Schweizerische Eidgenossenschaft
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Federal Department of Economic Affairs,
Education and Research EAER

Agroscope

Workshop 6:

Animal behaviour and localisation

Wednesday, 9th July – 15:30h

Room HG F 7

Nils Zehner, Franz Nydegger (Agroscope Tänikon, Switzerland)

Jan Harms (LfL Bayern, Germany)

AgEng International Conference of Agricultural Engineering 2014

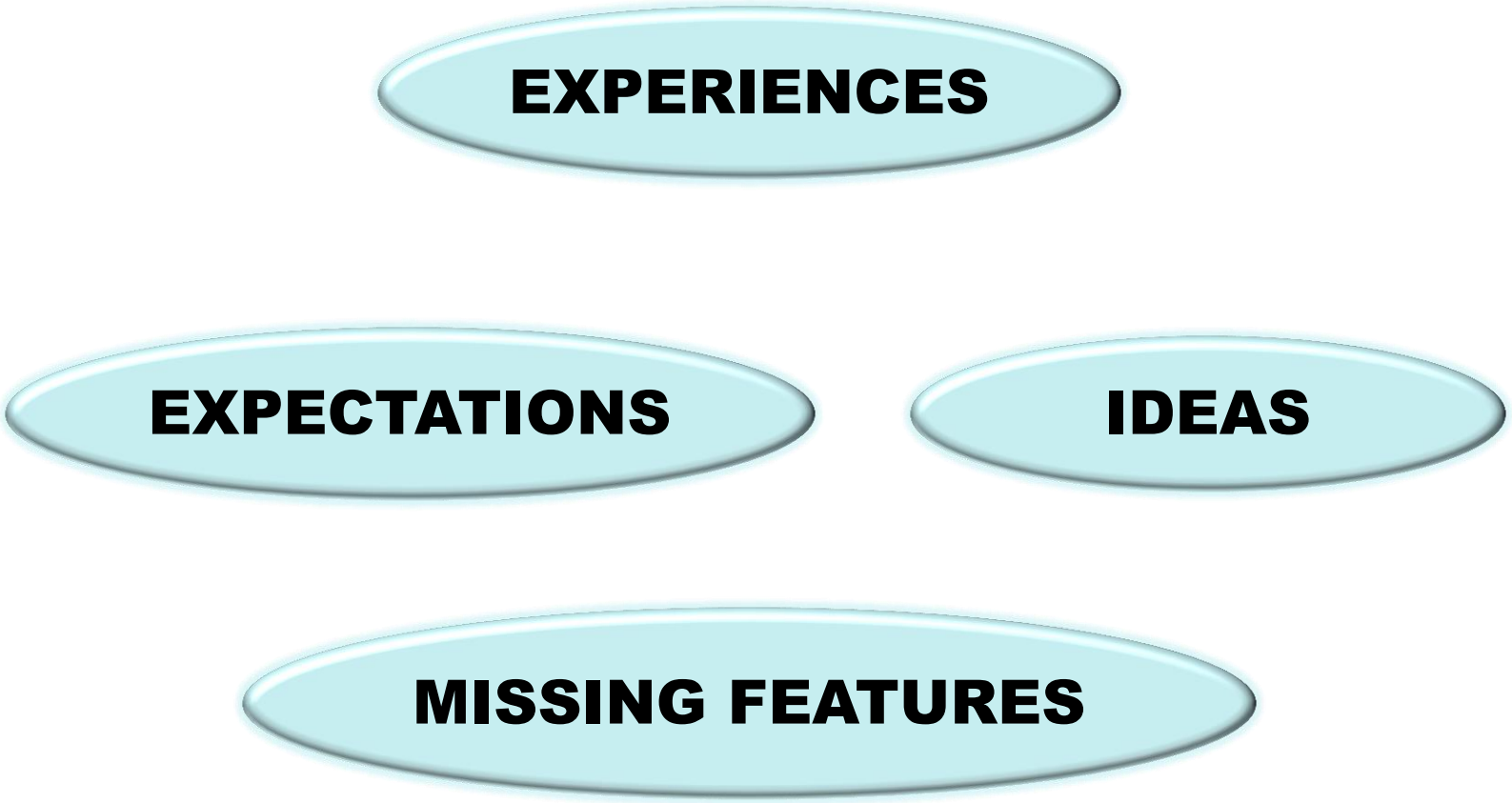
Animal Monitoring Systems

Ideal Technology:

