

VILNIAUS UNIVERSITETAS  
MATEMATIKOS IR INFORMATIKOS FAKULTETAS

## **Requirements modeling**

### **Reikalavimų modeliavimas**

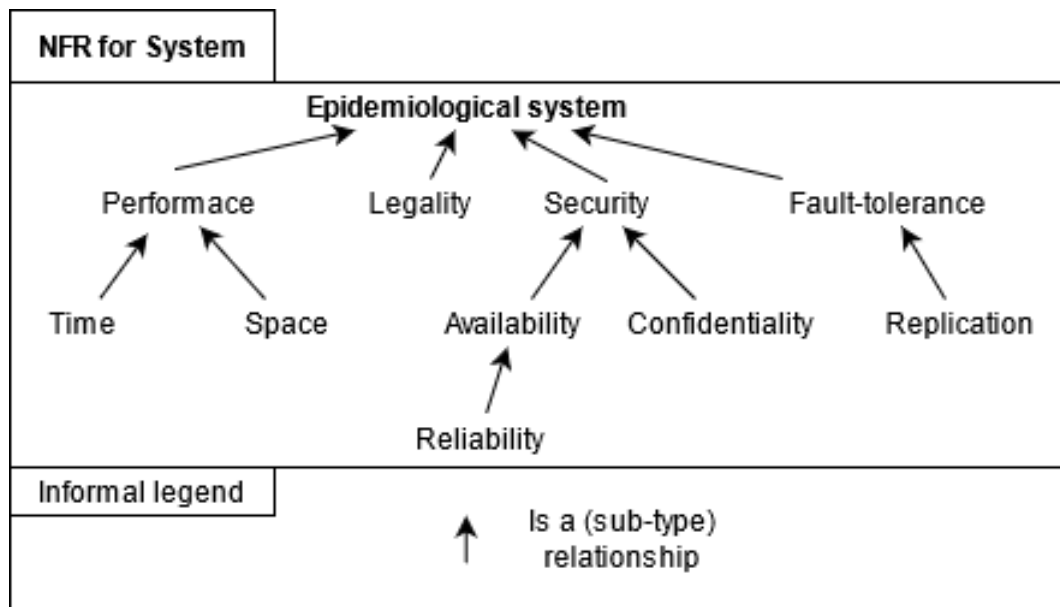
Programų sistemų inžinerijos modeliai ir metodai laboratorinis darbas 2

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# 1. NFR type catalogue



pic 1. NFR diagram

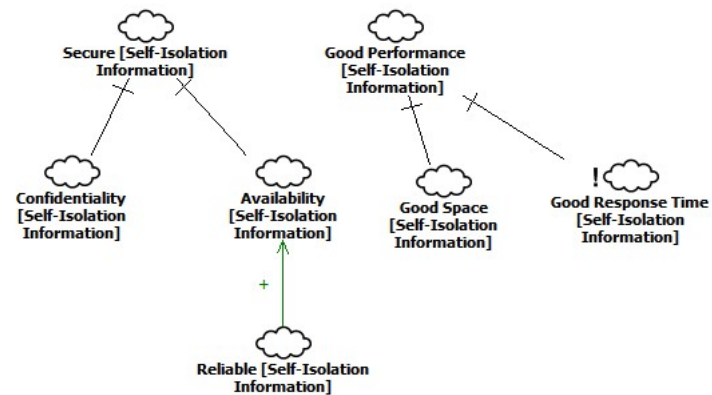
- **Time** - System is monitoring the epidemic therefore its processes or workflows have to be efficient time-wise.
- **Space** - since the system will contain lots of different data (e.g. person's geographical coordinates), data must be stored efficiently.
- **Reliability** - Tracking the state of the epidemic must be ensured 24/7 to not miss any crucial data or trends.
- **Confidentiality** - the epidemiological system must treat sensitive personal information (e.g. received medical records) to ensure systems credibility.
- **Legality** - due to the fact the epidemiological system will deal with sensitive information, data handling must comply with LT and EU data laws as well as GDPR.
- **Replication** - non-sensitive data must have duplicate records stored to increase the system's fault-tolerance.

