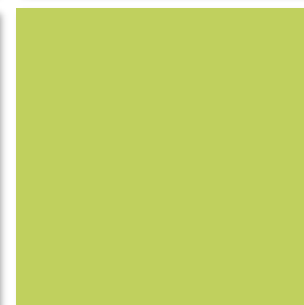
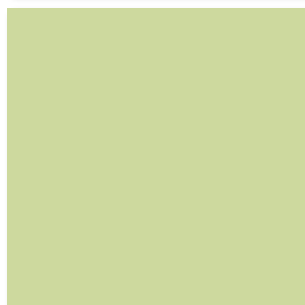


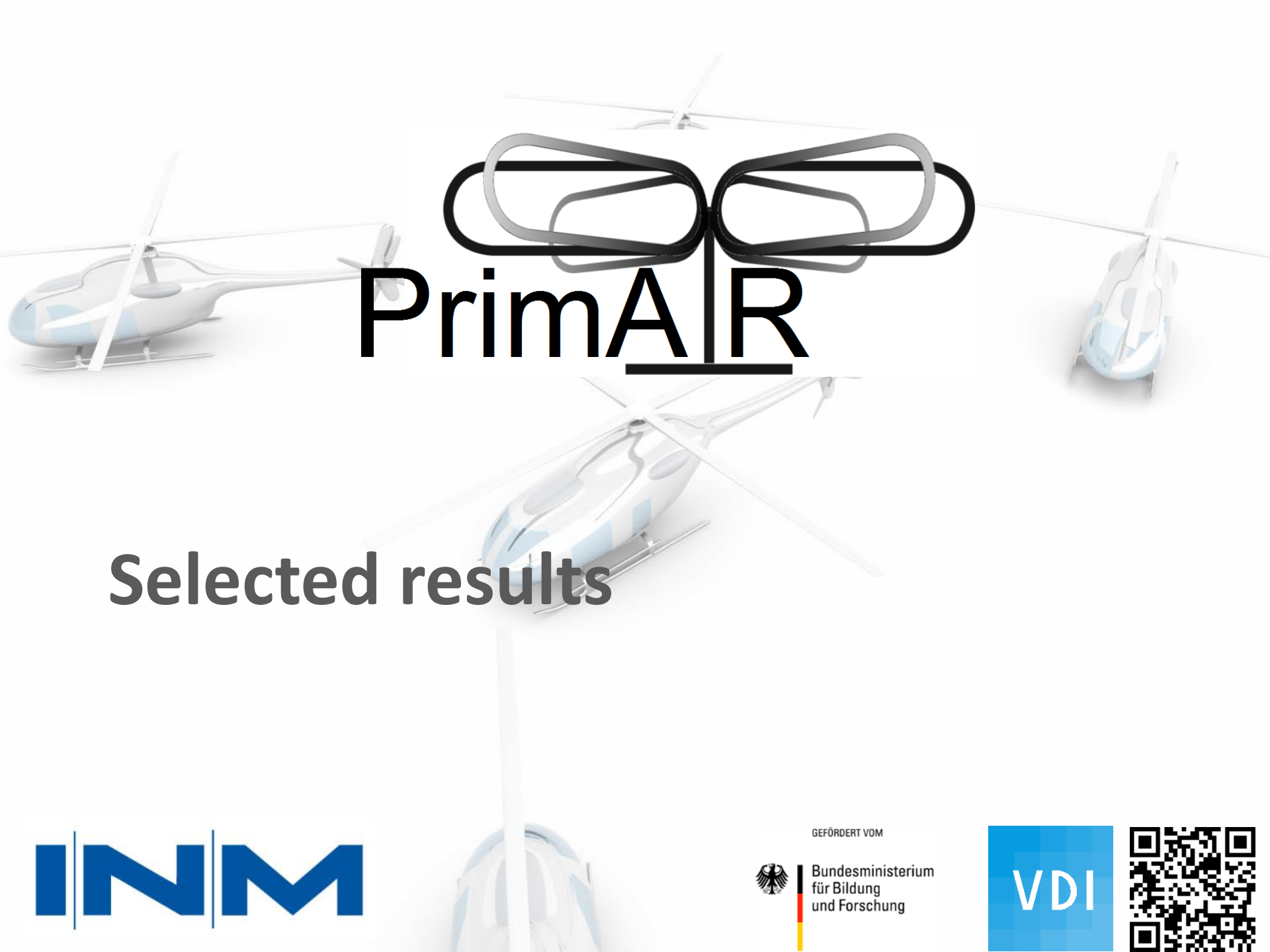
PRIMAIR – RESULTS AND CONCLUSIONS

EUPHOREA MUNICH, 7.-8. November 2016

S. Prückner, INM – Institut für Notfallmedizin und Medizinmanagement

Klinikum der Universität München





PrimAIR

Selected results



GEFÖRDERT VOM



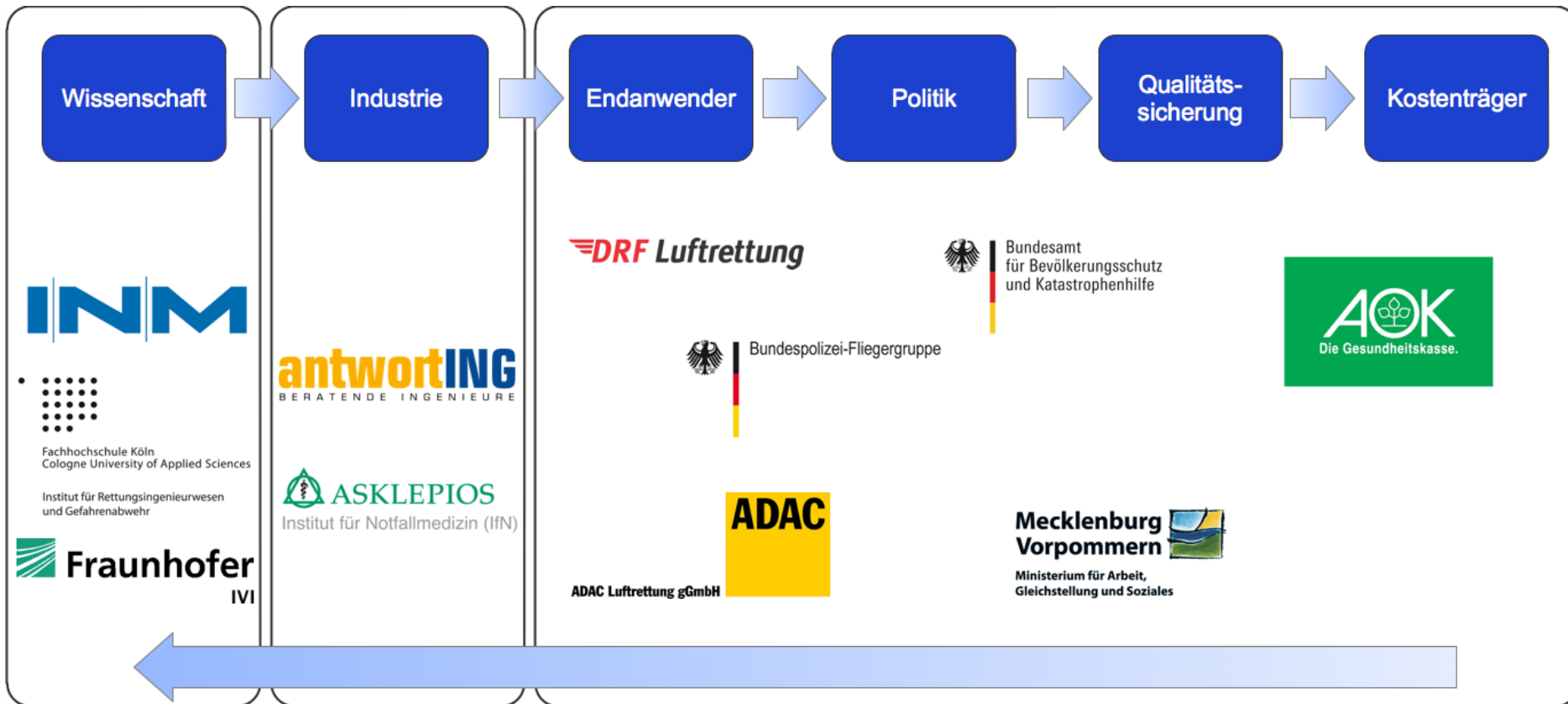
Bundesministerium
für Bildung
und Forschung



