

How to Improve Biosecurity?



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Numerous sources of infection and risk factors



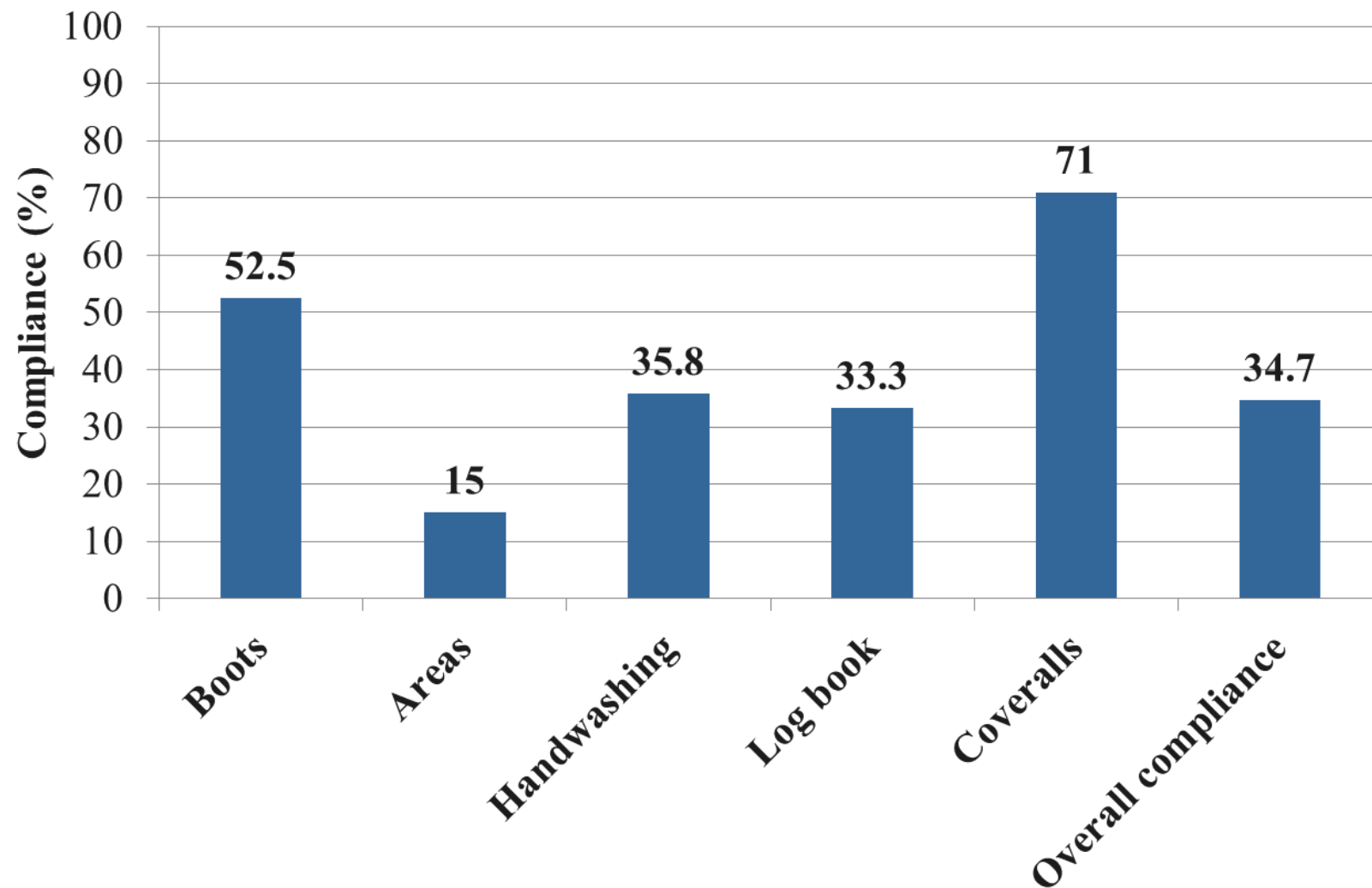
Are people complying with these biosecurity measures?

Evaluation of strategies to enhance biosecurity compliance on poultry farms in Québec: Effect of audits and cameras

Manon Racicot^{a,b,*}, Daniel Venne^c, André Durivage^d, Jean-Pierre Vaillancourt^a



883 visits
102 individuals



Why not?

Difficult to prioritize what to implement, which increases the likelihood of taking shortcuts

- **Lack of knowledge** (Lotz, 1997; Barcelo & Marco, 1998; Amass & Clarke, 1999; Sanderson et al., 2000; O'Bryen & Lee, 2003)
- **Lack of time, money and equipment** (Vaillancourt & Carver, 1998; Barclay, 2004; Millman et al., 2017)
- **Lack of training, communication and incentives** (Racicot et al., 2011)
- **Lack of consistency in recommended practices** (Jardine & Hurdey, 1997; Moore & al., 2008)
- **Beliefs, attitudes, perception, education, experience, personality traits** (Delabbio & al. 2003 et 2005; Racicot et al., 2012; Delpont et al., 2019)



Biosecurity = Behavior

Create a Biosecurity Culture



Create an automatic behavioral sequence: perform the same actions in the same order at all times



Effective work set up increases chances of complying by 13 times



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Difficult



Intermediate



Easy



Physical barrier increases chances of complying by 9 times



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Red Line



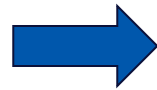
Physical Barrier



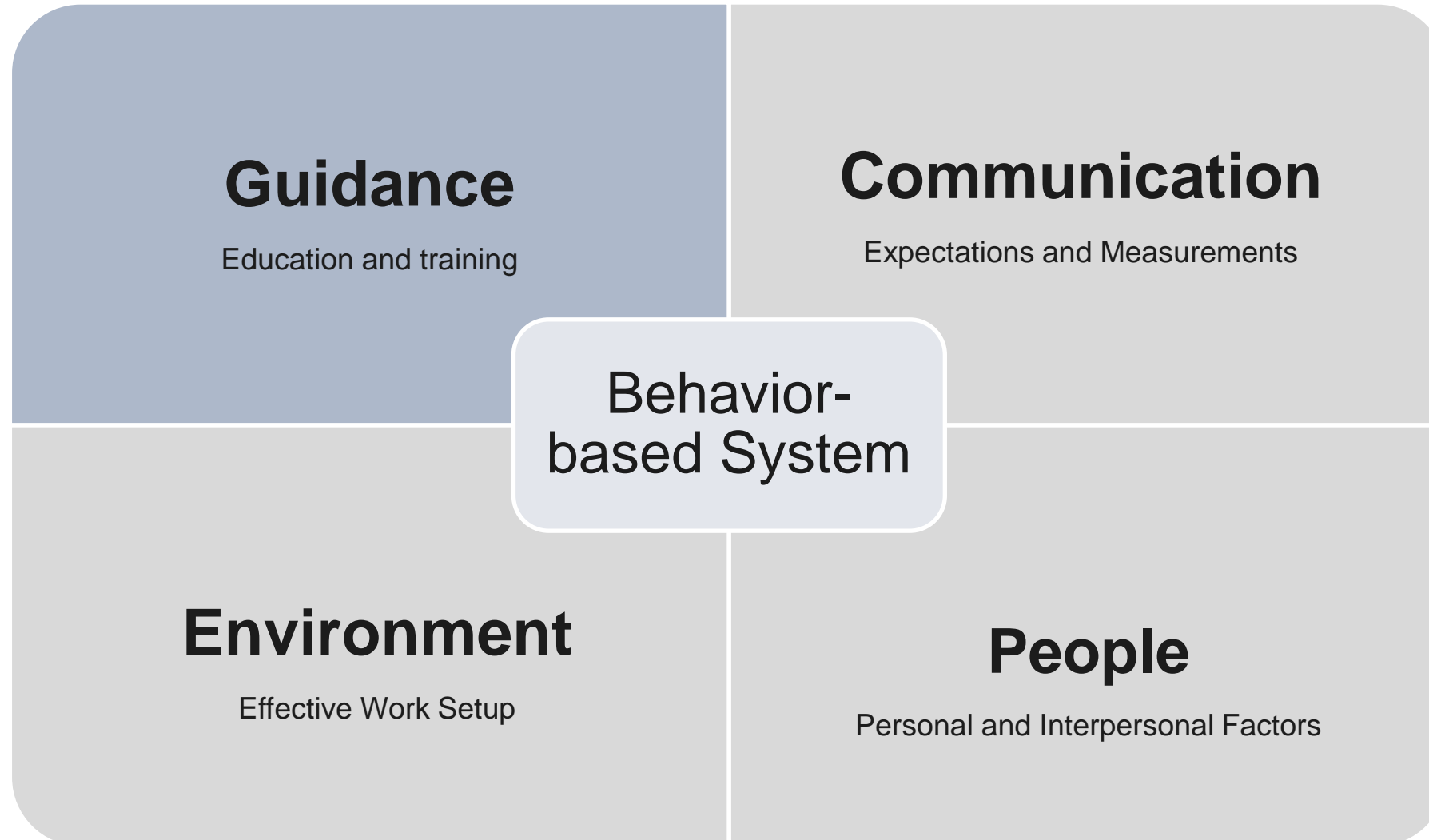
“If something has been done a particular way for 15 or 20 years, it’s a pretty good sign, in these changing times, that it is being done the wrong way” Elliot M. Estes