## 2. Modelling of the non-functional requirements

### 2.1. Self-isolation



pic 2. Self Isolation - Initial Software Dependency Graph

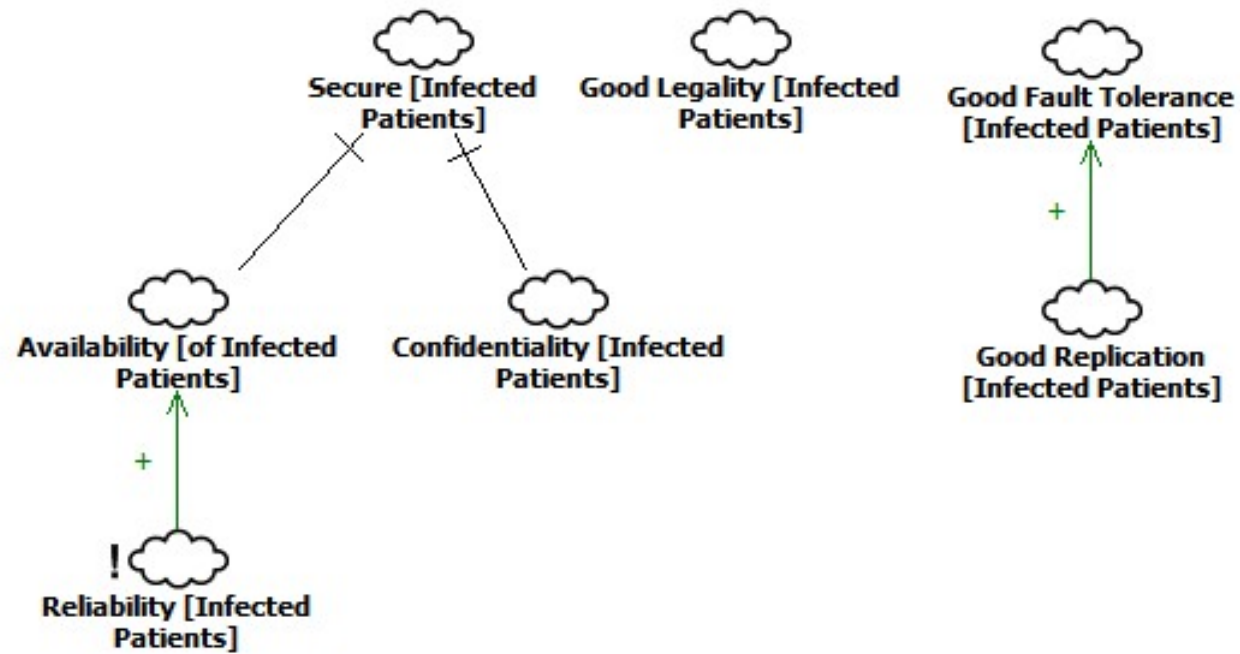


pic 3. Self Isolation - Decomposing NFRs

## 2.2. Infected patients

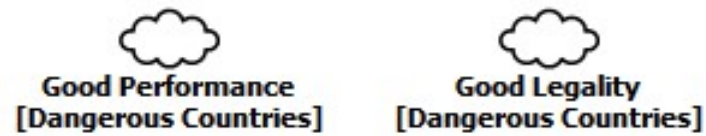