Consortium – the Team



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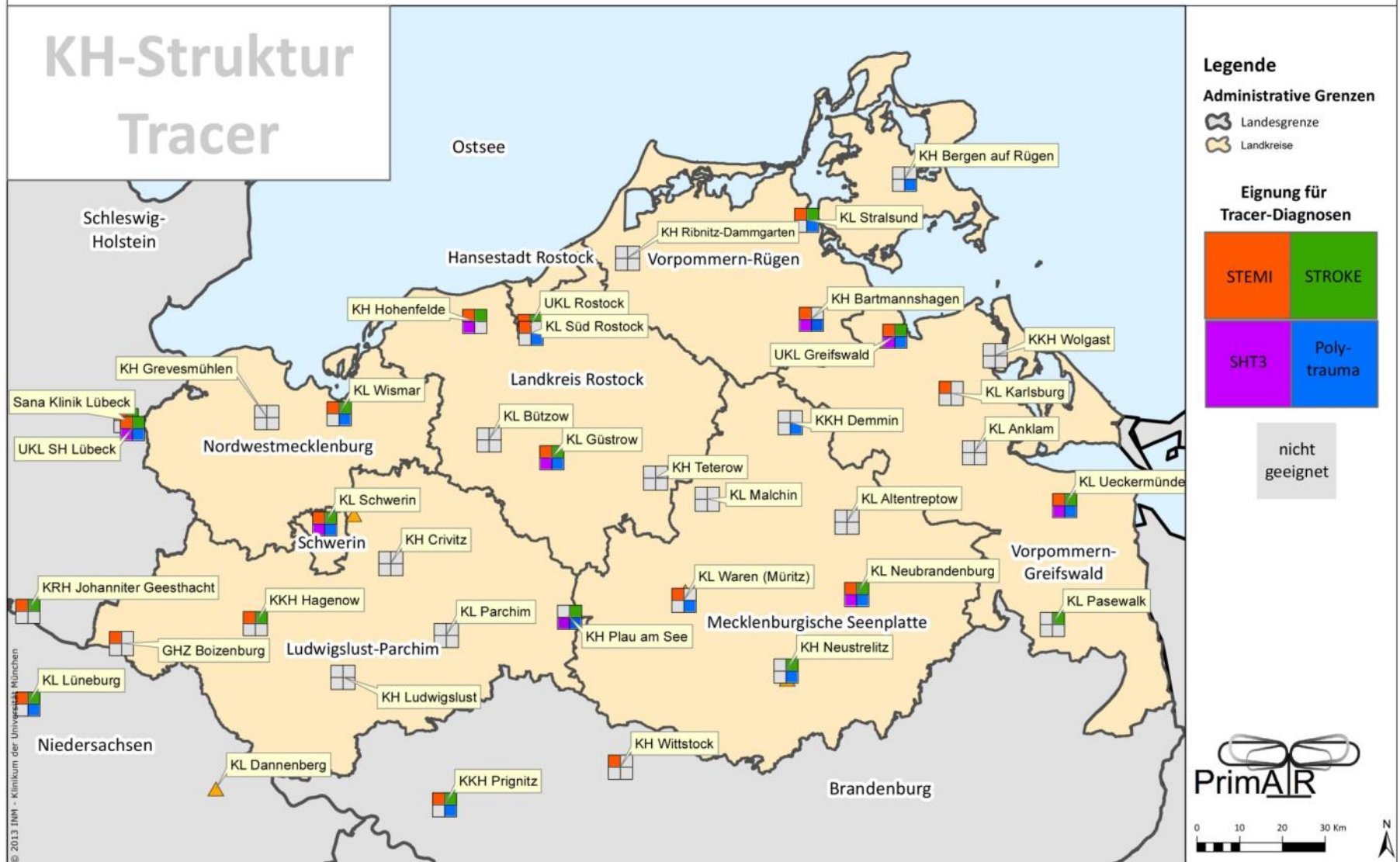
- Basic Parameters
 - Model Region Mecklenburg- Westpommern
 - Demography
 - Meteorology
 - Emergency count
 - Hospital structure
 - Landing site situation
 - Financing

Imagine 2026...

- Why Mecklenburg- Westpommern?
 - rural / structurally weak
 - declining / ageing population
 - specialisation / tapering of hospitals
 - lack of medical specialists/lack of specialized medical personnel
 - sparsely populated
 - **trailblazer in demographic change**

Krankenhausstruktur Mecklenburg-Vorpommern und Eignung für Tracer-Diagnosen

Datenquelle: Erhebung der Krankenhausinfrastruktur im Rahmen des Projektes PrimAIR; Stand 11/2013

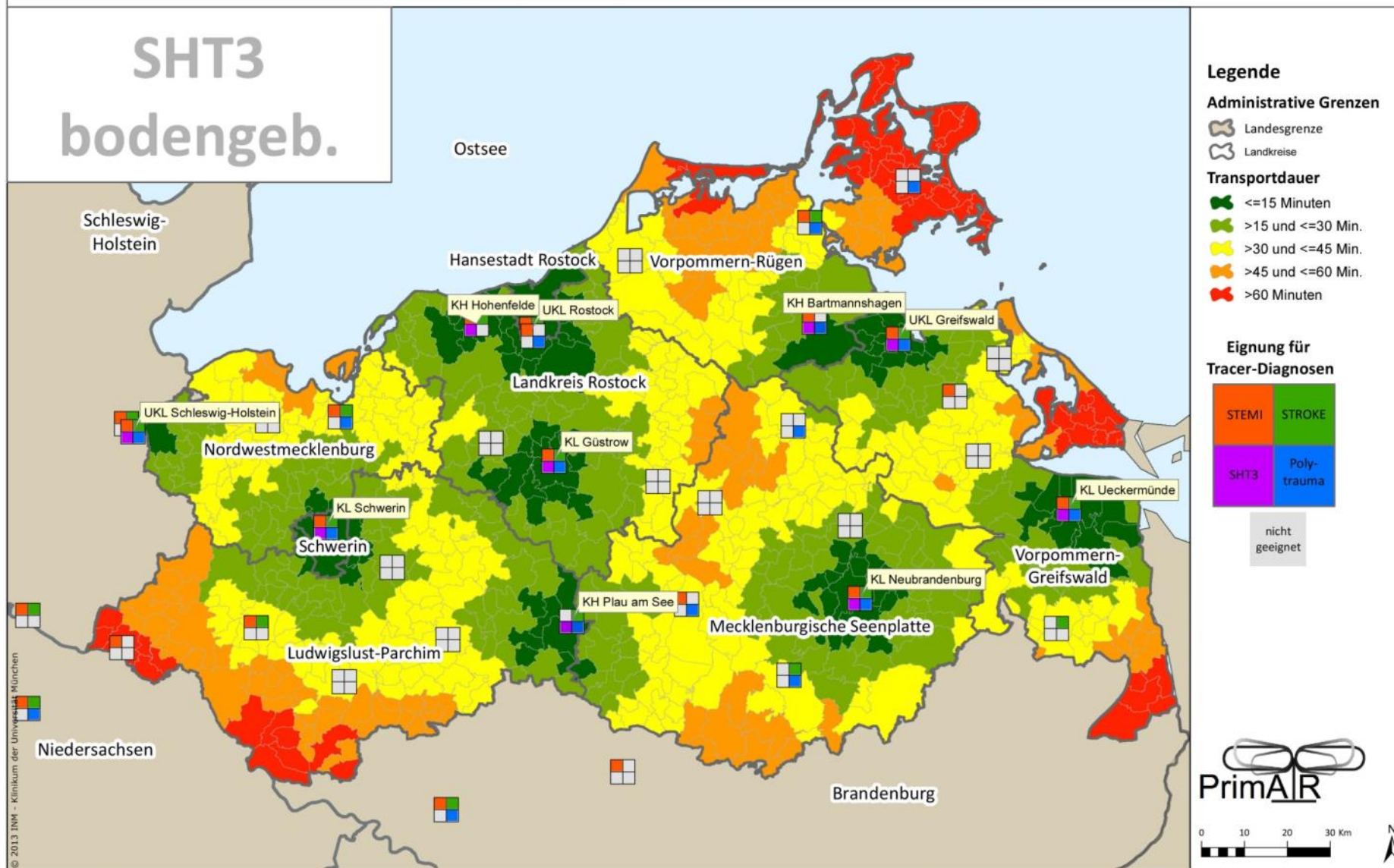


Fahrzeit RTW in das nächstgelegene geeignete Krankenhaus: Tracer SHT3

Datenquelle: Erhebung der Krankenhausinfrastruktur im Rahmen des Projektes PrimAIR; Stand 11/2013

Fahrzeit pro Gemeinde mit Sondersignal in das nächstgelegene geeignete Krankenhaus

