

**USER SUPPORT SYSTEM**  
**FOR IMAGE ANALYSIS**  
**AND OBJECT IDENTIFICATION**

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# SURVEY

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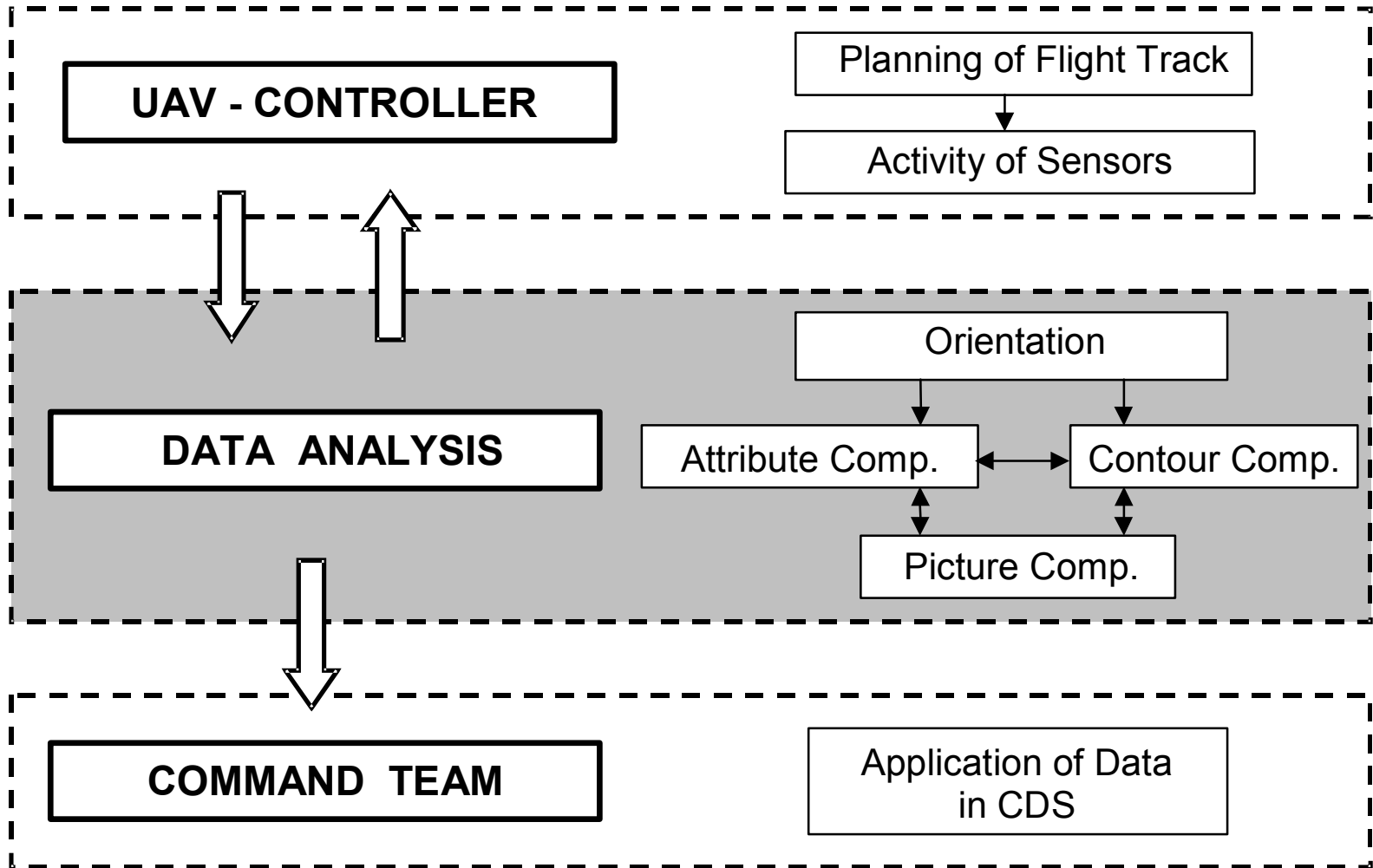
- Introduction
- Design of the User Support System
- Realization of the User Support System
- Evaluation of the User Support System
- Conclusion
- Further Steps

