

Integrated **m**onitoring & **o**peration system in **u**se within a **s**tandardized **e**nvironment

The iMouse System combines COTS\* hardware and open-source software to a **flexible retrofit monitoring solution**

Fokus: **R**eduction & **R**efinement





- Our Vision
- Our Solution
- USP's
- Proof of Concept
- Call to Action

## Notice:

The iMouse project is privately established and financed.

No public or governmental funding until 03/2022

## Agenda



Leibniz-Institut für Experimentelle Virologie  
Animal Facility

**Dr. Oliver Strauch**  
Head of Animal Facility

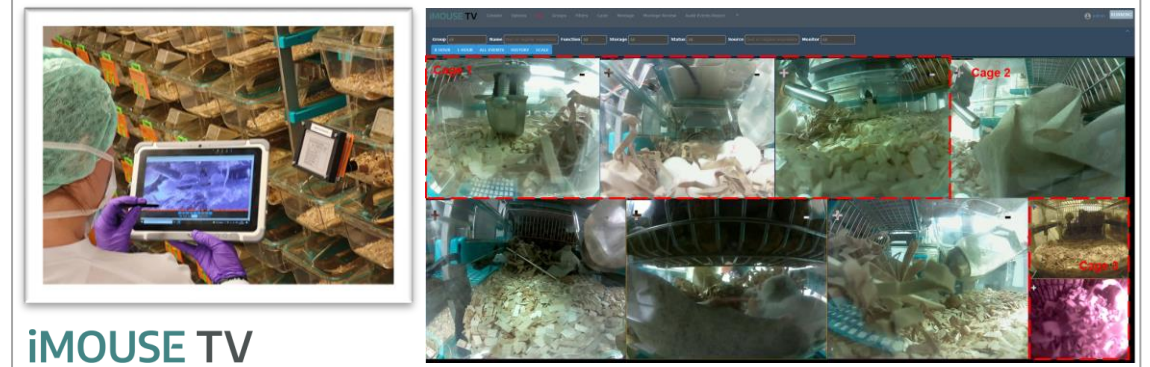
**Ursula Müller**  
Animal Facility / Practical work

**Dr. Janine Kah**  
Project Leading Scientist & Practical work

<https://iiot-projects.com/news/>



**DIGI FRAME** Retrofit system based on Techniplast IVC Emerald Line Home Cage  
4 Cameras implemented and online VPN Secure access

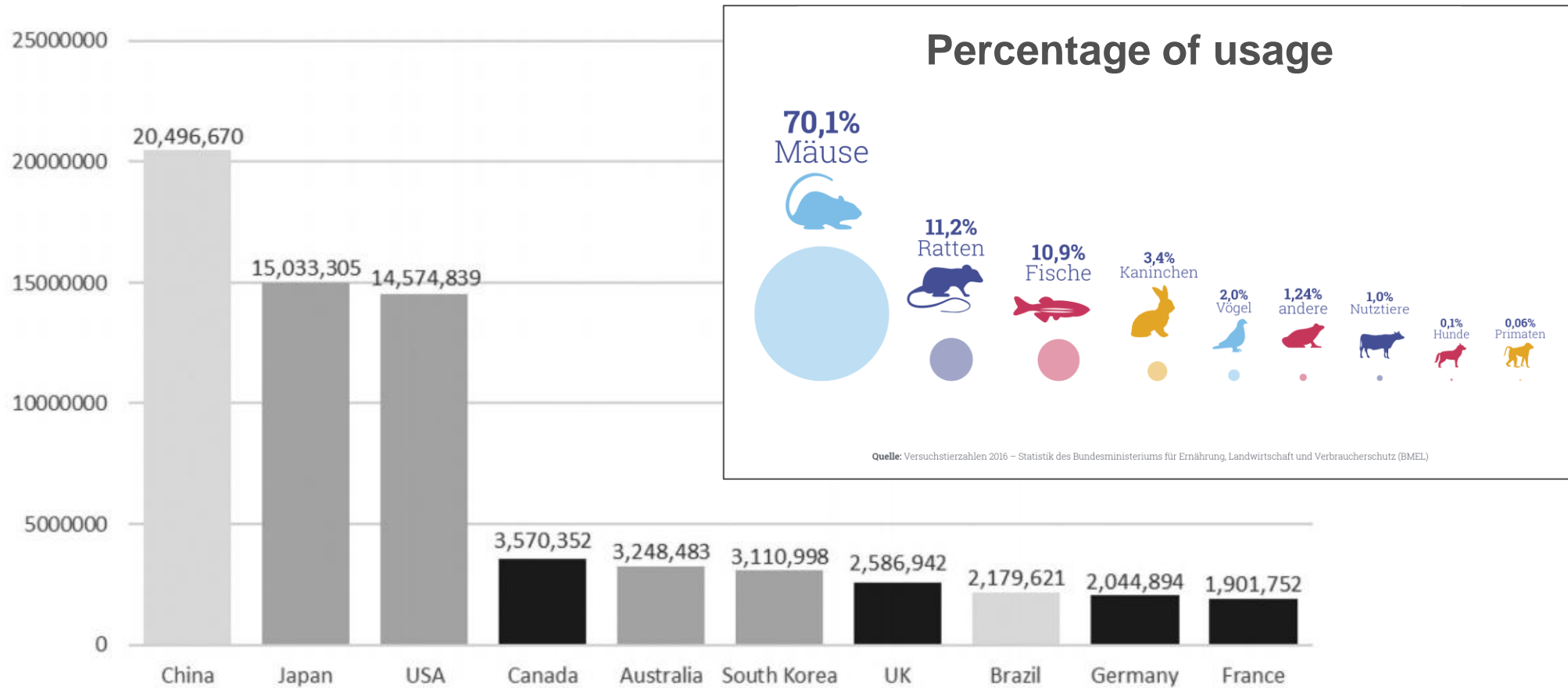




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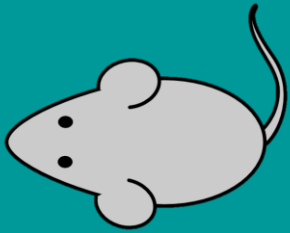
An overall estimate of global animal use in scientific procedures reaches 79.9 million animals, which means a 36.9% increase on the equivalent estimated figure for 2005, of 58.3 million animals. A further extrapolation of this estimate obtains a more comprehensive final global figure for the number of animals used for scientific purposes in 2015, of 192.1 million. (Taylor/Alvares, 2/2020)





Today`s situation:

- Limited digitalisation
- Limited standardisation
- Limited transparency
- Limited DATA sharing



results in a lack of **reproducibility**

## Subjectivity

Research needs Data – Digital Data!



