Introduction

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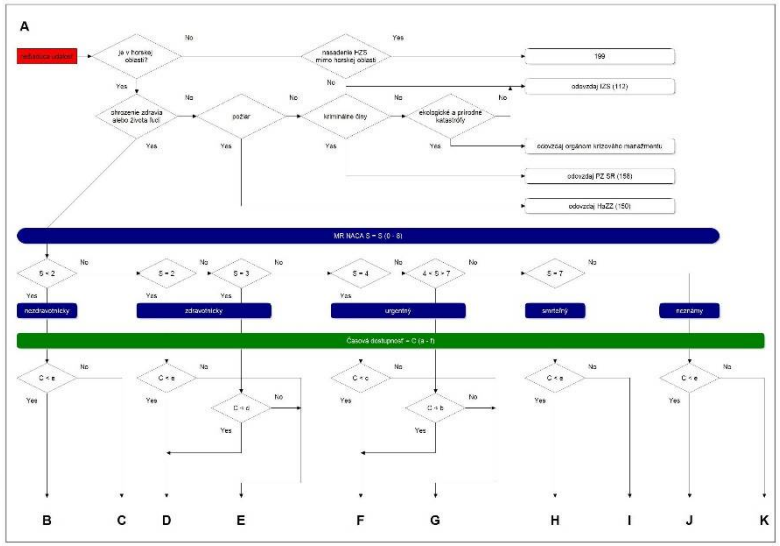
Emergency call handling: Algorithm vs. Improvisation



Decision-making at dispatching

Subjective

High degree of **dependence on the knowledge and abilities of operator** and the reaction time to evaluate all input data when taking a decision

Pros: the operator is able to take a decision without sufficient input intel

Cons: lack of speed, relatively high error rate in accession process, subjective elements not needed in decision-making

