Hand-held Displays vs Paper-based Maps: Requirements of Outdoor Users Concerning Survey and Detailed View

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- Quickly increasing amount of geodata

- Immediate access to information

- „Digitalisation" of everyday life with mobile devices

- Current hype of outdoor activities

Different devices with variable display sizes

https://static.garmincdn.com/en/products/010-00868-01/g/cf-lg.jpg

http://p4.focus.de/img/gen/7/k/HB7kA9HO_Pxgen_r_Ax354.jpg

http://www.iphone4gen.de/img/iphone4_schwarz.jpg

http://www.androider.de/wp-content/uploads/2010/09/samsung-galaxy-tab.jpg

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Are all devices similarly suitable for every outdoor user?

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Examination of the cognitive basics:

➢ Basic principles of the perception process

➢ Mental models and mental maps

➢ Map vs navigation – depending on the user`s intention:

route knowledge – point by point

overview – high-contrast areas

➢ Overview vs detailed view

75ms overview considerably increase the detailed search (Vo & Henderson 2010)

Figure-to-ground phenomenom
(Buchroithner & Wälder 2003)

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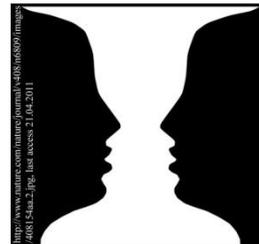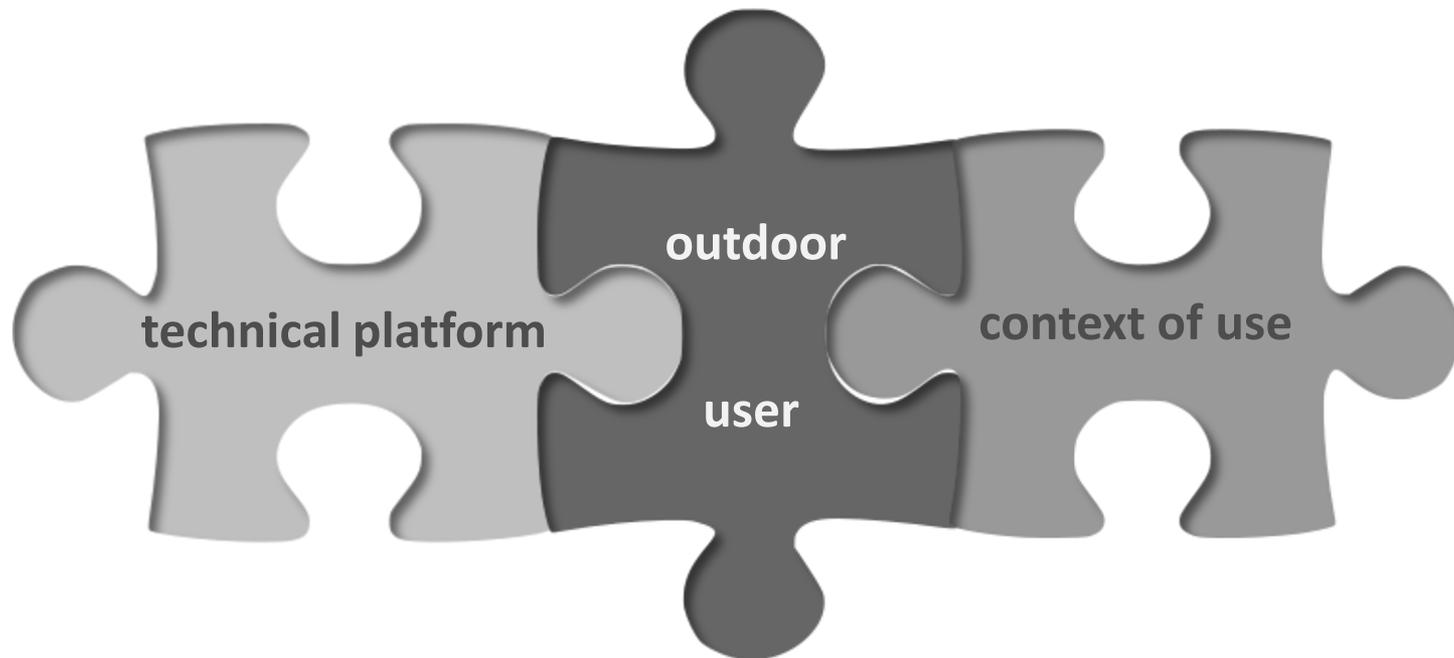
Distinction of outdoor activities
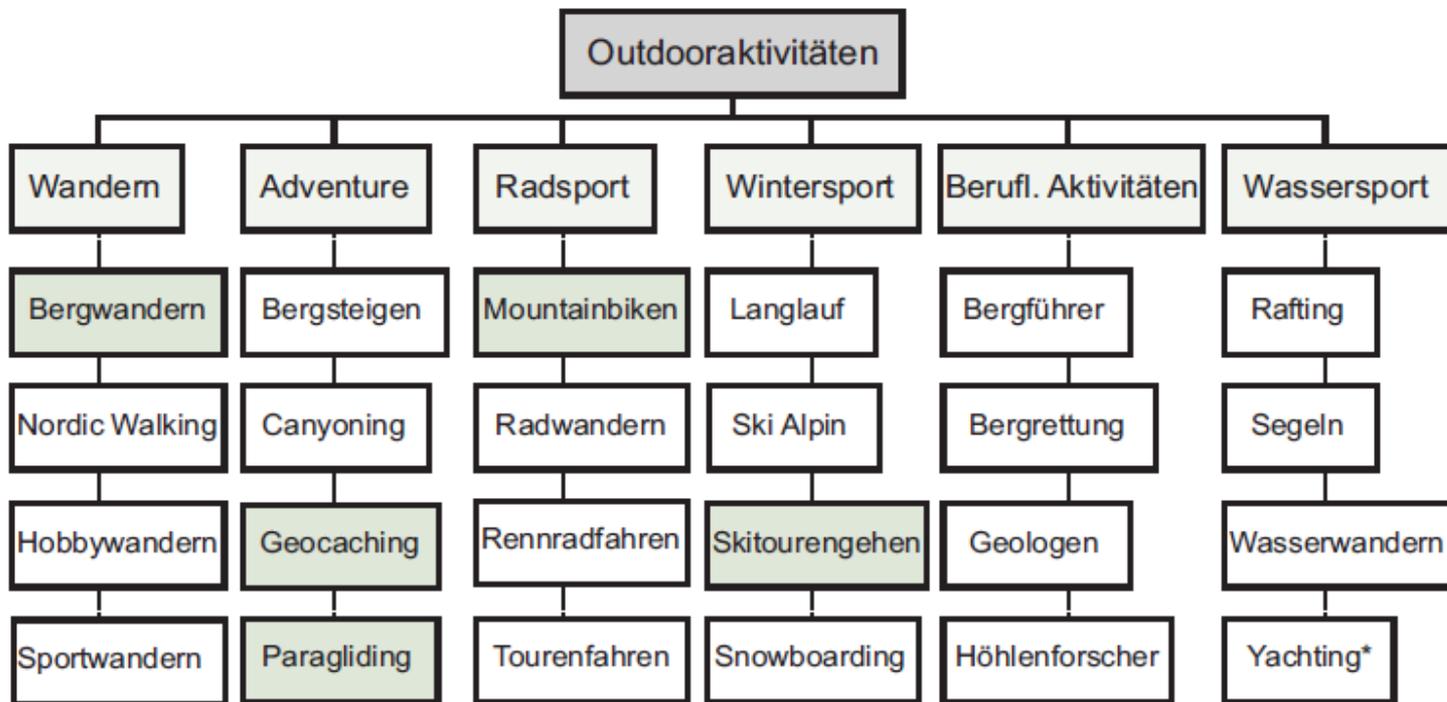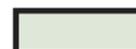
Representive outdoor activities chosen for the study