# INTRODUCTION

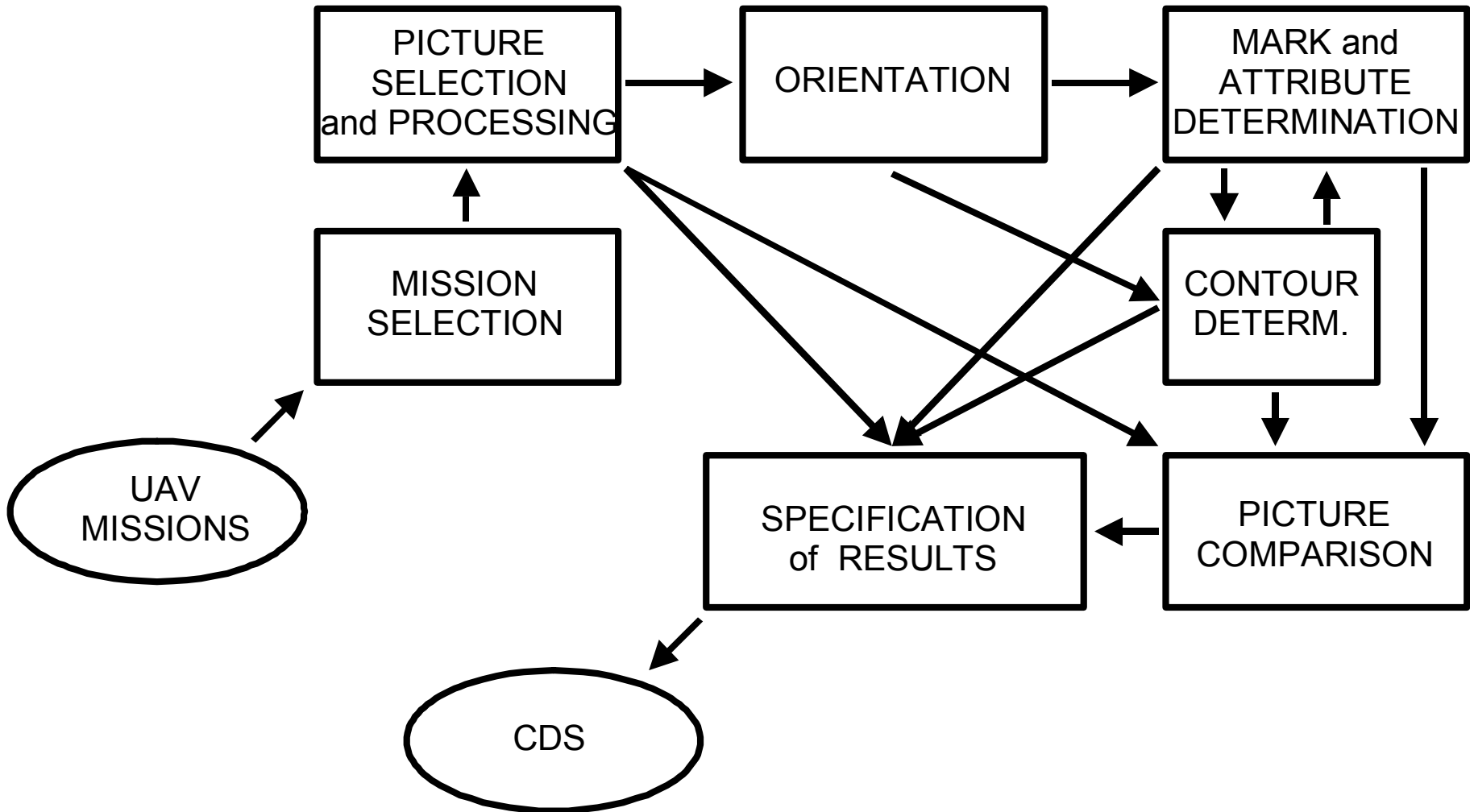
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- Importance of Reconnaissance is growing for German Navy
- Surface Reconnaissance with UAV
  - Jagged Coastlines cut off Lines-of-Sight
  - High Density of civil and military Objects
  - Passive Sensors avoid Provocations
- UAV with 2 Sensors (EO and ISAR)
- Results of Reconnaissance as Pictures or Sequences
- Classification by comparing characteristic Marks and Contour with Database
- Identification by comparing Sensor-Pictures with Database-Pictures
- User Support for Classification and Identification
- User Support by an Ergonomic Operating Concept and User Interfaces