Manifestation: Improvised approach

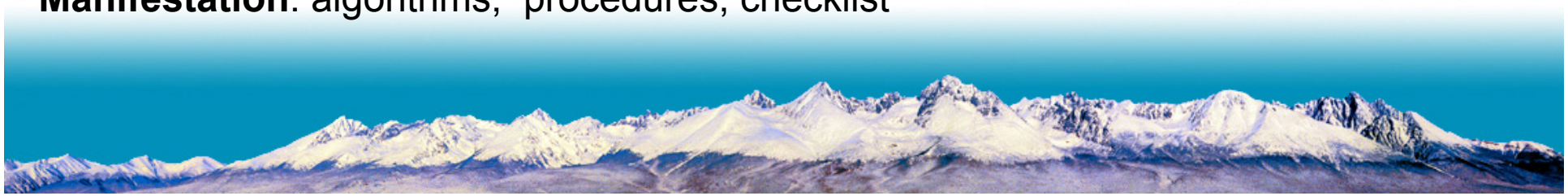
Objective

Support tools and input data dependent decision making procedure

Pros: high speed, accuracy, autonomity

Cons: does not cover all types of situations, uselessness when missing data

Manifestation: algorithms, procedures, checklist

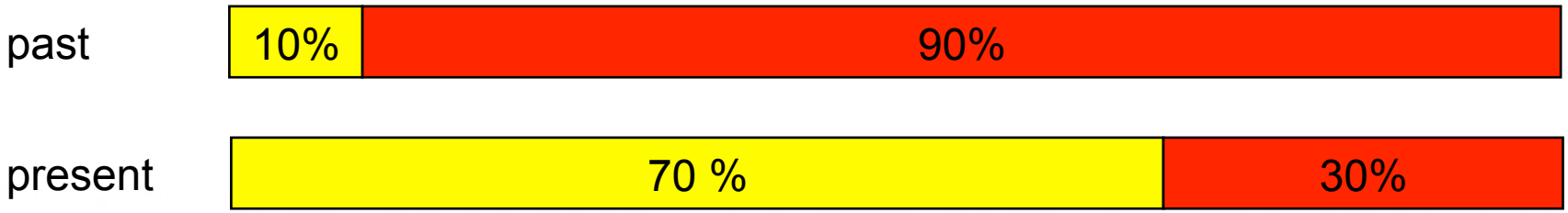


Subjective vs. Objective

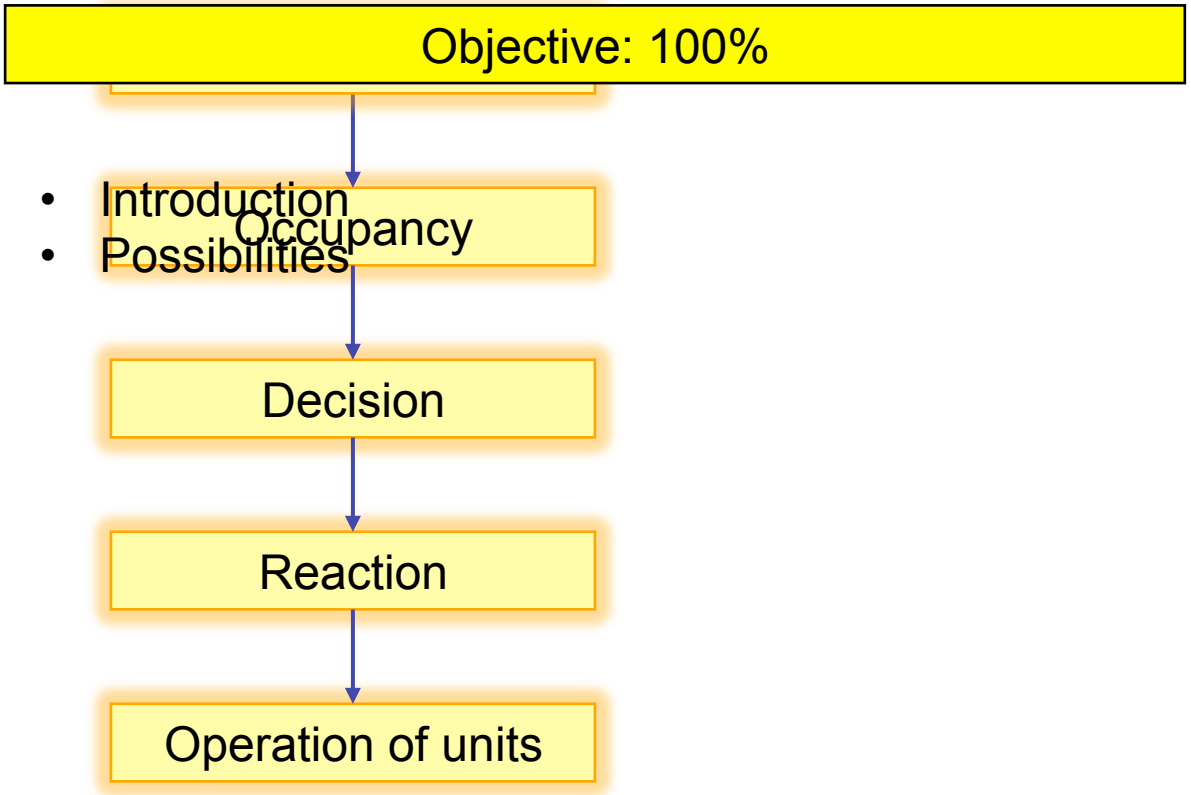
The relation betwen subjective and objective decision making

Objective decision-making takes precedence over subjective one.
Subjective decision replaces objective one only when
not applicable, competition is undesirable.

Proportion of objective vs. subjective decision in SMRS conditions



Emergency call receiving



Emergency call receiving

Receiving

Occupancy

Decision

Reaction

Operation of units

Subjective: within 20 sec.

