**Table 1.** Complexity static measurements

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **FCM** | **Layer** | **# nodes** | **# edges** | **Density** | **Cycles(+)** | **Cycles(-)** |
| 1 | 1 | 11 | 93 | 0.84 | 230654 | 228706 |
| 2 | 2 | 3 | 6 | 1 | 5 | 0 |
| 3 | 2 | 4 | 12 | 1 | 20 | 0 |
| 4 | 2 | 3 | 6 | 1 | 0 | 5 |
| 5 | 2 | 6 | 30 | 1 | 409 | 0 |
| 6 | 2 | 6 | 30 | 1 | 409 | 0 |

**Table 2.** Strength and Tendency indicators for the sub-FCMs of the ML-FCM model

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SubFCM** | **Concept** |  |  |  |  | **Cycles+** | **Cycles-** |
| FCM1 (root) Microservices Adoption | Governance | 8 | 10 | 18 | 6.25 | 202064 | 200980 |
| **Infrastructure and Management Services** | **9** | **10** | **19** | **4.57** | **207666** | **206077** |
| **Maintainability & Evolvability** | **9** | **10** | **19** | **7.54** | **207656** | **206087** |
| Operational Complexity | 8 | 10 | 18 | 5.93 | 202603 | 200441 |
| Business Complexity | 7 | 10 | 17 | 4.11 | 198572 | 196774 |
| **Reliability** | **9** | **10** | **19** | **5.35** | **207729** | **206014** |
| Security | 8 | 9 | 17 | 4.22 | 202242 | 199954 |
| Cost | 9 | 5 | 14 | 4.10 | 180637 | 178502 |
| Design | 8 | 10 | 18 | 6.24 | 202590 | 200454 |
| DevOps | 8 | 9 | 17 | 5.91 | 199392 | 197911 |
| Microservices Adoption | 10 | 0 | 10 | 4.34 | 0 | 0 |
| FCM2 Governance | Governance | 2 | 2 | 4 | 1.333333333 | 4 | 0 |
| **Decentralized Governance** | **2** | **2** | **4** | **1.991666667** | **4** | **0** |
| Data Governance | 2 | 2 | 4 | 1.391666667 | 4 | 0 |
| FCM3 Infrastructure and Management Services | Infrastructure and Management Services | 3 | 3 | 6 | 3 | 15 | 0 |
| Containerization | 3 | 3 | 6 | 2.15 | 15 | 0 |
| **Scalability/Elasticity** | **3** | **3** | **6** | **2.67** | **15** | **0** |
| FCM4 Cost | Cost | 2 | 2 | 4 | 1.63 | 4 | 0 |
| **Migration Cost** | **2** | **2** | **4** | **1.14** | **4** | **0** |
| Operations Cost | 2 | 2 | 4 | 1.08 | 4 | 0 |
| FCM5 **Design** | Design | 5 | 5 | 10 | 4.2 | 325 | 0 |
| Design For Failure | 5 | 5 | 10 | 3.175 | 325 | 0 |
| **Granularity and Bounded Context** | **5** | **5** | **10** | **4.35** | **325** | **0** |
| Service Contracts | 5 | 5 | 10 | 3.49 | 325 | 0 |
| Communication Model | 5 | 5 | 10 | 2.455 | 325 | 0 |
| Decentralization | 5 | 5 | 10 | 4.17 | 325 | 0 |
| FCM6 DevOps | DevOps | 5 | 5 | 10 | 5.175 | 325 | 0 |
| Organization Culture | 5 | 5 | 10 | 3.62 | 325 | 0 |
| **Infrastructure Automation** | **5** | **5** | **10** | **4.33** | **325** | **0** |
| **Continuous Delivery/Deployment** | **5** | **5** | **10** | **4.855** | **325** | **0** |
| Skilled and Educated DevOps Teams | 5 | 5 | 10 | 3.545 | 325 | 0 |
| Tool Support | 5 | 5 | 10 | 3.335 | 325 | 0 |

# Static Analysis

## Complexity measurements

Following the framework’s stepwise process as this described in [xxx], we firstly performed static analysis by applying metrics and indicators regarding graph complexity. The corresponding measurements are listed in Table 1.

## Inferences (based on Table1)

* The density of all sub-FCMs that constitute the ML-FCM model is above the threshold for medium magnitude and thus the model can be characterized as a highly complex, two-layer structure.
* Five of six sub-FCMs are complete graphs with density values equal to 1.

* The number of feedback cycles have also been calculated for each sub-FCM, divided into positive and negative and the corresponding results are also listed in Table 1.
* Five sub-FCMs appear to have more positive cycles than negative and this is a strong indication of how the model tends to behave: “”
* High values of metrics and indicators for maps complexity confirm the high complexity of the problem

## Strength and Tendency indicators

Measurements were performed for all sub-FCMs aiming to identify the significance of each node in the ML-FCM model. These measurements that provided in Table 2, define the strength of each node, as well as the tendency of each sub-FCM.

*degin(i), degout(i), degtot(i)* και *valtot(i).*

Measurements *Cycles+* and *Cycles-* denote the participation of each concept in positive or negative cycles respectively.

## Inferences (based on Table2)

* *Infrastructure and Management Services*, *Maintainability & Evolvability* and *Reliability* are the three strongest nodes of the main FCM.
* Respectively the two weakest nodes are *Cost* and *Business Complexity*

# Dynamic Analysis

We firstly setup and executed a series of scenarios to examine if our model converges and behaves as expected to.

We performed scenarios with randomized initial activation level values. After a number of iterations in all cases all concepts activation level values converged to a specific point.