TIP #1

Encourage producers to invest in an effective work set up such as a Danish Entrance



Create a Biosecurity Culture



Guidance

Education and training

Communication

Expectations and Measurements

Behavior-based System

Environment

Effective Work Setup

People

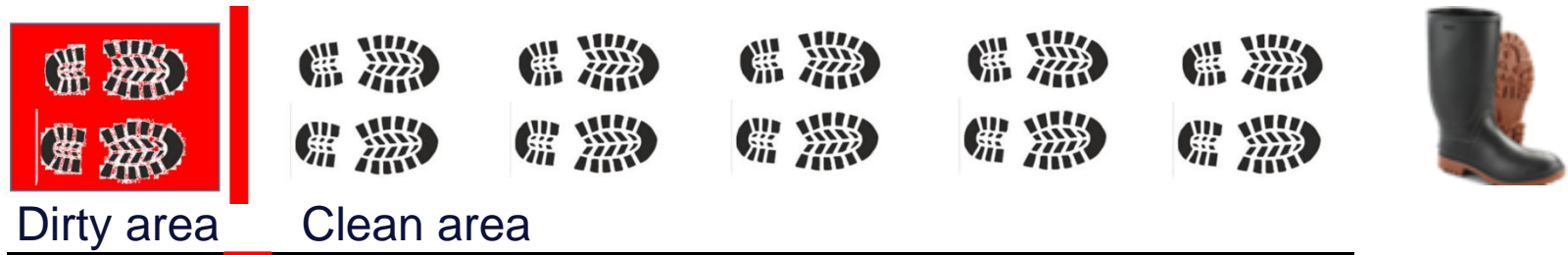
Personal and Interpersonal Factors

2008

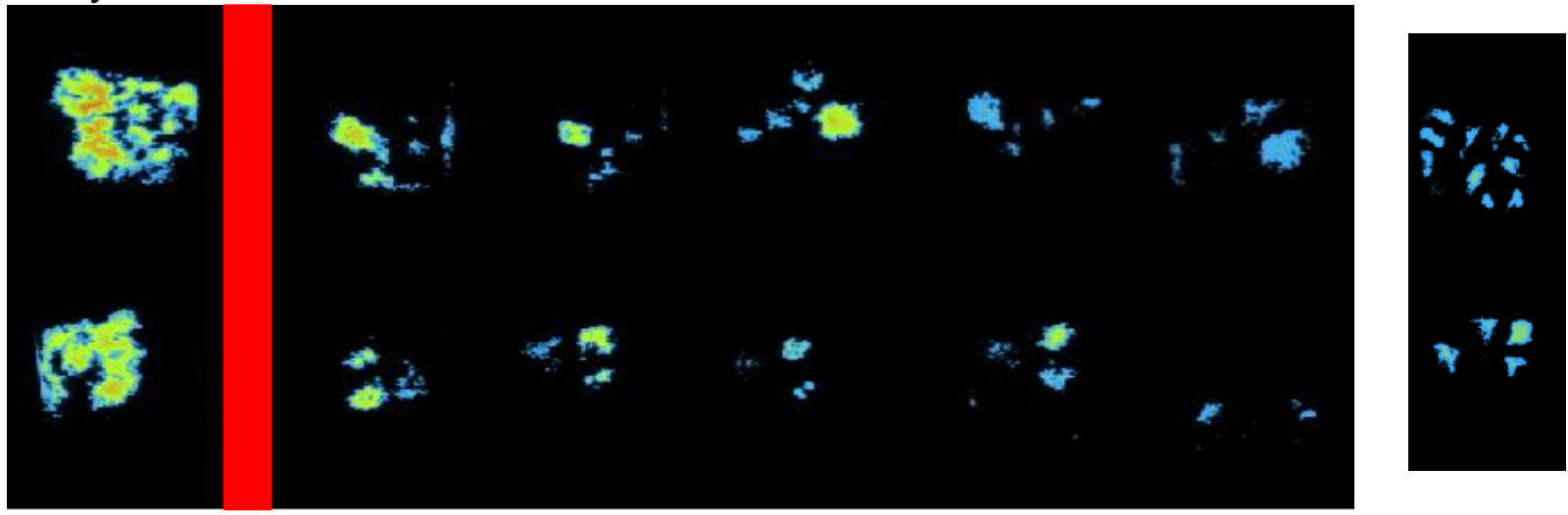
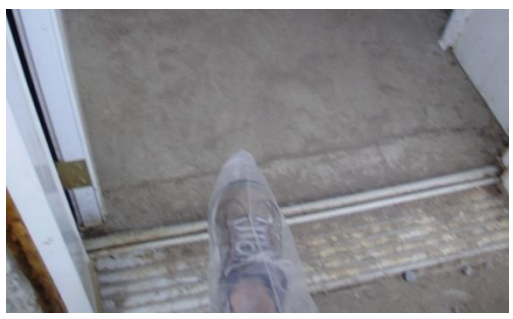