Description of…

➢ the chosen context of use for the deduction of the user requirements

➢ the applications (what are analog and mobile maps generally used for)

Criteria	user group				
	Mountain hiker	Geo cacher	Paraglider	Mountain biker	Ski mountaineer
Activities					
Route planning	+	+	+	+	+
Orientation	+	+	+	+	+
Navigation	+	+	o	+	+
Finding positions	--	+	--	--	--
Tracking	o	o	o	+	--
Expectations / requirements for the map or device					
Watertightness	+	o	--	+	+
Weight	low	less relevant	low	less relevant	low
Overview	+	o	+	+	+
Detailed view	+	+	--	o	+
Robustness	+	--	+	+	+
Additional digital services	o	o	o	o	o
GPS	o	+	o	o	o
Operation with gloves	o	--	+	o	+
Period of use	(multi) day trip	day trip	day trip	(multi) day trip	day trip

(+ common/important   ○ occasional/medium important   – irrelevant)

Short-dated market, permanently new devices

? How can these be made comparable?

? Evaluation of individual devices regarding their suitability for certain user groups is **not representative**!

! Definition of characteristic **groups of devices** in which current and future devices can be categorised

! Classification and characterisation in a **criteria catalogue of the technical platforms**

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Technical Platforms

1. Outdoor Mobiles

Nokia 3720 classic

Sonim XP3 Quest

Sony Ericsson C702

Samsung B2710

Technical platforms

2. GPS Devices

Garmin GPS 62s   Garmin Dakota 20   Lowrance Endura Safari   MyNav 500 Sport

Technical platforms

3. Smartphones

Motorola Defy

Apple Iphone4

HTC Desire HD

Samsung
Galaxy S I9000

Technical platforms

4. Tablets

Samsung
Galaxy Tab

DELL Streak 5

Apple IPAD 1

Pearl Touchlet XTG

Criteria		Outdoor-mobile		GPS-device		Smartphone		Tablet	
Size	width (cm)	5	±0,5	7	±1	6,5	±0,5	13,5	±5,5
	heigth (cm)	11	±1	13	±3	11,5	±1	20	±5
Weight	(g)	132	±38	226	±34	141	±23	450	±230
Display Diagonal	(cm)	5	±0,5	8	±1,5	10	±1	18,5	±6
Display size	width (cm)	3,5	±0,5	4,5	±1	5	±0,5	11	±4
	heigth (cm)	5,5	±1	6	±0,5	8,5	±1	15	±5
Resolution	(ppi)	175	±18	130	±18	274	±56	160	±27
Uptime	(h)	13	±6	15	±5	10	±4	11	±5
Operation		keyboard		keyboard (touch)		touch (keyboard)		touch (keyboard)	
Robustness		rugged		rugged		sensitive		sensitive	
Water-tightness		splash guard		waterproof		no		no	
Connectivity		very good		usually sufficient		very good		(very) good	
Specifics		-dust cover -often flashlights -rugged design		-often trans-flexive displays -barometric altimeter -electronic compass -carrying device		-high resolution displays -electronic compass		-large displays	

Average sizes of the technical platforms including their minima and maxima
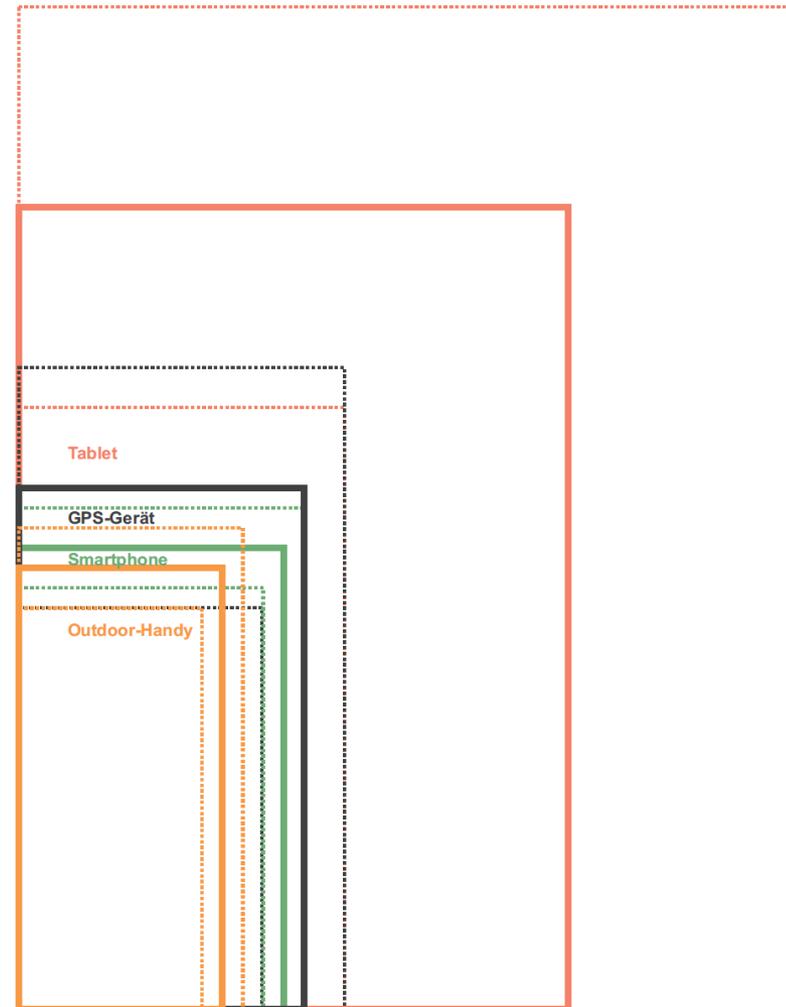
Crucial questions:

1. How suitable are paper-based and digital maps for the specific outdoor user groups?

2. Which technical platforms are suitable for those user groups that benefit from digital maps?

? Complex, multi-criteria decision-making, difficult to assess

! Utility analysis to make criteria comparable

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Utility analysis:

1. **Weighting factors** for the importance of the criteria for the 5 outdoor user groups

+	9	high
o	4	medium
--	0	none

Weighting factors

2. **Evaluation scale** for the suitability (degree of fulfillment) of each individual criterion (e.g. robustness, watertightness etc.)

