Design and Evaluation of an Image Analysis Tool supporting Naval Reconnaissance

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Design and Evaluation of an Image Analysis Tool supporting Naval Reconnaissance
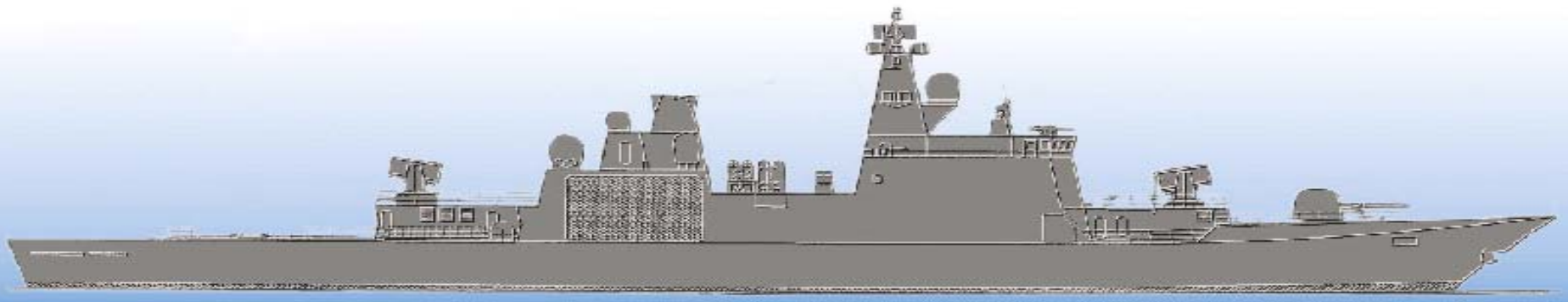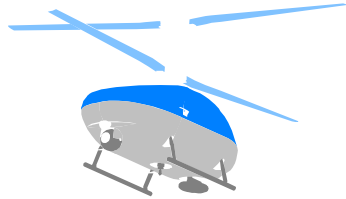
- **Introduction**

- **Concept, Design, Realization**

- **Evaluation & Optimization**

- **Conclusions**

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Introduction

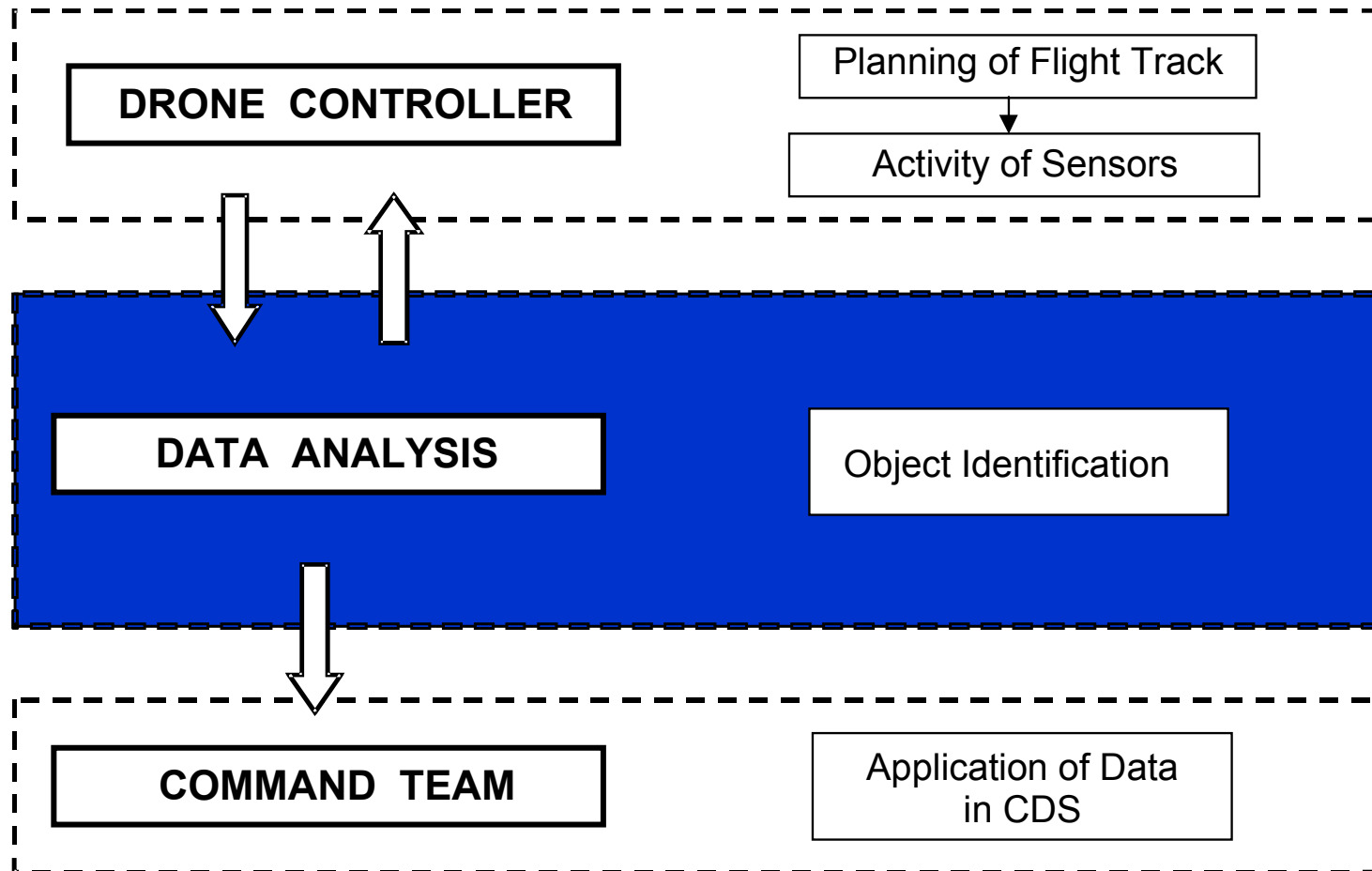## The new german Corvette Class K 130 with Navy Drone