2023

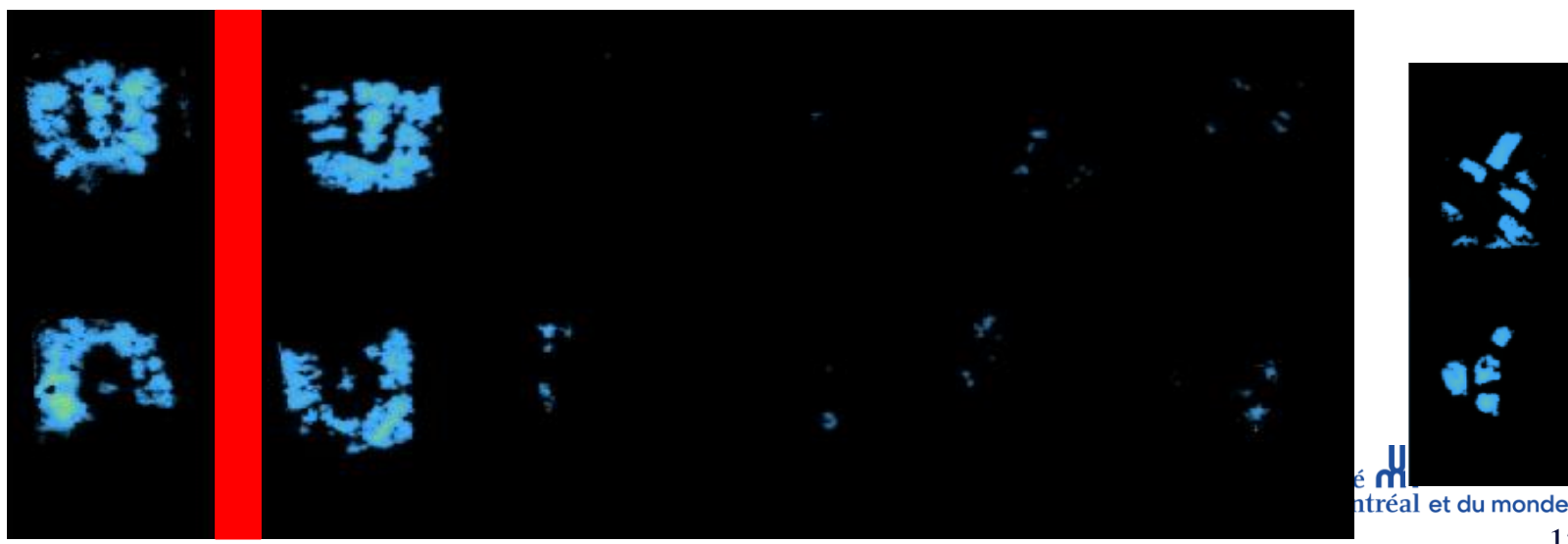


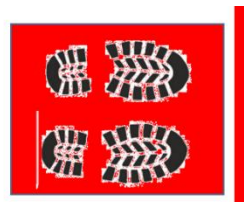


Donning plastic boots while getting in the barn



Donning boots in clean area





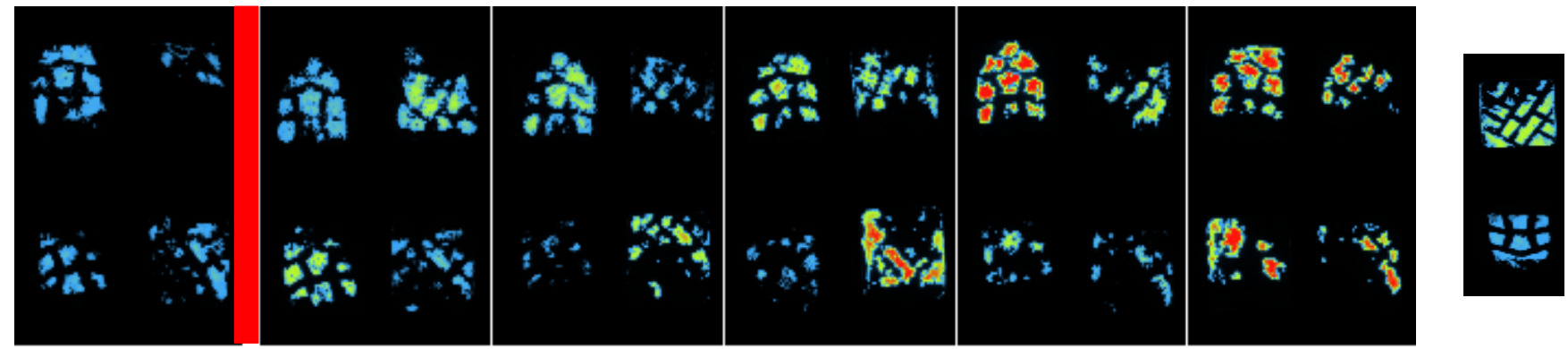
Dirty area



Clean area



Not changing boots



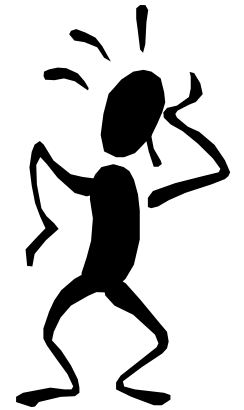
Donning boots properly



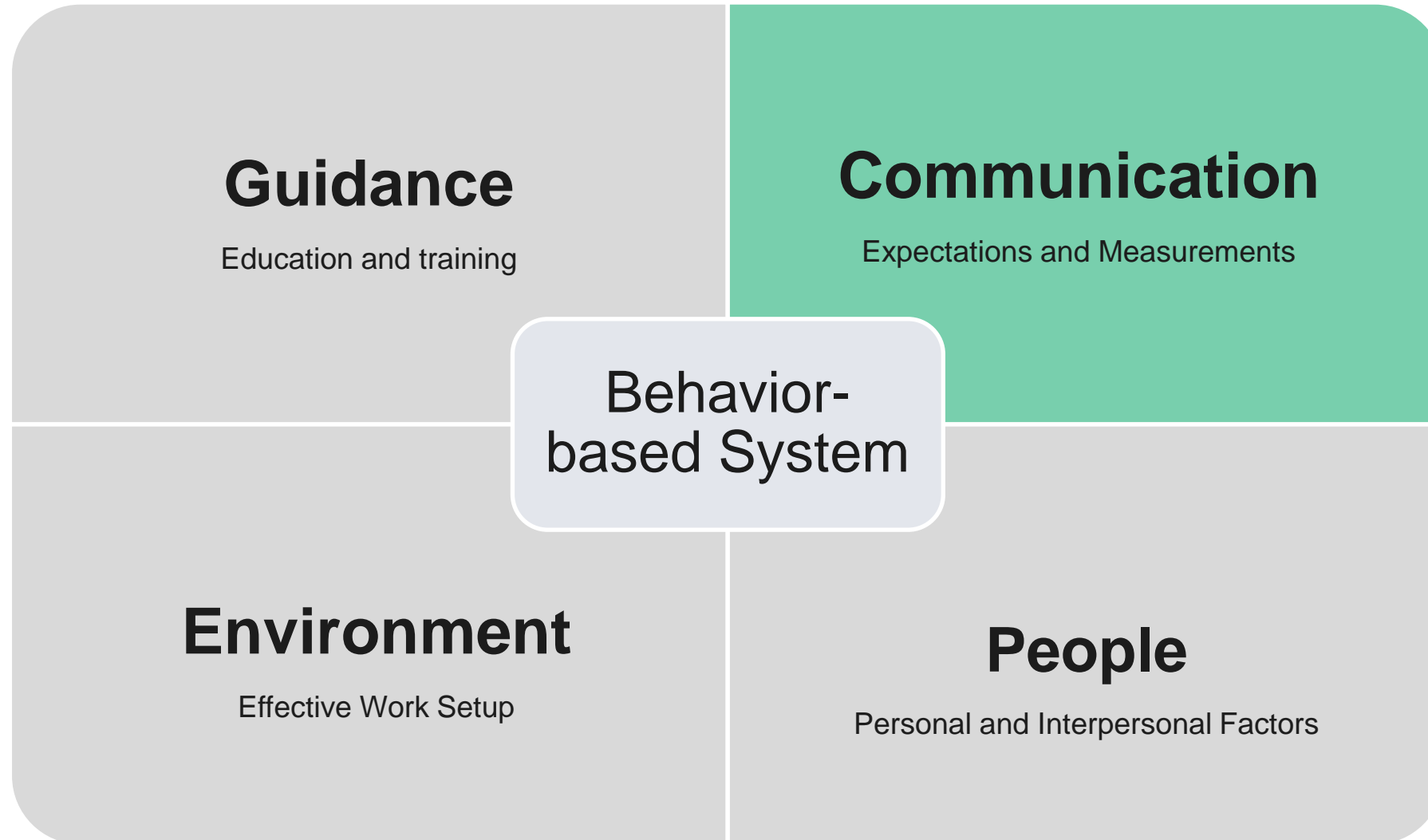
*I hear and I forget.
I see and I remember.
I do and I understand.*

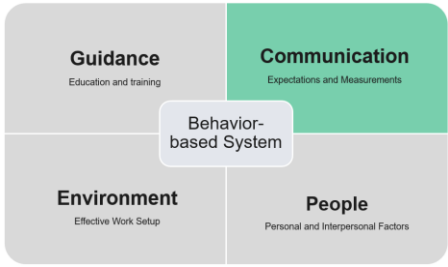
TIP #2

**Intervene when you see biosecurity errors
Errors must be learned from**












Create a Biosecurity Culture





How to monitor biosecurity compliance?