9	very good
6-8	good
3-5	suitable
0-2	bad

Evaluation scale

3. Factor x degree of fulfillment

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Suitability of paper-based and digital maps for specific outdoor user groups

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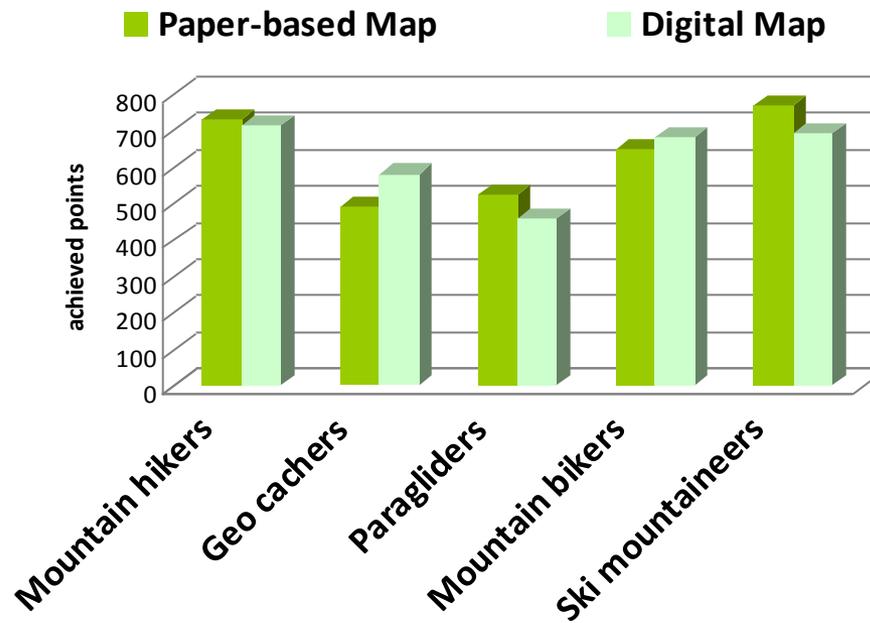
Suitability of the technical platforms for geo cachers and mountain bikers

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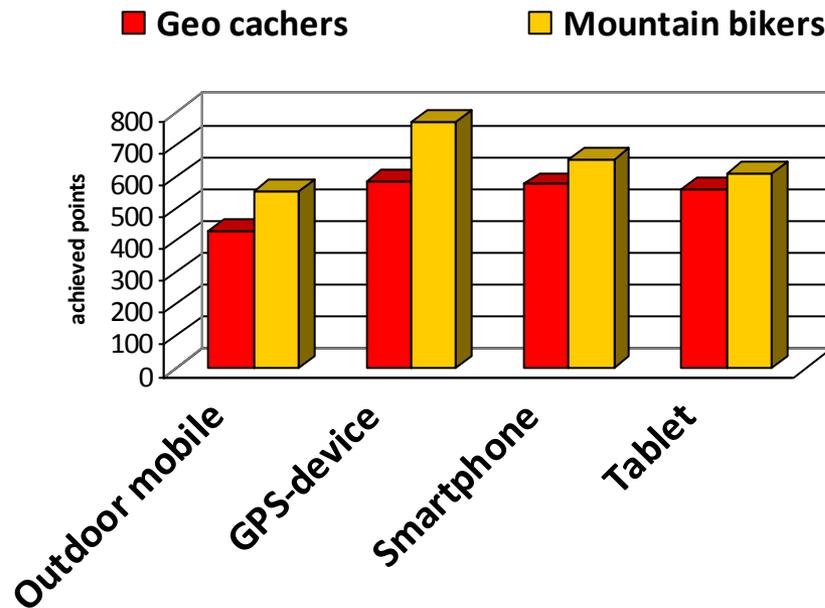
Validation and parameterisation of the criteria with:

> Online surveys

> Personal interviews

> Observations

Extension of the criteria catalogue with:

> Future devices (rollable and/or 3D-displays, head-mounted displays)

> Other user groups

Thank you for your attention!