- Explains an underlying biological process
- Can be translated to a meaningful action
- Cost-effective
- Flexible, robust, reliable
- Information readily available to farmer
- Commercial demonstrations
- Continuous improvement and feedback loops

(JEFFREY BEWLEY, University of Kentucky)

Animal Monitoring Systems



Experiences

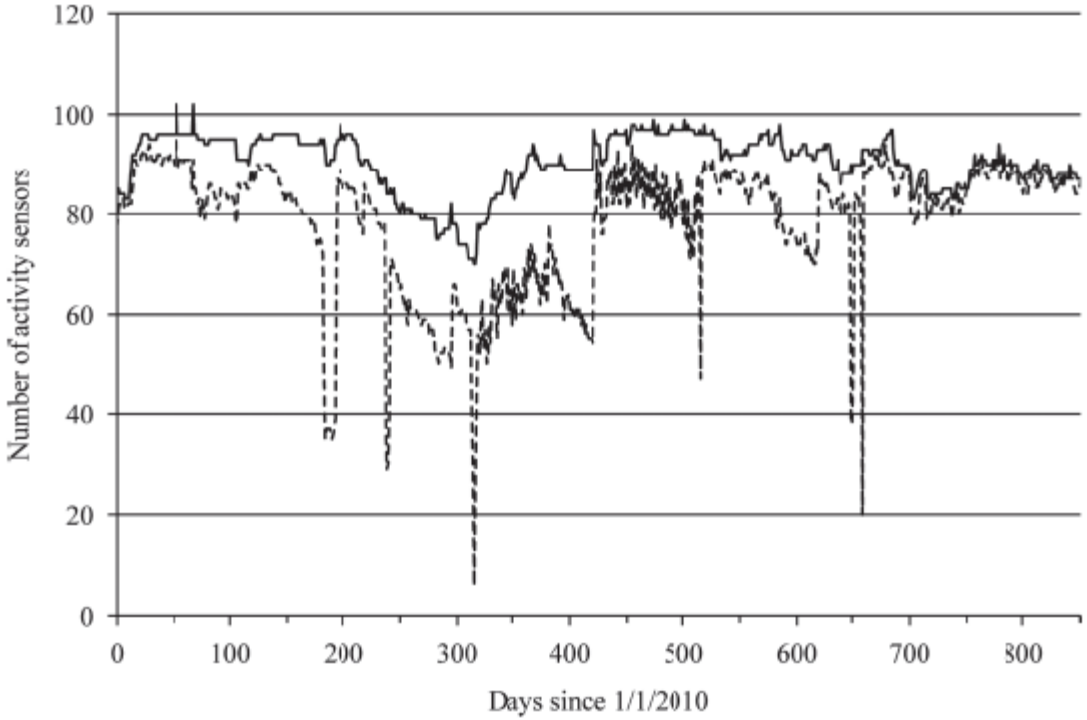
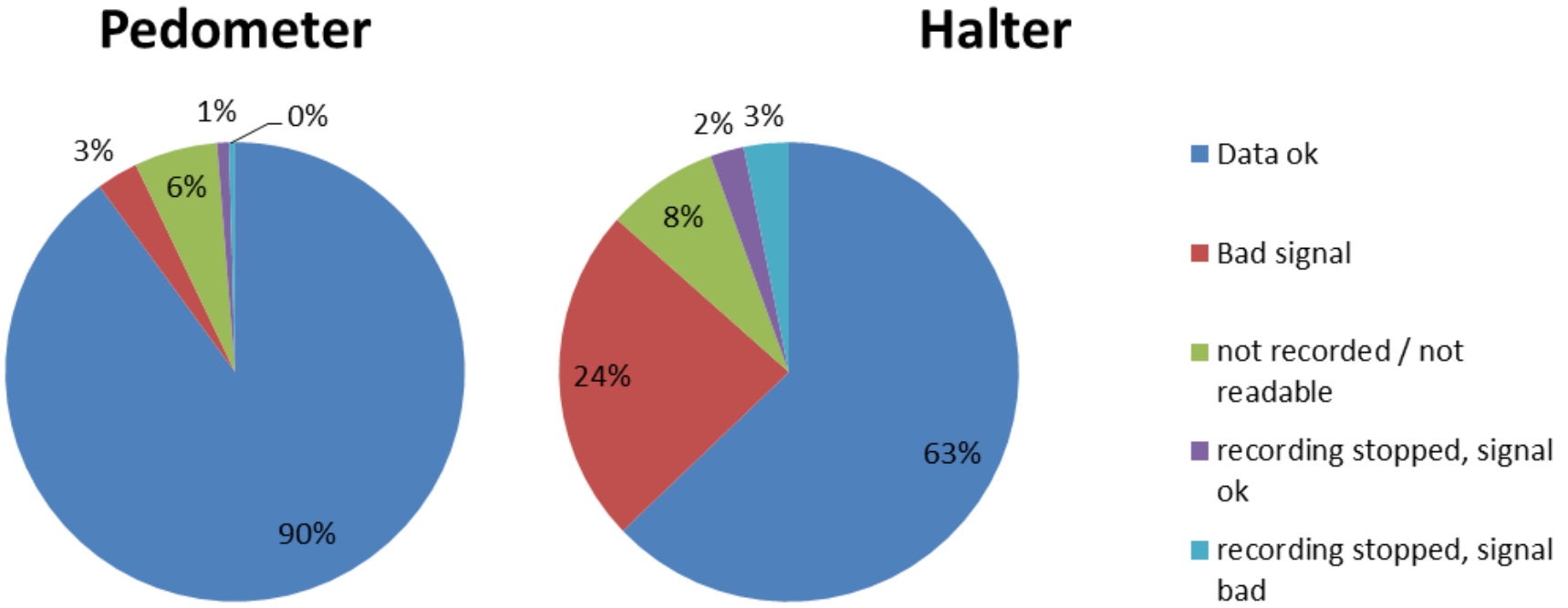