Routinganalyse im kategorisierten Straßennetz, Quelle: ATKIS 2012



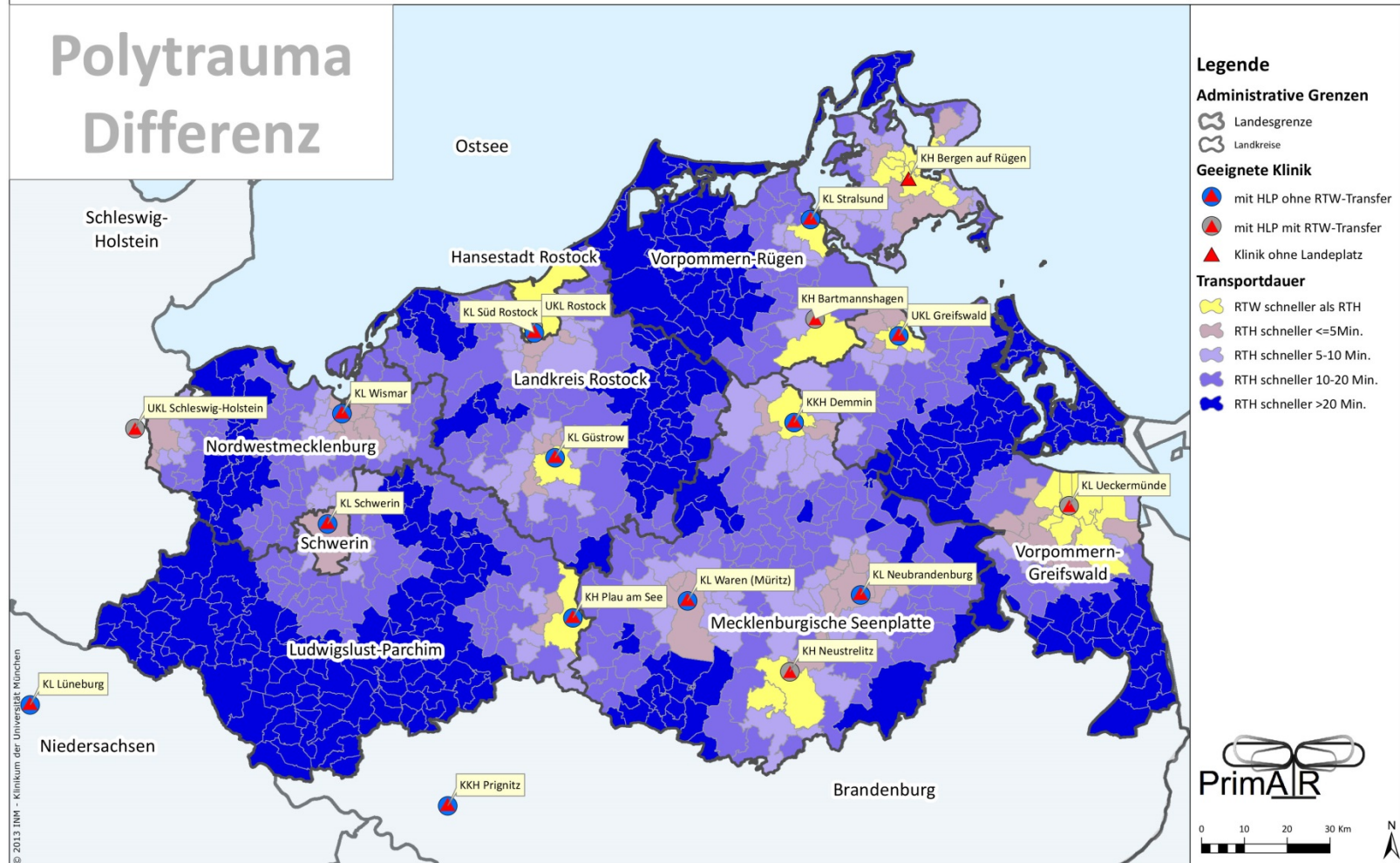
Differenz der Transportdauer mit RTW vs RTH in die nächstgelegene Klinik: Tracer Polytrauma

Datenquelle: Erhebung der Krankenhausinfrastruktur im Rahmen des Projektes PrimAIR; Stand 11/2013

Fahrzeit RTW: Routinganalyse über das kategorisierte Straßennetz

Flugdauer RTH: Sofern erforderlich inklusive 7 Minuten RTW-Transfer Kliniklandeplatz zur Notaufnahme

Polytrauma Differenz



PrimAIR: Die PrimAIR-Luftrettung als Zukunft der Notfallrettung im dünn besiedelten Raum (2016)
ISBN 978-86460-257-3

KLINIKUM DER UNIVERSITÄT MÜNCHEN®

INSTITUT FÜR NOTFALLMEDIZIN
UND MEDIZINMANAGEMENT

Paradox of emergency rescue

- daytime: highly differentiated network for care (ground and airborne, centres, certification standards etc.)
- At night: limited functionality of structures, reduction to ground based system

Challenges



- Helicopters have to be able to fly any time
 - night time
 - bad weather
 - bad sight
 - landing at hospital
 - landing near emergency site

Definition night flight

- Flights in the time in between half an hour past sunset and half an hour before sunrise

LuftVO § 2



Challenges

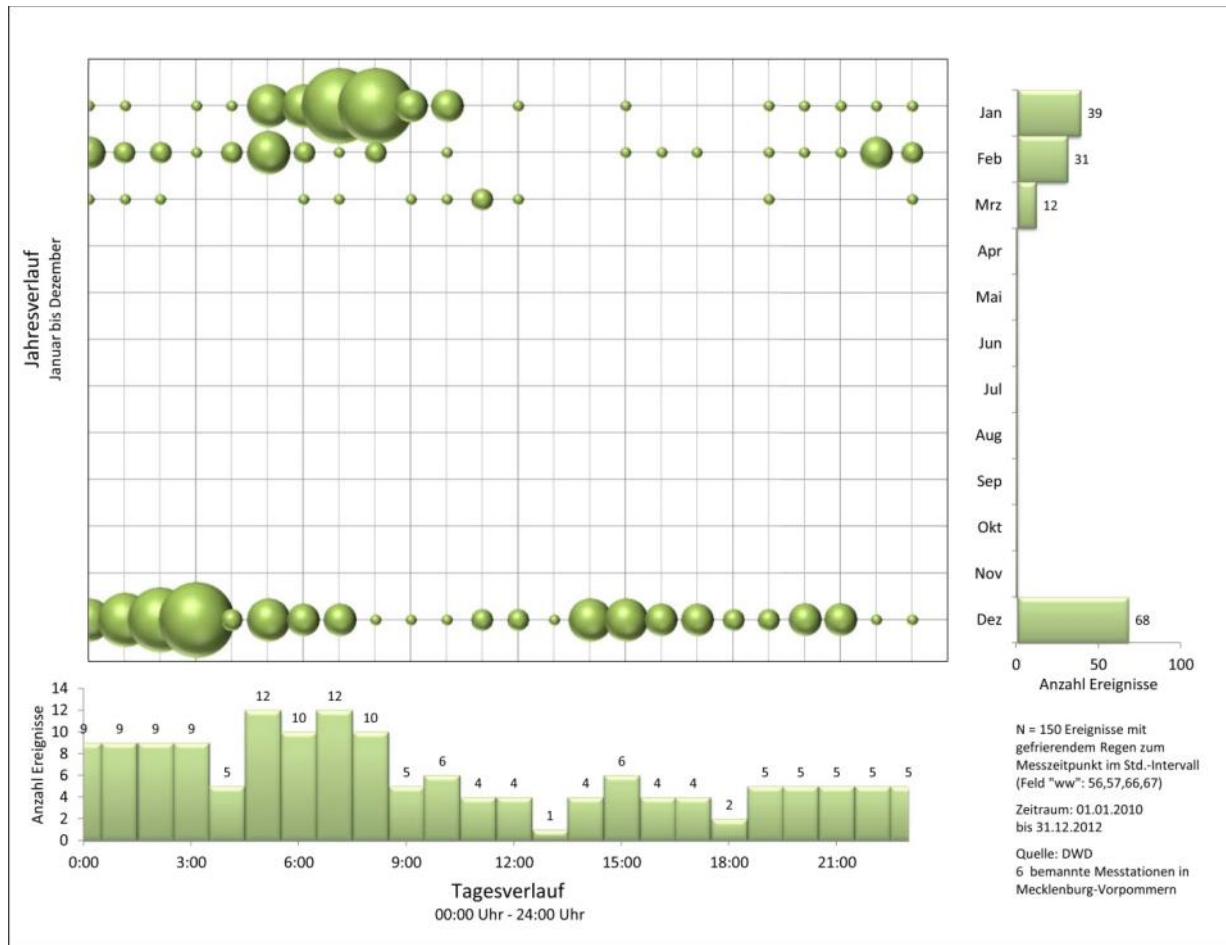


- adaptation infrastructure
 - air rescue base
 - landing sites
 - dispatch centres
- defining demands
 - helicopter model/type
 - crew composition
 - equipment



