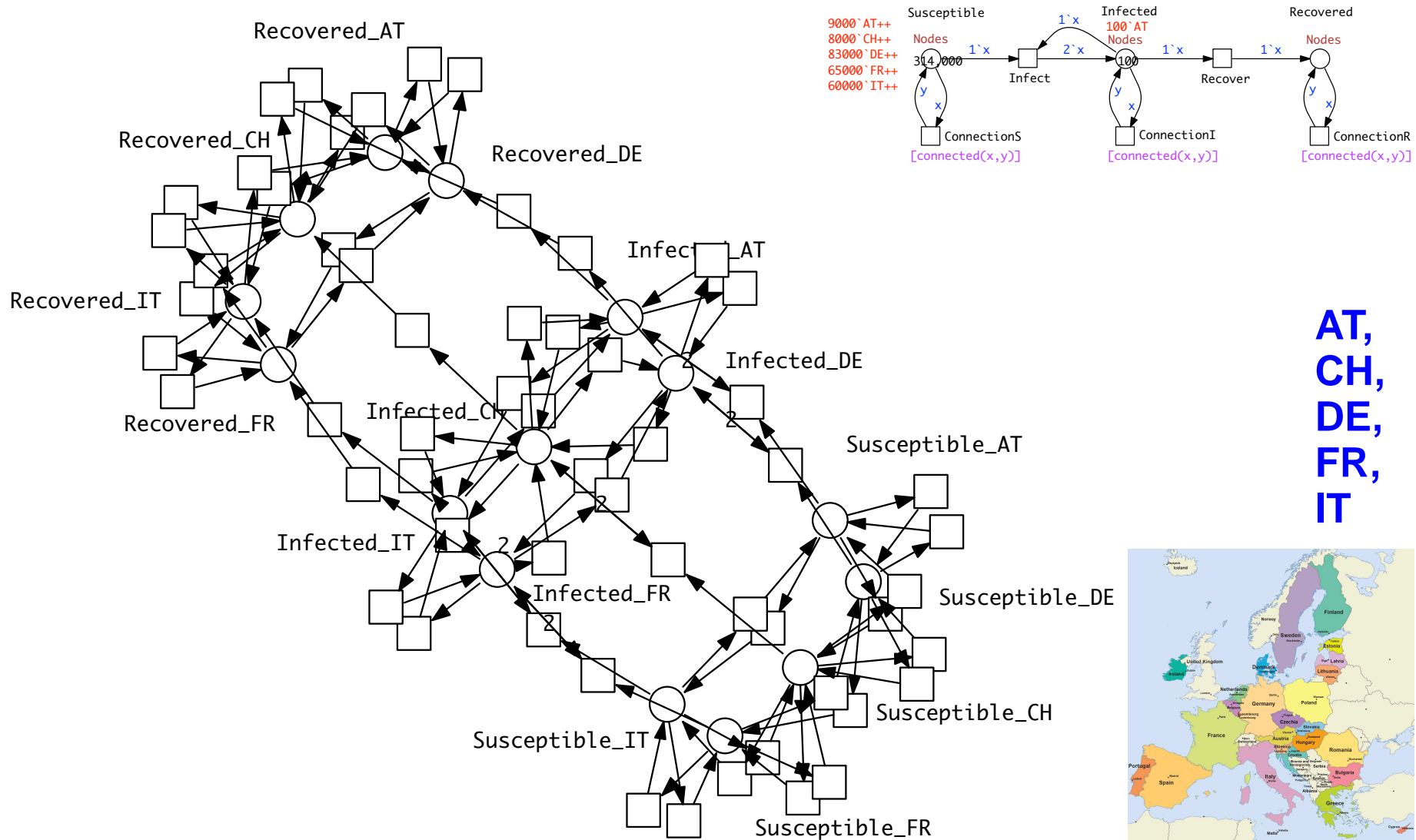


AT,  
CH,  
DE,  
FR,  
IT

