# Y-chart mapping

The Y-chart was developed in 1983 to explain the differences between different design tools and different design methodologies in which these tools were used.

The Y-chart districts between three basic ways which different properties of a system a can be modelled from.

These three aspects can be described as:

* **Behaviour** – Specification or functionality, here the system is seen as a black box where only inputs and outputs are described.
* **Structure** – Netlist or block diagram. The block box is described as components and connections between components
* **Physical** – Layout or board design. Adds dimensions to the structure. The physical dimensions of the design are specified: Height, width and position of each component.

Futhermore, the Y-chart also introduces four levels of abstractions:

* **System** – Here the system is defined as a number of computation- and communication components. The developer identifies which processors, memory and busses that should be used in the system.
* **Processor** – Processors, memory controllers, arbiters, interface components.
* **Logic** – Gates and flip-flops, register transfer components
* **Circuit** – Transistors

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| Figure 1 - Y-chart, the red line indicates where we moved from and towards. |

The work we conducted during this exercise relates to the process of moving from the Behaviour-axis to the Structure-axis at the system abstraction level.

The behaviour of the system was already specified from the exercise description, so we had to figure out how to divide up the behaviour into software and hardware and define components that for filled the requirements.

# Non-functional requirements and design constraints

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| Req. ID | Related Use Case(s) | Description |
| 1 | Noise Cancellation, Audio/Video Processing | The system shall have a 48[KHz] samplerate. |
| 2 | Noise Cancellation, Audio/Video Processing | The system samplerate shall have a 24 bit resolution. |
| 3 | Audio Control, Remote control | The system shall have a button for adjusting the volume |
| 4 | Audio Control, Remote control | The system shall have a button for adjusting the bass (<500[Hz]) |
| 5 | Audio Control, Remote control | The system shall have a button for adjusting the treble (>4[KHz]) |

Table 1 – Non-functional requirements

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| Req. ID | Description |
| 6 | The system shall have two microphone inputs. |
| 7 | The system shall have a two line output. |
| 8 | The system shall have a unit for displaying the current status of the unit |
| 9 | The system shall have an VGA output port. |
| 10 | The system shall have a LCD display. |

Table 2 – Design constraints

# Conclusion

Working with exercise we got experience with modelling and analysing systems using UML and SysML. We used internal block diagrams to describe three possible solutions.

We identified the tasks carried out during this exercise to be the process of moving from Behavior-axis to the Structure-axis on a System-level on the Y-chart.

While the system requirements were not specified as functional- non-functional or design constraints we tried to do so, and found that there were some of each kind.