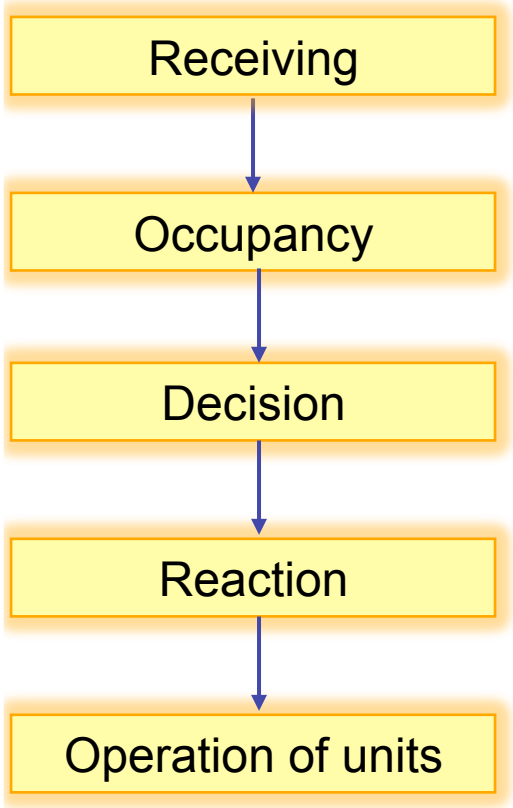
- Spontaneous occupancy of caller
- Maintaining of the call line

Objective: 90 - 120 sec.

- Conditional occupancy of caller:

✓ where (location, time availability, technical availability)
✓ what (count, injury, other)
✓ Weather conditions(risk management, technical specs)
✓ Caller information

Emergency call receiving



Objective: 70 %

- All data detected events

Subjective: 30 %

- Missing person search
- Events lacking at least two input data
- Dial navigation

Emergency call receiving

Receiving

Occupancy

Decision

Reaction

Operation of units

Objective: 90 %

- Handing intervention to a correct executive branch

Subjective: 10 %

- Handing intervention to a wrong executive branch

Goal

Increase the speed and accuracy of performed activities processing emergency calls
= increase the proportion of objective decision making

- create decision making algorithms, work procedures, checklists....
- Evaluate and analyze interventions made – edit differences
- poskytnúť potrebné technologické rozhranie a užívateľský komfort pri práci s algoritmami

Maintaining the improvisation ability of operators
= maintain high level of subjective decision making of operators

- Training of unusual situations
- Training of large scale emergencies

History

First directory for rescue leader („Rescue in mountains, Horská služba, ČSTV, 1962“)

Leader:

1. *Decision about scale of alert. Shall have regard to the data from the report governed by the type of accident, site specs, weather, distance and terrain ratios, time of the year*
2. *Declares the alarm by the alarm plan, ensuring readiness of personel in case of double action (very offten the case)!*
3. *Informs personel about gathering site according to alarm plan,*
4. *Determines appropriate time of a sudden urgency with ambition of exact gathering time schedule of rescuers from around avoiding first confusions and time pressure resulting in a unnecessary nerves, high level of order is the key, right on time, etc.*
5. *Is obliged to operativelly inform all rescuers about nature of rescue action, approximate its durability,...“*