## Objectivity

## Environmental landscape in Germany

Target: interconnection and joint data access



Mice market trend: <https://www.marketsandmarkets.com/Market-Reports/mice-model-market-1308.html>

ongoing activities

**Open science:**  
*Interconnection to ongoing science projects and initiatives*



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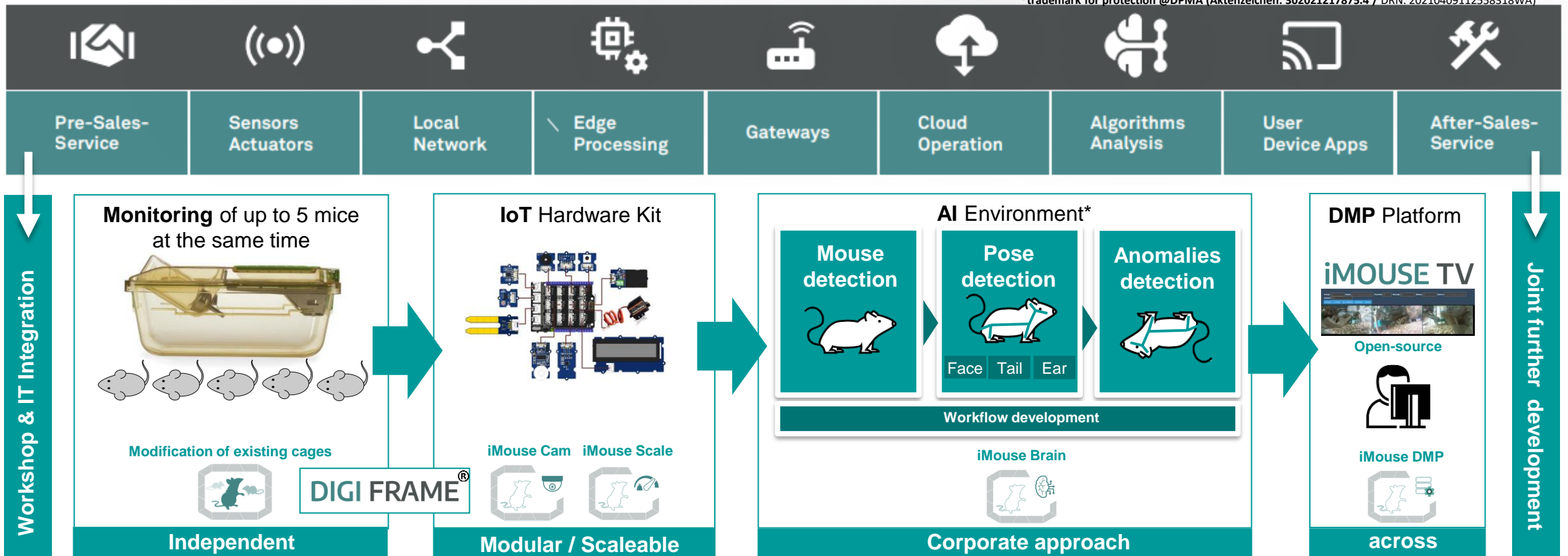
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# The disruptive project approach

Independent | Open-Science | Open-Source | Pre-competitive → from science & research 4 science & research

\*trademark for protection @DPMA (Aktenzeichen: 302021217875.4 / DRN: 20210409112558318WA)



**Digitalize the research field! — bring transparency and reduction of human interaction (animal stress reduction) – Improve efficiency and animal life.**



\*Under development. Goal: Statistical data out of video files.



**Simple handling.** No change of **existing** handling processes.

**DIGI FRAME<sup>®</sup>**

Retrofit

Cage producer independent

Scalable

Open Source

AI development  
Open Science

Transparent regarding data ownership & data usage

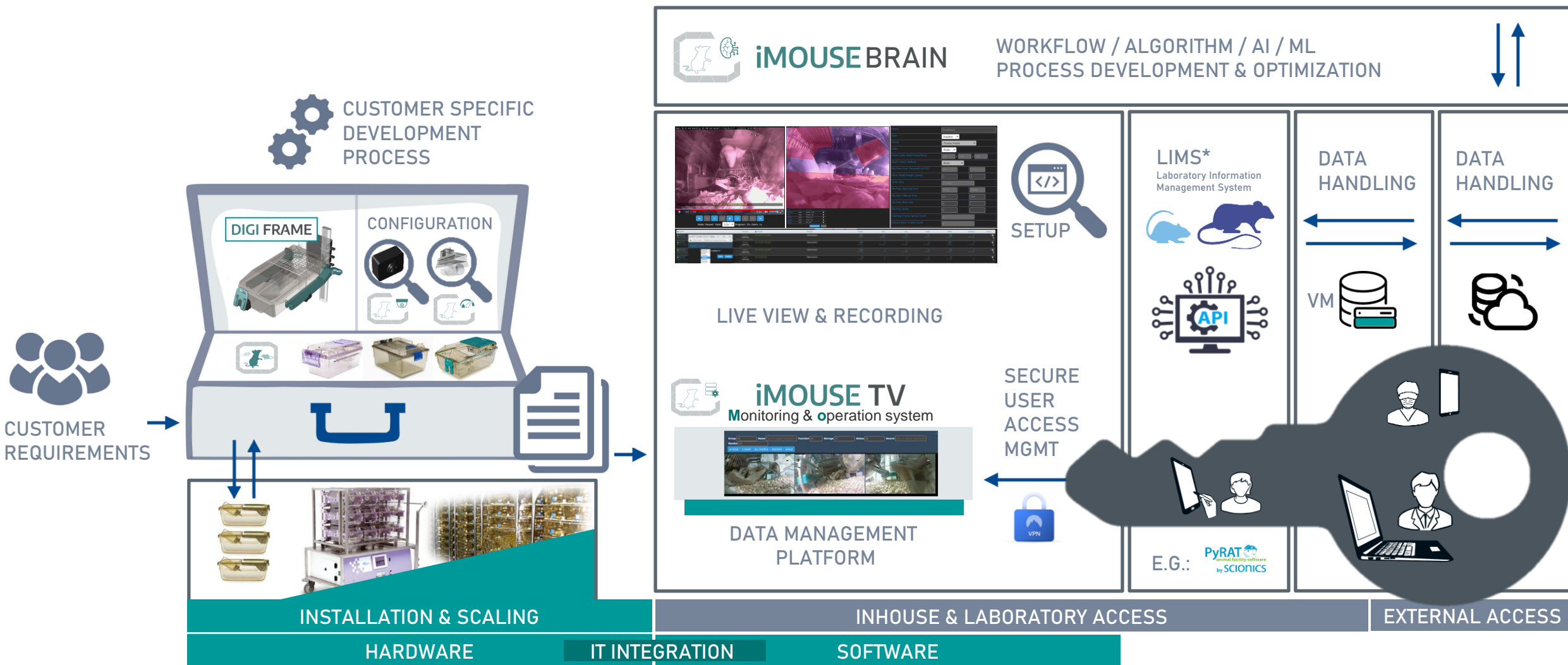
**Continuous user centric development**  
**Functionality updates will be provided over the time to the community**