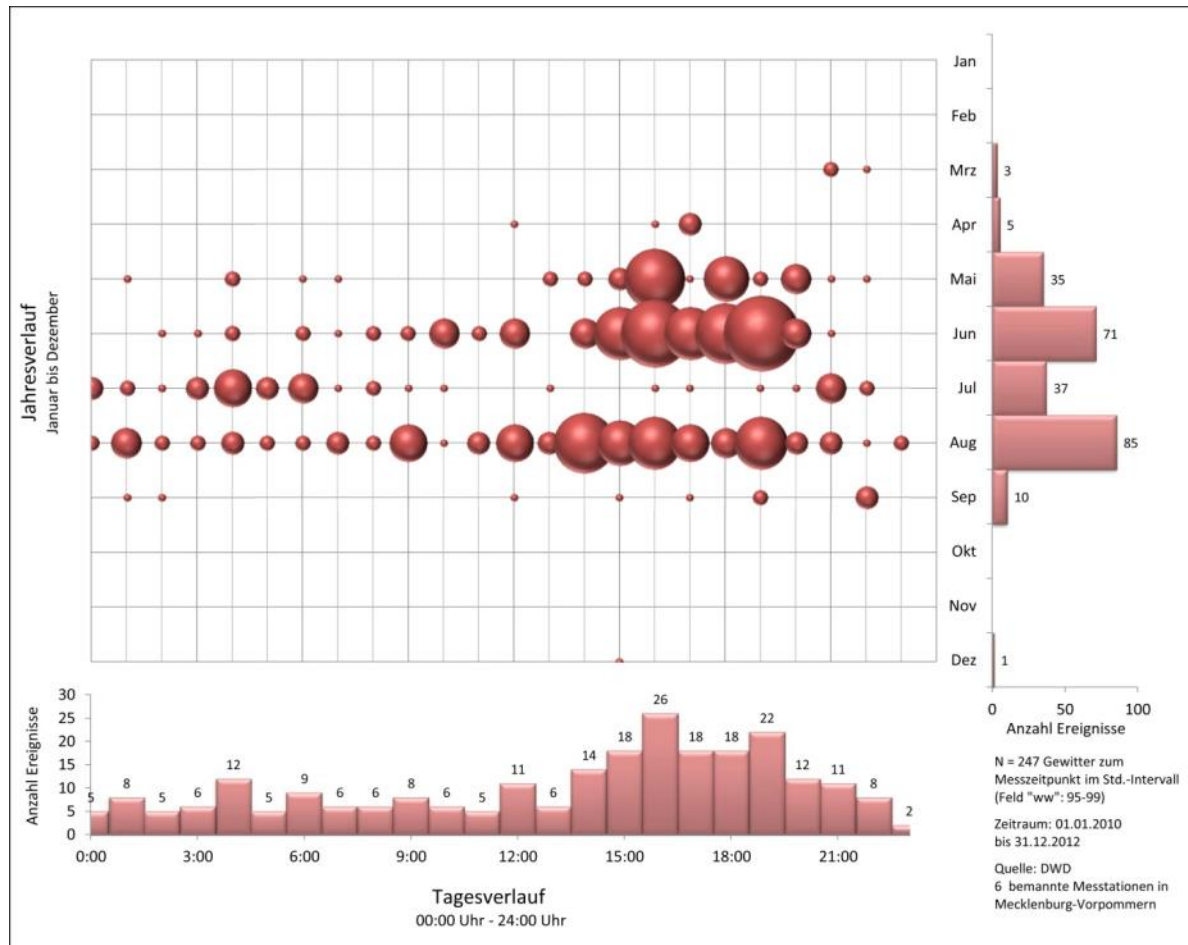
Meteorology

freezing rain

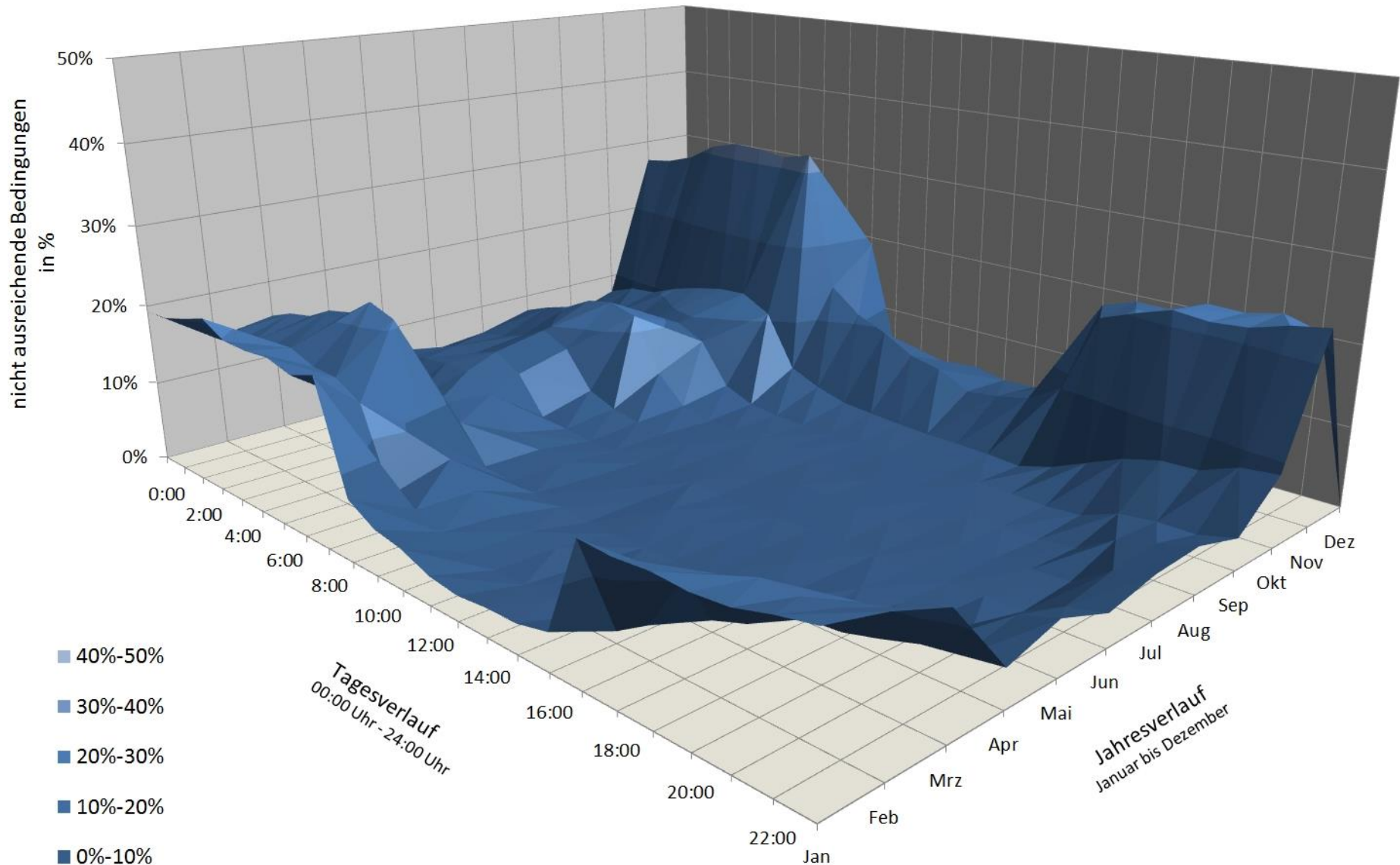


Meteorology

thunder storms/lightning



Insufficient visual flight conditions for rescue flights according to JAR-OPS 3



Meteorology

summary



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-
- bad weather conditions impede an airborne mission in 5,6% of emergencies (n = 161.267 emergencies)
 - during daytime this number is 2,4% and at night time it is 12,1%

The weather will also impede airborne rescue missions in the future.

- technical innovations support night flight and orientation in low visibility conditions
- freezing rain and thunder/lightning are issues that can only be dealt very limited even with modern technical equipment

- Difference for landing at:
 - hospital (airfield)
 - emergency site (landing site)
- landing at emergency site
 - known landing sites vs. ad-hoc
 - illumination at night
 - obstacle situation

Airfield situation

derivation data base



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-
1. definition of potential landing obstacles
 2. extraction of relevant obstacles from existing data
 3. development of method to identify landing sites
 4. definition of possible landing sites

Airfield situation

Data sources

- ATKIS (LAIv – department for geoinformation)
 - Vegetation, housing, traffic routes etc.
- infrastructure-carriers
 - e.g. power lines
- open streetmap (OSM)