Methods	Cost / time	Reflect compliance	Training opportunity	Continuous monitoring
Questionnaire	Low			
Audit	Medium			
Cameras	High			

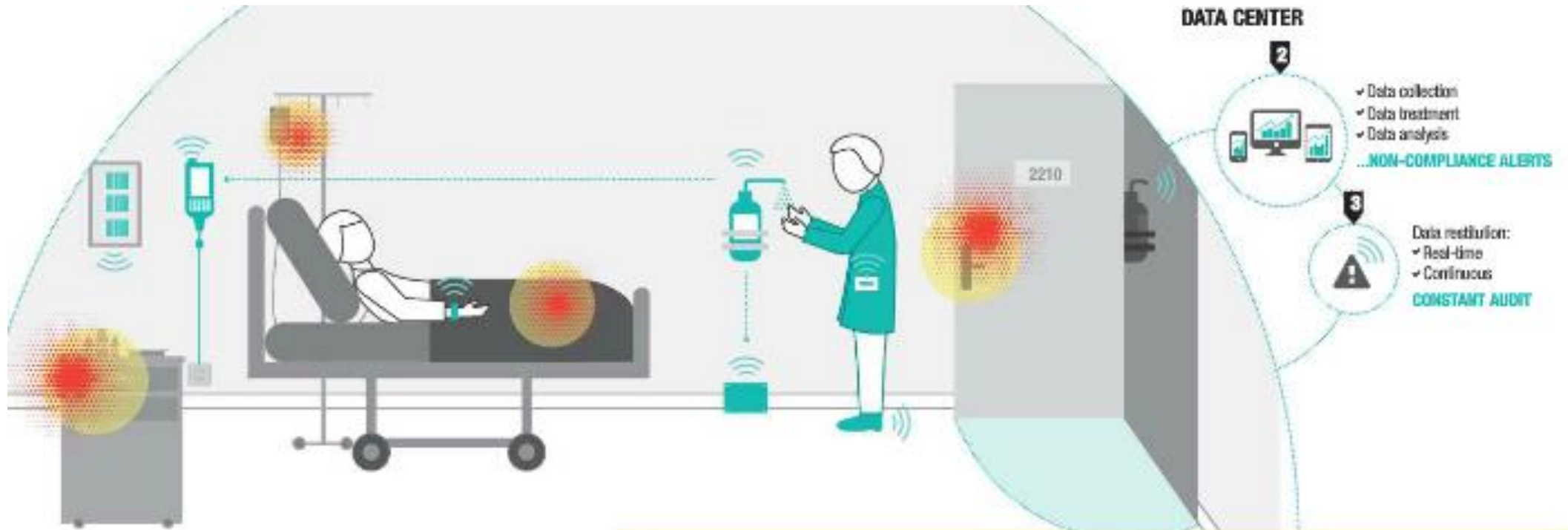


Evaluation of hand hygiene compliance and associated factors with a radio-frequency-identification-based real-time continuous automated monitoring system

J-C. Dufour^{a,b,*}, P. Reynier^{a,b,c}, S. Boudjema^{c,d}, A. Soto Aladro^{c,d},
R. Giorgi^{a,b}, P. Brouqui^{c,d}

MediHandTrace - Shoe chip measures hospital handwashing:

https://www.youtube.com/watch?v=d1Oa7vNT_iQ



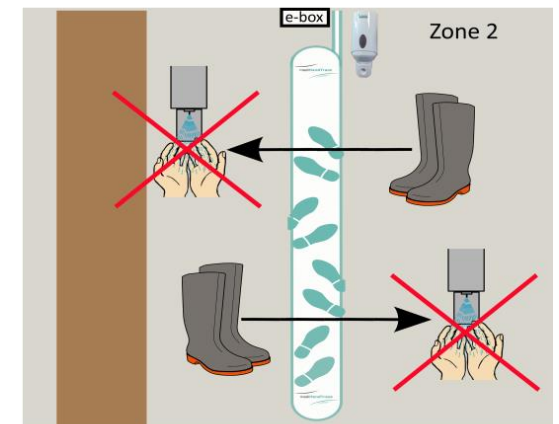
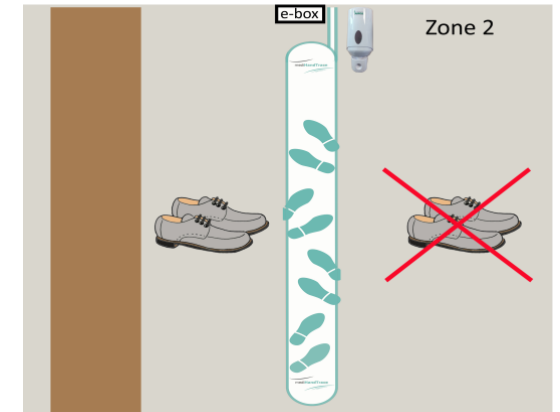
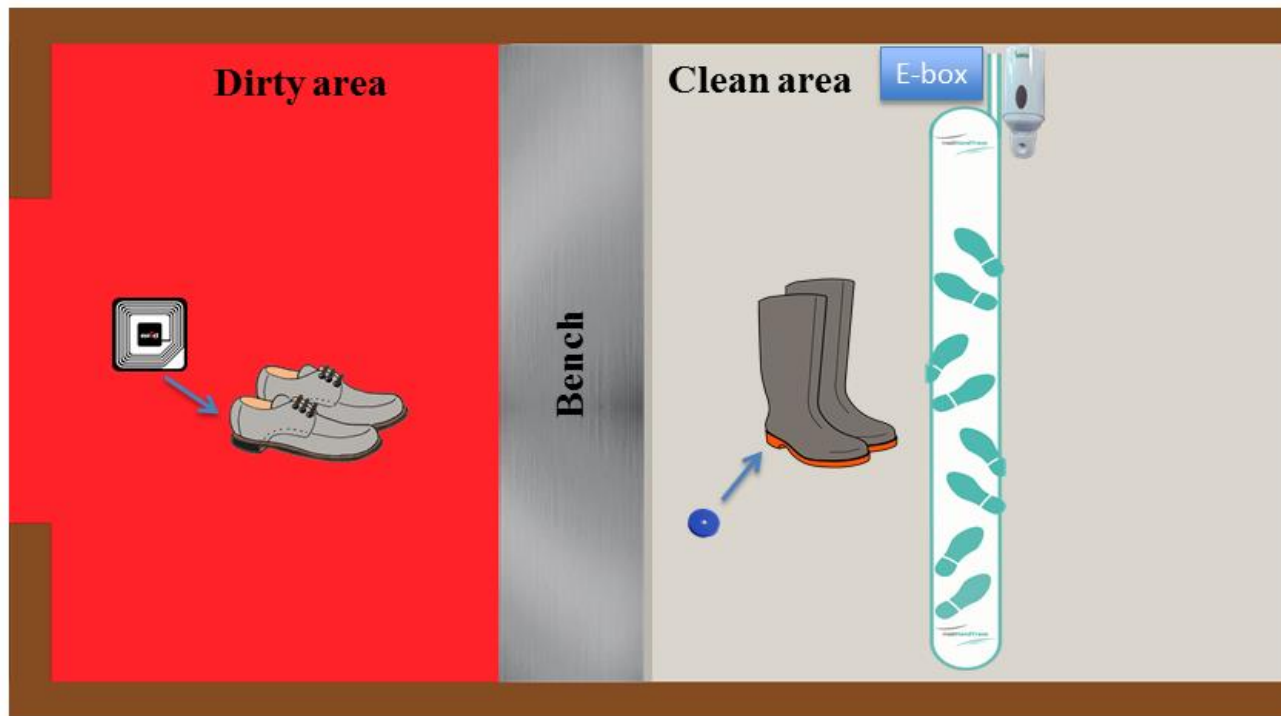
Hospital Context



