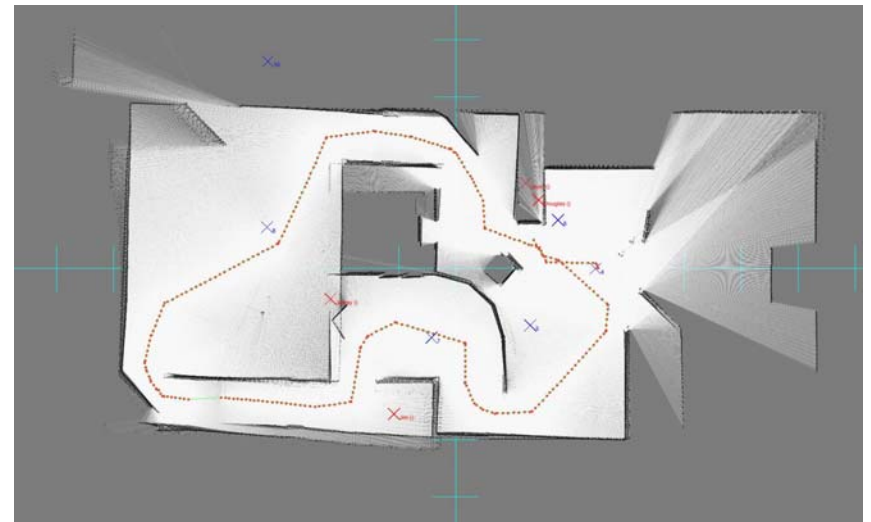# Natural Boundary
project assignment

- Explore with a team of simulated robots, a building of the Virtual Rescue league of RoboCup.

- Indicate to human rescue workers where victims are located, and *mark* the *areas* that are 'cleared'.

UvA @ 2006 competition

- Simultaneous Localization and Mapping
  - √ State-of-the-art SLAM
  - √ State-of-the-art scan matching

- Multi-Robot capabilities
  - √ Cooperation demonstrated up to 8 robots
  - √ Individual Maps can be combined to a global map
  - √ Algorithms for loop closure and island merging

- Explore an unknown environment
  - √ Autonomous operation
  - √ In the semi-finals 87% and 100% of the required area was explored.
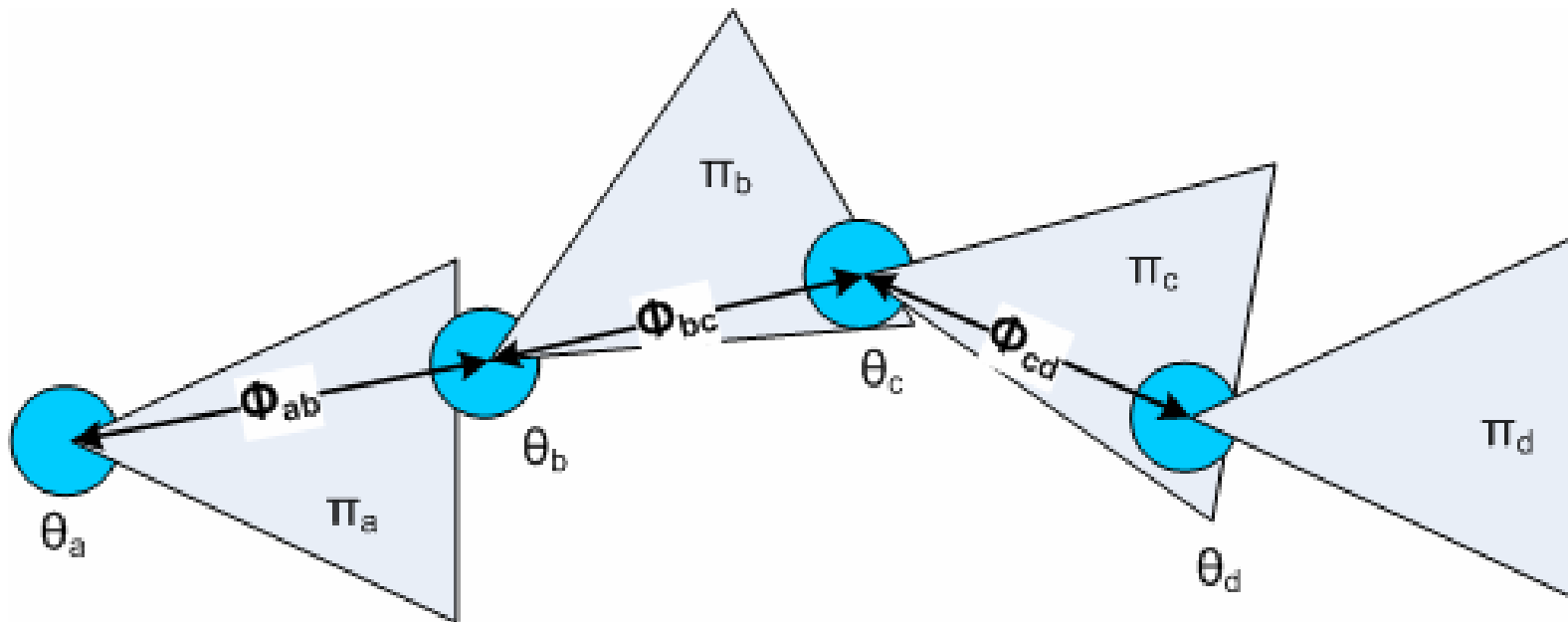 - √ Avoids collisions, SLAM robust against operation problems