Airfield situation

airfield data base

Punkte

12 Kategorien – 33.523 Objekte
Bsp.: Turm, Schornstein, Windrad

Linien

12 Kategorien – 45.174 Objekte
Bsp.: Stromleitungen, Straßen,
Schienen

Flächen

45 Kategorien – 146.703 Objekte
Bsp.: Gewässer, Gebäude, Wald

Hindernis-
datenbank

bekannte Landeplätze

4 Kategorien – 1.354 Objekte
Bsp.: Flughafen, Sportplatz

potentielle Landeflächen

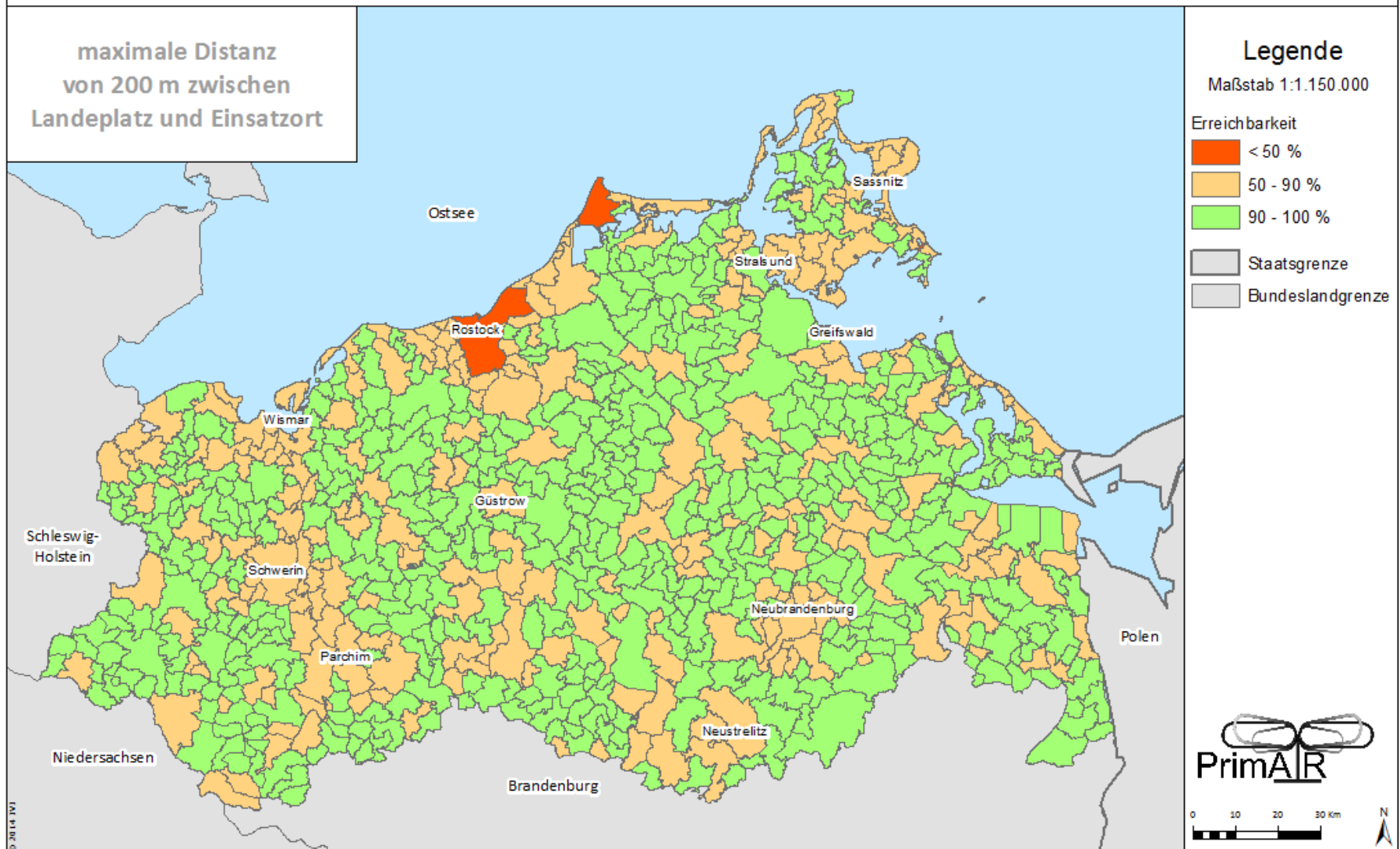
10.599 km² auf einer
Gesamtfläche von 23.180 km²

Ableitung der Landepunkte

Kriterien: Nähe und direkte
Erreichbarkeit (ohne Hindernisse)
zur Straße

Ergebnis der allgemeinen Erreichbarkeitsanalyse

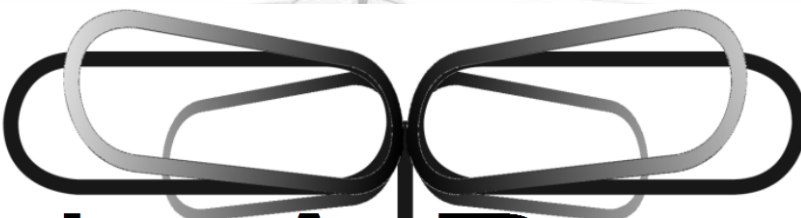
Erreichbarkeit potentieller Einsatzorte von möglichen Landeplätzen in Mecklenburg Vorpommern



Airfield situation

selected landings





PrimAIR

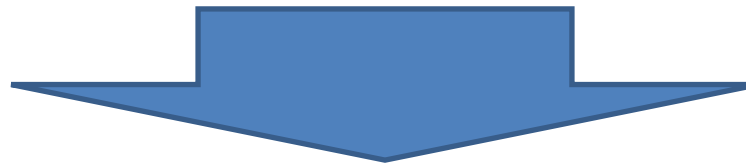
simulation of a system change



Simulation of a change in systems: PrimAIR-Szenario

status quo

On basis of real operation documentation of dispatch centres



simulation model

zero-scenario

planning-scenario

Goal parameter PrimAIR



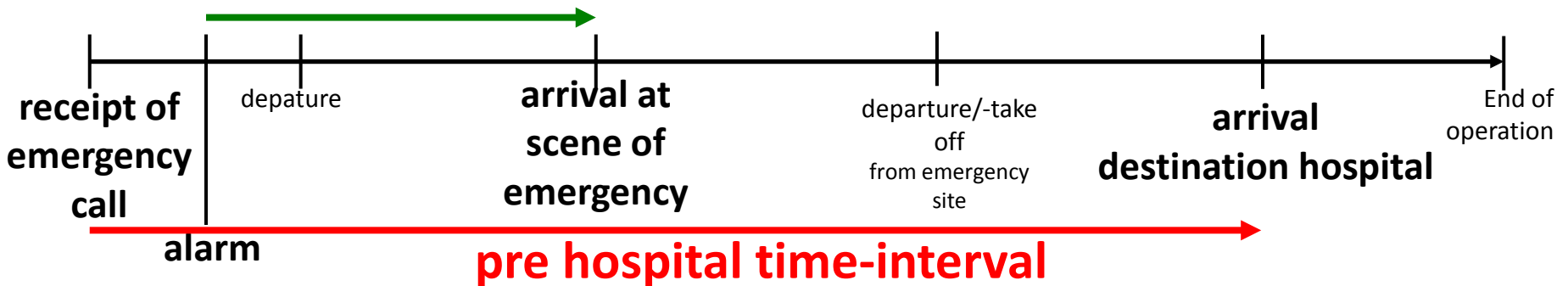
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interval to arrival

15 minutes

state wide

day and night



emergency call until arrival at destination hospital

specification for TRACER-diagnoses:

60 Minutes max

state wide day and night

specification

- no secondary call for an emergency physician.
 - 1 emergency physician; 1 HEMS-TC as „medical crew“
- high level of flight safety
- 2 pilots as „flight crew“
- day and night 2 members of each crew:



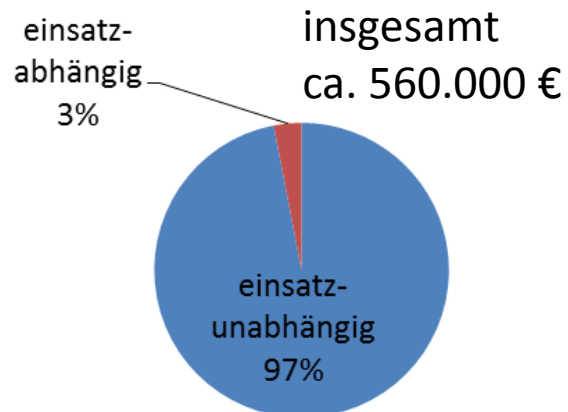
Cost of emergency rescue

exemplary calculation

One rescue base with one rescue vehicle,
1000 operations and 24/7-provision

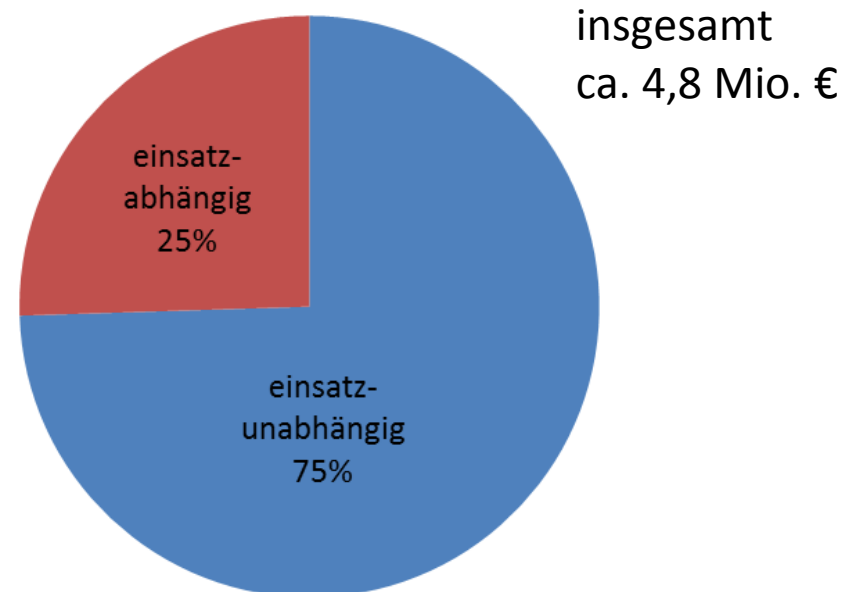
Kosten RW mit 1 RTW

(24/7-Vorhaltung und 20 km/Einsatz)