System approach



# SYSTEM Approach

Overview of the holistic approach – The iMouse system is part of customer’s infrastructure



*monthly-costs*

## **SYSTEM USAGE FEE**

**incl.:**  
**service & support**  
**maintenance**

*minimum rental time: 6months*

*One-time-costs*

## **HARDWARE INTEGRATION** **IT INTEGRATION**



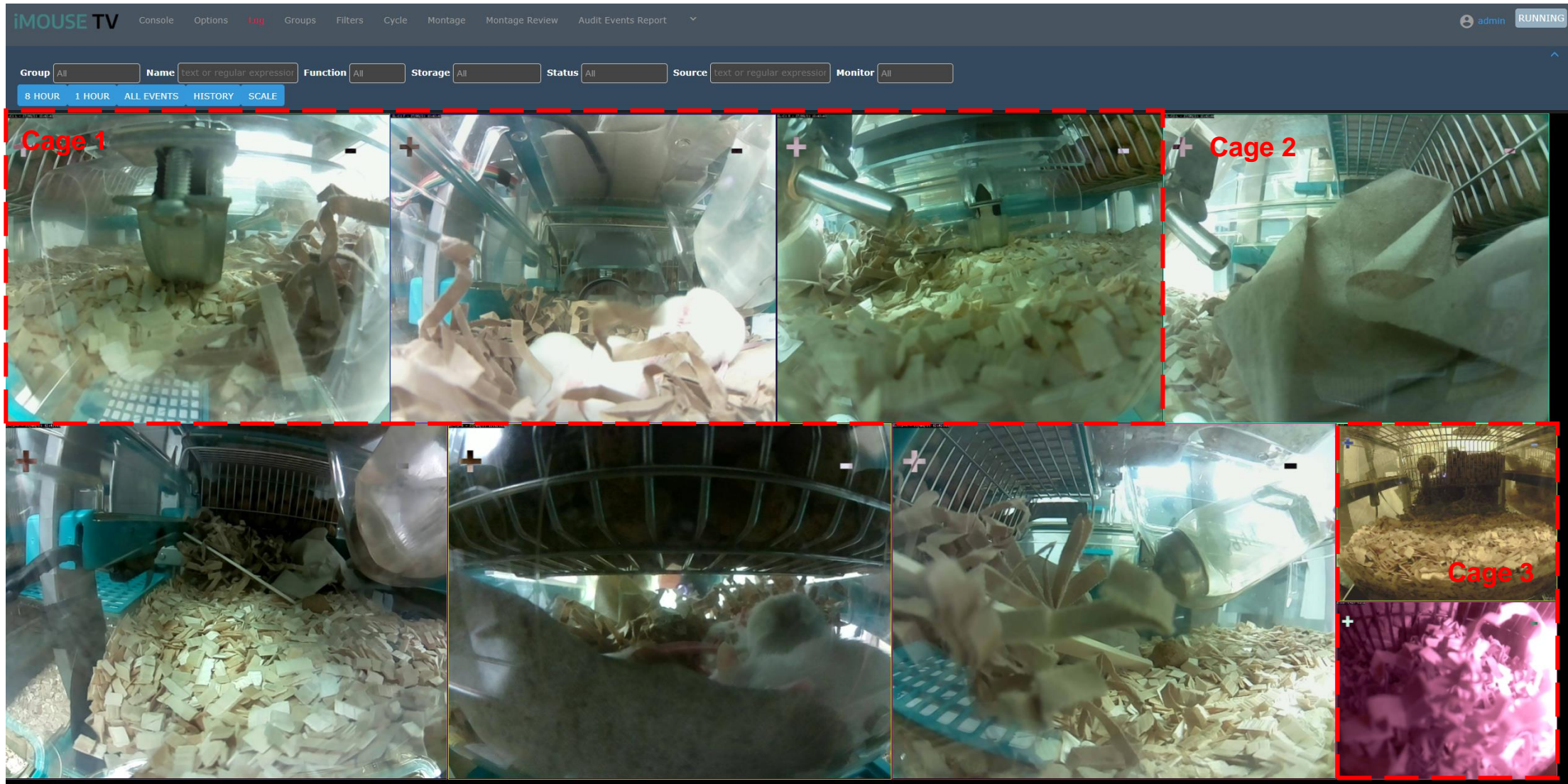
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## iMOUSE TV Environment

Real life – Pilot Systems - [Click](#) Internal Access - [Click](#)