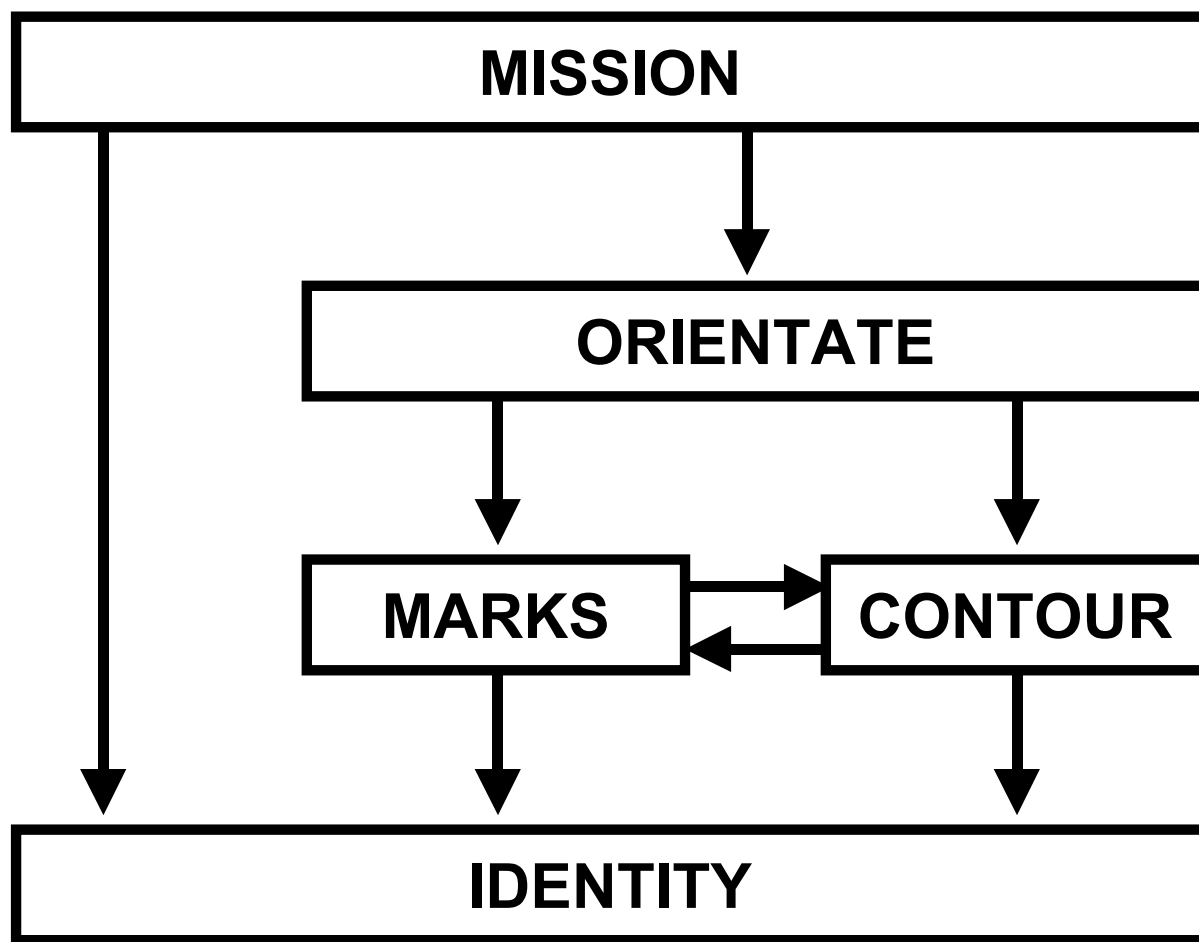
# PROCESS ENVIRONMENT



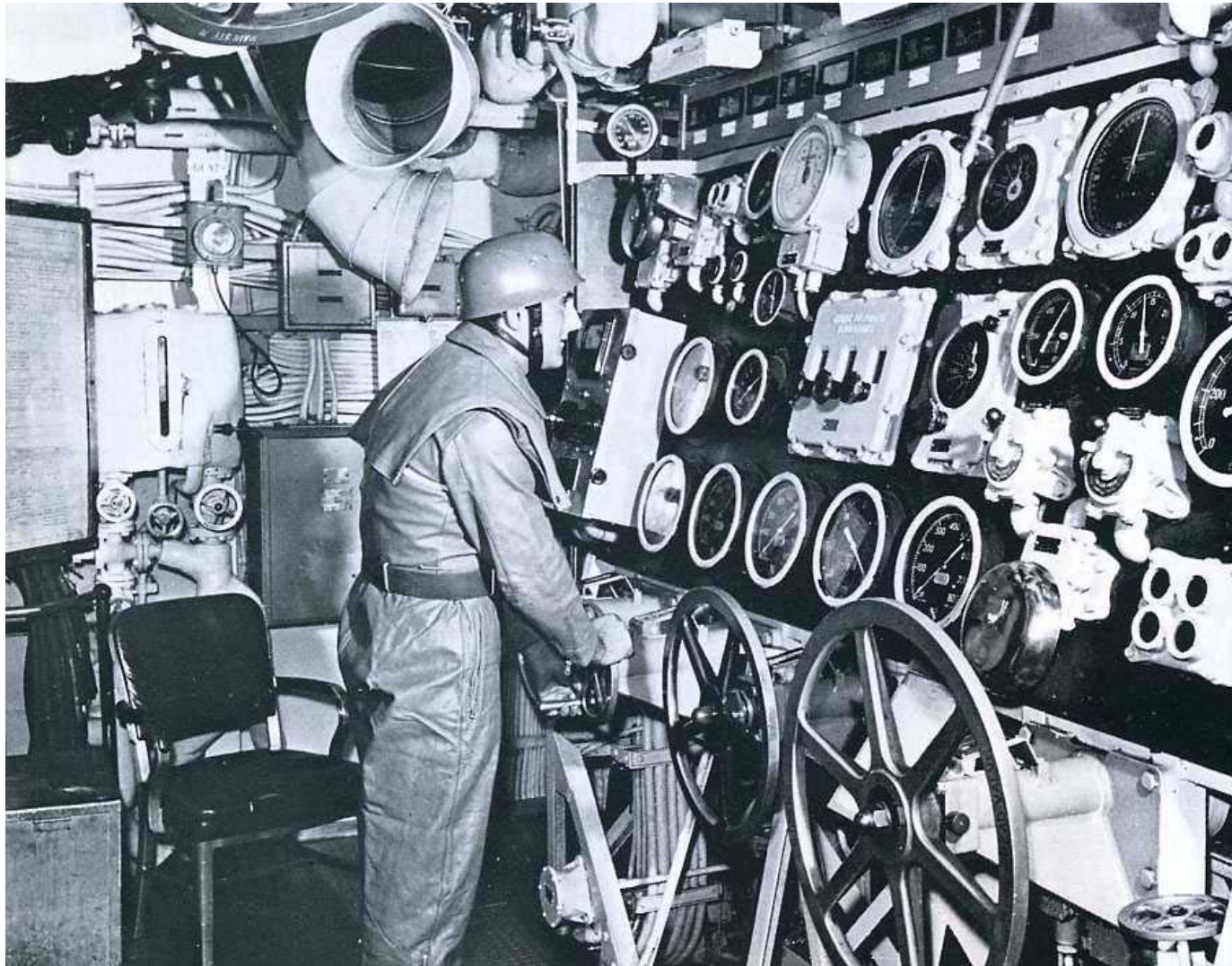
# PROCESS STRUCTURE



# PROCESS CONDITIONS AND TRANSITIONS



# VERSION 0.0



# GUI DURING PROCESS CONDITION MISSION

Database - Area

Control - and  
Status - Area

The screenshot displays the RDA (Remote Data Acquisition) GUI. On the left is a database area with a tree view containing 'AIR', 'LAND', and 'SEA'. The bottom-left corner features a control and status area with a table of parameters and several control buttons. The right side of the GUI is dominated by two image windows. The top window shows a clear image of a ship at sea, while the bottom window shows a pixelated, processed version of the same ship. A blue arrow points from the bottom image window towards the control area.