pic 4. Infected Patients - Initial Software Dependency Graph

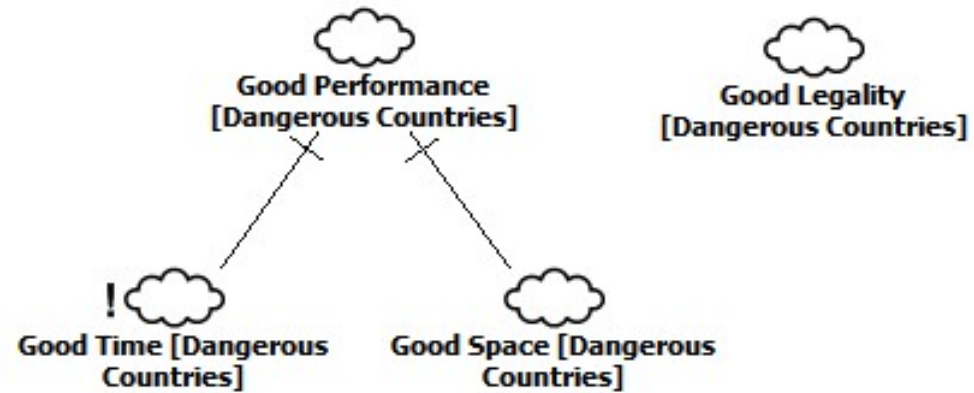


pic 5. Infected Patients - Decomposing NFRs

### 2.3. Dangerous countries



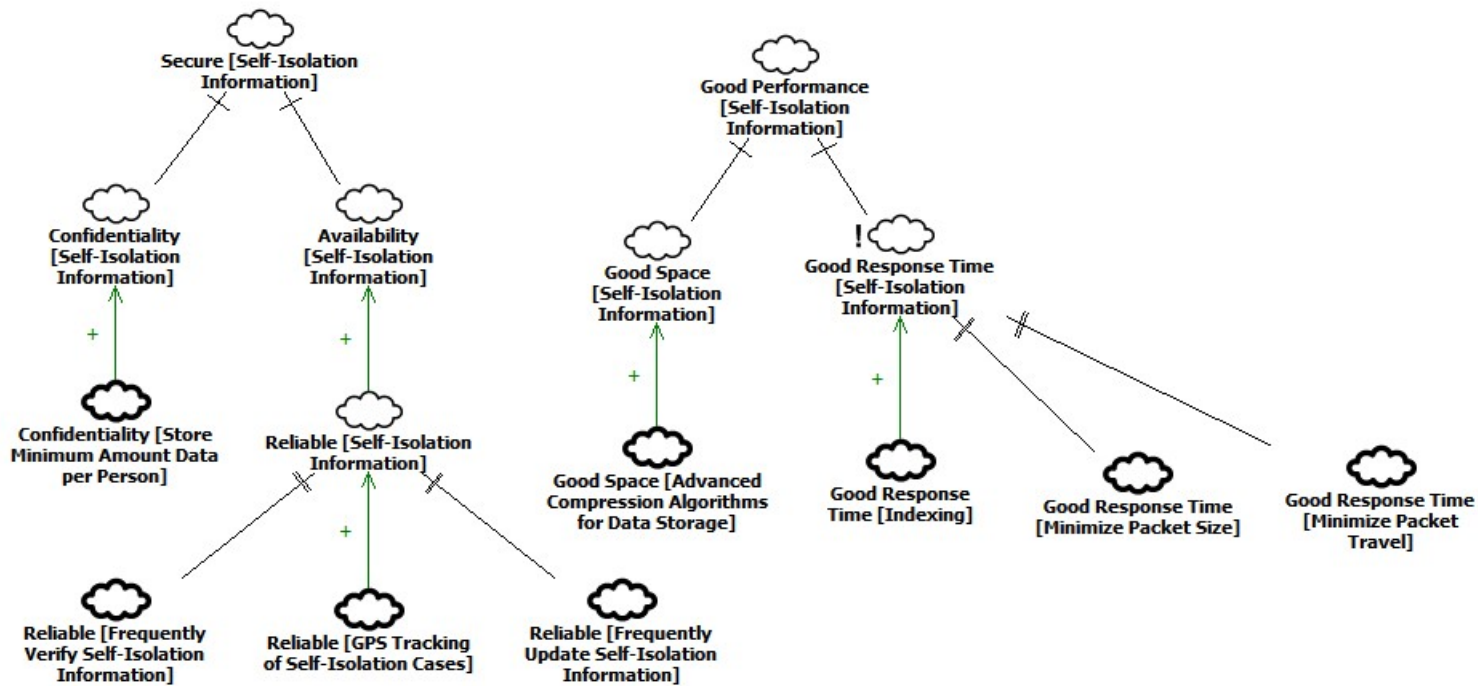
pic 6. Dangerous Countries - Initial Software Dependency Graph