Farm Context – pilot project 2018

Objectives

- Adapt the RFID system for monitoring boot and hand sanitizing compliance when entering and exiting on farms
- Evaluate employees' appreciation of the RFID system



Farm Context





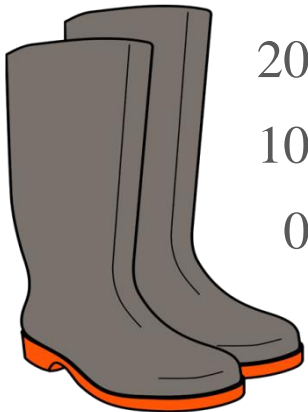
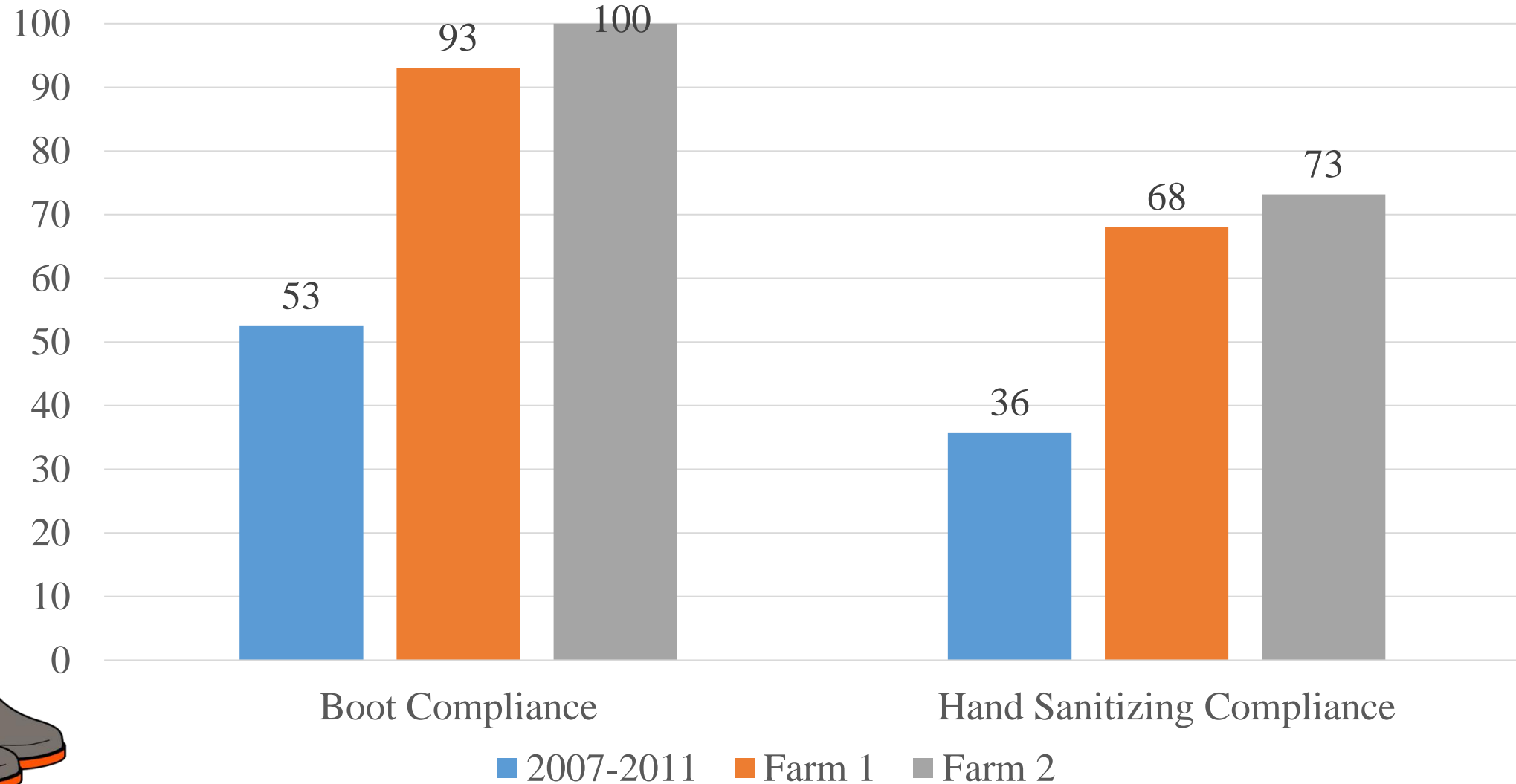
Farm Context – pilot project 2018

- Farm 1: layer farm
 - RFID system for 17 days
 - 4 employees
 - 254 entries and exits recorded (on average: 15 per day)
- Farm 2: broiler farm
 - RFID system for 13 days
 - 3 employees
 - 56 entries and exits recorded (on average 5 per week day and 2 for weekend)



