Practical Challenges

In a major transport hub (e.g., Frankfurt Airport):

- There may be 50,000 smoke detectors.
- 100,000 Lbeacons may be used to achieve the desired location accuracy (e.g., 5-10 meters)
  - Where should the beacons be placed?
  - How to pinpoint the chosen location of each Lbeacon and install it there?
  - How to systematically and reliably maintain the system during remodeling?

[Diagram showing spatial and floor plan data, structure data, geometric models, and exchange data]
These 2D and 3D views of parts of the building are retrieved from the BeDIC of the building. So are the 3D virtual reality model of the complex areas.

Our plugin provides models of Lbeacons of different ranges, antenna beam shapes, and coverage footprints. During the design process, the developer selects for each location in an area a beacon from the available types.

When design completes, the BeDIPS server contains:
- For each area, the coordinates of the reference point of the area
- For each Lbeacon in the area,
  - Type and QR code
  - 3D coordinates
  - Location description
Installing Lbeacons Using a Servo-Controlled Laser Pointer

- When design completes, BeDIPS server contains:
  - QR code, coordinates, and type of each Lbeacon, and
  - Coordinates of the reference point of each area

- The installer prepares each Lbeacon as follows:
  - Take a new beacon of the selected type,
  - Fix the QR code of the beacon on it, and
  - Load from the server its coordinates

- To install Lbeacons in an area, the installer places the laser pointer at the reference point of the area and retrieves from the BeDIPS server the coordinates of the pointer.

- To find the location of a new Lbeacon:
  - The installer: have the laser pointer scan the QR code of the beacon.
  - The pointer: reads the coordinates of the beacon and points to the location on the ceiling with the coordinates.