pic 7. Dangerous Countries - Decomposing NFRs

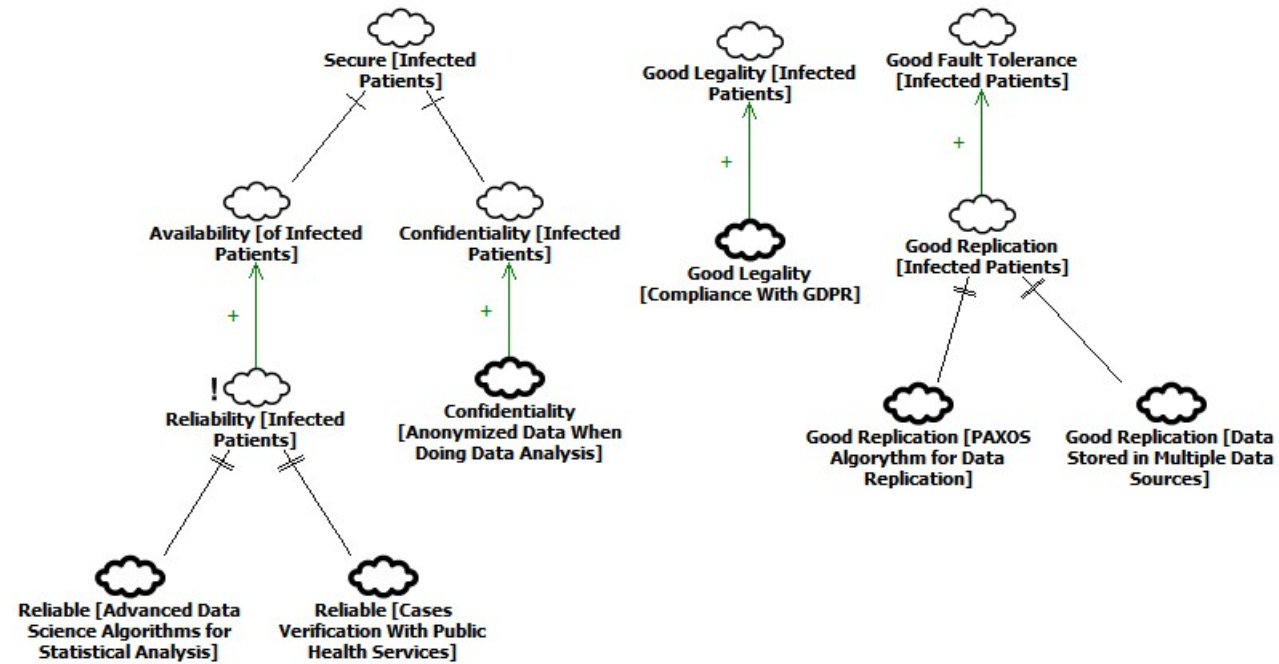
### 3. Identifying and modelling of possible operationalizations for NFR