Figure 2. Number of attached activity sensors (——) and number of valid activity measurements (– – –) in the experiment shown per day from January 1, 2010 (January 1, 2010 = d 1, April 30, 2012 = d 851).

DE MOL ET AL. (2013): Applicability of day-to-day variation in behavior for the automated detection of lameness in dairy cows. Journal of Dairy Science, 96 (6), pp. 3703–3712.

Experiences

RumiWatchSystem: 1 experiment, 500 24h records
(A. Münger, Agroscope Posieux, Switzerland)



Presented at 1st International RumiWatch User Meeting, November 2013, Agroscope Tänikon, Switzerland

Expectations

RumiWatch validation: noseband sensor

		Direct observation [min]	
		Ruminating	**Eating**
	Observed duration	884	848
Automatic evaluation [min]	Classification Ruminating	859	30
	Classification Eating	25	807
	Classification Other Activity	0	11
	Concordance [%]	**97.2**	**95.2**

Direct observation = 100% (gold standard)

Expectations

NBS & Pedometer

Precision Sensors

Reader & USB interface

ANT+ USB 2.0

Wireless and serial data transmission

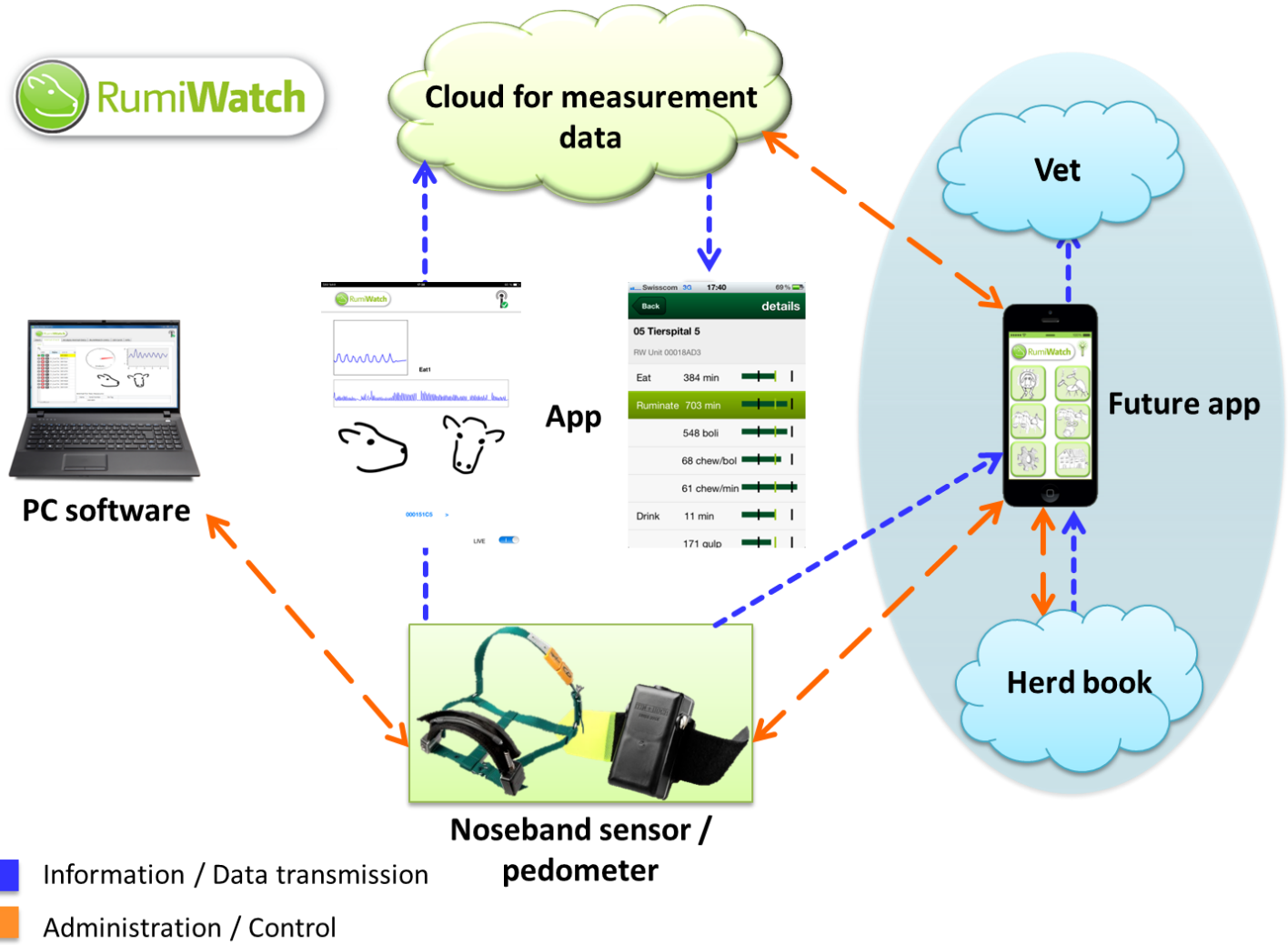
RumiWatch Manager

Operating software
measurement control

RumiWatch Converter

Analysis software
user-defined data processing

Expectations



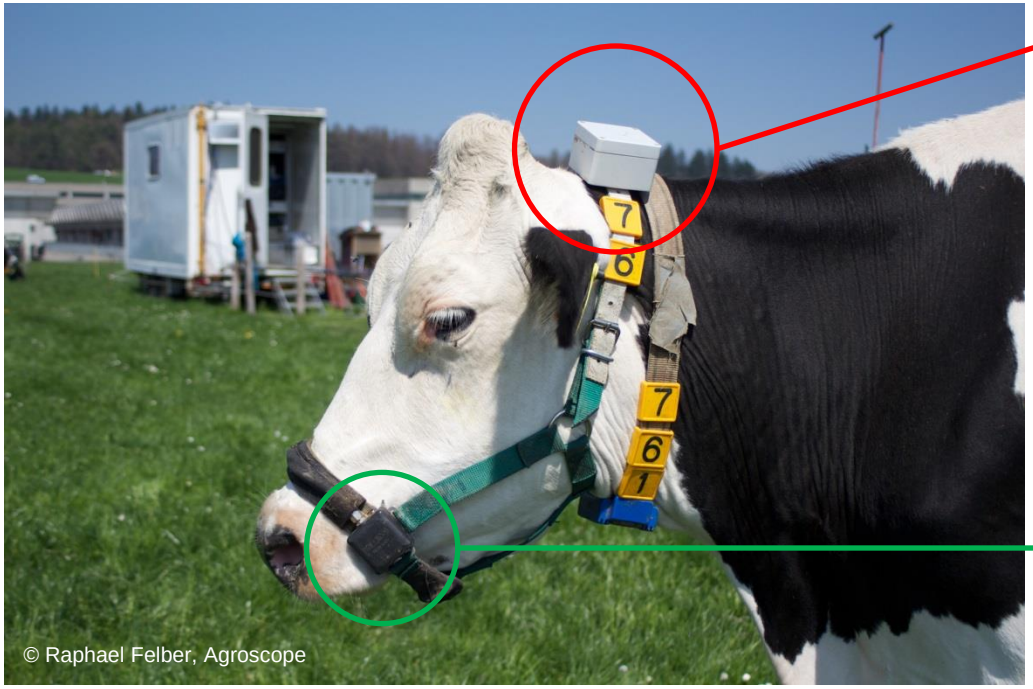
Ideas

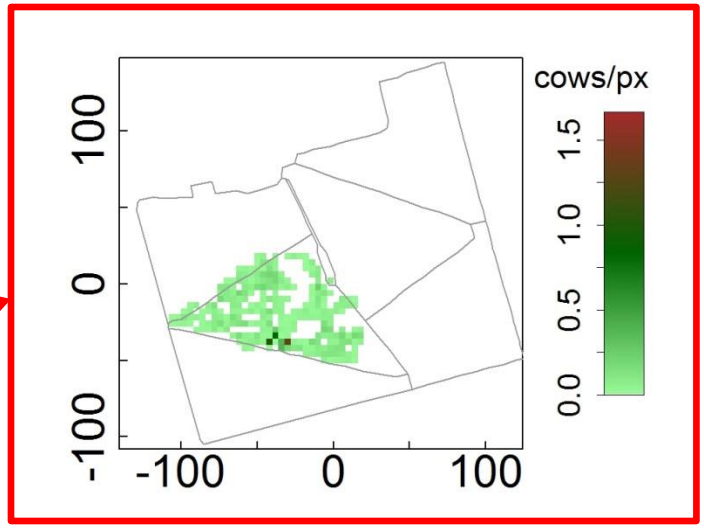
RumiWatch

EquiWatch