Introduction

Basic conditions:

- increasing needs for reconnaissance

- why surface reconnaissance with „Marinedrohne" ?

    -> discontinuous sight in coastal areas

    -> high density of civil and military targets

    -> usage of maximum weapon range

    -> camouflage of own position while reconnoiter

- „Marinedrohne" with 2 sensors (EO and ISAR)

- reconnaissance results as graphical material
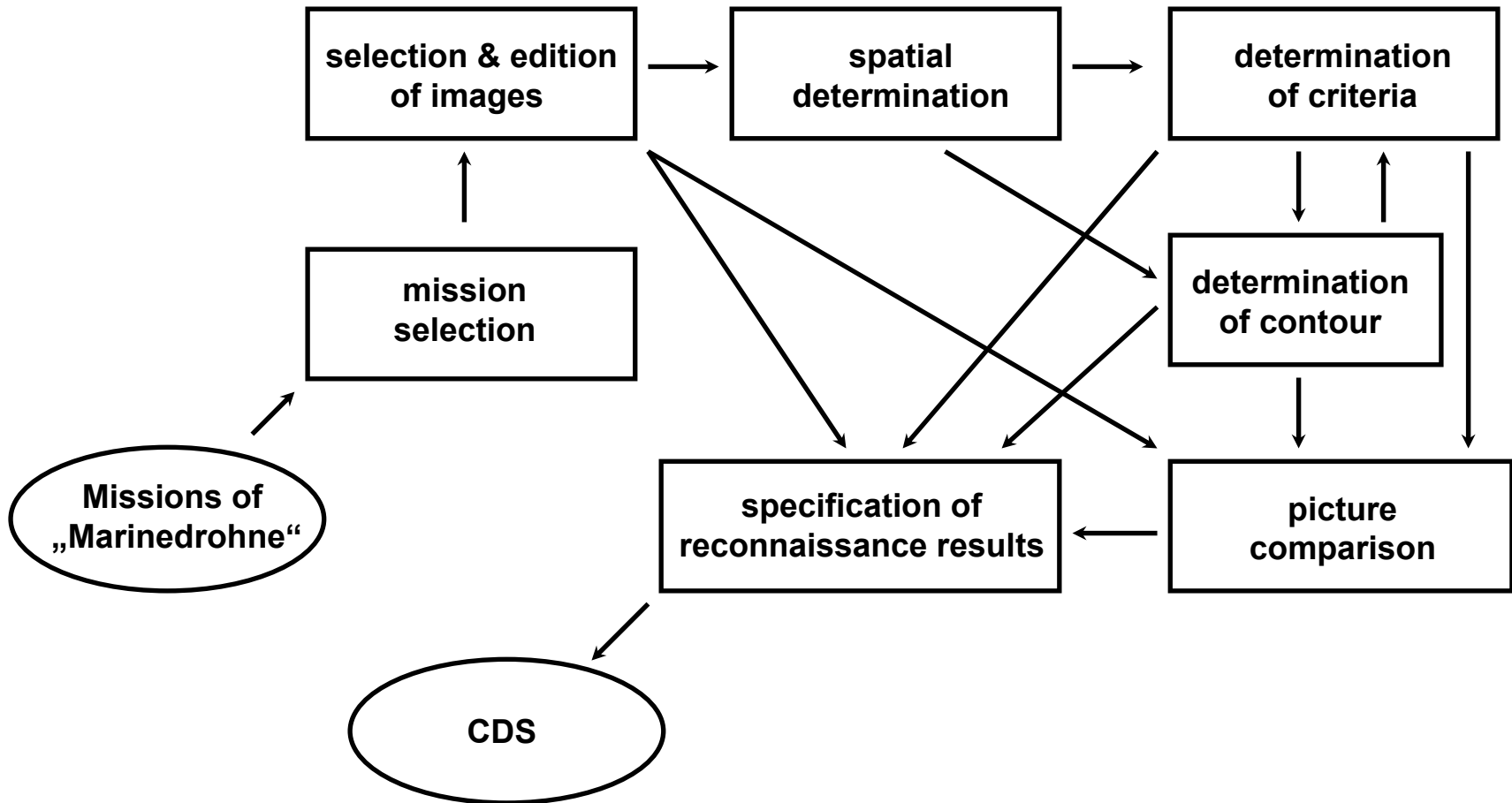
- supporting interpretation and implementation

