

Low vs. High Tech Options for IVC Rack Inventory Management

VOEN Analytics Conference 2018



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For the Record

- The opinions in this presentation are mine alone and may not reflect those of current or past employers, professional affiliations, colleagues, family, or anyone else I ever met.
- I have no commercial or financial conflicts to declare. Any commercial entities mentioned are named only for example purposes, and does not imply an endorsement of any products or services.



Our Animal Care Program

- Almost all mice (no large species)
- Ave daily census = 9,500 cages
- All sterilized (SPF/barrier) housing
- IVC microisolator caging, auto water, robotic cage wash
- 25 FTE's (20 = HUCTW members)
- Direct costs = \$3.6M/year (77% = labor expense)



Let's Start at the Beginning

The DIY App Revolution: One Program's Journey



Ethan Hildebrand, Jason Jorgenson, Steve Niemi
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Tuesday, October 17, 2017



Let's Start at the Beginning

- Manual cage census done (only) on Wednesdays
- Animal techs recorded # cages/PI/room on paper forms
- Weekly forms compiled for monthly invoicing



- No easy operations or compliance analytics



Let's Start at the Beginning

- Initial investment \approx \$600K
 - Hardware & software
 - Installation & testing
 - Departmental admin staff labor for beta-testing over 20 months
 - Purchased March 2010
- Annual operating costs \approx \$50K
 - Combined license and support fees (2 vendors, starting November 2010)
 - Departmental admin staff labor



2010 → Today



April 2014 – eProtocol live

April 2015 – eAnimal Ordering live

February 2016 – all cages have RFID cage cards

February-May 2016 – run manual and RFID cage census in parallel

June 2016 – RFID cage census = census of record (official per diem invoices)



How Else To Leverage This Asset?



(>\$900K spent to date)



What About Compliance?



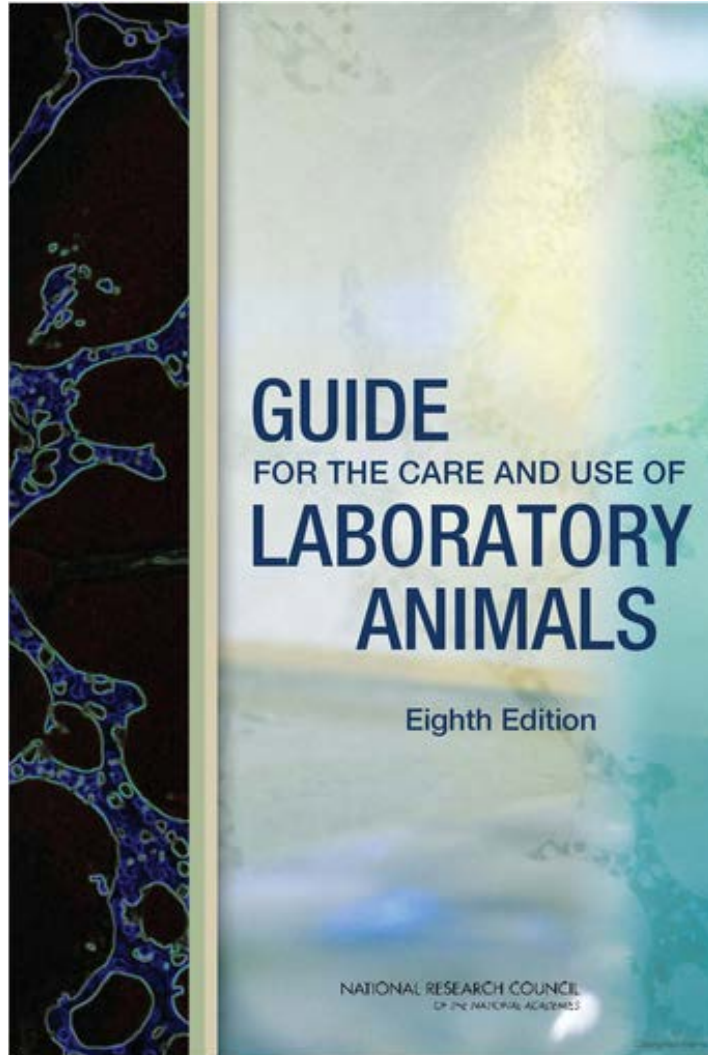
AWA Regulations, Part 3, Subpart F – Specifications for the Humane Handling, Care, Treatment, and Transportation of Warmblooded Animals **Other Than** Dogs, Cats, Rabbits, Hamsters, Guinea Pigs, Nonhuman Primates, and Marine Mammals