Algorithm 2006

Deployement algorithm creates a graph taking into account rescue deployement

The health condition of affected– X axis

Health condition of affected is NACA-S defined

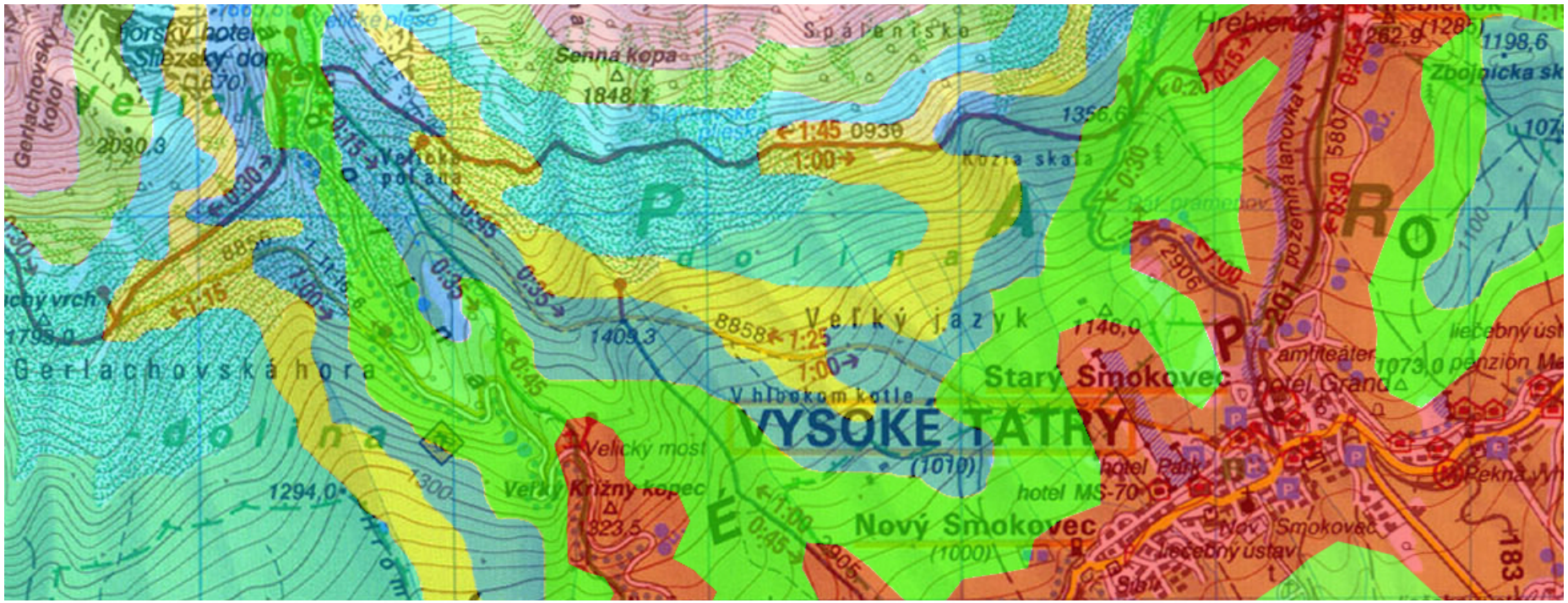
NACA	description
0	No injury or disease
1	Minor disturbance, no medical intervention required needed
2	Slight to moderate disturbance, no emergency medical measures
3	Moderate to severe but non life-threatning disorder
4	Serious incident where rapid development, lifethreat cannot be excluded
5	Acute danger
6	Respiratory and/or cardiac arrest, CPR
7	Death, exitus before reaching

Algorithm 2006

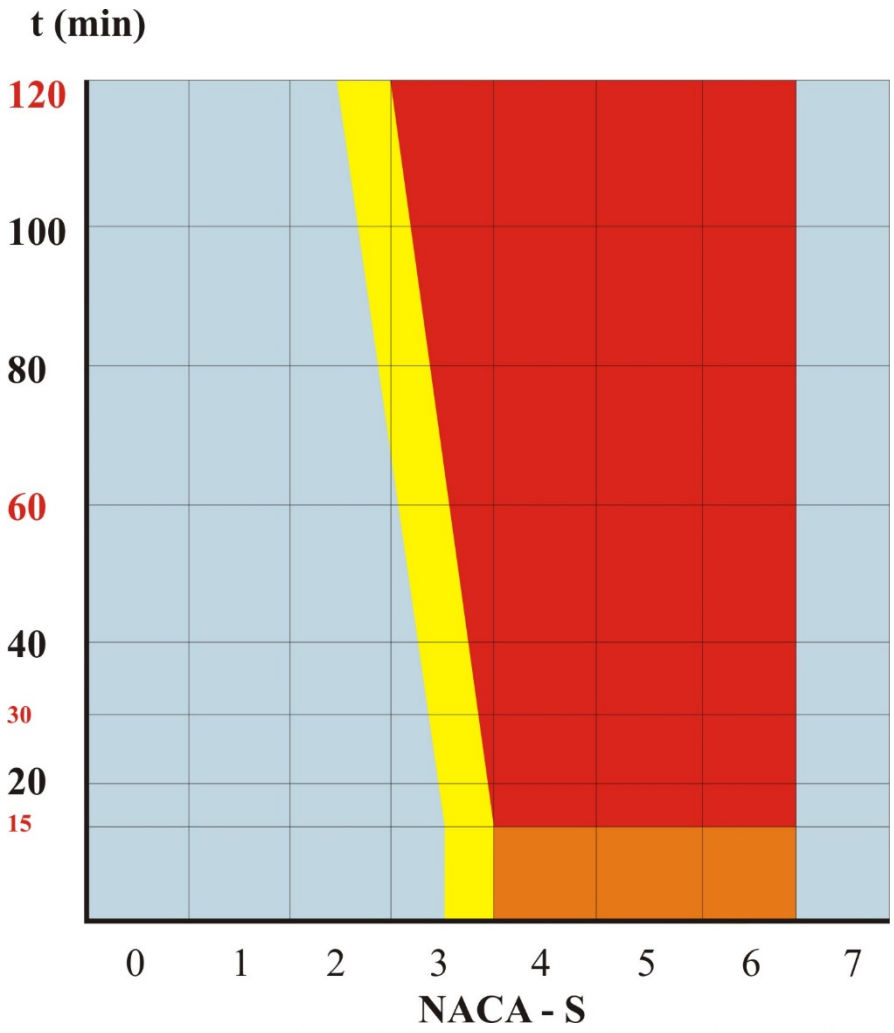
Deployement algorithm creates a graph taking into account rescue deployement