Farm Context – pilot project 2018

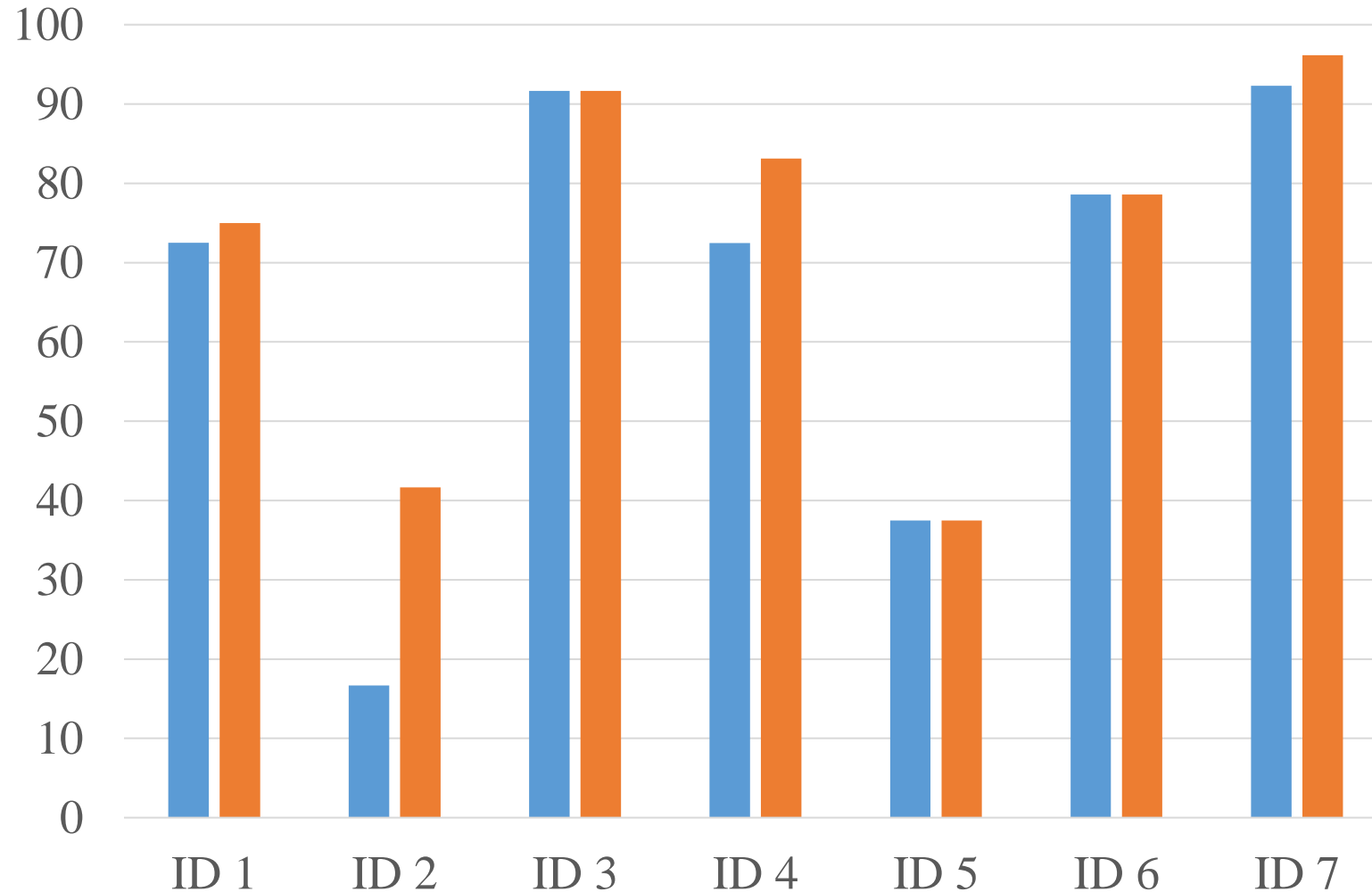
Results at the farm level



Farm Context – pilot project 2018

Results at the individual level

Hand sanitizing compliance



■ Compliance before alarm
■ Compliance after alarm

MediHand Trace System Limitations



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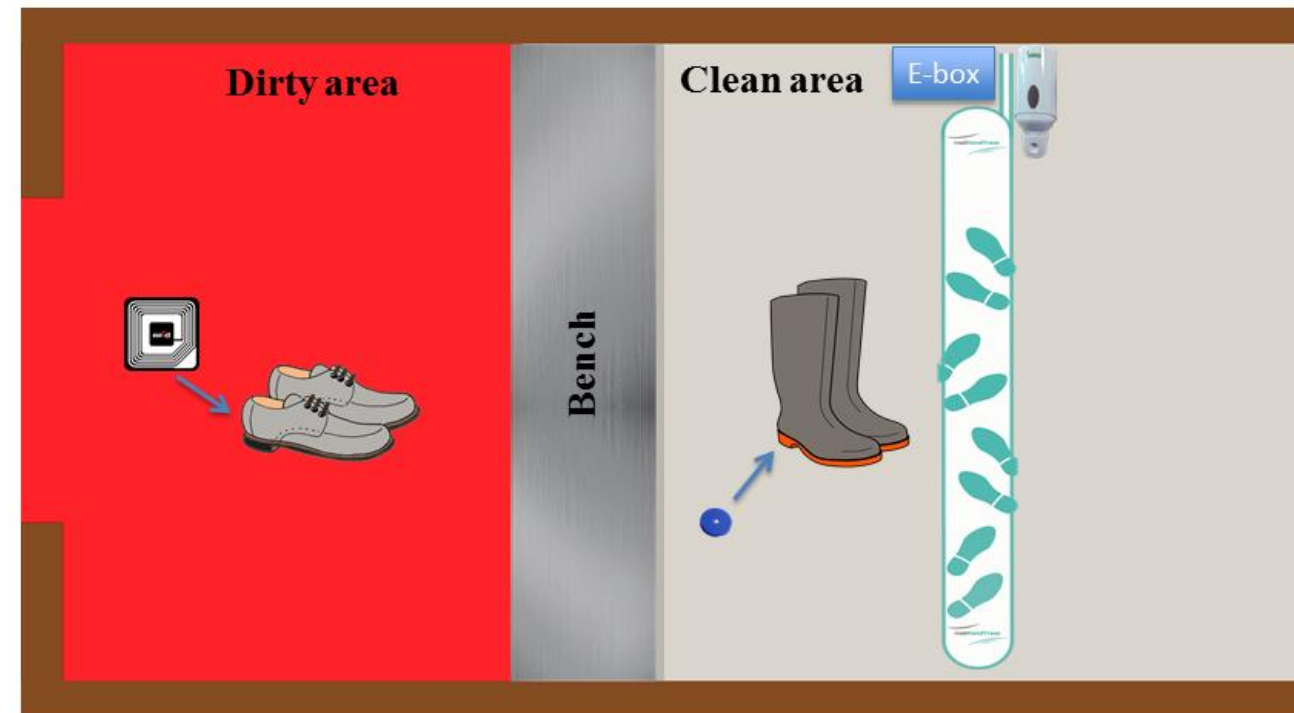
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Technologies monitoring and improving biosecurity compliance in barn anterooms

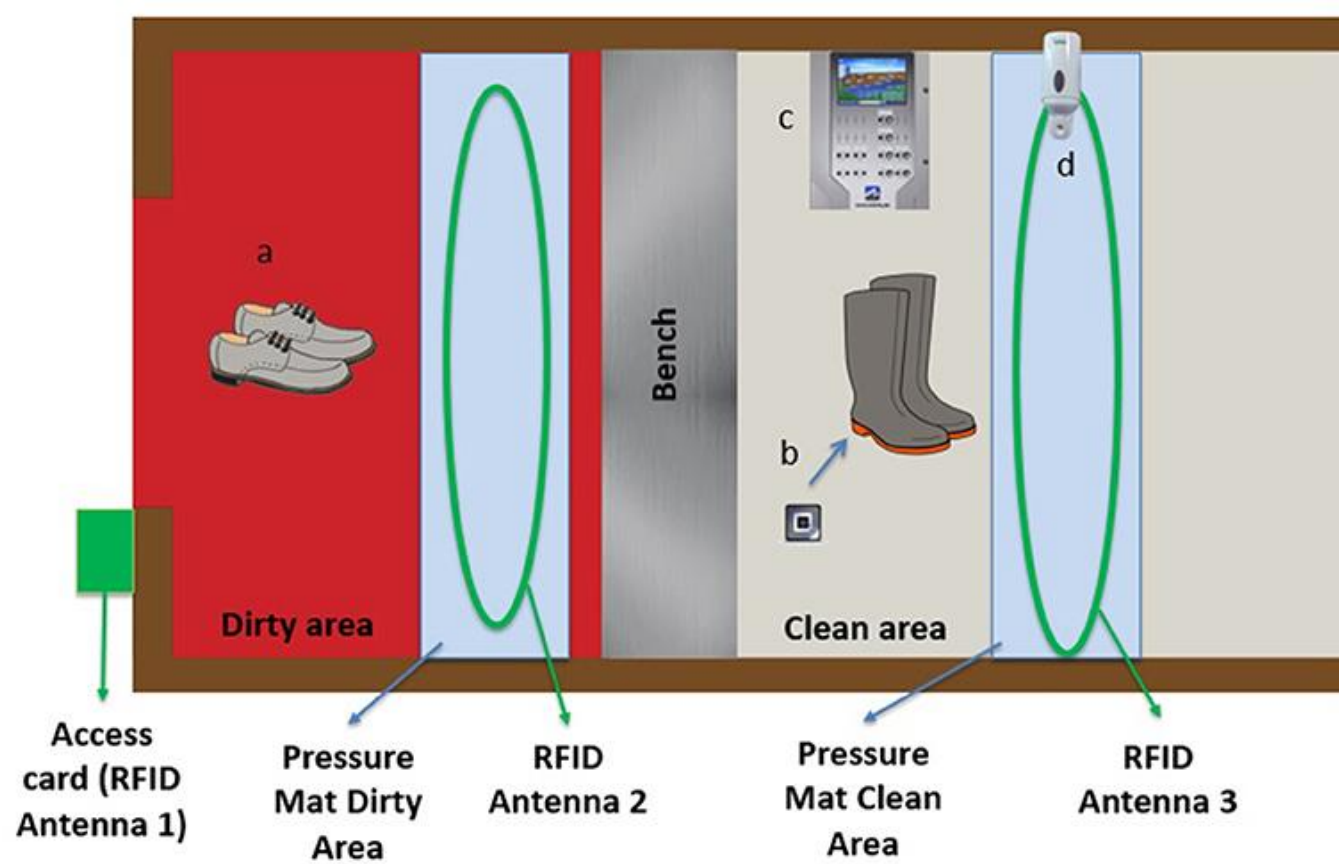
Manon Racicot^{1*}, Anne-Marie Cardinal², Dominic Tremblay³ and Jean-Pierre Vaillancourt²