Transform a monitoring system between species

Ideas





Combine behavioural monitoring and localisation

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Missing features

User feedback **= points for improvement**	**Reactions by developers** **= "RumiWatch facelift"**
Battery lifetime	• 100 → 300 days raw data recording, • Sleep mode when not in use (planned)
Battery state	• Improved prognosis and visualization of remaining battery capacity (FW 1.16)
Pressure hose	• Improved, loss-free, stabilized assembly
Measurement stability	• Updated firmware 1.16 disabling data recording at insufficient battery state
Data security	• Custom SD Memory Card (Swissbit) • On-board flash storage (in progress)
Rubbing of halter	• Dimensions and materials improved, • Minimized rubbing by added protection
Wireless data transmission	• Quickened in RumiWatch Manager V1.0
Evaluation software	• Better overview when working with high numbers of devices in RW Manager V1.0
Validity of activity classification	• Improved in firmware version 1.16
User-defined data processing	• Extended analysis functions in RumiWatch Converter V0.7.3

Thank you!

RumiWatch

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Discussed Topics

Animal Behaviour and Localisation Systems:

- Systems for scientific application
- Features
- Research topics
- Biggest challenges

Systems for scientific application

- Conventional video recording
- ALT-Pedometer
- IceTag
- RumiWatch
- SCR
- Nedap
- ENGS
- HOBO
- MKW Electronics

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Systems for scientific application

- Ubisense
- LTM
- SAW Passive Localisation
- SensOor
- pH Bolus (ecow, smaxxtec)
- SCC measurement for milking parlor
- DeLaval Herd Navigator

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Features

- Fault tolerance
- Automated fault detection
- Data access
- Modeling procedures
- Standardized data exchange
- Comparability of data
- Model designs

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Research topics

- Lameness detection
- Fertility
- Transition management and feeding
- Animal health
- System assessment
- Animal emissions
- Pasture management
- Animal-individual differences: how to find them?

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Research topics

- Learning behavior
- Feeding behavior and precision feeding
- Adaption to new systems

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Biggest challenges

- Better exchange among researchers
- Overcome weak «standards»
- Long-term studies and their outcomes
- Data mining
- Open access technology
- Data reduction

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Outlook: CIGR-AgEng 2016