When and Where to support understanding and communication of What and How

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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.

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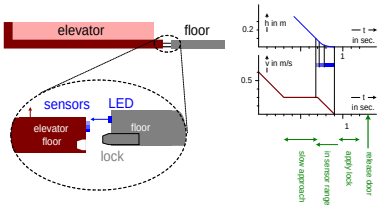


Assertions

Models that are used for commnciation purposes, must connect to the mental models of the audience.

for example by using as basis

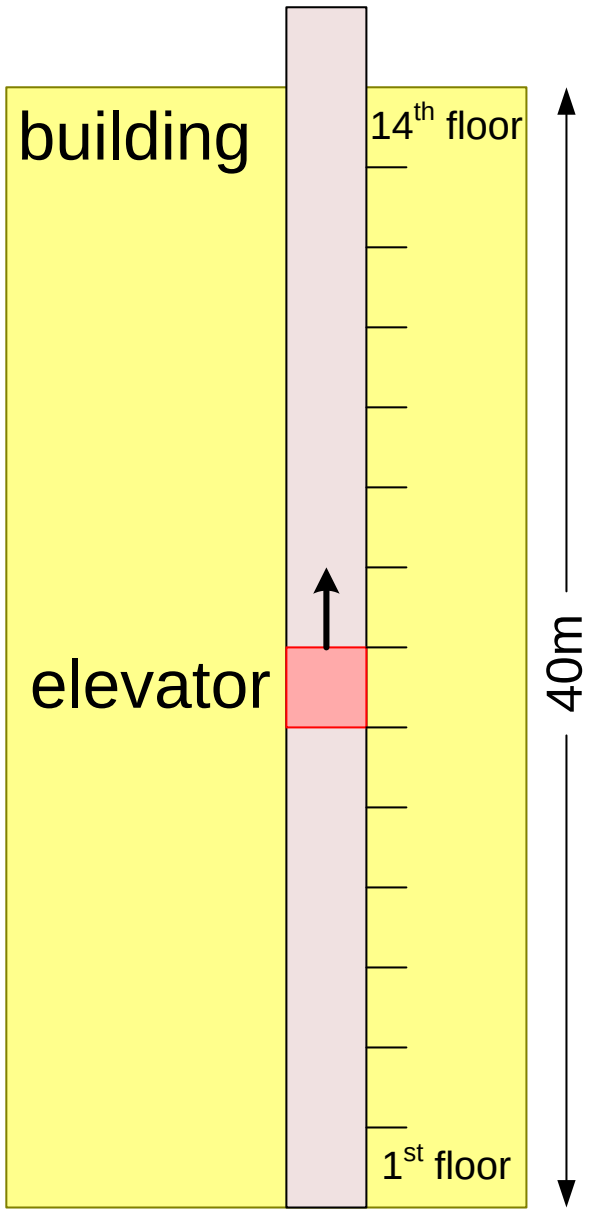
- geography (2D or 3D, spatial dimensions)
- the domain work (or goods, control, signal, ...) flow as basis
- absolute time

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.

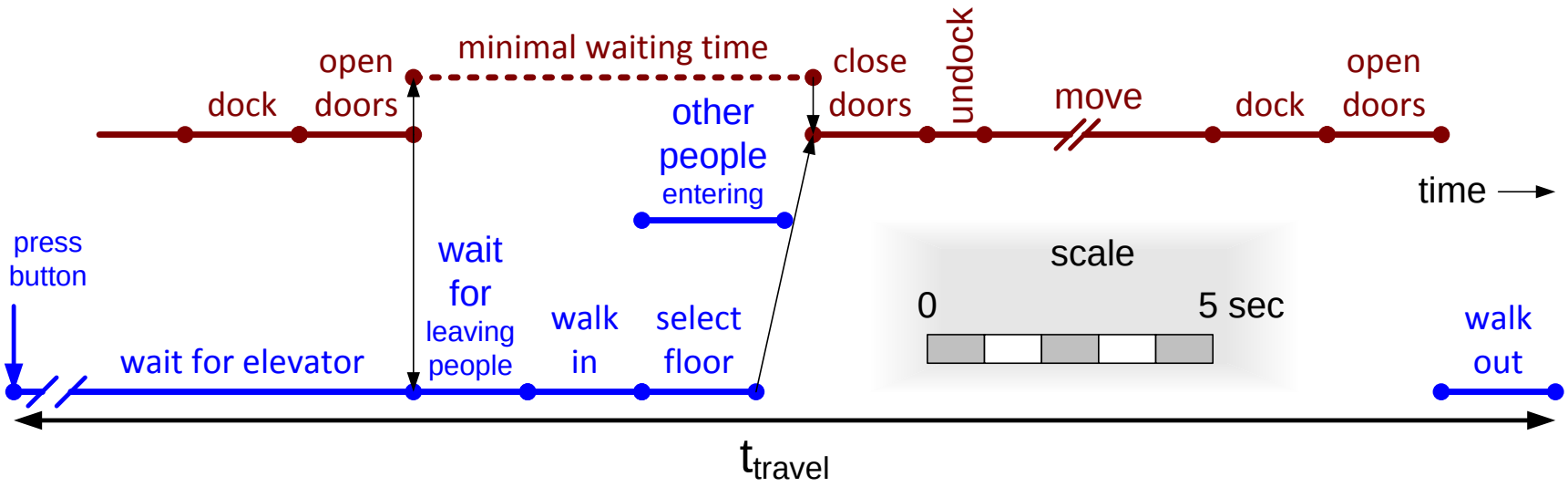
Example *meter* scale diagram for Elevator