Time availability – Y axis

Time availability based on map data and actual weather conditions



Algorithm 2006



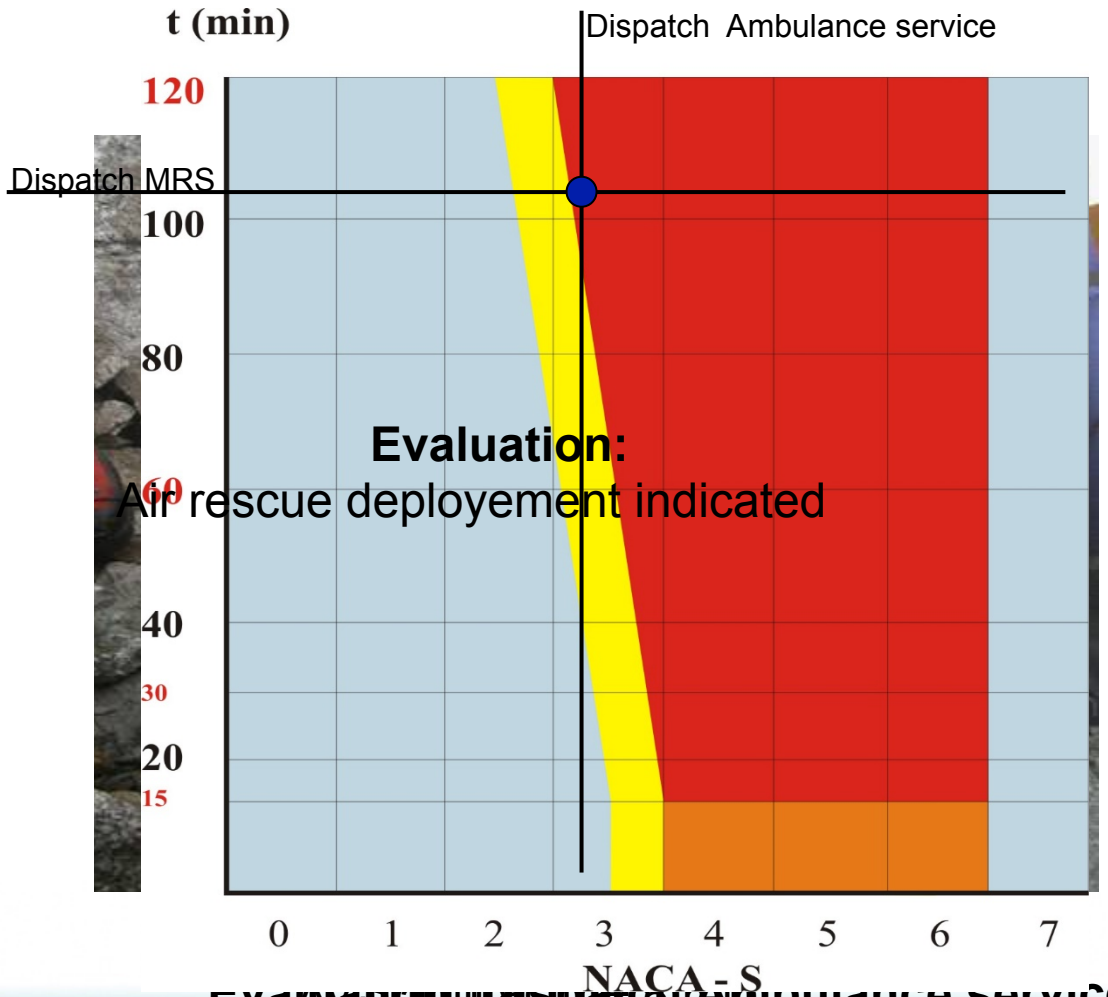
Terrestrial rescue indicator

Air rescue indicator

Air/Terr. combined

Detailed consultation indicator

Algorithm 2006 - simulation



Evaluation:
Air rescue deployement indicated

Dispatch Ambulance service

NACA-Score: 4

Severity of underlying conditions: High

Algorithm 2006 – error n.1

t (min)	0	1	2	3	4	5	6	7
> 60	250	51	181	54	7	25	1	60
41 - 60	89	15	148	38	16	22	2	25
21 - 40	121	29	371	116	22	34	2	23
16 - 20	28	19	245	74	22	21	1	7
< 15	148	455	3533	1192	307	233	5	10

NACA S

Evaluated period: **8300** interventions
Number in algorithm: **8002** interventions
Interventions: **298** not possible to assign medical condition or time availabillity

Algorithm 2006 – error n.2

t (min)	0	1	2	3	4	5	6	7
> 60	250	51	181	54	7	25	1	60
41 - 60	89	15	148	38	16	22	2	25
21 - 40	121	29	371	116	22	34	2	23
16 - 20	28	19	245	74	22	21	1	7
< 15	148	455	3533	1192	307	233	5	10

NACA S

Number of interventions implementing air rescue: **426** interventions
Number of real air rescue interventions: **356** interventions
Difference: **70** interventions could not be performed due to weather disfavour and terrain difficulty

Algorithm 2015

- Medical condition of patient
- Time availability
- Technical availability
- Risk management of rescuers
- Air rescue availability

Algorithm 2015 – medical status

NACA S		