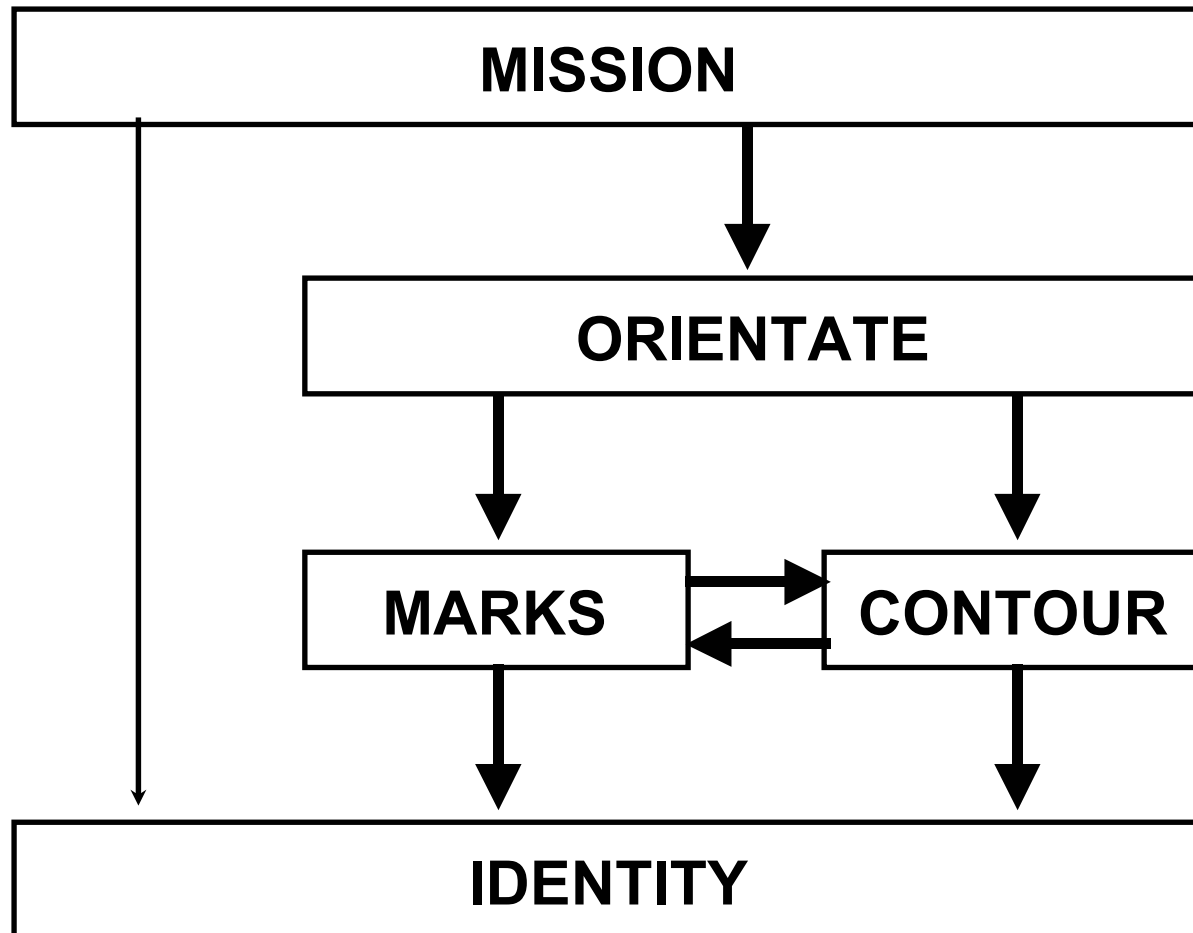# Concept, Design, Realization

Process Environment

DRONE CONTROLLER

Planning of Flight Track

Activity of Sensors

DATA ANALYSIS

Object Identification

COMMAND TEAM

Application of Data in CDS