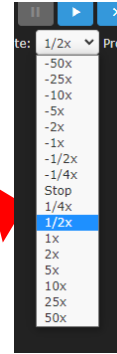
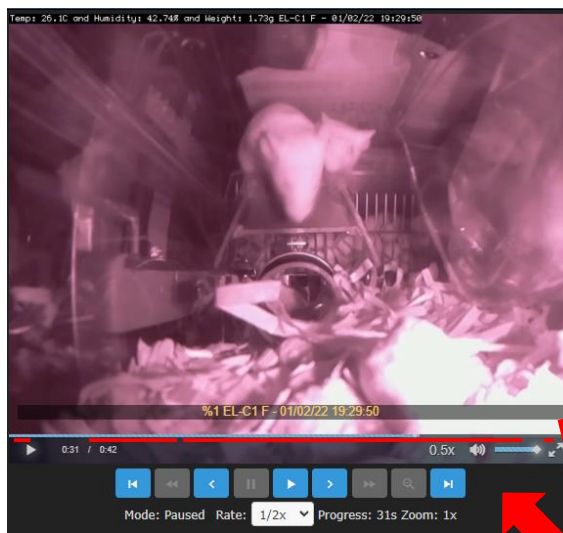




# iMOUSE TV – DMP

File and Data handling

## MOTION DETECTION



Console Options Log Groups Filters Cycle Montage Montage Review Audit Events Report

High Load: 16.82 DB:36/151 Storage: Default VideoAnalytics: 24% /dev/shm: 23%

**Nodect Capturing**  
33.33 fps 2.25MB/s

Group All Name text or regular expression Function All Storage All Source text or regular expression Monitor All

Capturing 100%

Name	Function	Source	Storage	Events	Hour	Day	Week	Month	Archived	Zones	
EL-C1-L Rack_1 > Row_1	Motion Capturing	192.168.98.101:8000	VideoAnalytics	4231 34.8GB	105 175.32MB	148 4.01GB	256 17.55GB	299 21.34GB	0 345.34MB	3	
EL-C1-F Rack_1 > Row_1	Record Capturing	192.168.98.102:8000	VideoAnalytics	7979 39.56GB	4 226.56MB	12 622.75MB	13 622.75MB	3677 24.54GB	0 9.47GB	3	
EL-C1-R Rack_1 > Row_1	Nodect Capturing	192.168.98.103:8000	VideoAnalytics	2294 115.43GB	0 0B	12 6.05GB	43 25.2GB	125 82.76GB	0 350.68MB	8	
EL-C2-F Rack_1 > Row_1	Nodect Capturing	192.168.98.105	VideoAnalytics	34 26.43GB	0 0B	0 0B	17 13.13GB	20 15.11GB	0 0B	2	
EL-C2-B Rack_1 > Row_1	Nodect Capturing	192.168.98.107:8000	VideoAnalytics	280 12.18GB	0 0B	0 0B	86 3.95GB	135 5.97GB	0 103.68MB	2	
EL_C2-R Rack_1 > Row_1	Motion Capturing	192.168.98.108:8000	VideoAnalytics	942 155.26GB	135 1.23GB	303 2.53GB	610 90.56GB	661 100.69GB	0 0B	5	
EL-C2-L Rack_1 > Row_1 > Column_4	Motion Capturing	192.168.98.109:8000	VideoAnalytics	440 92.33GB	5 23.4MB	8 36.5MB	153 24.57GB	177 27.64GB	0 4.29GB	4	
BL-S3-F Rack_2 > Row_1 > Column_1	Motion Capturing	192.168.98.111:8081	VideoAnalytics	17 21.73MB	11 14.1MB	17 21.73MB	17 21.73MB	17 21.73MB	0 0B	1	
BL-S3-B Rack_2 > Row_1 > Column_1	Motion Capturing	192.168.98.111	VideoAnalytics	31 264.98MB	0 0B	30 264.98MB	30 264.98MB	31 264.98MB	0 0B	1	
				12.67MB/s	16248 476.67GB	260 1.66GB	530 13.52GB	1225 175.86GB	5142 278.34GB	0 14.54GB	29