Level	**Severity {slovak vocab.}**	**Medical status**
0	Non	Without disabilities
1	Light	Minor disturbance
2	Moderate	Slight to moderate disturbance, usually no emergency measures needed
3	High	Moderate to severe but not life-threatning disorder
4	Potentialy life-threatening	Potentialy life-threatning conditions
5	Acute danger	Life threatening conditions not requering resuscitation
6	CPR	Condition requeirng resuscitation
7	Death	Exitus before reaching

Algorithm 2015 – medical condition

NACA S MR		
Level	**Severity**	**Medical status**
0	Non	Without disabilities
1	Light	States requiring healthcare
2	Intermmediate	States requiring healthcare - nonurgent
3	High	States non life-threatening conditions, but complicated
4	Potentially life-threatening	Potentially life-threatening conditions
5	Acute danger	Life-threatening conditions not requiring resuscitation
6	CPR	Condition requiring resuscitative measures
7	Death	Exitus before reaching
8	Uknown	Uknown

Algorithm 2015 – time availability

Time availability	
Level	**Time span/min**
a	do 15 min
b	16 - 20 min
c	21 - 40 min
d	41 - 60
e	more than 60 min
f	uknown

Algorithm 2015 – technical availabilty

NACA L MR	
Level	location
A	transport
B	roads I., II., III. class
C	Locations available for off-road (4 x 4) ambulances
D	Ski slopes
E	Marked tourist trails, chalets, saddleback, valley
F	Easilly accesible climbing terrain, difficulty degree I.
G	Wall climbing, degree of difficulty II.
H	as G where achievement is complicated by helicopter