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Concept, Design, Realization

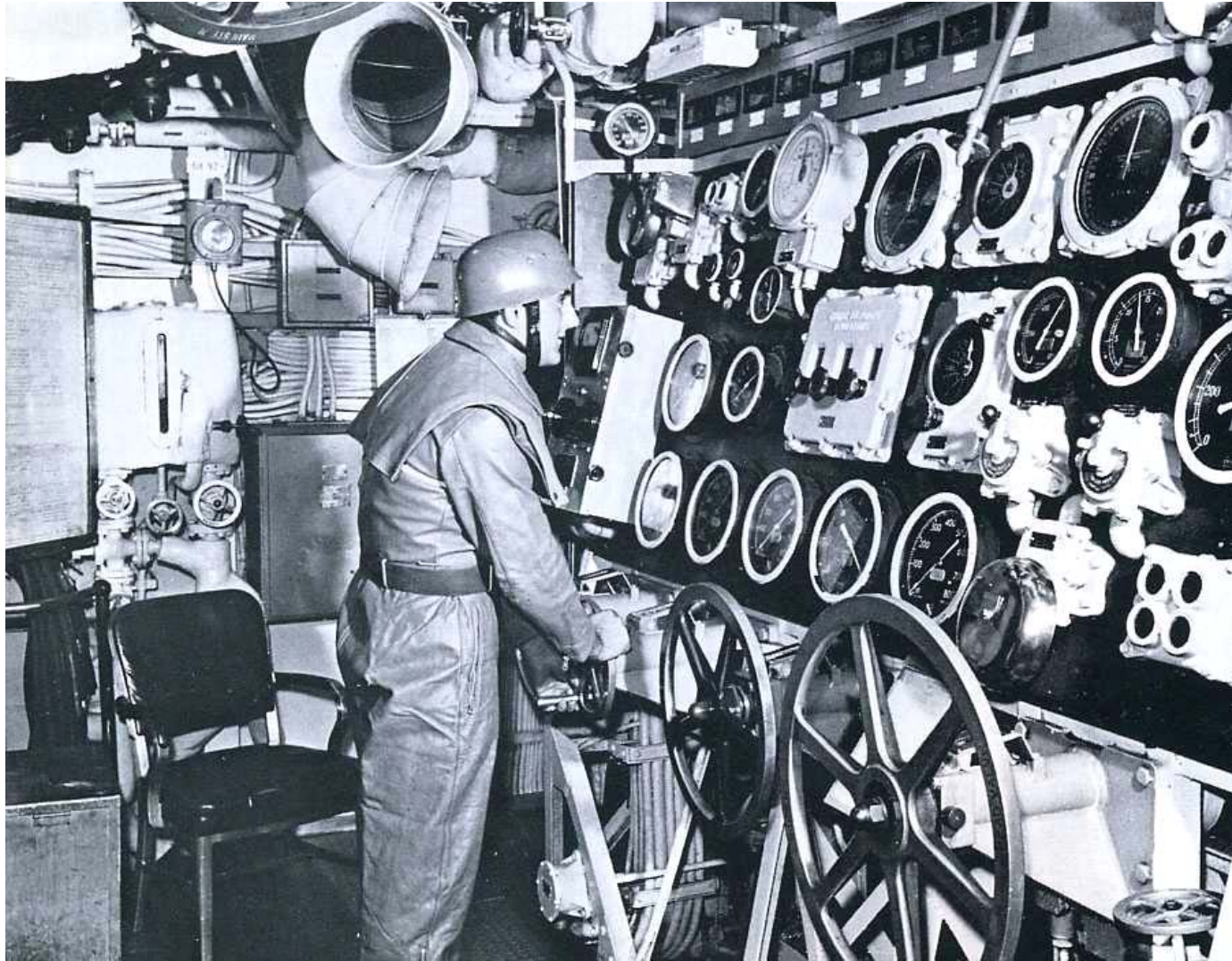## Process Structure

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Concept, Design, Realization