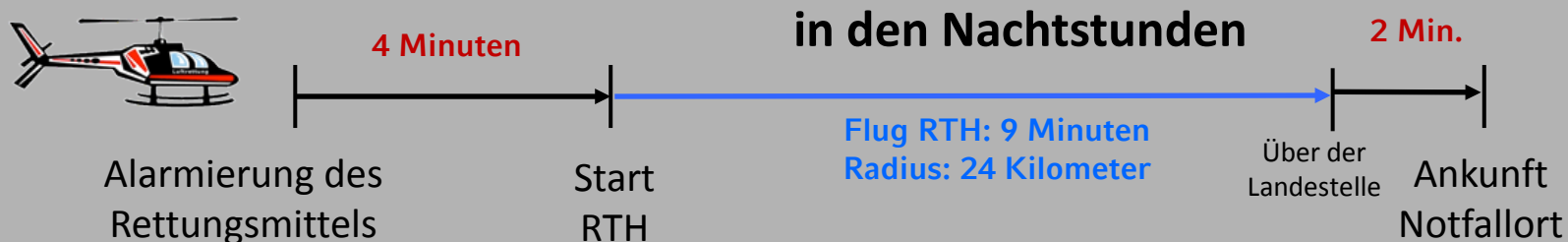
Kosten RW mit 1 RTH

(24/7-Vorhaltung und 30 Flugminuten/Einsatz)