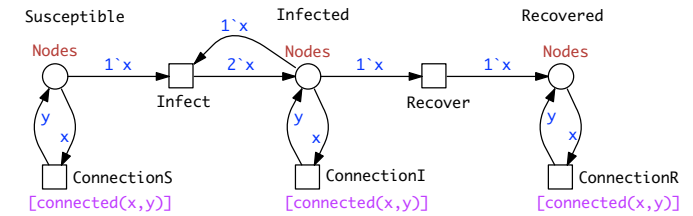
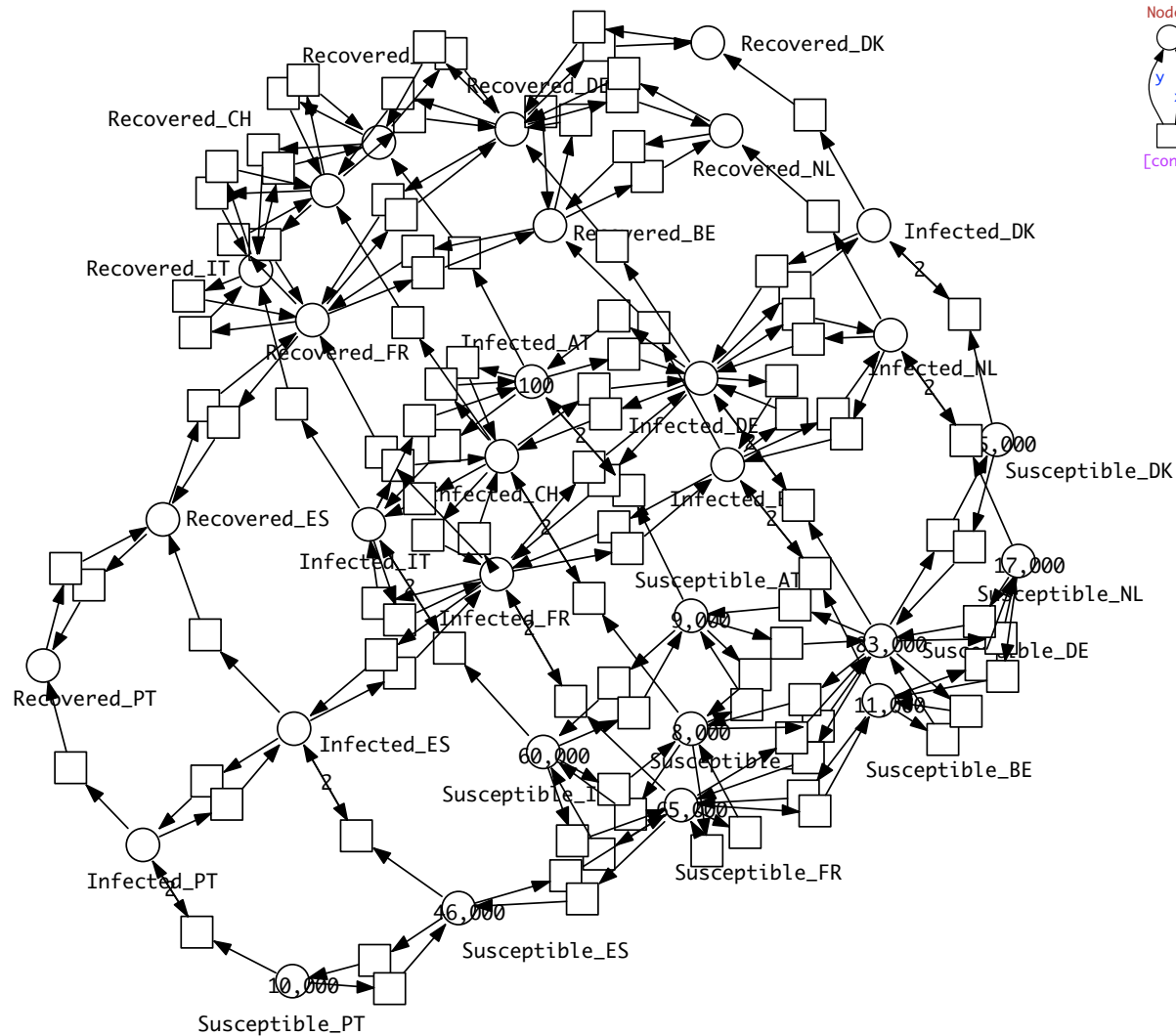