Record Monitor Nodect Record Moccord Nodect

admin RUNNING v1.34.25

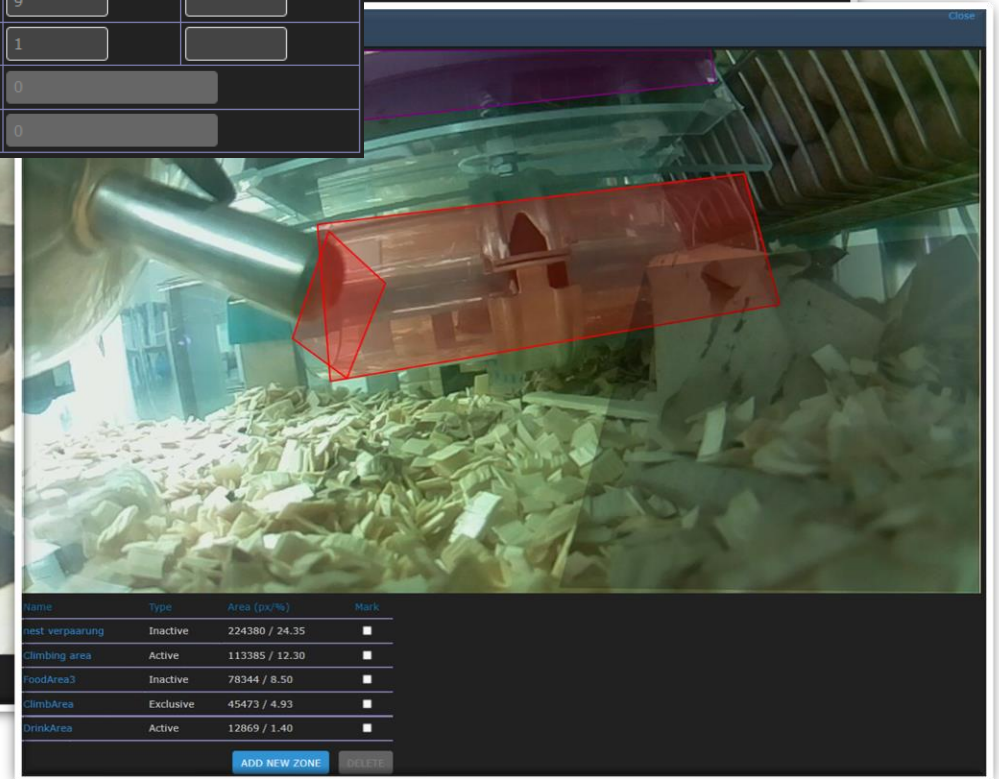
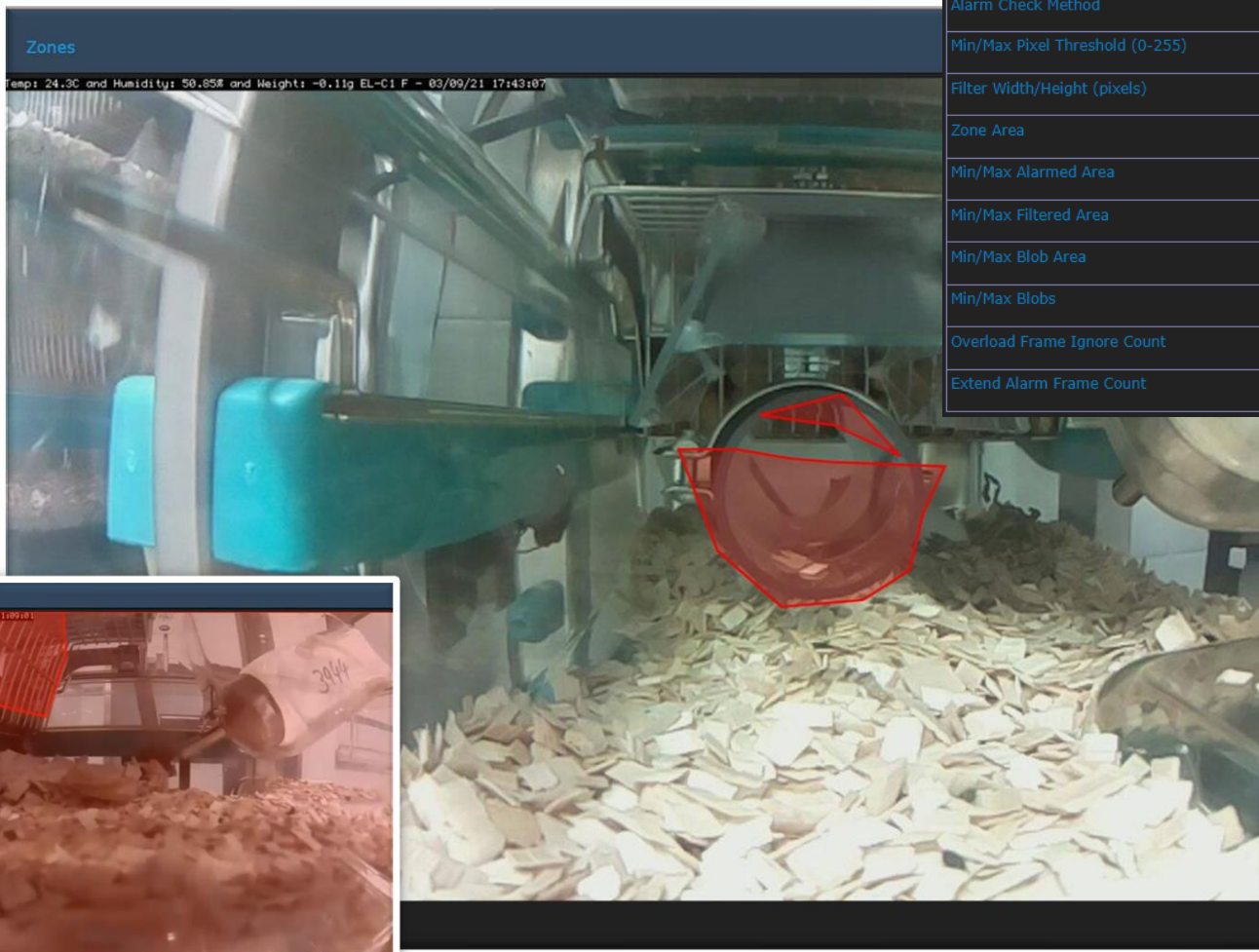
# iMOUSE TV Environment

Zone & Movement Detection – Camera specific

Name	FoodArea3	
Type	Inactive	
Preset	Choose Preset	
Units	Pixels	
Alarm Color (Red/Green/Blue)	255	130 / 130
Alarm Check Method	Blobs	
Min/Max Pixel Threshold (0-255)	25	
Filter Width/Height (pixels)	3	3
Zone Area	111462	
Min/Max Alarmed Area	7111	56889
Min/Max Filtered Area	21	320
Min/Max Blob Area	9	
Min/Max Blobs	1	
Overload Frame Ignore Count	0	
Extend Alarm Frame Count	0	

Type	Area (px/%)	Mark
Active	22146 / 2.40	<input type="checkbox"/>
Active	1787 / 0.19	<input type="checkbox"/>

ADD NEW ZONE DELETE



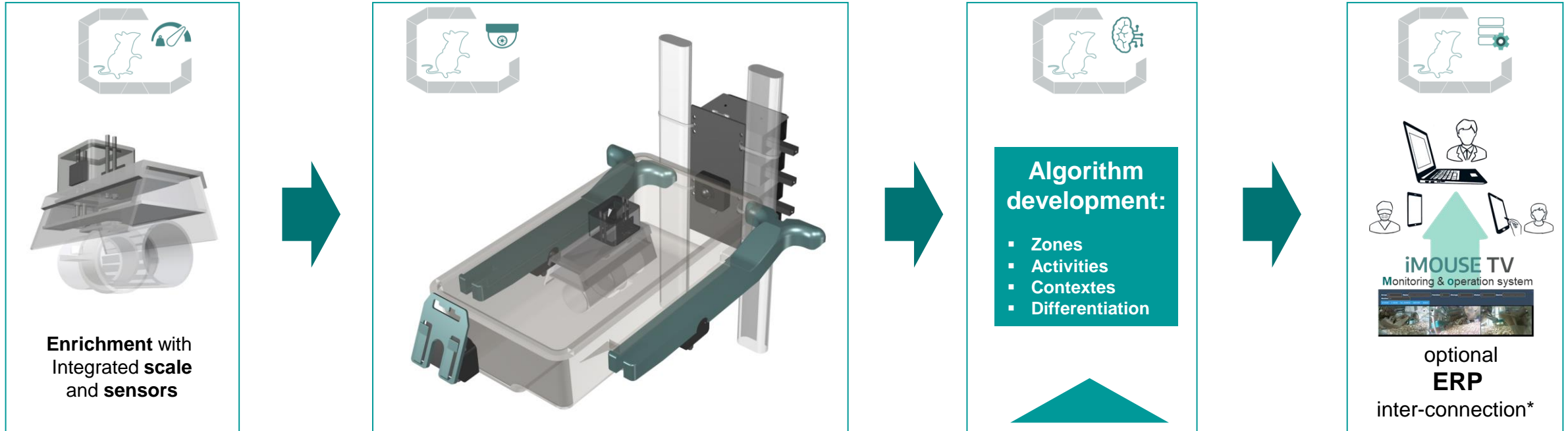


- Our Vision
- Our Solution – **iMouse Scale**
- USP's
- Proof of Concept
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## iMouse Scale