¹Department of Pathology and Microbiology, Faculty of Veterinary Medicine, Université de Montréal, Montreal, QC, Canada, ²Department of Clinical Sciences, Faculty of Veterinary Medicine, Université de Montréal, Montreal, QC, Canada, ³Institut de technologie Agroalimentaire du Québec, Programme de technologie des productions animales, St-Hyacinthe, QC, Canada

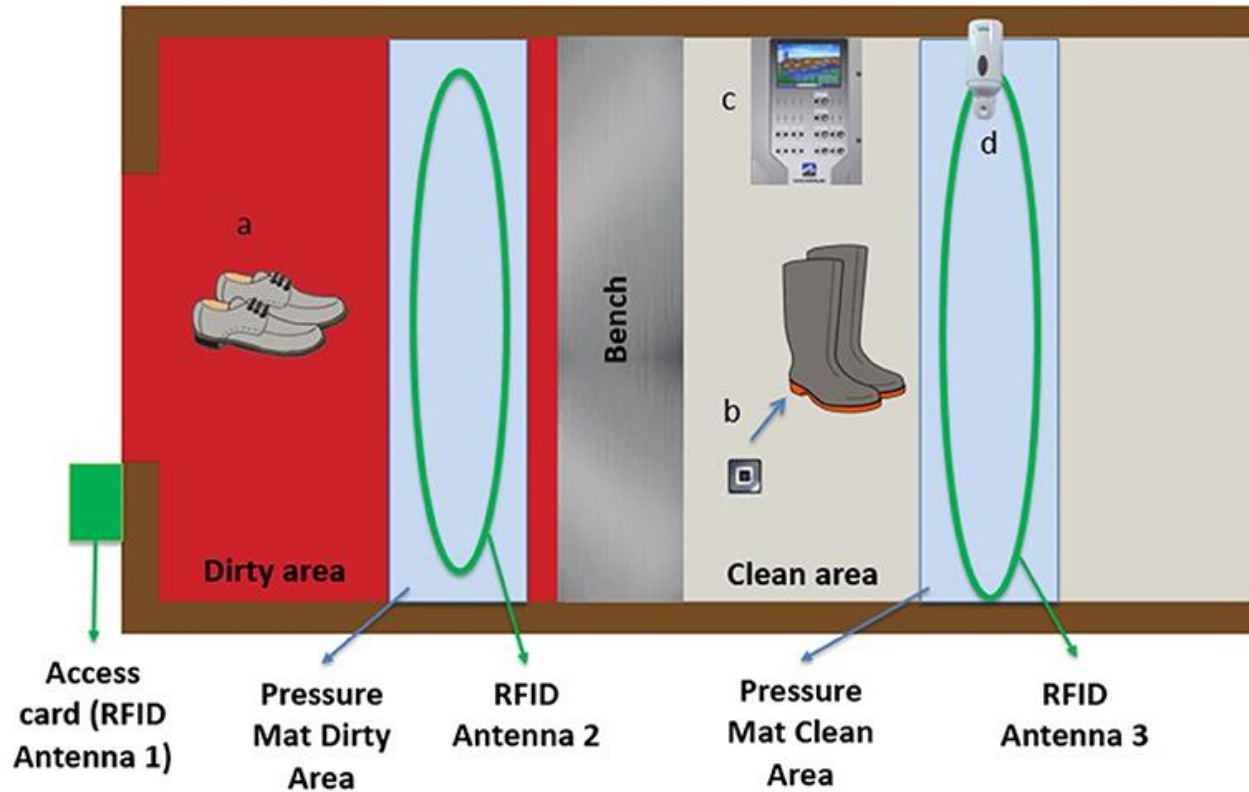
- Keep same **personal footwear**
- Not detecting **farm boots in dirty area**
- Confusion when going **back and forth in the clean area** or leaving the barn \Rightarrow hand sanitizing non-compliance overestimation
- Issue with visitors' compliance (no chips in personal footwear, no dedicated chipped farm boots; likely using plastic boots)



Maximus Prototype 2021



Farm Context – Maximus pilot project 2021



- Programmed for 2-area entrance design
- Tested on 3-area entrance design

Maximus Prototype 2021

Results

- 7 employees and 4 visitors
- # entries:
 - ✓ Camera recorded 105 entries
 - ✓ Maximus recorded 81 entries
(*multiple people entering*)
- # exits:
 - ✓ Camera recorded 104 exits
 - ✓ Maximus recorded 163 exits
(*traffic in clean area = exit*)

Overall results:

- Overestimating non-compliance with boots (*sensitivity of antenna, tag in one farm boot of a pair*)
- ↓ errors when activating alarms



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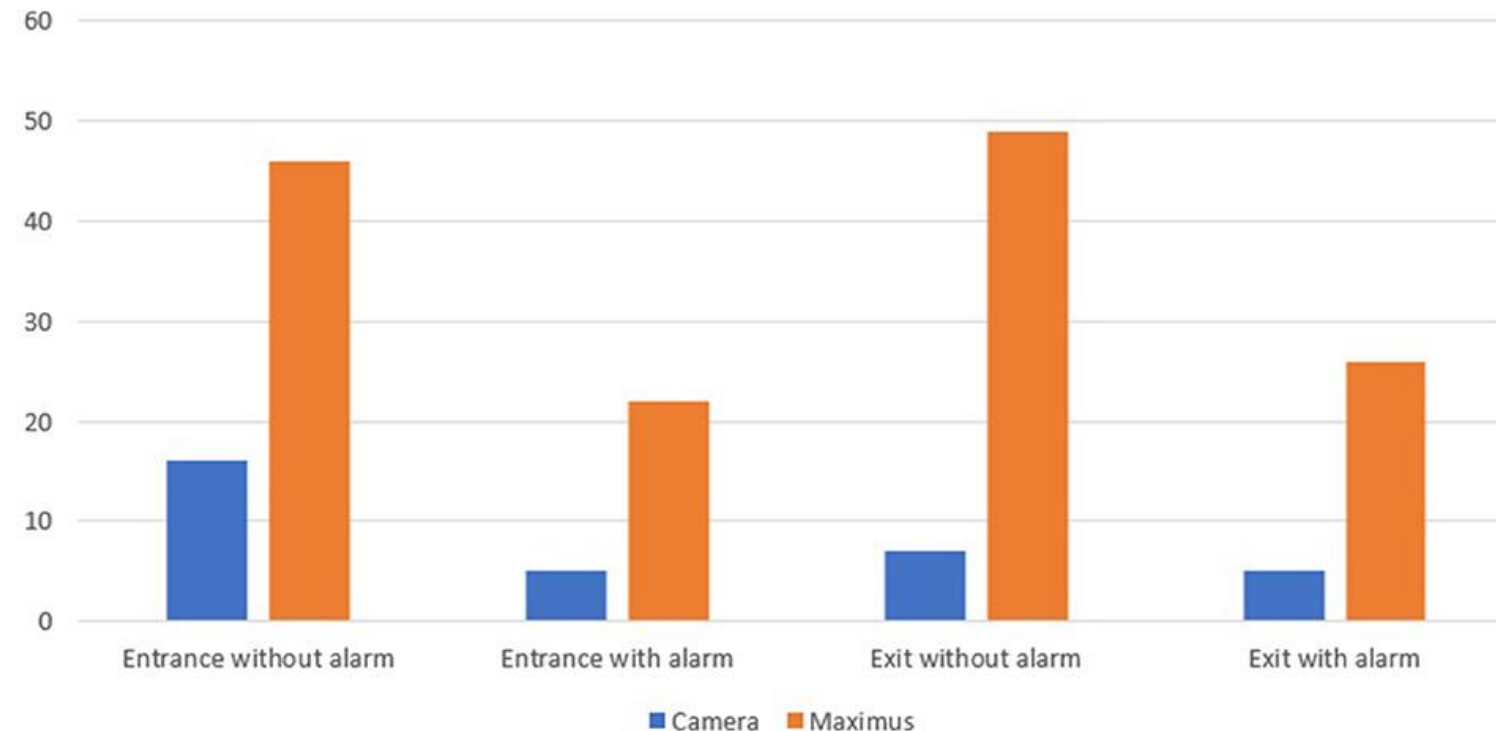
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Technologies monitoring and improving biosecurity compliance in barn anterooms