§ 3.131 - Sanitation.

(b) *Sanitation of enclosures.* Subsequent to the presence of an animal with an infectious or transmissible disease, cages, rooms, and hard-surfaced pens or runs shall be sanitized either by washing them with hot water (180 F. at source) and soap or detergent, as in a mechanical washer, or by washing all soiled surfaces with a detergent solution followed by a safe and effective disinfectant, or by cleaning all soiled surfaces with saturated live steam under pressure.

(NB: no required sanitation frequency stated)

What About Compliance?

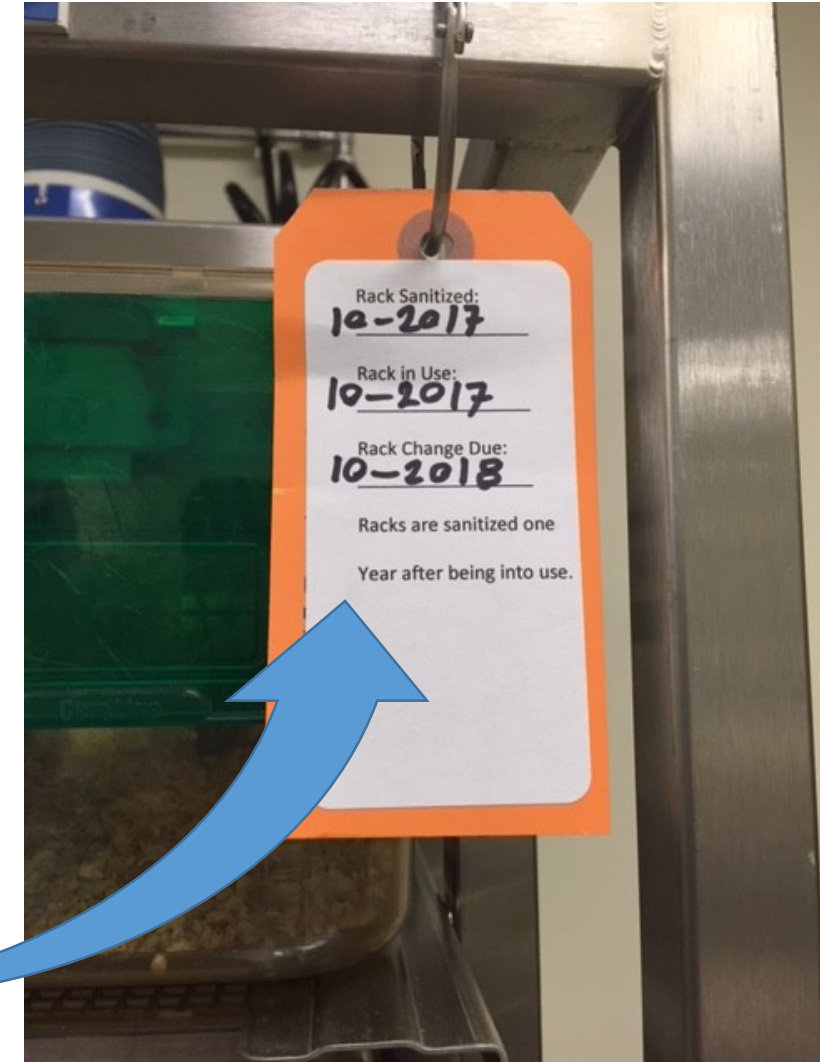


“Cleaning and disinfection of the Macroenvironment
All components of the animal facility, including animal rooms and support spaces (e.g., storage areas, cage-washing facilities, corridors, and procedure rooms) should be regularly cleaned and disinfected as appropriate to the circumstances and at a frequency based on the use of the area and the nature of likely contamination.”

