The Aussois Shortest Path Problem (ASSP)

• After some lengthy activities at the bar, you eventually want to go to bed.
• Task: find the shortest path from the bar to your bedroom!

Researchers discussing the ASSP
The Aussois Shortest Path Problem (ASSP)

- Graph is connected
  - Anyone did not reach their bedrooms?
- Graph does not contain negative cycles
  - At least I did not see any
- Conclusion: Problem always has an optimal solution and can be solved in polynomial time
- Thus, the problem can easily be solved!? 
  - NO!
    - Still unsolved since 22 years!
    - Why?
- There seems to be a disconnect between theory and practice!
The Biggest Challenge in Practice: Data

• Lack of data
  • Industry partner (Gurobi) does not deliver the data
  • Industry partner is not even aware of the fact that you are waiting for data
  • During the first 14 years of the project, your industry partner did not even exist!

• Eventually, they ask some low-level underpaid engineer (me) to generate the data
  • Yesterday night I walked multiple times through the building to draw a graph and measure distances to obtain edge lengths.

• Result of industry data collection
  • Data is incomplete
    • Doesn’t include lecture hall, lobby, restaurant and bar areas – topology just too trivial!
  • Data is wrong
    • Data was collected after having a few glasses of wine
    • Estimated distances by steps
    • Rounded lengths to integer values in some arbitrary way
  • Data comes in a format that is completely useless
    • Hand-written barely readable sheet of paper
    • Not much better: Powerpoint
The ASPP Graph

- Bedroom area has 11 levels that are connected in a random fashion to each other.
- 81 bedrooms, often (but not always) two behind a common entrance door.
- 1 elevator that connects the levels.
- Graph has 74 nodes.
- Graph has about 90 edges.
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From the Bar to Room 519

• My current incumbent solution:
  • Take stairs up to restaurant level
From the Bar to Room 519

- My current incumbent solution:
  - Take stairs up to restaurant level
  - Switch to level H and go down to the end
From the Bar to Room 519

- My current incumbent solution:
  - Take stairs up to restaurant level
  - Switch to level H and go down to the end
  - Switch to level E and enter my room
From the Bar to Room 519

• My current incumbent solution:
  • Take stairs up to restaurant level
  • Switch to level H and go down to the end
  • Switch to level E and enter my room

• But this is sub-optimal!

• Instead, I should:
  • Avoid the stairs, exit bar through level I
  • Switch to level H, passing the elevator
  • Go down to the end
  • Switch to level E and enter my room
  • Most importantly: don't get lost on my way!