#### 3.1. Self-isolation



pic 8. Self Isolation - Possible Operationalizations

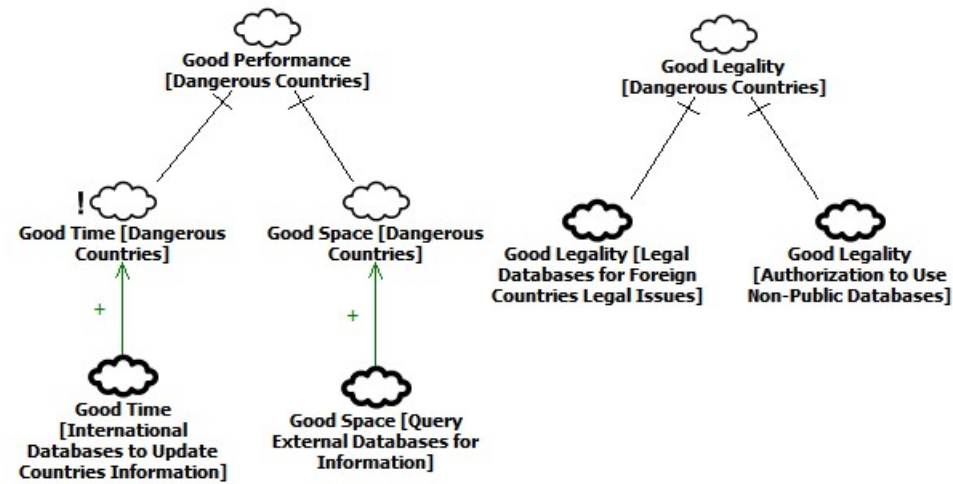
### 3.2. Infected patients



pic 9. Infected patients - Possible Operationalizations

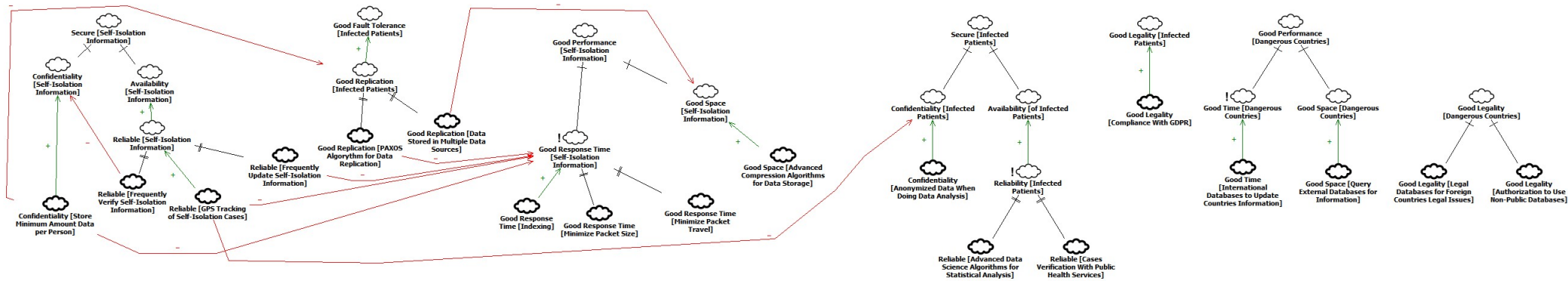


### 3.3. Dangerous countries



pic 10. Dangerous Countries - Possible Operationalizations

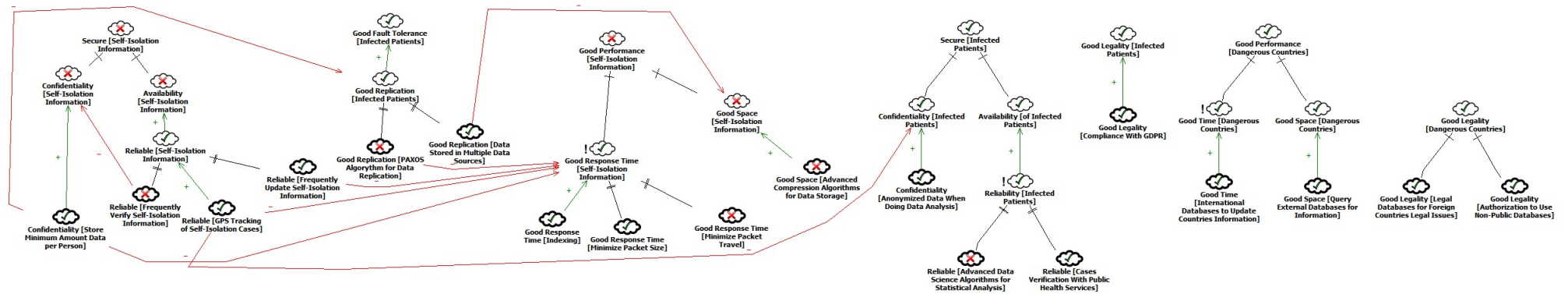
## 4. Detecting and Modelling of Implicit Interdependencies Among NFR