inhabitants want to reach
their destination fast and comfortable

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

Example *second* scale time line for Elevator



assumptions human dependent data

$t_{wait\ for\ elevator}$ = [0..2 minutes] depends heavily on use

$t_{wait\ for\ leaving\ people}$ = [0..20 seconds] idem

$t_{walk\ in} \sim= t_{walk\ out} \sim= 2$ s

$t_{select\ floor} \sim= 2$ s

assumptions additional elevator data

$t_{minimal\ waiting\ time} \sim= 8$s

$t_{travel\ top\ floor} \sim= 25$s

$t_{travel\ one\ floor} \sim= 11$s

outcome

$t_{one\ floor} = t_{minimal\ waiting\ time} + t_{walk\ out} + t_{travel\ one\ floor} + t_{wait}$

$t_{top\ floor} = t_{minimal\ waiting\ time} + t_{walk\ out} + t_{travel\ top\ floor} + t_{wait}$

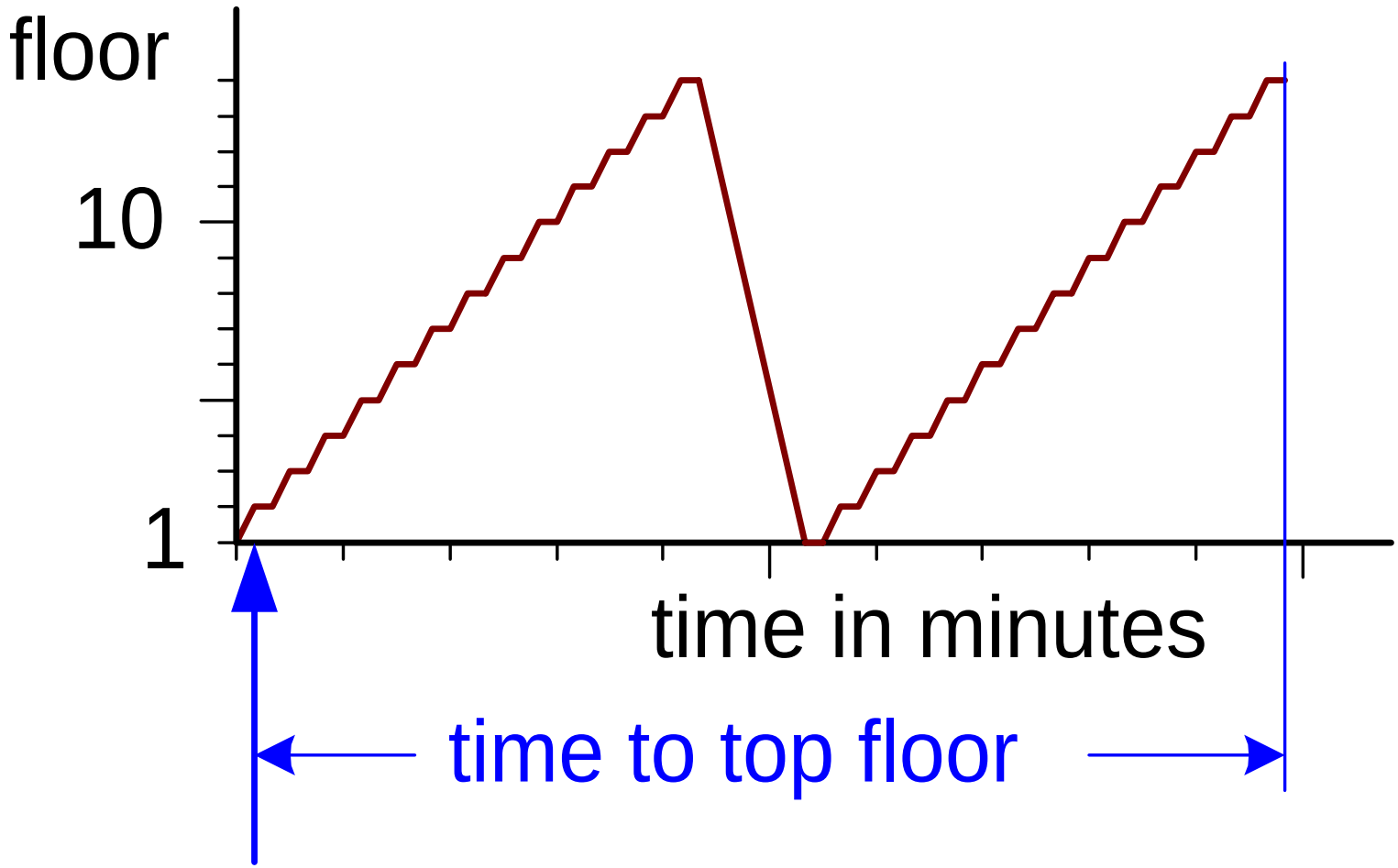
$t_{one\ floor} \sim= 8 + 2 + 11 + t_{wait}$