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# PANDEMIC MODELLING WITH COLOURED NETS



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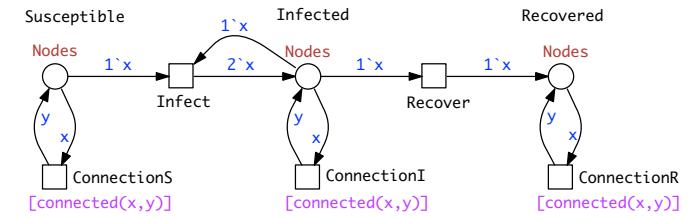
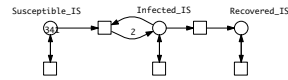
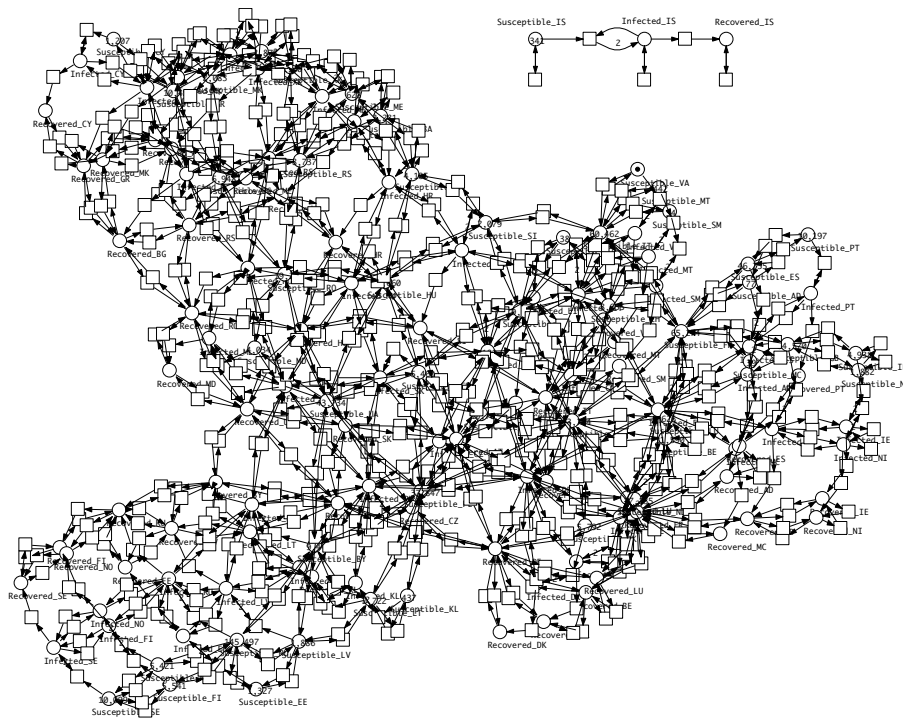