pic 11. Implicit interdependencies among NFRs

## 5. Making decisions

### 5.1. Chosen Operationalizations and SoftGoals



pic 12. Chosen Operationalizations among NFRs

## **5.2. Decision Explanation**

### **5.2.1. Negative impact**

- Frequently verify self-isolation information harms confidentiality because increasing amounts of data are processed with an increased chance for data interception.
- Store minimum amount of data about a person hurts good response time because querying small unstructured data takes longer.
- Store minimum amount of data about a person harms good replication because replication requires a lot of data to work properly.
- GPS tracking of self-isolation cases harms confidentiality because in case of data breach intruders might gain the ability to know a person's location.
- GPS tracking of self-isolation cases hurts good response time because updating GPS information takes a long time.
- Frequently update self-isolation information harms response time because it takes computer resources to do the update.
- Use PAXOS algorithm for replication harms response time because this algorithm takes a lot of computational resources to complete. Which impacts response time.
- Data stored in multiple data sources hurts good space because it takes a lot of physical computer space to store in multiple sources.

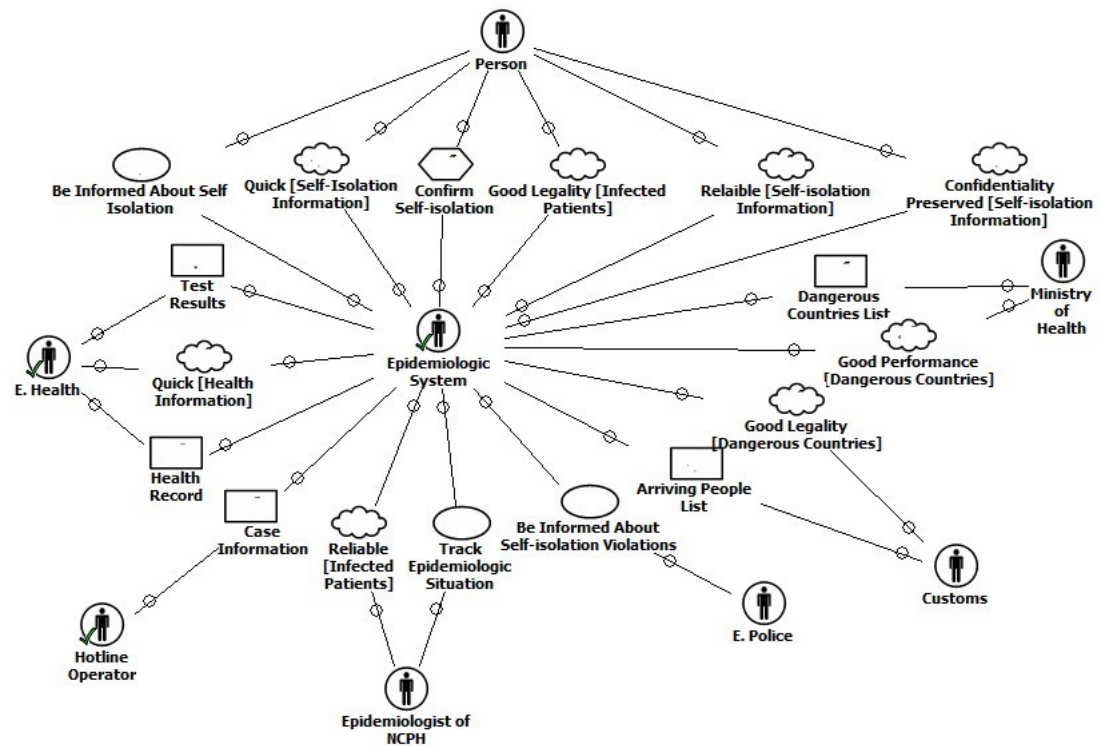
### **5.2.2. Rejected operationalization**

- Frequently verify self-isolation information - verification usually can be a complex process also it heavily impacts confidentiality, that's why we decided to reject.
- Advanced protocol to minimize packet travel - lack of competency in the team to implement such protocols.
- Use advanced compression algorithms for data storage - lack of competency in the team to implement such algorithms.
- Apply advanced data science algorithms for statistical analysis - lack of competency in the team to implement such algorithms.
- Use PAXOS algorithm for replication - lack of competency in the team to implement such protocols.