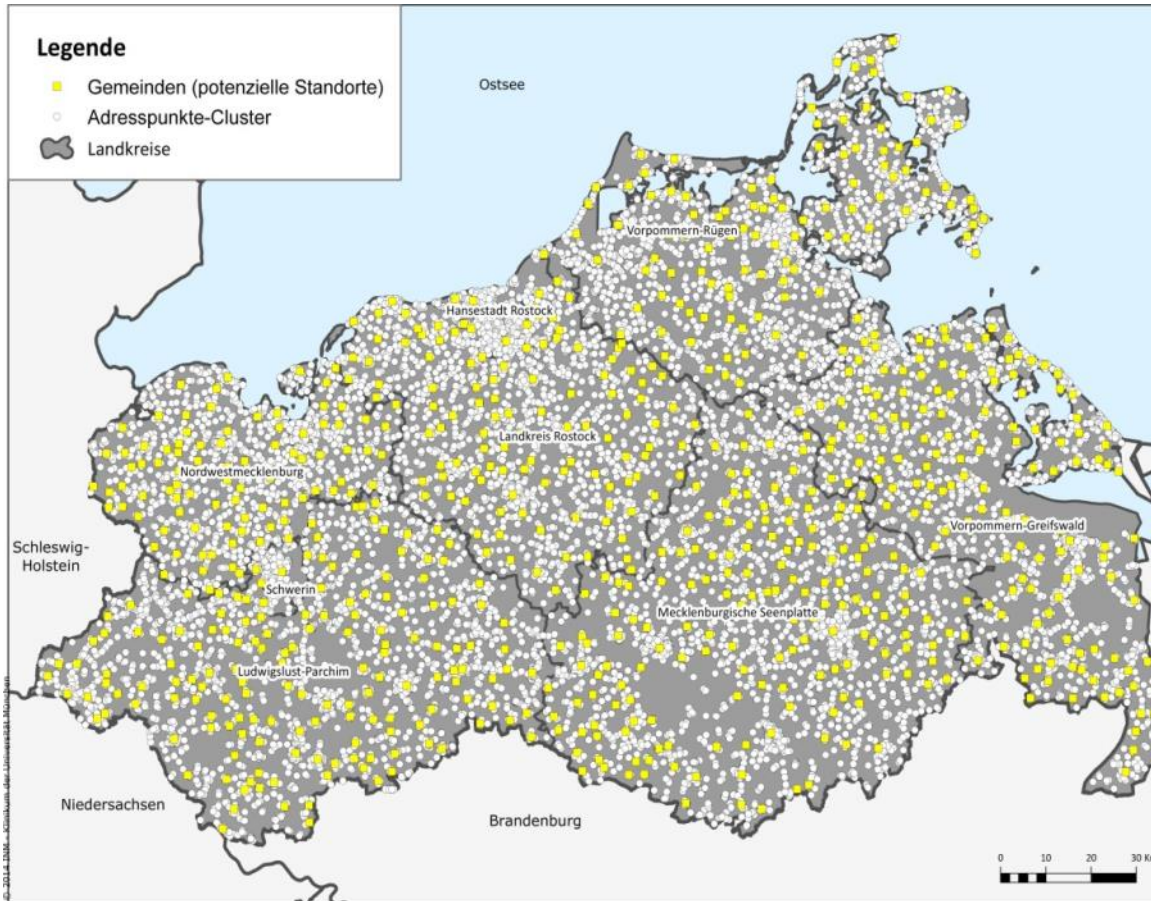


Time to arrival on scene airborne vs. ground based

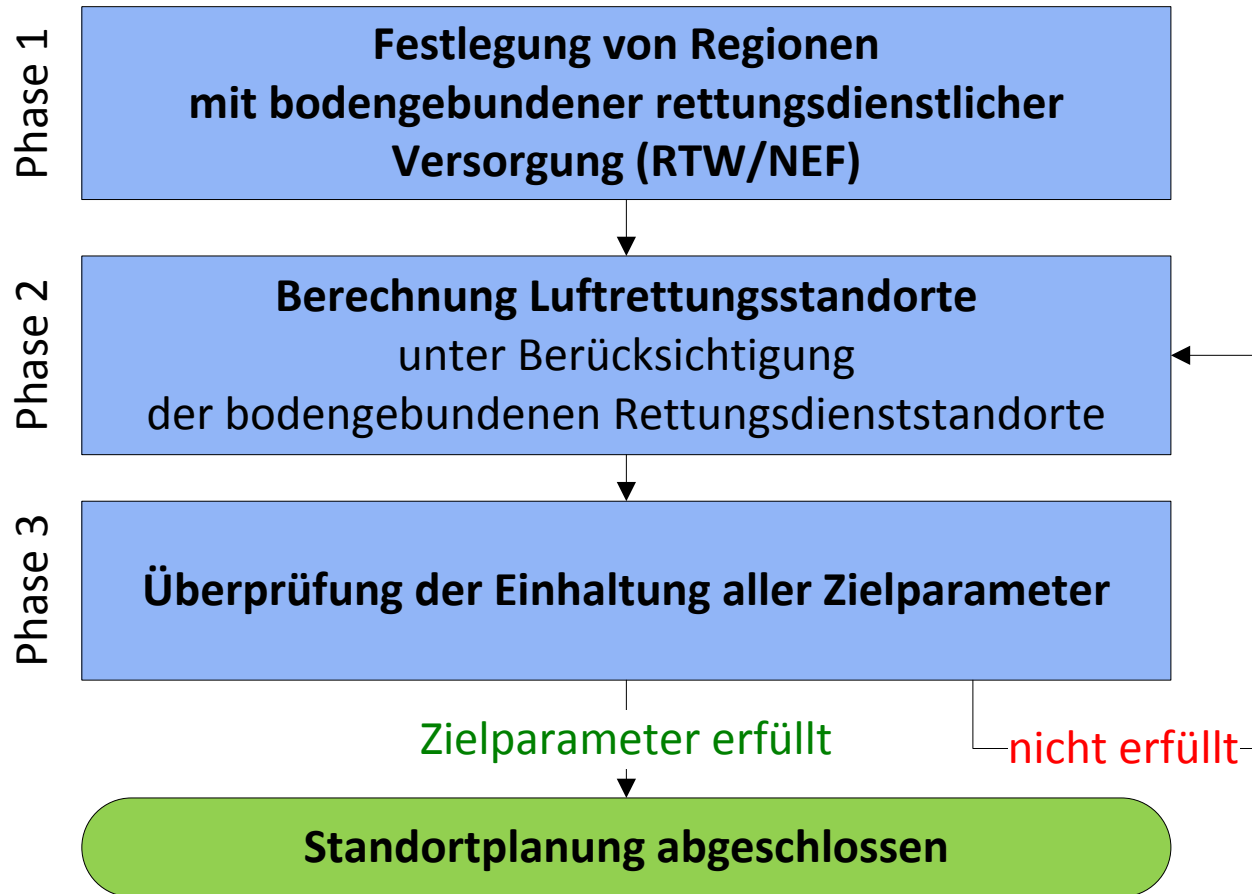
Eintreffintervall: maximal 15 Minuten



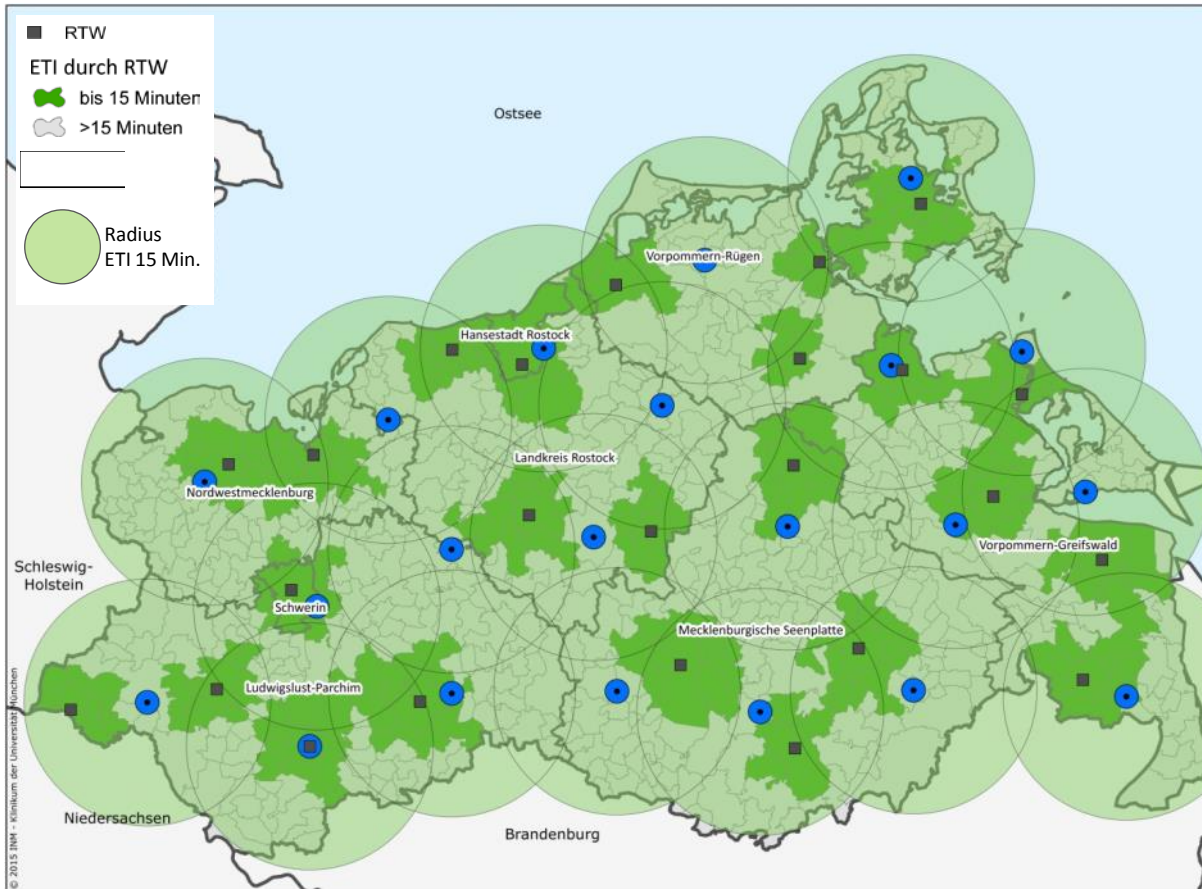
base planning



- 783 communities as potential bases
- 19.975 address points as potential emergency points



base planning



- 24 paramedic/emergency physician bases in upper- and middle-centres
- 21 rescue helicopter base
- 100% area coverage by rescue helicopter
- 24/7

Impact

demand for ground and air based resources



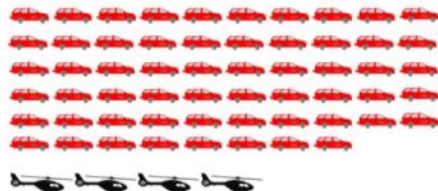
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Zero-Scenario

151 bases



110 RTW
(92 Standorte)



58 NEF
(55 Standorte)

4 RTH/ITH
(4 Stationen)



➤ **172 Rettungsmittel**

PrimAIR-Scenario

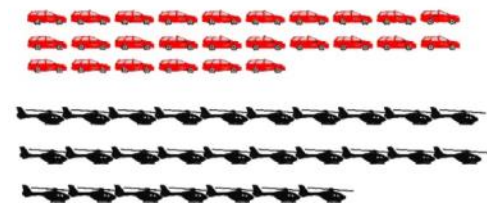
68 bases



45 RTW
(24 Standorte)

26 NEF
(23 Standorte)

27 RTH
(21 Stationen)



➤ **98 Rettungsmittel**

Auswirkungen

Personalbedarf (24/365 Bereitschaft)

