Request a Rescue Robot - Deployment Model for Assistant Robots for Responder

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Example: B-Fast – EUCPM Module UAV

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Initial Situation

- **Observations:**
  - robot technology has reached a level to be beneficial in the field
  - robot technology not yet reached responder (costs, maintenance, training, ...)
  - on the other side experience from the field are needed to drive research and development
Request a Rescue Robot (R-Cubed,R³)

- KIRAS study (Sep 2014 – Okt 2015)
  „How we can provide robot technology for special missions?“

- goal of the project
  - responder can request robots and experts easy and quickly
  - definition of realistic use case
  - development of a solid and immediately deployable model
  - no development of technology
Roadmap

based on the system engineering approach
## Interesting Finding – Temporal Aspect

<table>
<thead>
<tr>
<th>&lt; 1h</th>
<th>&lt; 3h</th>
<th>time not critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>reconnaissance</td>
<td>object manipulation</td>
<td>assistance service in natural and technical disasters (KHD)</td>
</tr>
<tr>
<td>detection</td>
<td>预防/检查</td>
<td></td>
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<tr>
<td>situation awareness</td>
<td>documentation</td>
<td></td>
</tr>
<tr>
<td>person search</td>
<td>underwater search and recovery</td>
<td></td>
</tr>
</tbody>
</table>
Interesting Finding – Data Processing

- if the *response* time increases and the *complexity* of the applied technology increases
- the collected data have to processed, augmented and presented *professionally*
- the presented data really need to be beneficial and real *add-on*
Goal Catalog

- **Functional Goals**
  - use cases, organization, interfaces, maintenance
- **Finance Goals**
  - investment, operation, deployment
- **Person Goals**
  - training, certification
- **Legal Goals**
  - labor law, aviation laws, liability, data protection
Model Variations

• generate different models for the integration of robots in real missions
• guided generation of approaches by variation of the parameters
• benchmarking and selection of models that can be realized
Model Variants and Dependence

- Organization Form
- Legal Foundations
- Availability
- Use Cases
- Equipment
- Alarming
- Documentation
- Training
- Logistics/Infrastructure
- Interfaces
- Team Structure
- Investment Costs
- Operation Costs
# Model Variants and Availability

<table>
<thead>
<tr>
<th>readiness</th>
<th>responder organization</th>
<th>public authority</th>
<th>society/company</th>
<th>research organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 h</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>1 to 3 h</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>time not critical</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

○… possible, ●… realistic
Variant: Responder Organization (< 1h)

- robots and operators are part of the responder team
- availability below one hour
- UAVs deliver images and videos from the air
- equipment is integrated in existing responder vehicles
- alarming according the alarm plan and alarm level
Variant: Society/Company
(time not critical)

- robots and experts are part of a society or company
- availability for not critical cases only
- special task supported by robots (ground, sea and airborne robots)
- equipment is stored in a way that allows easy transport
- transport to the operation site by responders
- additional alarming in case of necessity
Thank you!

Request a Rescue Robot (R-CUBED)

Wissenschaftlicher Endbericht

Technische Universität Graz
Landesfeuerwehrverband Steiermark