### **5.3. Conclusions**

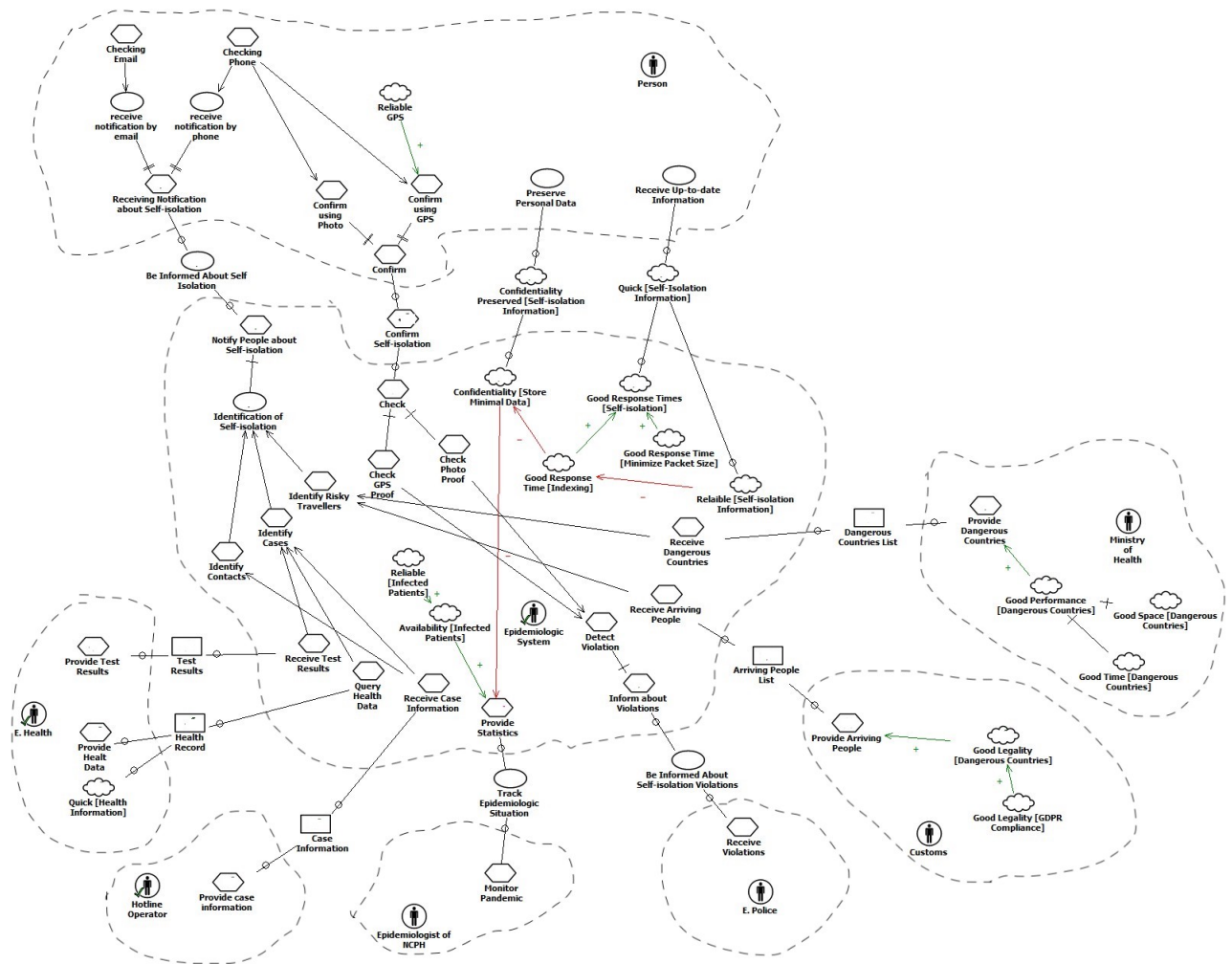
Using NFR we successfully selected, decomposed, and chose operationalized soft goals to be completed in our project. Analysis was very useful and applicable in real-life scenarios in the industry.

## 6. Strategic Dependency Model



pic 13. Strategic Dependency Model

## 7. Strategic Rationale Model



pic 14. Strategic Rationale Model

## **8. Conclusions about an dependency**



## Conclusions