Null-Szenario



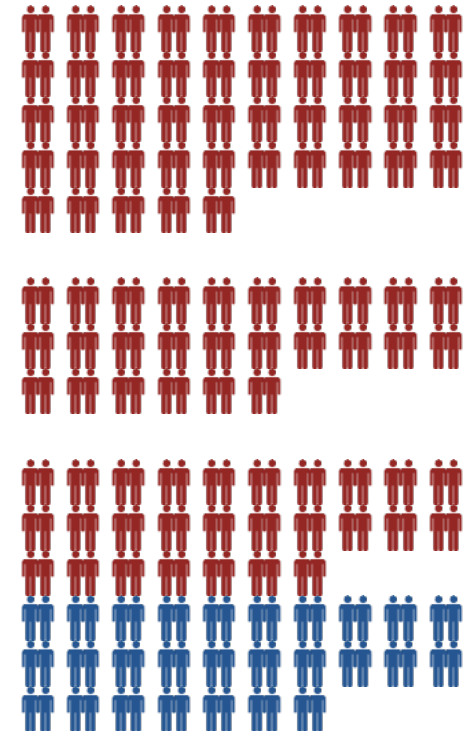

110 RTW
(92 Standorte)


58 NEF
(1 NA + 1 RettSan)


4 RTH/ITH
(1 Pilot + 1 NA + 1 RettSan)

➤ **348 Mitarbeiter**

PrimAIR-Szenario




45 RTW
(1 NA + 1 RettSan)


26 NEF
(1 NA + 1 RettSan)


27 RTH
(1 NA + 1 RettSan
+ 2 Piloten)

➤ **250 Mitarbeiter**

Impact on hospitals

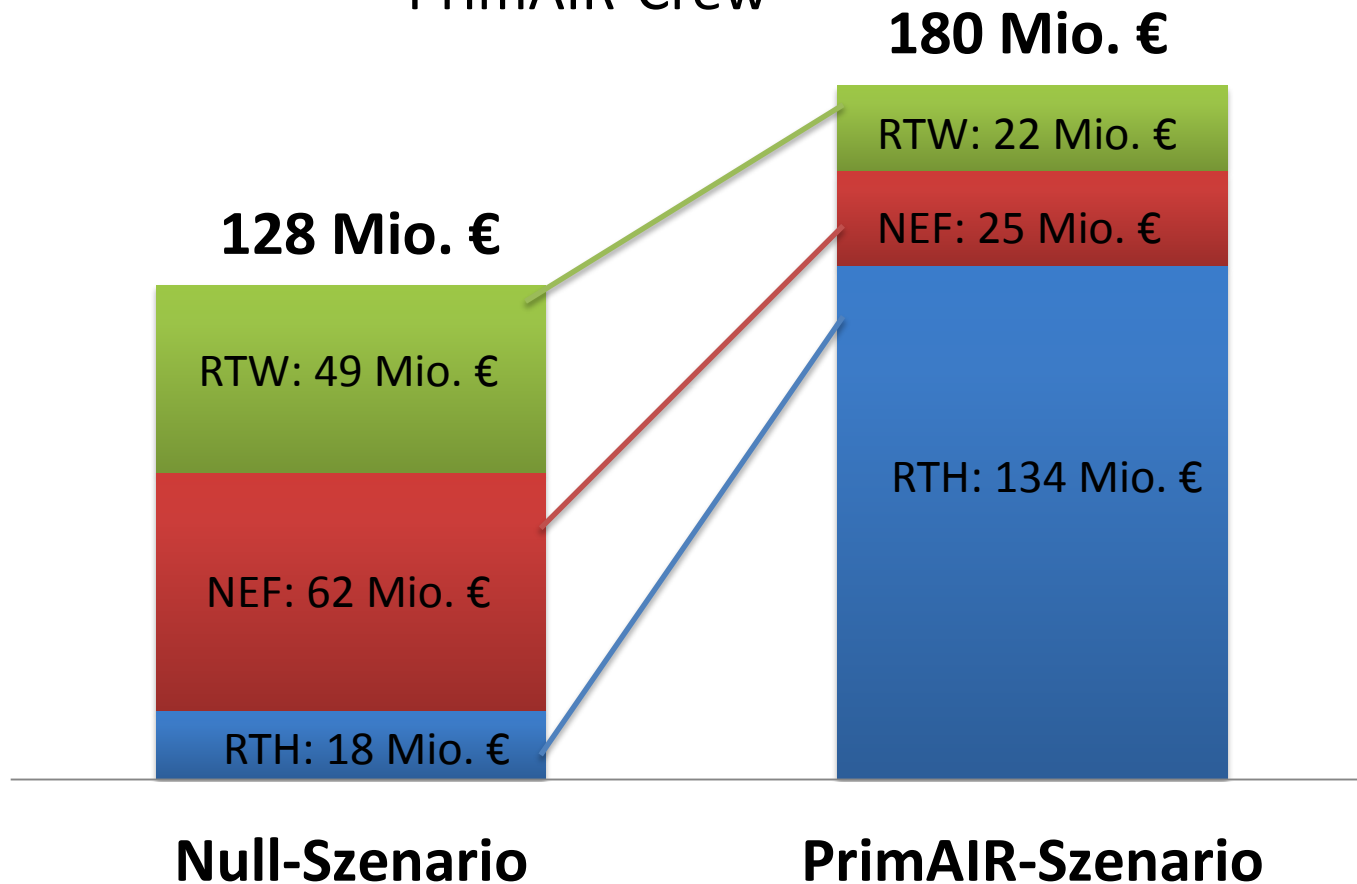
-
- decidedly more transports with rescue helicopter also for level 1 and 2 hospitals
 - hospitals without airfield will experience drastic decline in patients
 - increased helicopter traffic also at night

Impact cost comparison

-
- **business-management sight vs national economic accounting**
 - **comparison of operating costs**

Impact operating costs of the scenarios

Planning basis: 100% ETI (15 Min.), 100% PHZ (60 Min.),
PrimAIR-Crew



comparison of performance and costs

costs in PrimAIR-Scenario

- different cost structures
- higher operating costs

strong regional implication on costs

- (judicial) basic parameters
- number of emergencies
- density of ground based rescue bases

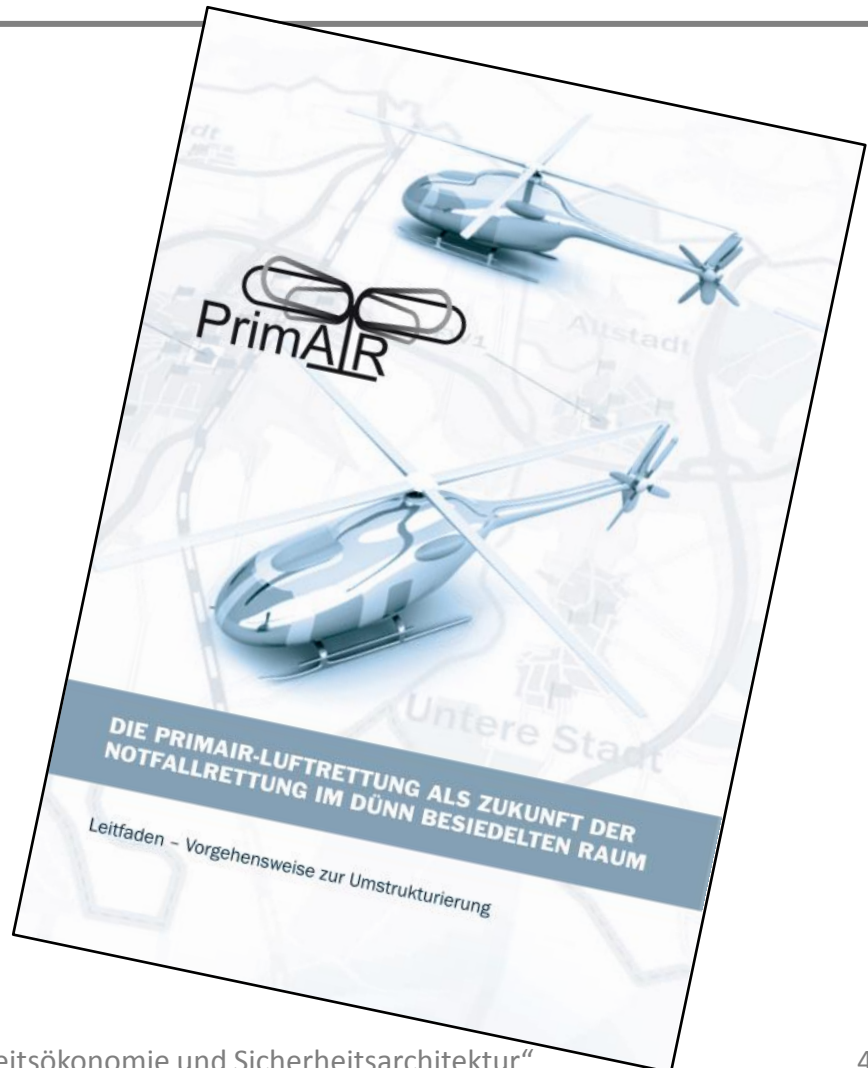
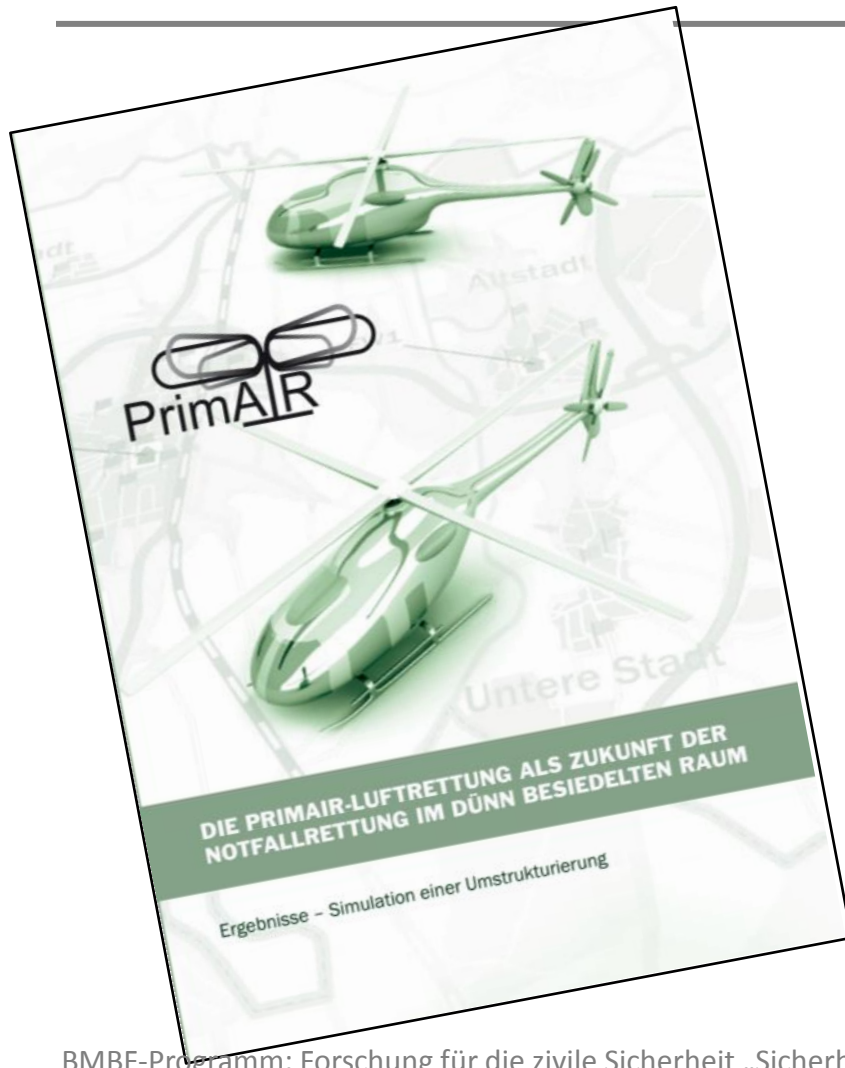
Conclusion

-
- **Existing solutions are dysfunctional**
 - access to medical care and overcoming great distances in structurally weak areas will be of great importance in the future
 - system evaluation with simulation and calculation in model region MW
 - development of methods to test if a region qualifies for a system change

Guidelines and Results



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Contact



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am Klinikum der Universität München