Automatic scale process in combination with iMouse Cam and iMouse Brain\*



Development of a possibility to have just one mouse within a standard situation

10% weight difference to be measured

Typical weight: 22g from 4g – 40g

Including additional sensors within scale system:

- Today: **Temperature & Humidity**
- Microphone (?)
- Gas sensors (?)
- Ammonia (!)
- CO2 (!)

**Development steps:**

- **Cabled / Mounted** (today)
- Cabled with **magnet contact** (V3)
- Simplier installation (**click in**)
- Cost effective and more robust
- Easier parametration

\*development project



Data set

Time stamp

Temp: 25.2C and Humidity: 53.55% and Weight: 15.31g EL-C1 F - 25/08/21 21:24:14

- Scan rate x/s
- Averaging
- Ability to export data (Excel / ERP)\*

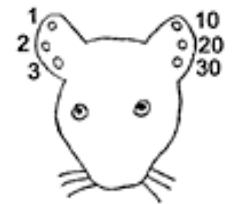
Temp: 25.2C and Humidity: 53.55% and Weight: 15.31g EL-C1 F - 25/08/21 21:24:14

Front Camera

### Automatic mice identification system (AMIS)

1) Ear holes

System to differentiate up to 5 mice



2) Tail marking



Movement detection



Combining cameras to rise accuracy and recognition



Side Camera

Temp: 25.1C and Humidity: 46.24% and Weight: -0.1g EL-C1 F - 19/11/21 11:14:49



e.g.:

		<b>Ind.1</b>
		<b>Ind.2</b>
		<b>Ind.3</b>
		<b>Ind.4</b>
		<b>Ind.5</b>







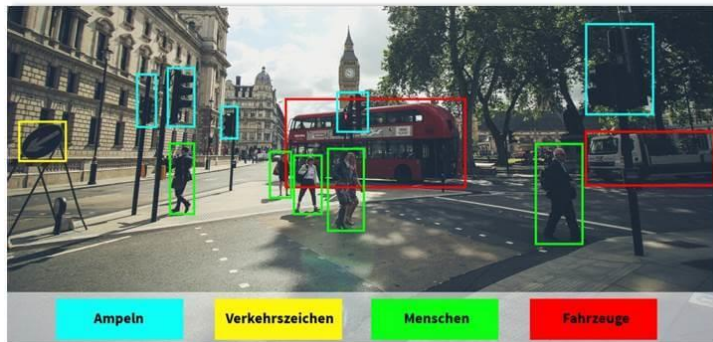
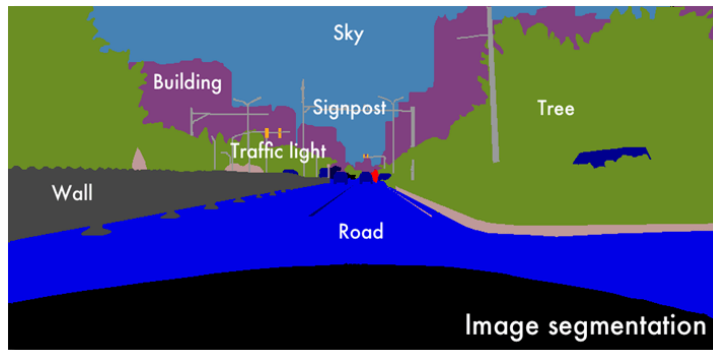
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# iMouse Brain

Annotation & ML approach / Ideation

## GOAL: Generating data out of moving pictures

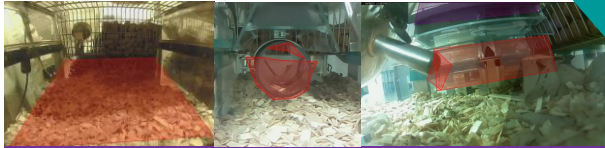
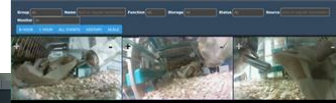


