Clean, Green and Lean

Managing Continuous Improvement in Animal Care Programs

Center for Comparative Medicine
Massachusetts General Hospital
Boston, MA

American Association for Laboratory Animal Science
60th Annual Meeting, Denver Colorado

November 11, 2009

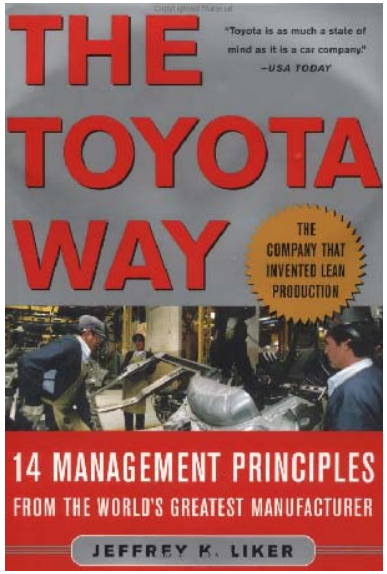
Management Challenges

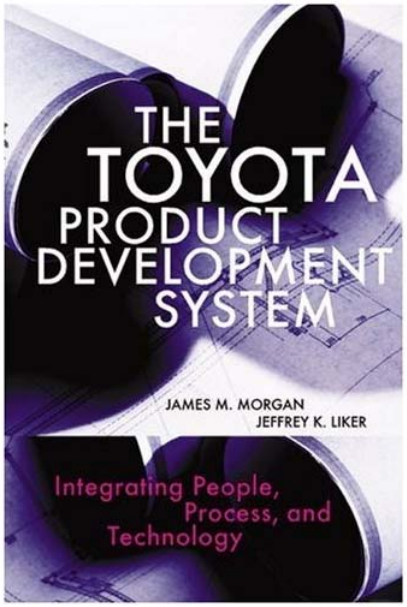
Common problems exist in our programs that adversely affect either cost, quality, safety or efficiency?

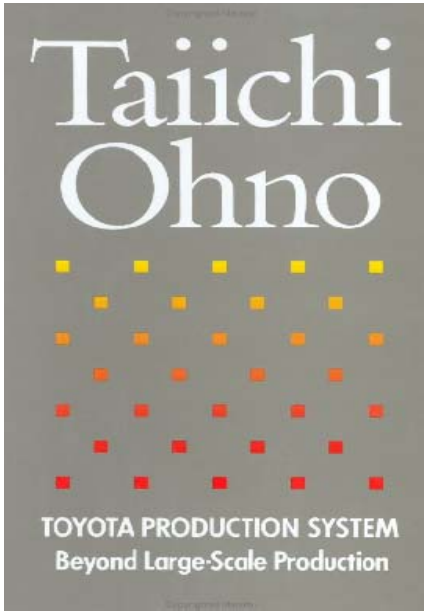
- Customers are not satisfied with services provided
- Staff work in silos and work performance differs greatly between employees
- Employee performance failure is the primary reason for poor service and regulatory non-compliance
- Problems are generally hidden and problem-solving generally occurs at the mid- and high-management levels with varied implementation success
- Partnering departments do not understand how they impact our operations

Lean Management/TPS

Global reputation of excellence in quality, cost reduction and understanding what the customer wants; in the “Top 5” with J.D. Power Initial Quality Awards for automotive quality, dependability and green efficiency

