Systems analysis SYSA
Seminary project “Analysis of a system“

Part 1 – choice of a systems and its initial description
Part 2 – structural identification of a system
Part 3 – interface task on the identified system
Part 4 – decomposition on the identified system
Part 5 – behaviour of the identified system and its genetic code

Part 1: Choice of a systems and its initial description

Task: Identify a system based on your interest with approximately 15 elements.

Procedure: Choose the system so that it has heterogeneous character (wrong choice is e.g. tram network where all the tram stops have the same function)

Outputs:
1a) Name and brief system description
1b) Verbal description of the system function, its parts, reasoning of the choice of level of distinguish and the viewpoint on the system
1c) Description of the system neighbourhood and its relation to the system
1d) List of system elements
1e) Graphical scheme of the system containing elements and relations

Note 1: The system you choose you will analyze in all the part of the seminary work.

Note 2: There may be some corrections of the elements and relations during the work on part 2 and extension of the system description if needed.

Part 2: Detailed structural identification

Task: In the chosen system identify and describe its elements and relations among the elements. Describe the elements by their functions and parameters and the relations by their parameters. In the system identify important elements (border elements, important elements based on their complexity – aggressive, complex, etc.)

Outputs:
Formal description of the system using the tables:
2a) Table of elements containing their functions, at minimum 2 parameters of the elements and marking the importance (note: not every element is “important”)
2b) Table of relations containing at minimum 2 parameters of the relations
2c) Description of the system structure using a matrix (e.g. matrix element-element)

Note: In the way you describe the system in this part, you have to work with it further on. All information about the element and relations must be stated already here!

Part 3: Interface task

Task: from the system relations, described in previous parts, choose 2 relations and check their regularity.

Procedure: For the relations chosen check its regularity – describe input and output parameters and their values of each of the relations (using the input and output matrix) and check the regularity (using the regularity table or regularity matrix).
Describe the way how to regularize the interface. In case you have no irregular interfaces choose one of the relations and describe what kind of irregularity may appear there and what the ways of regularization would be.

Outputs:
3a) List of chosen relations

3b) Parameters and values for the chosen relations in the input and output matrix
3c) Regularity condition for each of the parameters
3d) Resulting regularity matrix or table
3e) Description of proposed ways how to eliminate the irregularity

Part 4: System decomposition

Task: On the chosen system make decomposition according different criteria (topological, functional, subject and hierarchical). Make the decompositions based only the information on the system described in previous part of the seminary project (mainly part 2).

Outputs:
System decompositions according the rules for decomposition:
4a) topological
4b) functional
4c) subject
4d) hierarchical
or if need be the reasoning why particular decomposition is not suitable for the chosen system.

Note: Decomposition does not mean cancelling some of the relations! It may just mean dividing the system for more simple evidence, distribution of work on the system, etc.

Part 5: System behaviour and genetic code

Task: On the system identify the processes describing system behaviour and find its genetic code.

Procedure: On the system find at least 3 input relations (outside events, events coming from the system neighbourhood). For each of these inputs find all the processes it activates. (To make it simpler do not consider parallel processes – at one moment only one event can be activated).
For every input make the graph of partial behaviour, list the partial state space Si. For every partial state space Si make the matrix of partial behaviour Di and list the sets of partial behaviour Fi (set of all processes between the input and output elements) (Fi={f1i; f2i; ... fni}..). Write down the whole state space S (S=S1 ∪ S2 ∪ S3 ...) and the whole system behaviour (as a behaviour matrix and set of system behaviour)
Find the genetic code as the intersection of partial behaviour. If the genetic code cannot be found this way, find the strong functions and find the genetic code as the set of processes with the highest amount of strong functions.

Outputs:
5a) List of input events (at least 3)
5b) Verbal description of processes activated by particular events
5c) For every partial behaviour (processes activated by particular input event):
- Graph of processes
- Partial state space
- Matrix of partial behaviour
- Set of processes of partial behaviour

5d) For the overall system behaviour:
- State space of the system
- Behaviour matrix
- Set of system behaviour

5e) Genetic code and the way of its finding
5f) Verbal conclusion (if the result makes sense, if need be why not, where an error or simplification may have occurred, etc.)