**WESTERN  
EUROPE**



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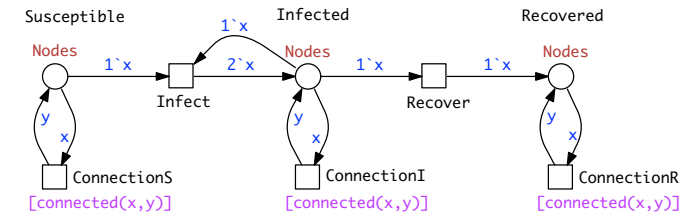
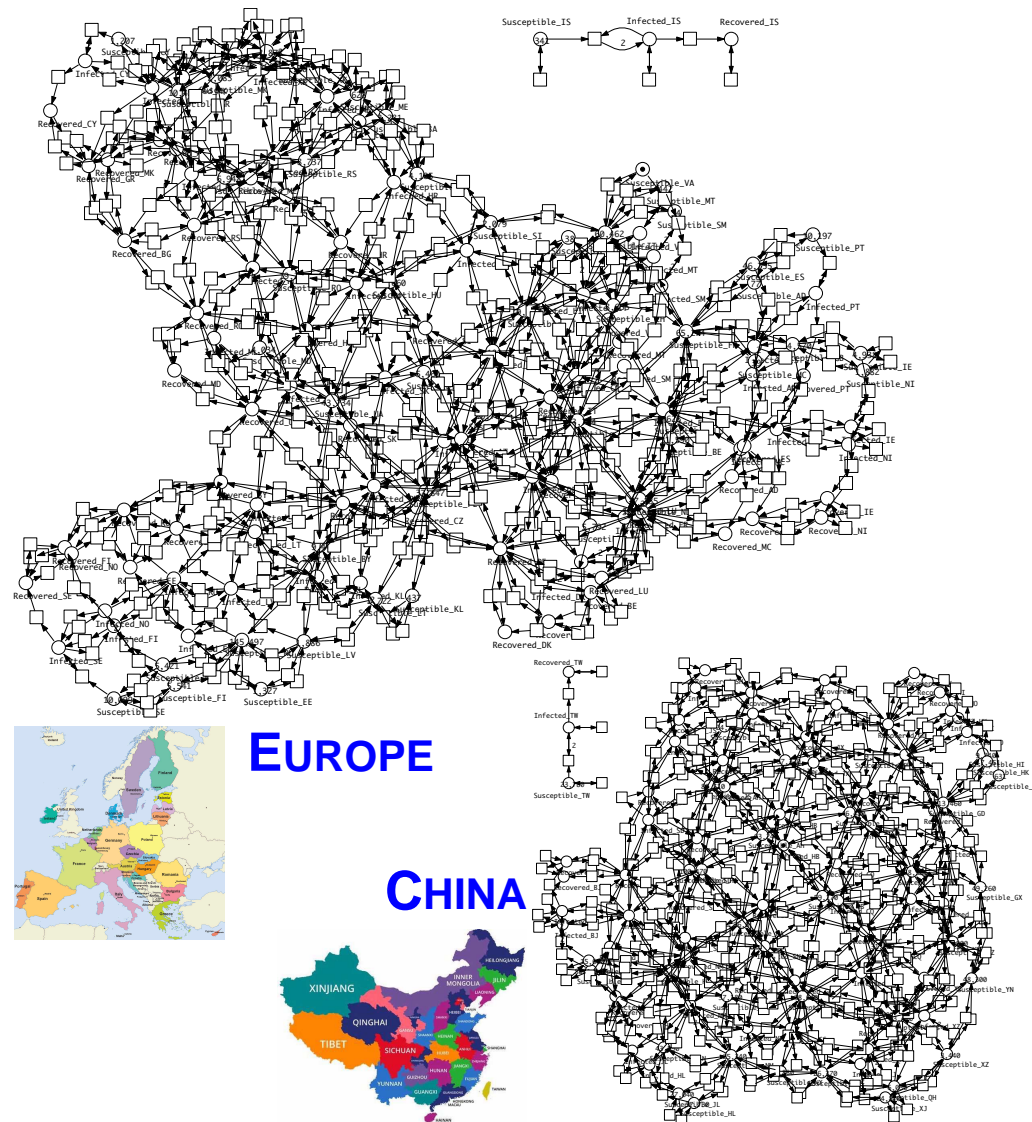
# PANDEMIC MODELLING WITH COLOURED NETS