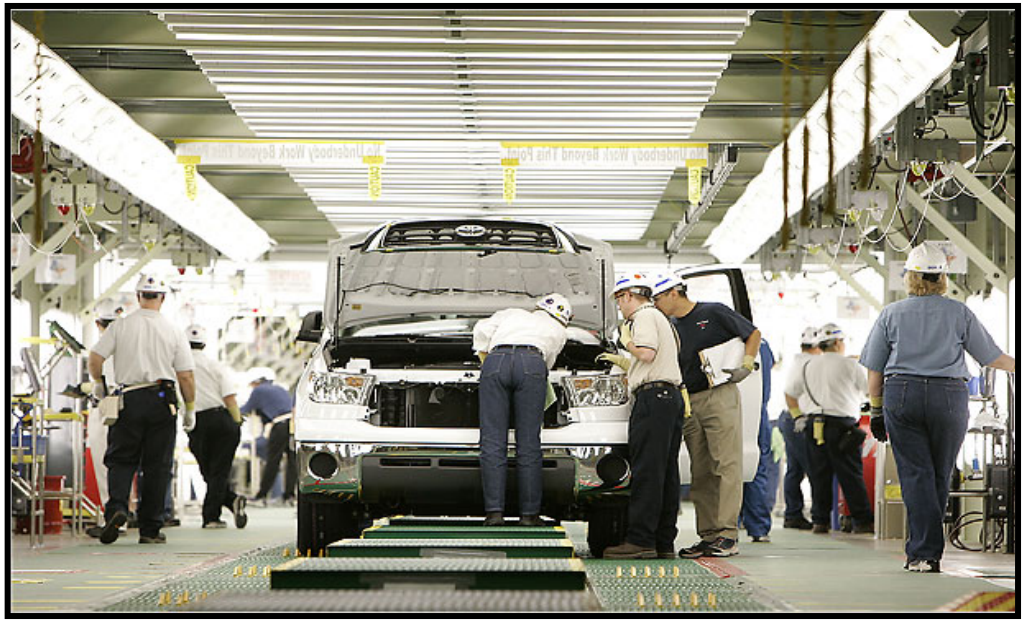






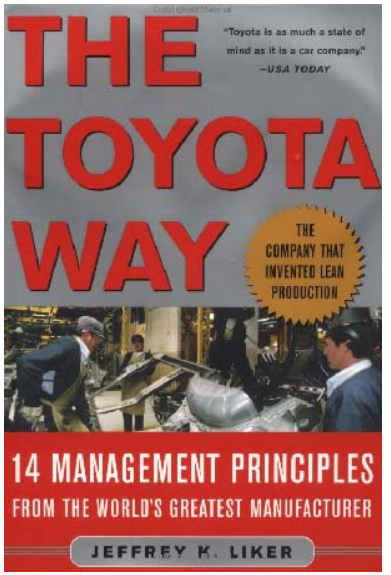
But We Don't Make Cars…

Toyota Production System (TPS)/Lean Management has been successfully adapted to non-manufacturing industries including insurance, healthcare and now research management



Four “P” Management Model

- **PHILOSOPHY: *Long-Term Picture***
  - Relentless reflection & continuous improvement
- PEOPLE & PARTNERS: *Team Empowerment; Expand partnerships*
- PROCESS: *Eliminate Waste*
- PROBLEM-SOLVING: *Jidoka*
  - Problem Identification through analysis
  - Problem Solving by consensus, considering multiple options
  - Document Plan (A3 Process) with measurable goals

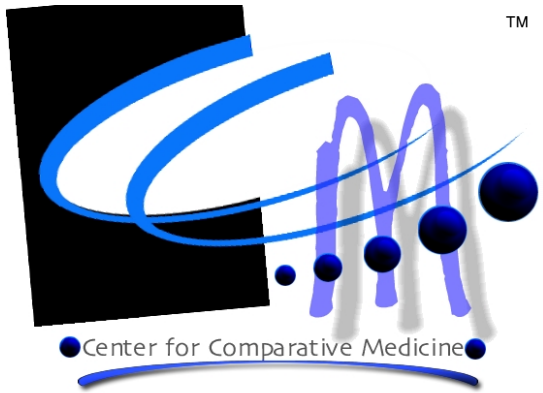


Vision of the Future

Maximize Efficient

Control Cost

Massachusetts General Hospital
Center for Comparative Medicine



Ensure Safety

Enhance Quality

FY 2007-2009
STRATEGIC PLAN
[CONFIDENTIAL]