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

Buttons: SAVE, DELETE, EO, ISAR

Timeline: 08:45 | 09:39:20 | 12:32

Picture - Ar

Disposal - Ar



# GUI DURING PROCESS CONDITION IDENTITY

Database - Area

Database - Area

Picture - Area

Disposal - Area

Control - and Status - Area

SEA	143B-ALBATROS GER	143B-ALBATROS GER
AIRCRAFT-CARRIER		
AUXILIARIES	143B-ALBATROS GER	
COAST-GUARD/CUSTOM/POLICE/SA		
CORVETTE		
CRUISER		
DESTROYER		
FRIGATE		
ICEBREAKER		
LANDING/AMPHIBIOUS		
MINE-WARFARE		
PATROL		
143A-GEPARD GER		
143B-ALBATROS GER		
148-TIGER GER		
TYP-57 GER		
CYCLONE USA		
RESEARCH-SHIP		
SUBMARINE		
TRAINING SHIP		

ID	TYP-57	GER
TRACK	143A-GEPARD	GER
AREA	143B-ALBATROS	GER
TYP	148-TIGER	GER
CLASS	CYCLONE	USA
NAT	TICONDEROGA	USA
NAME	333-ENSDORF	GER
HULL	332-FRANKENTHAL	GER

270845 Z FEB	MARKS
BRG 123 DG	LAUNCHER
DST 90 NM	UNKNOWN 1
CRS 247 DG	GUN 1
SPD 20 KN	
HGHT 0 FT	
LAT 23 46,4N	NOTES
LNG 123 44,3W	LENGTH 57 M

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

SAVE 09:39:20\_EO\_OCM I DELETE

EO ISAR 08:45 09:39:20 12:32

Control - and Status - Area

# EVALUATION OF THE USER SUPPORT SYSTEM

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- Design of a Test Procedure (Performance)
  - Homogeneous Collective with high Level of Education/Training
  - Same Test Conditions for all Subjects
  - Questionnaire with Rating-Scale (ZEIS) and List of Questions
- Experimental Tests
  - 10 experienced Navy Officers
  - Processing a realistic Navy Scenario
  - Processing the Questionnaire

# EVALUATION AND OPTIMIZATION

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- Analysis of Results
  - Rating-Scales (ZEIS)
  - List of Questions
  
- Optimization of the User Support System
  - Structure/Concept of the User Support System
  - Details of the User Support System

# RATING - SCALE (ZEIS)

**Selbstbeschreibungsfähigkeit**

Mit der folgenden Skala sollen Sie beurteilen, ob Sie zu jeder Zeit über den Systemstatus informiert waren und ihnen klar war, welche Eingaben oder Reaktionen von Ihnen erwartet wurden. Beurteilen Sie zunächst grob (wenig, angemessen oder gut), machen Sie in dem entsprechenden Kästchen ein Kreuz und folgen Sie dann dem nach unten weisenden Pfeil.

wenig                       angemessen                       gut

↓                                      ↓                                      ↓

wenig

Beurteilen Sie bitte, für wie wenig Selbstbeschreibungsfähig Sie das System empfunden haben. Durchkreuzen Sie die Skala - auch zwischen den Markierungen - mit einem Strich.

angemessen

Beurteilen Sie bitte, ob Sie Ihre Bewertung genau auf die Mitte oder an eine andere Stelle der Skala legen. Durchkreuzen Sie die Skala - auch zwischen den Markierungen - mit einem Strich.

gut

Beurteilen Sie bitte, für wie gut Selbstbeschreibungsfähig Sie das System empfunden haben. Durchkreuzen Sie die Skala - auch zwischen den Markierungen - mit einem Strich.

sehr wenig    ziemlich wenig    etwas wenig    eher wenig als gut    weder wenig noch gut    eher gut als wenig    etwas gut    ziemlich gut    sehr gut

0    1    2    3    4    5    6    7    8    9    10

# ANALYSIS RATING - SCALE

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**Suitability for the Task:** low: 0 adequate: 0 high: **10**

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

**Cotrollability:** low: 0 adequate: 0 high: **10**

**Conformity with User Expectations:** low: 0 adequate: 0 high: **10**

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

# ANALYSIS LIST OF QUESTION

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- Criticism of Details
- ...
- No Criticism of Structure/Concept
- ...
- It is easy and uncomplicated to operate the System
- System supports a determined working on tasks
- Monochrome GUIs reduce Distraction
- Coloured Time-Marker supports Orientation on the Time-Axis