Realization Process States

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Version 0.1

GUI Process State „Mission"

database area

control/ status area

picture area

disposal area

RDA

- AIR
- LAND
- SEA

MIS	9902 270845 Z FEB	
BRG	123 DG	ORIENTATE
DST	80 NM	
CRS	247 DG	CONTOUR
SPD	80 KN	
HGHT	340 FT	MARKS
LAT	23 45,6N	
LNG	123 45,6W	IDENTITY

SAVE   DELETE

EO

ISAR   08:45

09:39:20

12:32

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GUI Process State „Orientate"

database area

picture area

control/ status area

RDA

- AIR
- LAND
- SEA
  - AIRCRAFT-CARRIER
  - AUXILARIES
  - COAST-GUARD/CUSTOM/POLICE/SAR
  - CORVETTE
  - CRUISER
  - DESTROYER
  - FRIGATE
  - ICEBREAKER
  - LANDING/AMPHIBIOUS
  - MINE-WARFARE
  - PATROL
  - RESEARCH-SHIP
  - SUBMARINE
  - TRAINING-SHIP

MIS	9902 270845 Z FEB
BRG	123 DG
DST	10 NM
CRS	247 DG
SPD	80 KN
HGHT	12340 FT
LAT	23 45,6N
LNG	123 45,6W

ORIENTATE MARKS CONTOUR IDENTITY

SAVE 09:34:35_EO DELETE

EO ISAR

09:34:35

08:45   12:32

◀ X ▶   ◀ Y ▶   ◀ Z ▶   RESET

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GUI Process State „Marks"

database area

picture area

control/ status area

GUI Process State „Contour"

database area

picture area

control/ status area

GUI Process State „Identity"

database area

picture area

identification results

control/ status area

disposal area

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Evaluation

- **concept of test procedure (efficiency)**

  – **homogeneous collective incl. high expert knowledge**

  – **similar test conditions**

  – **list of questions with ratingscales and text queries**

- **experimental tests**

  – **10 test subjects (long served navy officers)**

  – **working on scenario (approx. 1h)**

  – **questionnaire**

Two-Level Sequential-Judgement Scale

Rating of Controllability

With the following scale you should rate the controllabilty of the system you just worked with. Please judge whether the controllability was low, adequate, or high and mark the correct box below with an X. Then follow the arrow below.

☐ LOW   ☐ ADEQUATE   ☐ GOOD

Now rate carefully, exactly how you would rate the controllabilty of the system.

Record your rating by marking anywhere on the line, on or between the scale marks.

Now consider carefully, whether the controllability is exactly adequate or more in the direction towards low or high.

Record your rating by marking on the line, on or between the scale marks.

Now rate carefully, exactly how you would rate the controllabilty of the system.

Record your rating by marking anywhere on the line, on or between the scale marks.

| very low | rather low | somewhat low | barely low | neither low nor high | barely high | somewhat high | rather high | very high |

0 1 2 3 4 5 6 7 8 9 10

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Ratingscale Results

Suitabilty for the task: low: **0**   adequate: **0**   high: **10**

Self-descriptiveness: low: **0**   adequate: **2**   high: **8**

Controllability: low: **0**   adequate: **0**   high: **10**

Conformity: low: **0**   adequate: **0**   high: **10**

Error tolerance: low: **0**   adequate: **0**   high: **10**

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Results of Questionnaire

- comments on minor details only

- ...

- no comments concerning system structure

- ...

- „system very good and easy to handle"

- „system supports goal-oriented task processing"

- „usage of greyscales minimises distraction"

- „coloured timemarker supports orientation on timeline"

- „path-structure enables good orientation in database"

Optimization of Details

- **more clearly arrangement of filenames**

- **warning before deletion of files**

- **RESET function for brightness and contrast**

- **fast forward and rewind on timeline**

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Conclusions

- **support system highly required**

- **developed support system is efficient**

- **support system is independent from sensors**

- **support system is independent from platform**

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