Fire Department of Dortmund

On benefits of UAV in research and fireground operations

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600.000 inh.
280 km²
D ≈ 22 km

>6.000.000 inh.
Tasks of FDDO

- Fire Department
  - fire suppression
  - fire prevention
  - (integrated) command and control center

- Emergency Medical Services
  - (integrated) command and control center

- Disaster Management

→ structural planning mandatorily required by law
• 8 professional fire stations
• 19 voluntary fire stations
• 16 EMS stations
• airport fire & rescue
24/7 Functions on Duty

<table>
<thead>
<tr>
<th>Command &amp; Control</th>
<th>Station 1</th>
<th>Station 2</th>
<th>Station 3</th>
<th>Station 4</th>
<th>Station 5</th>
<th>Station 6</th>
<th>Station 8</th>
<th>Station 9</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 + 9 = 17</td>
<td>16 + 5 + 6 = 27</td>
<td>16 + 2 + 5 = 23</td>
<td>10 + 4 = 14</td>
<td>16 + 2 + 4 = 22</td>
<td>10 + 1 + 2 = 13</td>
<td>10 + 2 = 12</td>
<td>10 + 6 + 2 = 18</td>
<td>10 + 2 = 12</td>
<td>= 158</td>
</tr>
</tbody>
</table>
Special Units

- heavy rescue
- CBRN
- height rescue
- water rescue
- decontamination
- water supply
- logistics (catering)
- command & communication
- analytical task force
Everyday Workload vs. Mass Incidents

everyday workload:
approx. 1,600 emergency calls / day
resulting in:
- 25 … 35 fire / technical incidents
- 250 … 350 EMS incidents

extreme weather conditions may cause a major increase of incident numbers
- flash flood 2008JUL26f + 691 incidents
- storm Kyrill 2007JAN18ff + 2,152 incidents
Command Structure: 3rd alarm

1. LZ
2. LZ
3. LZ

section 1
BLO 1

section 2
BLO 2

section 3-med
leading emerg. doctor

IC
A-level officer

command post

logistics / staging

RTW/NEF
RTW/NEF
RTW/NEF
On-scene incident command

established in case of local major / mass incidents

supports IC with a command staff equipped with direct data link to CCC
Status Quo: Möglichkeiten der opt. Erkundung

area

1.000 km²
100 km²
10 km²
1 km²
100.000 m²
10.000 m²
1.000 m²
100 m²

time

helicopter
aircraft

No UAV: lack of capability

turntable ladder / snorkel
by foot

satellite

by foot
how far to go…?

danger for personnel…?
Examples: ANCHORS und TRADR
Added value using UAV

multi-functional sensor carrier
- optical
- IR
- C-/RN-detection
- ...

scaleable system
- manual
- semi-autonomous
- autonomous
UAV – type and equipment

AscTec Falcon 8, Octocopter

- vis camera: Lumix DMC-TZ61, 30x zoom
- IR camera: Flir Tau2 640, 19mm lens
- ext. display: Black Pearl, 7“ / 5,8GHz div.config.
aerial view

laser scanning
way point navigation
geo-referenced

3D models

NIR

RGB

thermale IR

Sensorik: Beispiel Optik
sensor example: Chemical detection (GfG)

photo ionization detector (PID)

- carbon monoxide (CO)
- hydrogen sulfide (H₂S)
- oxygen (O₂)
- temperature
- volatile organic compounds (VOC)
  - z.B.: acetone, benzine/fuel, benzene, propene, toluene, xylene, etc.
sensor example: R/N detector (Mirion)

- background ... 10 Sv / h
- < 600 g
- 3 detectors, self-controlled switch
- detection / measurement / localization / identification

Quelle: Mirion
1.111 °C
Search Operation
Concept of Operation

- define scenarios
  - major fires, complex objects
  - widespread incident scenes
  - search of missing persons
  - special scenes (collapse, IED, …)
  - documentation

- determine tactical needs
  - realtime photo/IR transmission
  - post-processing of pictures, cross-cut IR/vis)
  - consider multiple displays
With the eyes of ... pilot ...

... incident commander
Operational concept

- determine operating unit → special task
  - vehicle / onboard stowage
  - concept of qualification
  - battery charging management

- personnel: recommend 1/1/4 = 6
  - liaison officer
  - crew commander
  - 2 pilots (steering, backup & UAV support)
  - image analysis specialist
  - engineer/driver & technical support
Area Management

clearly determine and cordon starting/landing area
Integration in Incident Management System

- update pre-determined attendances
- always support of incident command
- define and communicate availability and limits
- take care: controlled air zones / no-fly zones
Conclusion

- UGV and UAV
  - expand operational capabilities
  - increase operational safety
- current legal situation still limits the use of UAV
- legislation needs to take into account
  - privileges for disaster management organisations
  - flights beyond line of sight
  - autonomous use
  - expand weight limitations
Future Vision: „Fire Service Copter“

http://bit.ly/2vnEkm4
Contact – Direction

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