(page 72)

(NB: no required sanitation frequency stated)

Our Current Process



Our Current Process

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		All Allentown IVC racks within OAR's Vivariums												
2		Rack #	1	2	3	4	5	6	7	8	9	Notes	Date Due	Date Completed
3		Room												
4	January	1303	SM	SM	SM		DM	DM		SM	SM		Jan-18	Jan-18
5		1305	SM	SM	SM		DM	DM		SM	SM	rack 2 due	Jan-18	
6		1309	SM	SM	SM		DM	DM	SM	SM			Jan-18	
7		1306						DM	SM	SM	SM		Jan-18	Jan-18
8														
9	February	426.10.	SR	SR									Feb-18	
10		426.14												
11		328.40.												
12		328.02	SM										Feb-18	
13		328.30.	SM										Feb-18	
14		328.11	SM	SM									Feb-18	
15		328.15	SM	SM	SM								Feb-18	
16		228.12 rat	SR										Mar-18	
17		226.35 rat	SR										Mar-18	
18		328.13	SM	SM	SM	SM							Feb-18	

SM = S/S mouse

DM = D/S mouse

SR = S/S rat

181 IVC racks in use

50 housing rooms

3 buildings



Our Current Process

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Manual labels
Manual tracking
Cage-side monitoring
(no auto-reminders)



One Option

- Affix RFID tags to IVC racks
 - ID'd same time as cage tags
 - ID'd same way as cage tags
 - Date and location documented
- Not so fast...
 - Tag must withstand rack wash/autoclave
 - Tag must stay on IVC rack
 - Data set must be compatible with cage census
 - Data set should be easily extracted for display



Custom-Build Proposal

- \$29K to build hardware and software
 - Tags will withstand wash/autoclave
 - User-friendly dashboard included
- \$6K for annual support
- 2-3 months for delivery
- Requires validation



THE WALL STREET JOURNAL.

CIO JOURNAL.

What Your CEO Is Reading: Software Is Eating the World, Needs to Go On a Diet

By *Tom Loftus*

Sep 29, 2017 1:24 pm ET

The Kiplinger Letter

FORECASTS FOR EXECUTIVES AND INVESTORS

1100 13th Street NW, Washington, DC 20005 • kiplinger.com • Vol. 94, No. 38

Washington, Sept. 22, 2017

TECH

To trim your IT costs, start by taking a fresh look at your software bill.

Many companies spend way too much on programs they never or rarely use: A big cha-ching for Adobe InDesign, Microsoft Visio, Adobe Illustrator and others.

Epiphany!

Vivarium operations software = tools, not solutions

- ➡ Many apps available from Apple
- ➡ Many tools already provided via Harvard
- ➡ Simple to adapt to our work
- ➡ Simple to use (iPhone)
- ➡ Great user support by vendors
- ➡ Cheap! (easily replaced)



Our Newer Approach

Now

Leverage distributed hardware (smart phones) & generic software for routine vivarium tasks

- Replace manual with digital data capture
- Replace local/hidden postings with universal access