Algorithm 2015 – technical availability

NACA L MR	
Level	location
A	transport
B	roads I., II., III. class
C	Locations available for off-road (4 x 4) ambulances
D	Ski slopes
E	Marked tourist trails, chalets, saddleback, valley
F	Easilly accesible climbing terrain, difficulty degree I.
G	Wall climbing, degree of difficulty II.
H	as G where achievement is coplicated by helicopter
I	avalanche
J	cave
K	water
L	technical equipment, installation
M	unknown

Algorithm 2015 – Risk management

Risk management of rescuers – evaluation of intervention		
Level	Avalanche danger level	Weather service warnings
X - safe	< 3	< 3
Y - risky	> 2	> 2

Algorithm 2015 – air rescue

Availability of air rescue		
Level	**Availability**	**Description**
1	available	Availability is unbound an deployement of aviation should not be a problem
2	limited availability	Deployement is due to limited conditions, usualy it causes rescue approximation and not a direct hit
3	unavailable	Conditions, weather or traffic do not allow any deployement of aviation technology

Algorithm 2015 - aplication

t (min)	0	1	2	3	4	5	6	7
> 60	250	51	181	54	7	25	1	60
41 - 60	89	15	148	38	16	22	2	25
21 - 40	121	29	371	116	22	34	2	23
16 - 20	28	19	245	74	22	21	1	7
< 15	148	455	3533	1192	307	233	5	10

NACA S

E5=25

NACA L

e5B =0	e5C =1	e5D =0	e5E =8
e5F =9	e5G =7	e5H =0	e5I =0
e5J =0	e5K =0	e5L =0	e5M =0

Risk management

e5BX =0	e5BY =0	e5CX =1	e5CY =0	e5DX =0	e5DY =0	e5EX =8	e5EY =0
e5FX =9	e5FY =0	e5GX =7	e5GY =0	e5HX =0	e5HY =0	e5IX =0	e5IY =0
e5JX =0	e5JY =0	e5KX =0	e5KXY =0	e5LX =0	e5LY =0	e5MX =0	e5MY =0