**EUROPE**

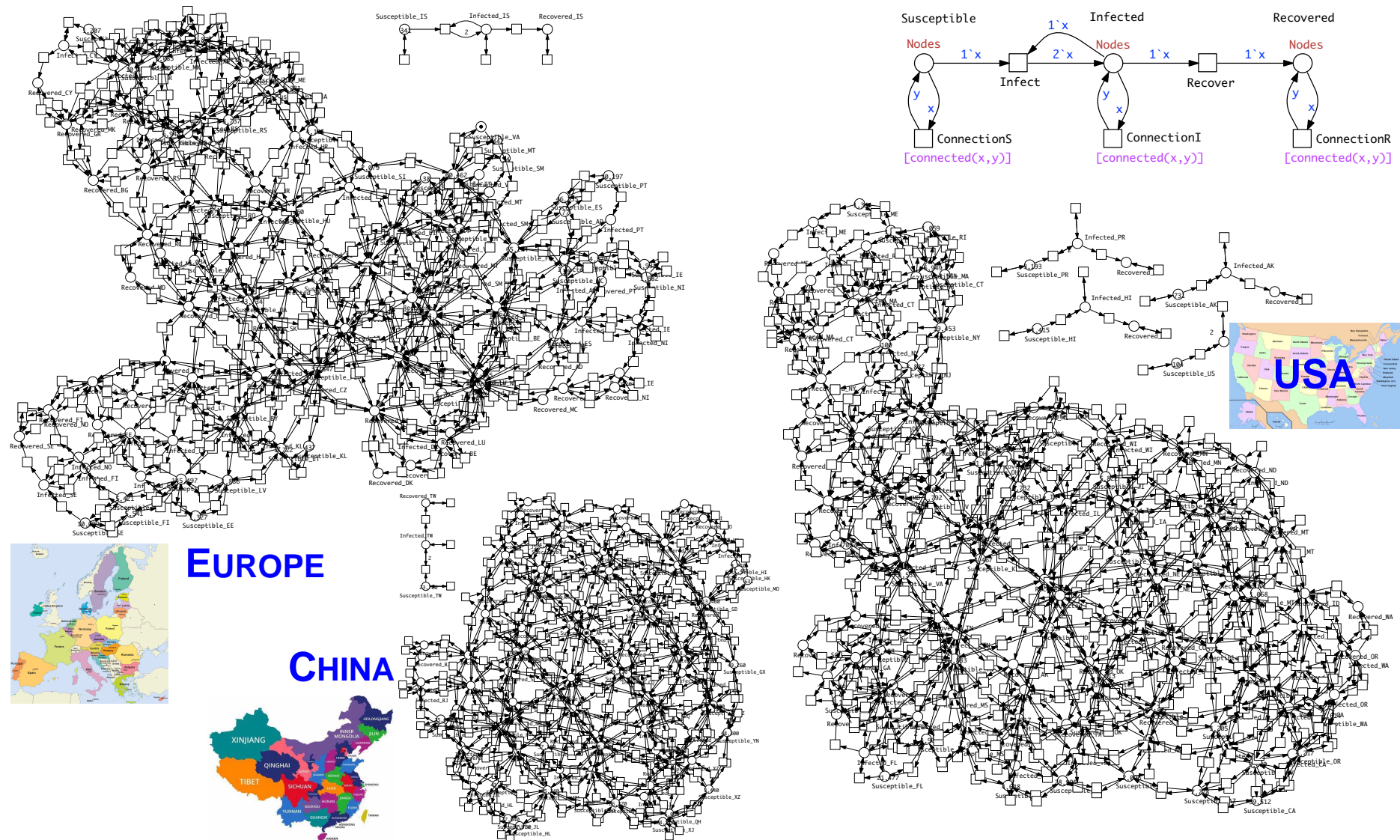
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# PANDEMIC MODELLING WITH COLOURED NETS



