Abstract

In communication with stakeholders engineers tend to use the diagrams of their trade. Unfortunately, many diagrams are specialized and contain many abstractions to serve the goals of the engineering discipline. In this paper we discuss diagrams based on when (time dimensions) and where (spatial dimensions). We assert that when and where diagrams are effective in communication with heterogeneous stakeholders. However, these same diagrams also provides insights to the engineers; insights that very often get lost when using the more specialized diagrams of the trade.
Models that are used for communication purposes, must connect to the mental models of the audience.

for example by using as basis

- geography (2D or 3D, spatial dimensions)
- the domain work (or goods, control, signal, ...) flow as basis
- absolute time

Space and time based diagrams are useful at different scales. Each scale is related to a specific set of concerns.

Architects and designers will make many more drawings, graphs, spreadsheets, et cetera while working. These are needed to analyze problem and solutions. However, a transformation is needed from this intermediate information into sharable information.

A key skill of an architect is to make an appropriate selection and representation. Note that the amount of information is significantly reduced and simplified, such that the essence is communicated and discussed.
Example *meter* scale diagram for Elevator

Inhabitants want to reach their destination fast and comfortable.

Building owner and service operator have economic constraints: space, cost, energy, ...

When and Where to support understanding and communication

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WWWWHelevatorMeterScale
Example second scale time line for Elevator

assumptions human dependent data

\[ t_{\text{wait for elevator}} = [0..2 \text{ minutes}] \text{ depends heavily on use} \]
\[ t_{\text{wait for leaving people}} = [0..20 \text{ seconds}] \text{ idem} \]
\[ t_{\text{walk in}} \approx 2 \text{ s} \]
\[ t_{\text{select floor}} \approx 2 \text{ s} \]

assumptions additional elevator data

\[ t_{\text{minimal waiting time}} \approx 8 \text{s} \]
\[ t_{\text{top floor}} \approx 25 \text{s} \]
\[ t_{\text{one floor}} \approx 11 \text{s} \]

outcome

\[ t_{\text{one floor}} \approx 8 + 2 + 11 + t_{\text{wait}} \]
\[ \approx 21 \text{ s} + t_{\text{wait}} \]

\[ t_{\text{top floor}} \approx 8 + 2 + 25 + t_{\text{wait}} \]
\[ \approx 35 \text{ s} + t_{\text{wait}} \]
Example *minute* scale time line for Elevator

someone who just missed the elevator in upgoing rush hour

time to top floor
Example *hour* scale time line for Elevator

- **500** people/hr going up
- **500** people/hr going down

- **Morning rush hour**
- **Lunch**
- **Evening rush hour**

0:00 | 6:00 | 12:00 | 18:00 | 24:00
Example *milli* scale diagram for Elevator Locking

When and Where to support understanding and communication

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