$\sim= \mathbf{21\ s} + t_{wait}$

$t_{top\ floor} \sim= 8 + 2 + 25 + t_{wait}$

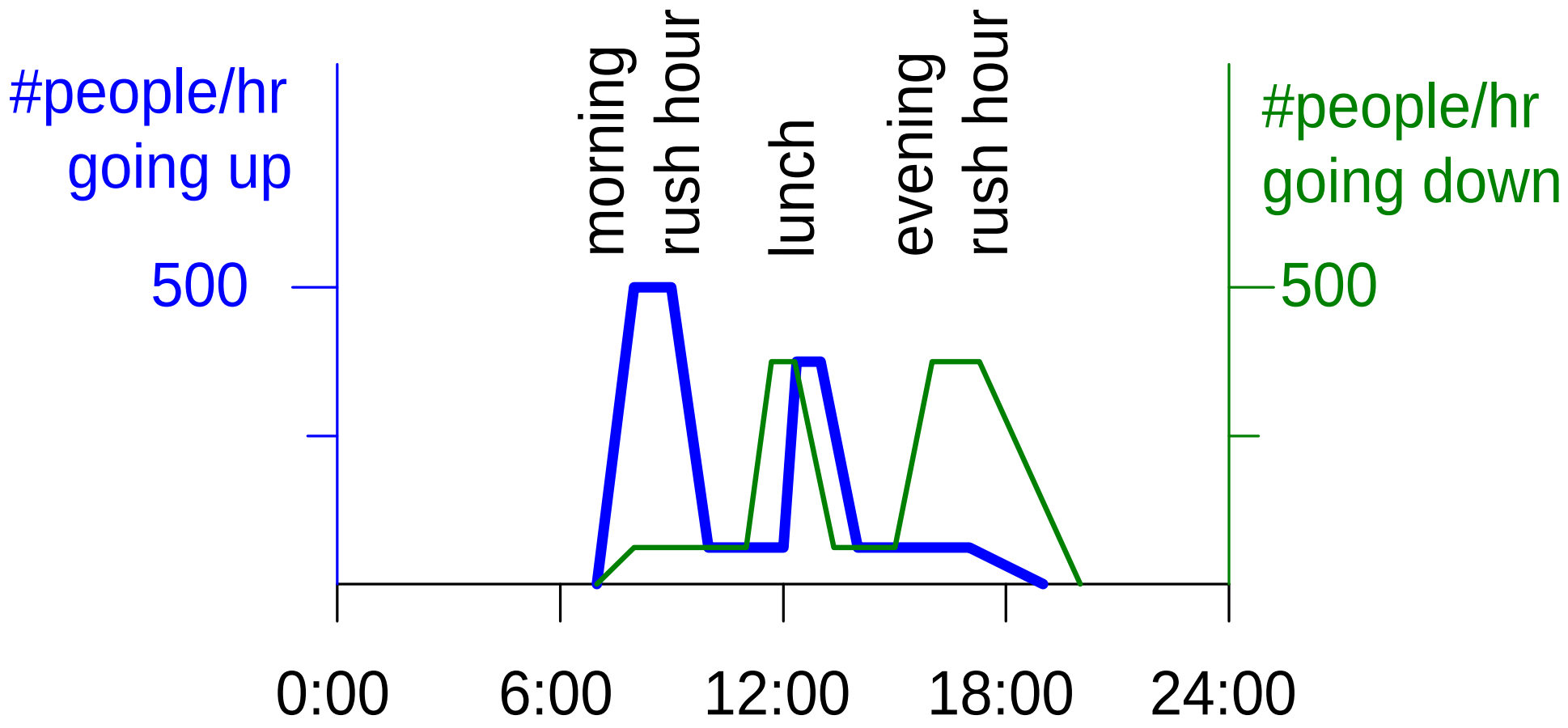
$\sim= \mathbf{35\ s} + t_{wait}$

Example *minute* scale time line for Elevator



someone who just missed
the elevator in upgoing rush hour

Example *hour* scale time line for Elevator



Example *milli* scale diagram for Elevator Locking