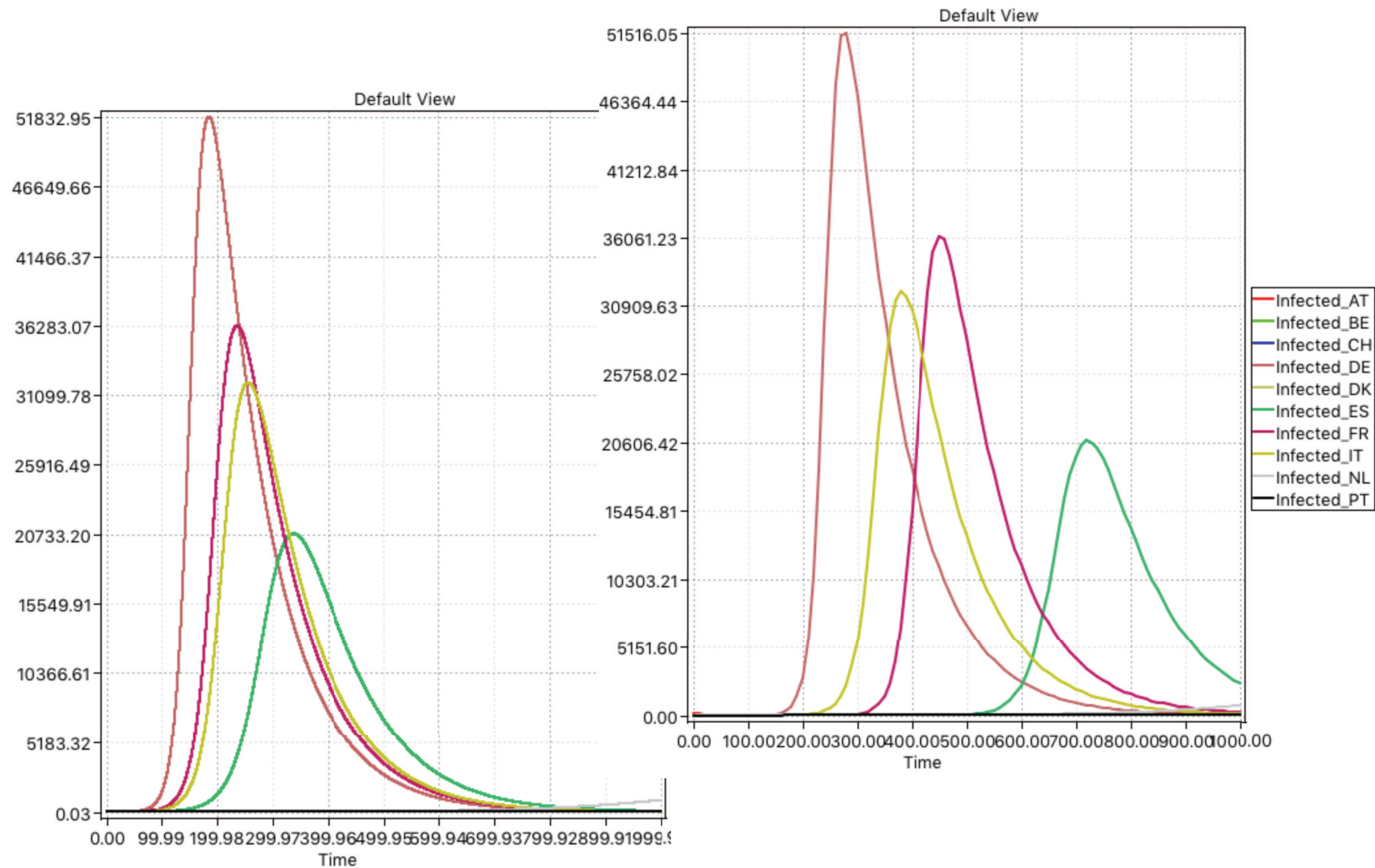
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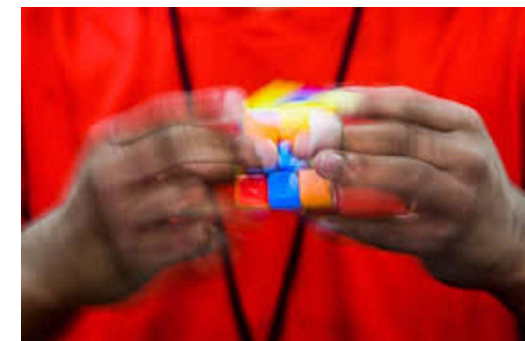
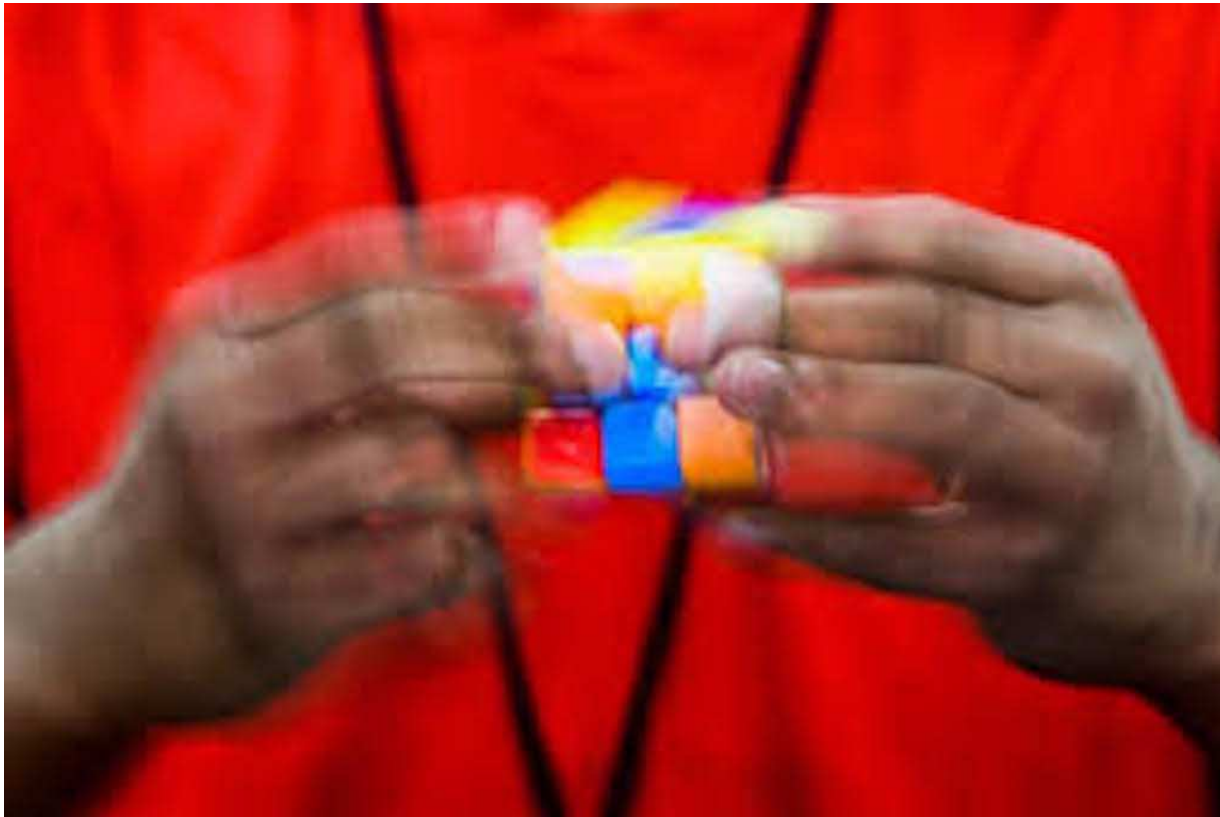
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# WHAT NEEDS TO BE CHANGED: COLOUR SETS + INITIAL MARKING



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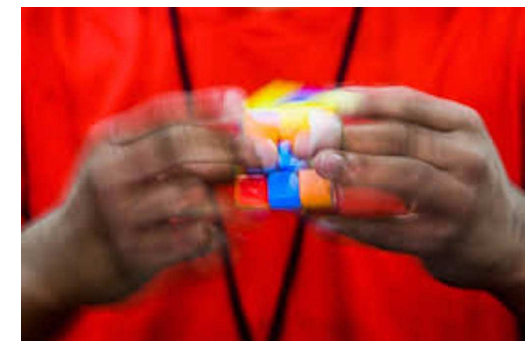
# HOW TO UNFOLD EFFICIENTLY ?



## HOW TO UNFOLD EFFICIENTLY ?



**SNOOPY  
MARCIE  
SPIKE**



**HOW TO UNFOLD EFFICIENTLY ?**

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