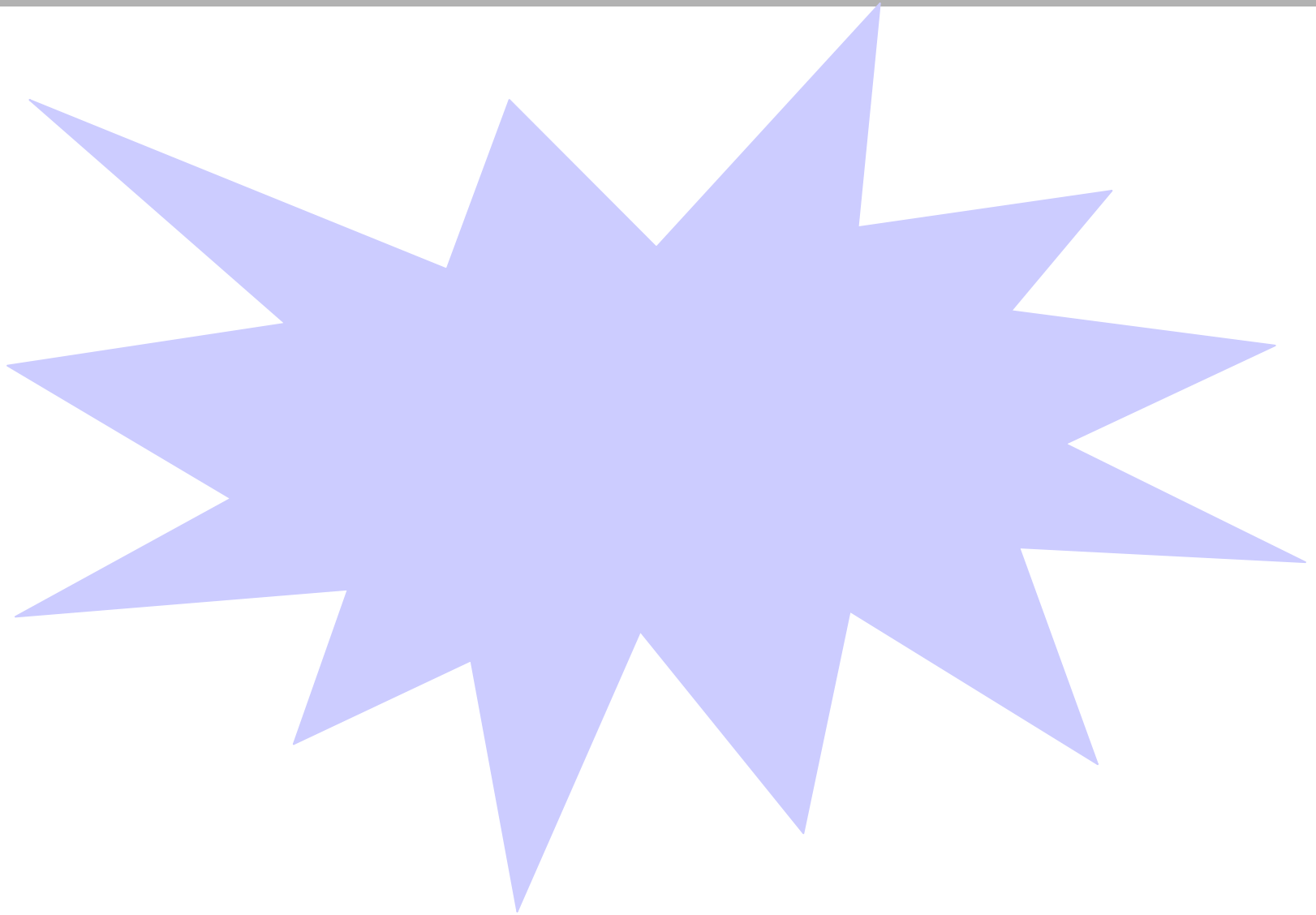
# EVALUATION AND OPTIMIZATION

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# OPTIMIZATION OF THE STRUCTURE/CONCEPT

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# OPTIMIZATION OF DETAILS

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- Optimized Clarity for the Names of the Data Files (M-O-C-M-I)
- Warning (Window) before Deleting Data Files (M-O-C-M-I)
- RESET-Functionality for Brightness and Contrast of Pictures (M-O-C-M)
- Fast Forward and Reverse Running on the Time-Axis (MISSION)
- Optimized Positioning of the Ship-Model (ORIENTATE)

# CONCLUSION

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- User Support System is necessary
- User Support System is efficient
- User Support System is independent of the Kind of Sensors
- User Support System is independent of the Kind of Platform

# FURTHER STEPS

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- Evolutionary Development of the GUI
- Independance of specific Sensors
- Design and Integration of (partial-)automatic Method to outline the Contour
- Expansion of Functionalities
- Realization of operationally ready System

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THANK YOU