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Number of biosecurity breaches related to changing boots



Maximus System Limitations

Check for updates

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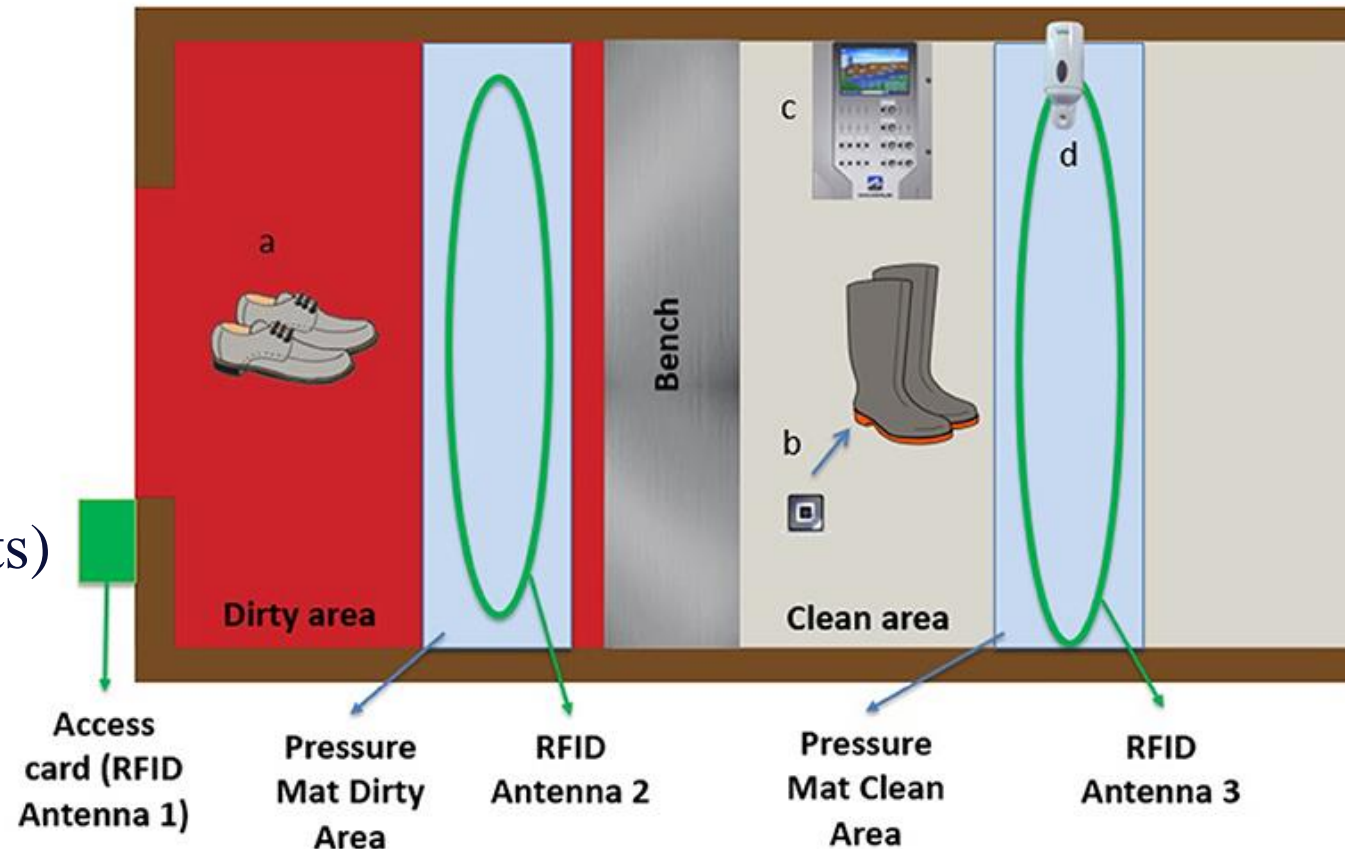
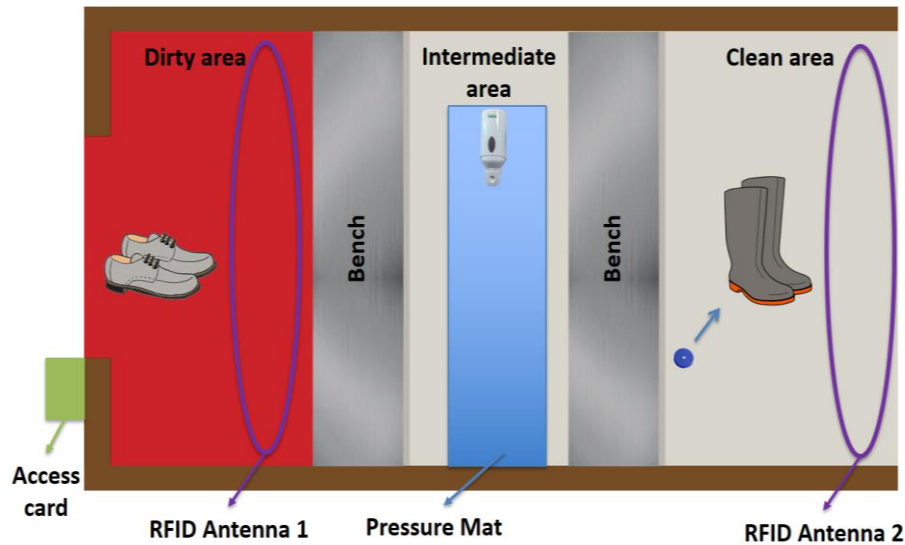
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- Challenge when multiple employees enter
- Not programmed for 3-area entrance design



- Visitors' compliance (no card?, plastic boots)



Create a Biosecurity Culture





Responsibility

Is responsible and conscientious towards the work he undertakes. **Does not compromise** or bend the **rules** as far as his principles and promises are concerned.

Complexity

Values a **logical and rational approach** as well as the use of complex strategies.

Action-oriented

Reacts quickly to constraints in his environment. Becomes energetic when faced with tasks to accomplish and challenges to overcome.



Is there a relationship between personality traits, emotional intelligence and receptivity to real-time audio feedbacks?

TIP #3



Be part of the solution, not
part of the problem

Conclusions

Biosecurity compliance is a significant challenge

- Implementing a behavior-based system creates a biosecurity culture



- Having a continuous monitoring system seems to improve biosecurity compliance and should be used to reward and motivate employees by providing personal performance and peer comparison data
- Providing real-time feedback seems to have a variable impact on participants

Collaborators

Université de Montréal

- Jean-Pierre Vaillancourt, DVM, MSc, PhD
- Geneviève Huard, DVM, Master student
- Dominic Tremblay, summer student (ITA)
- Anne-Marie Cardinal, DVM



Université du Québec en Outaouais

- André Durivage, psychologist, PhD



Financial support from:



Questions

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**Biosecurity
is a 24/7/365
commitment**