## Community approach – Open Science

## iMouse Brain

Data as backbone – process / target groups

## iMOUSE TV



**AREAS / ZONES**  
movements & detection – e.g.: front vs. rear

**PERIODS OF TIME:** duration vs. point of time



NIGHTTIME

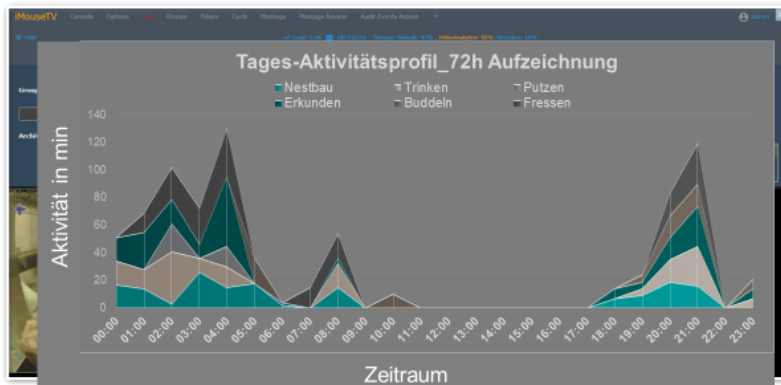


DAYTIME

**Movement activities daily**  
compared (to next / by last) speed



### Statistic: Hamster at S3 environment HPI/ HH

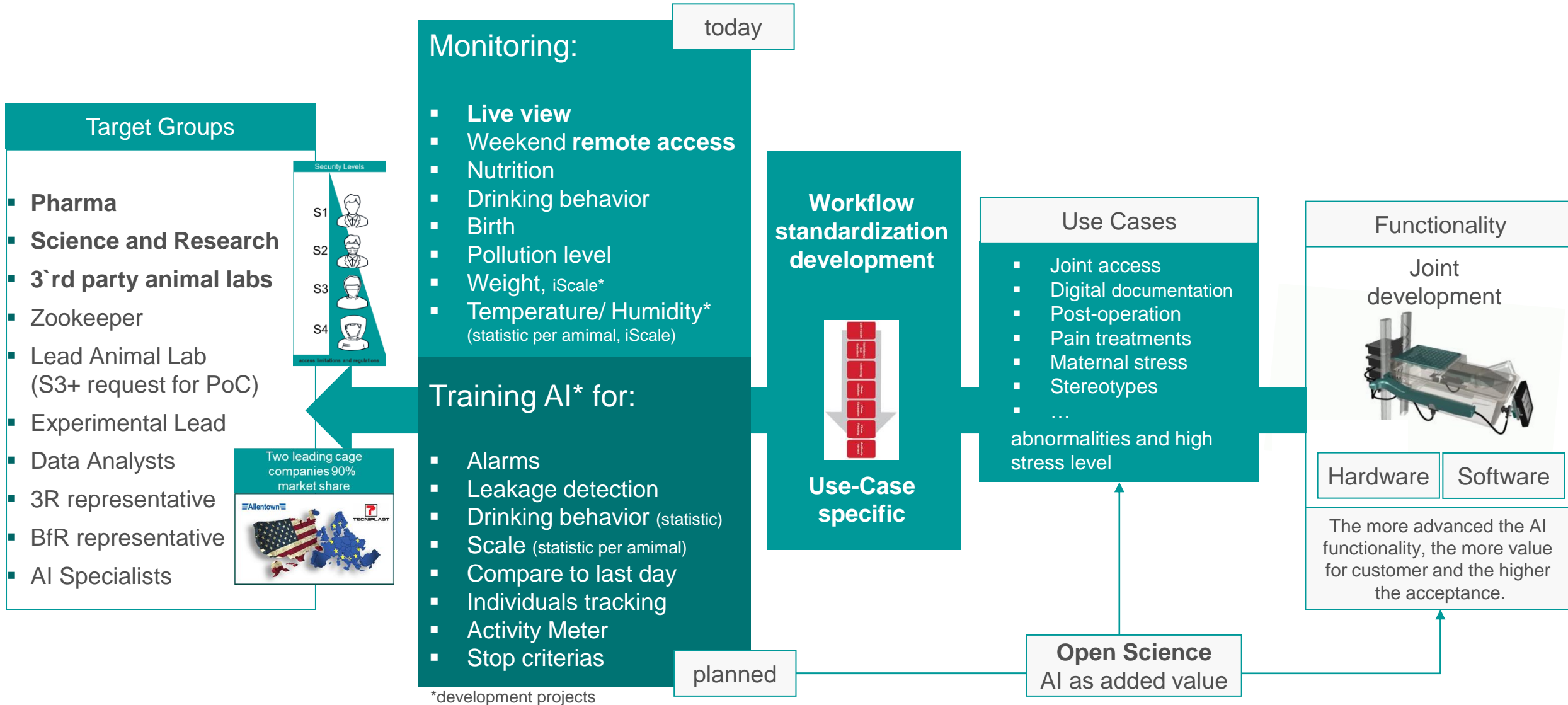


**Goal:**  
Statistical data  
out of pictures/ video files



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# System Installations

Voice of the customer

# IIoT PROJECTS



Leibniz-Institut für Experimentelle Virologie  
Animal Facility

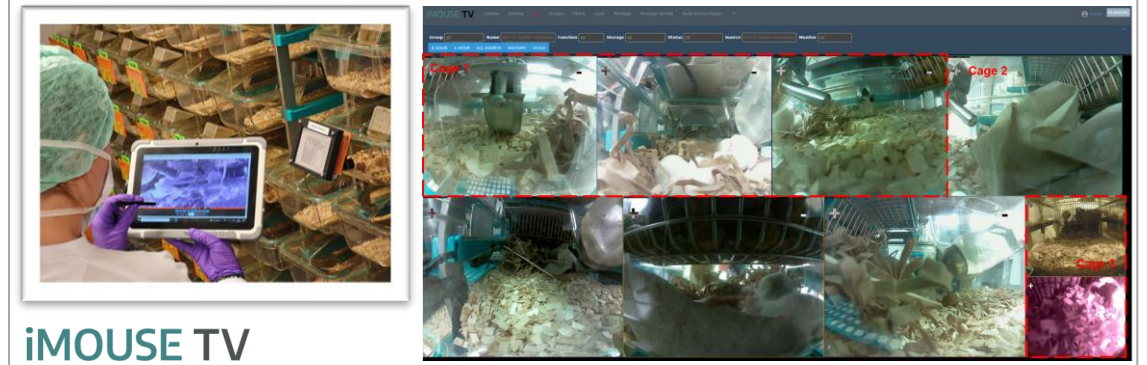
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**DIGI FRAME** Retrofit system based on Techniplast IVC Emerald Line Home Cage  
4 Cameras implemented and online VPN Secure access