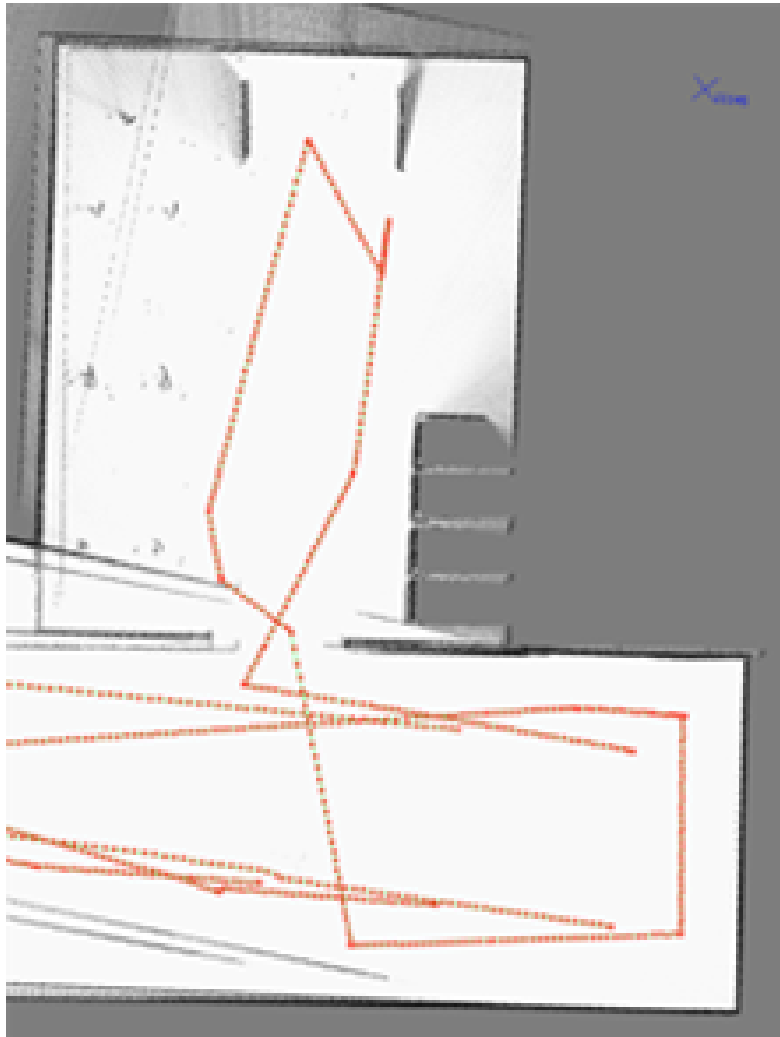# Map representations
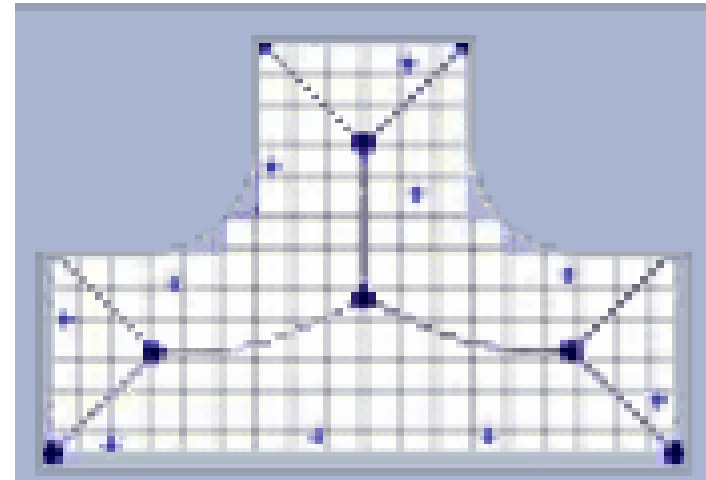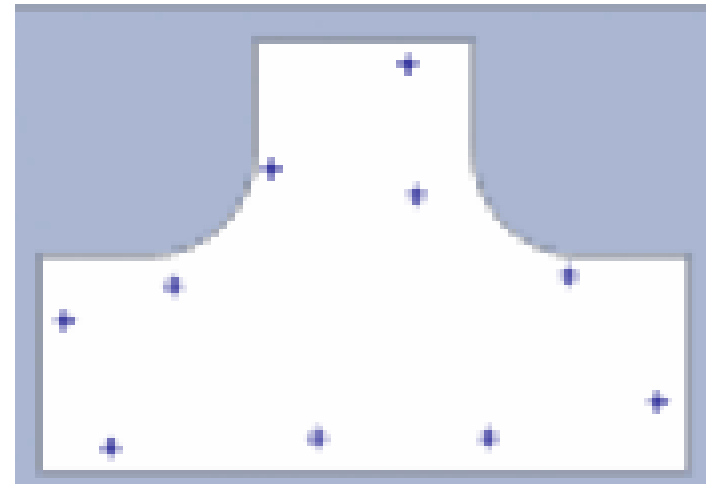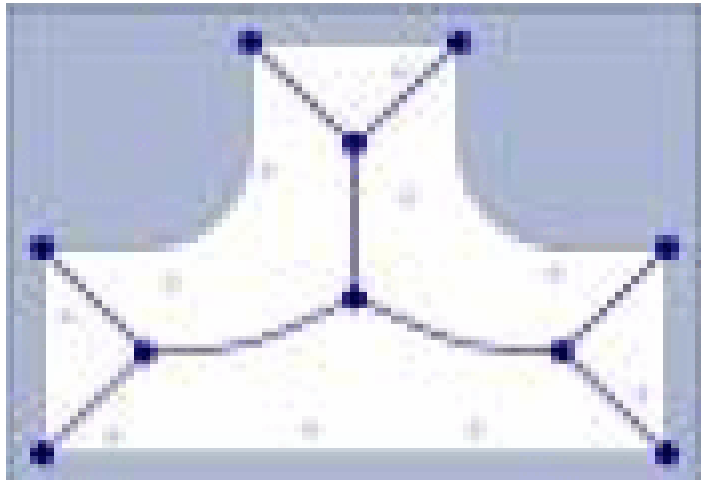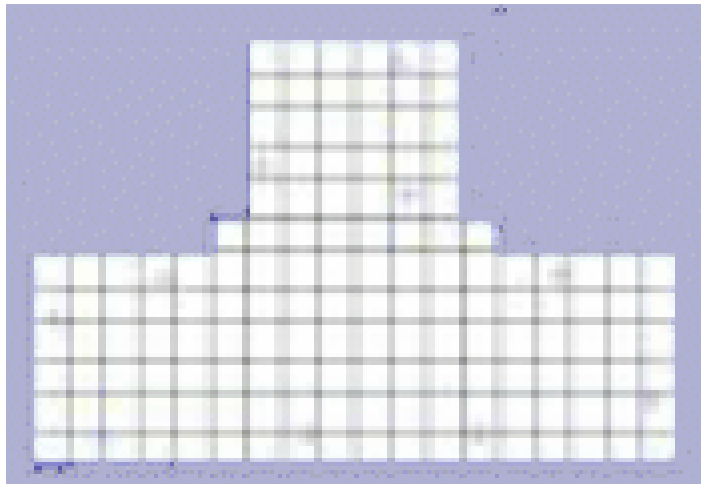
Chain of patches

π = laser scan
θ = absolute location (Euclidean)
Φ= relation
 = relative location (polar) Δθ + covariance matrix Σ

Fine grained map

Hybrid Map
- Red dots are nodes of a graph
- Each node stores 360 features

In a post-processing step the graph can be converted into an occupancy grid

High level map

- For exploration, a more symbolic level is needed.

- Concepts like areas, rooms, corridors, doorways, junctions and dead-ends are needed.

- The research question is what the natural boundaries of these areas are?