Algorithm 2015 - aplication

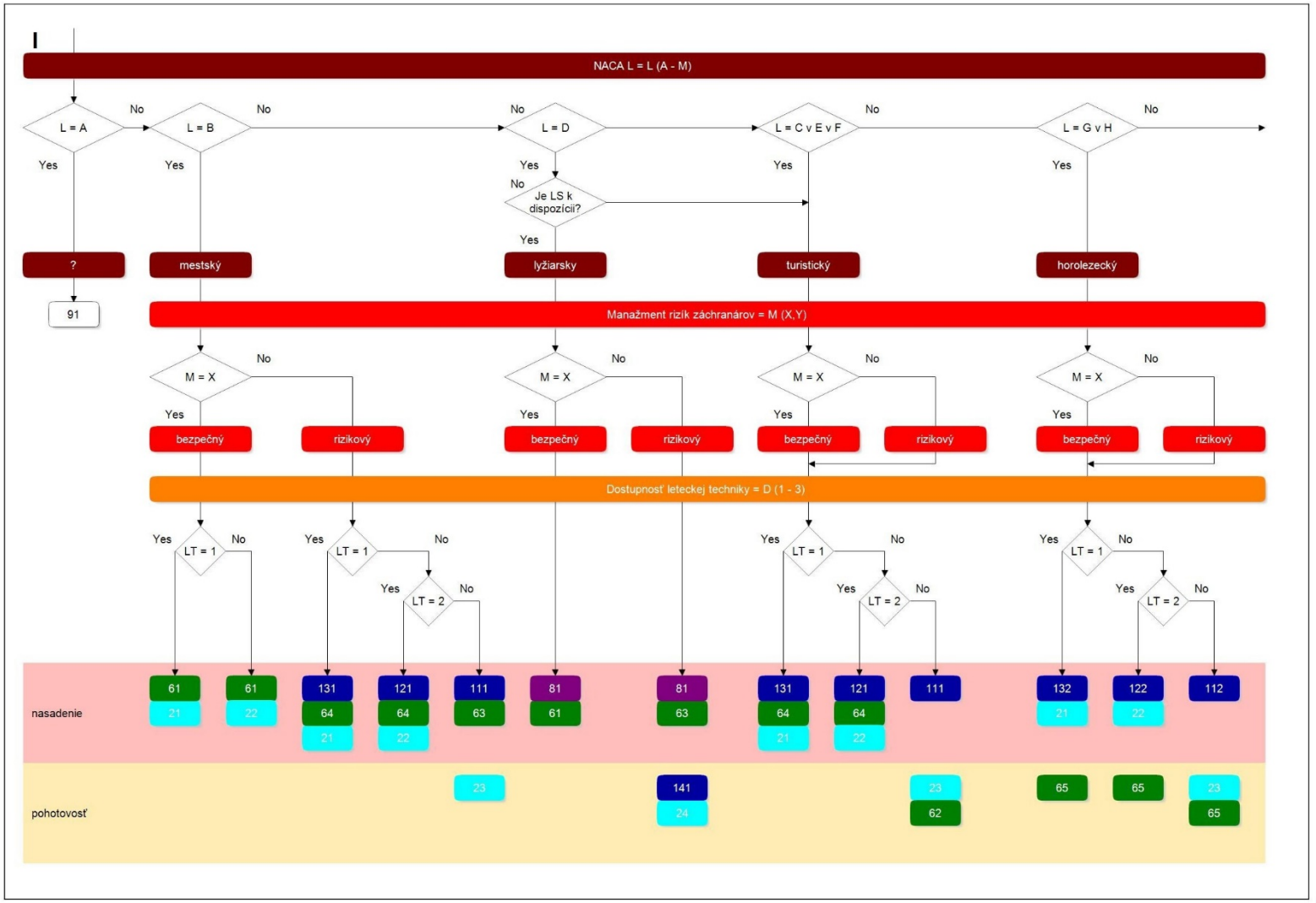
Availability of air rescue

e5BX1 =0	e5BY1 =0	e5CX1 =0	e5CY1 =0	e5DX1 =0	e5DY1 =0	e5EX1 =7	e5EY1 =0
e5BX2 =0	e5BY2 =0	e5CX2 =0	e5CY2 =0	e5DX2 =0	e5DY2 =0	e5EX2 =0	e5EY2 =0
e5BX3 =0	e5BY3 =0	e5CX3 =1	e5CY3 =0	e5DX3 =0	e5DY3 =0	e5EX3 =1	e5EY3 =0
e5FX1 =6	e5FY1 =0	e5GX1 =3	e5GY1 =0	e5HX1 =0	e5HY1 =0	e5IX1 =0	e5IY1 =0
e5FX2 =1	e5FY2 =0	e5GX2 =1	e5GY2 =0	e5HX2 =0	e5HY2 =0	e5IX2 =0	e5IY2 =0
e5FX3 =2	e5FY3 =0	e5GX3 =3	e5GY3 =0	e5HX3 =0	e5HY3 =0	e5IX3 =0	e5IY3 =0
e5JX1 =0	e5JY1 =0	e5KX1 =0	e5KY1 =0	e5LX1 =0	e5LY1 =0	e5MX1 =0	e5MY1 =0
e5JX2 =0	e5JY2 =0	e5KX2 =0	e5KY2 =0	e5LX2 =0	e5LY2 =0	e5MX2 =0	e5MY2 =0
e5JX3 =0	e5JY3 =0	e5KX3 =0	e5KY3 =0	e5LX3 =0	e5LY3 =0	e5MX3 =0	e5MY3 =0

Algorithm 2015 – summary

		2 input data	5 input data
1	Terrestrial rescue	0	7
2	SAR	0	5
3	Urgent medical attention	0	0
4	HEMS	25	13
5	Ski patrol	0	0

Algorithm 2015 – present



Algorithm 2015 – present

Thank you

Emergency call: 18300

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