**iMOUSE TV**





testing

cleaning

Doku

CE

Prototype V1 implementation:  
01.03.2021 / HPI in Hamburg

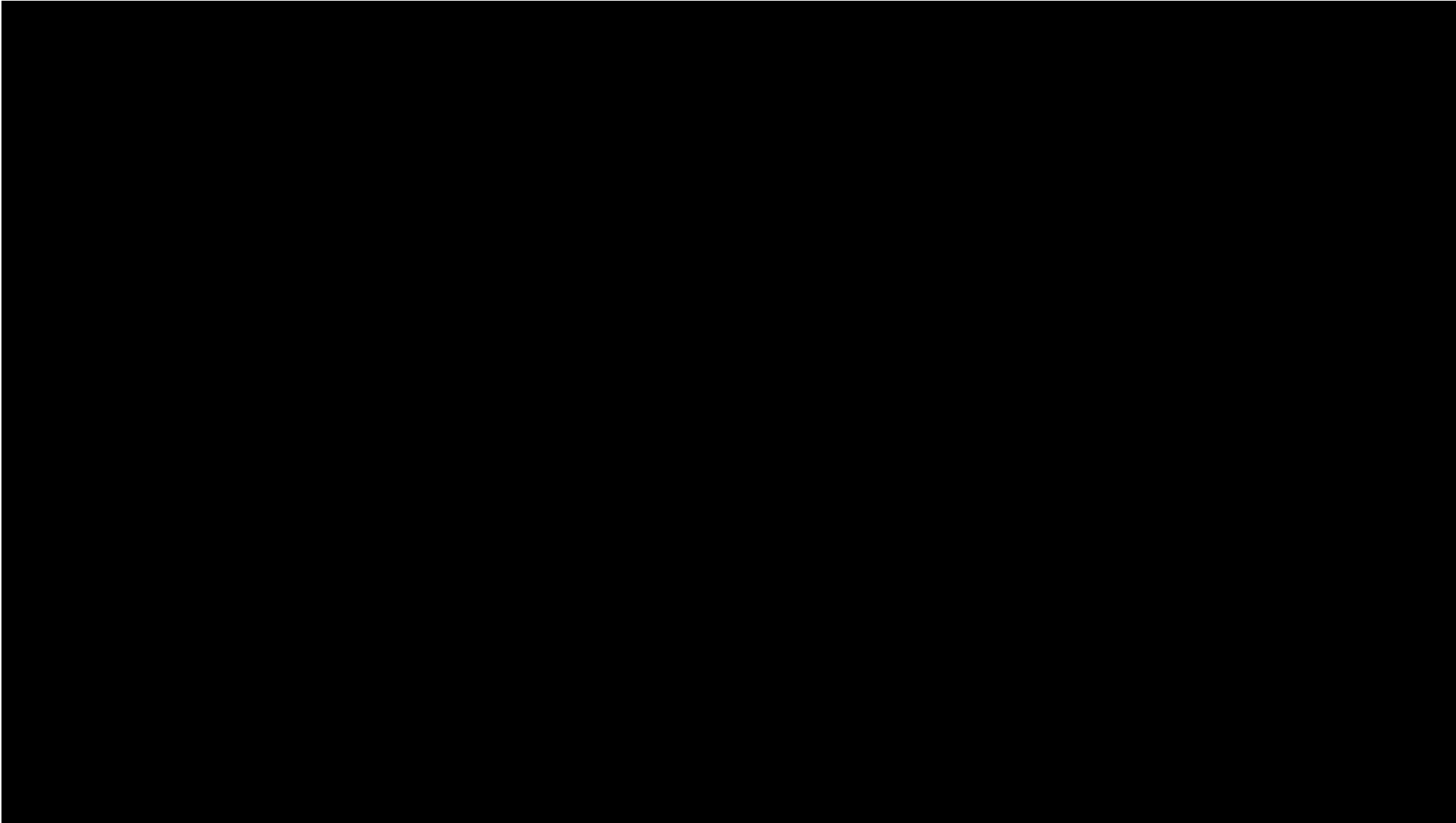


V2 implementation 29.06.2021  
V3 implementation 01.09.2021  
1. iMouse product: 07.01.2022



## Laboratory Environment

Prototype video\* (outdated front camera mounting option and compute unit)





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Start with just one cage system / mice or rat



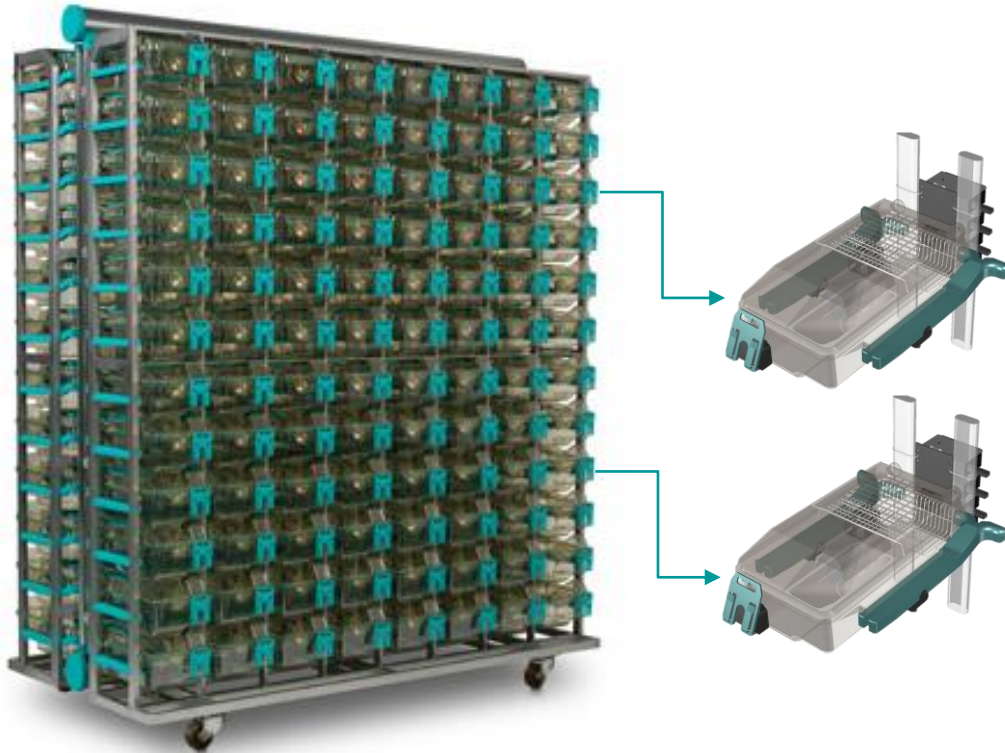
### 2'DIGI FRAME system:

Per cage 3 cameras.  
Compute unit box.

Installation on your existing DATA storage server system

No changes in handling,  
no modification on cages.

Access via LAN (most stable)  
or WLAN (for just one cage)



### Our aim:



- Installing the iMouse system
- Vertical diversification (rats... etc.)
- Partnership options for further joint development
- iMouse Scale development partner
- Experienced AI partner (video to statistics)

# We leverage our knowledge of scaling up & industrialization!



We simplify IOT in the Industry!



THANK YOU

[www.IloT-Projects.com/iMouse](http://www.IloT-Projects.com/iMouse)

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