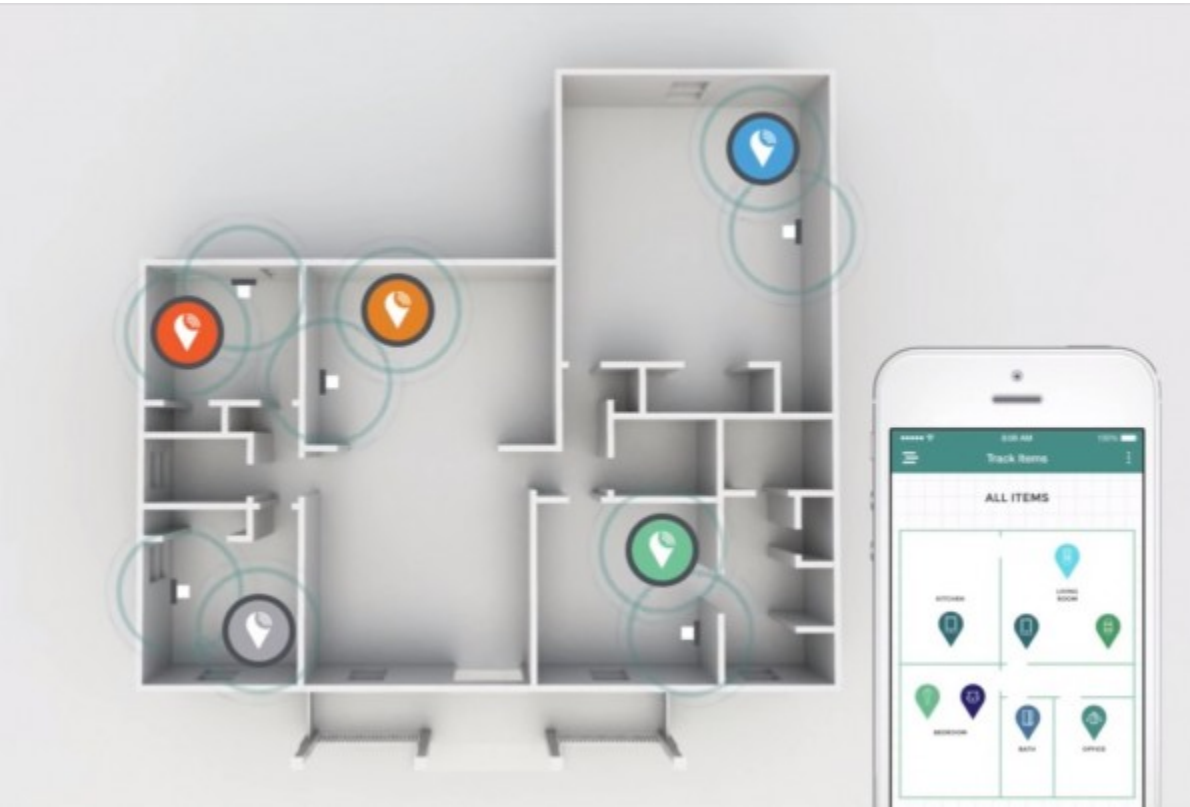
Later

Switch apps, office software as processes evolve

- Low switching costs
- Fast implementation



Faster and Simpler!



Consumer-simple, iPhone app-ready



Cheaper!



- TrackrBravo tags @\$150/8 ID tags
 - \$3,375 for 180 racks
 - TrackrAtlas sensors @ \$299/10 location devices
 - \$15K for 50 rooms
 - grand total = \$18.4K
 - No annual fees
- (can remove tags for rack wash)

Decision Time

- Do we really need digitized IVC rack tracking?
 - Current approach reliable if not efficient
 - Current approach easily trained, supervised
 - No need for historic documentation, only current status
 - Air supply to majority of rooms double-HEPA-filtered
 - Only 1 excluded pathogen outbreak in last 4.5 years
- Is this even a \$18K “problem”?



What About Compliance?

IACUC semi-annual citations (# racks not documented)

- Sept 2014: no findings
- Feb-March 2015: 2 rooms
- July-Sept 2015: no findings
- Jan-Mar 2016: 1 room
- June-Aug 2016: 8 rooms
- All 2017: no findings (2 inspection cycles)
- # citations/total # room-inspections = $11/(50 \times 7) = 3\%$
- Worst case = rack sanitized ≤ 6 months “late”



Impact Summary

- Decision: make no changes at this time
- Current state
 - No risk to animals
 - No risk to workers
 - No risk to science
- Other leadership factors
 - Choose your change initiatives wisely
 - Only pursue what's of obvious benefit to others



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