Go Green

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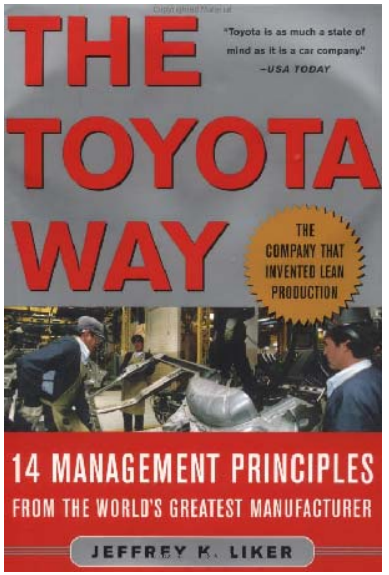
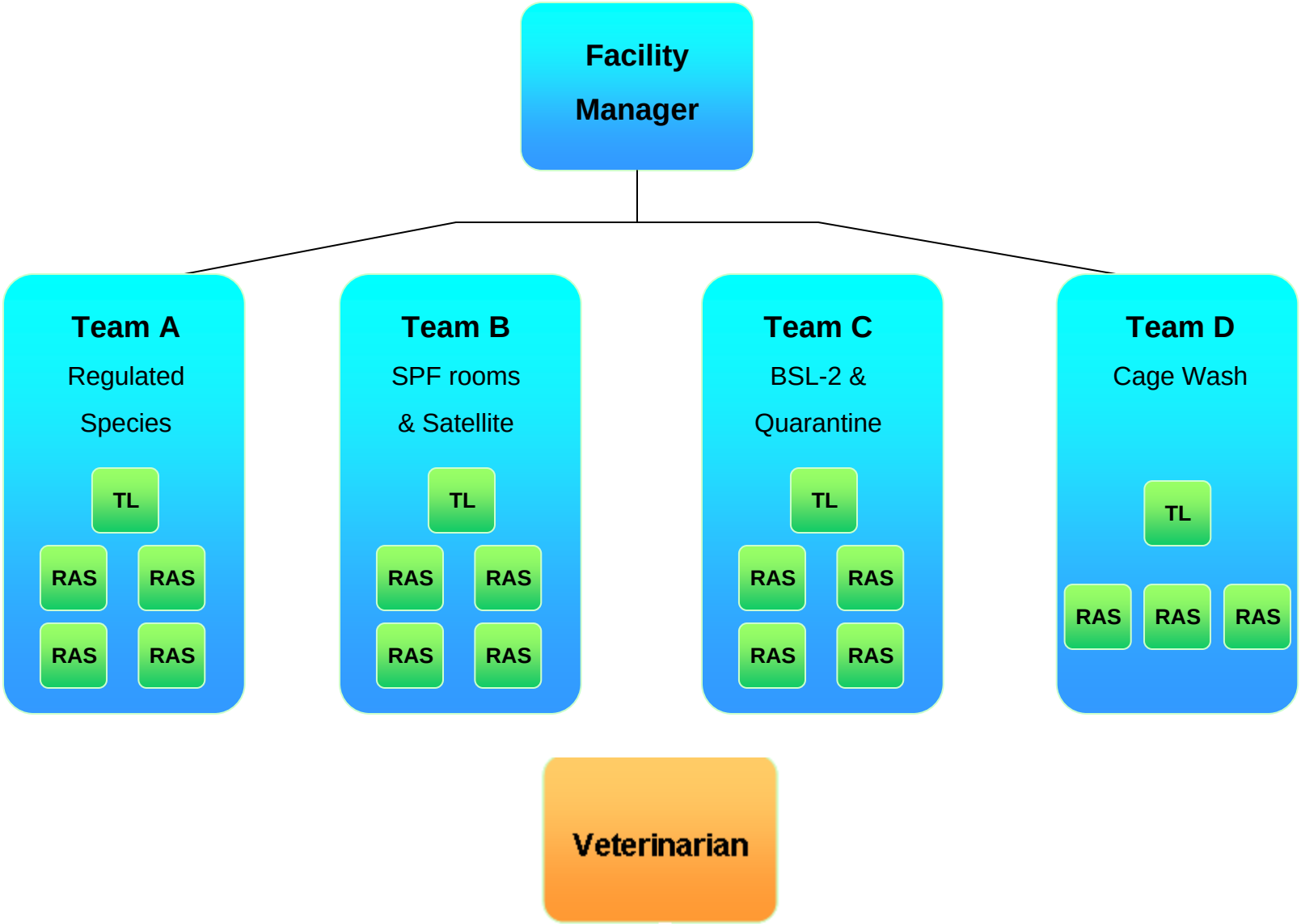


CCM “On-the-Floor” Roles

- Research Animal Technician/Specialists:
- Combination of Animal Care and Veterinary Technical Support
- Rooms/facility maintenance
- Critical equipment maintenance
- Basic husbandry
- Animal health assessments/treatments
- Research support services
- SOP development
- Process problems/root-cause analysis
- Pilot possible solutions to problems

Team-Oriented Organization



Culture of Empowerment

- Mid- and High-level management mindset cannot be to “blaming” employees when problems arise
- Staff have to trust that they will not be penalized if they bring problems to light; help will come
- Continuously Support Team Concept

TPS Training Program 2005-2009

- Management training
  - 4 sessions
- Team Lead training
  - 6 sessions
- Basic training (All CCM Staff)
  - Given 3x a year

Four “P” Management Model

- PHILOSOPHY: *Long-Term Picture*
  - Relentless reflection & continuous improvement
- PEOPLE & PARTNERS: *Team Empowerment; Expand partnerships*
- **PROCESS: *Eliminate Waste***
  - Standardize and visualize procedures
  - Recognize workflow connections
  - Look for all types of waste (7)
- PROBLEM-SOLVING: *Jidoka*
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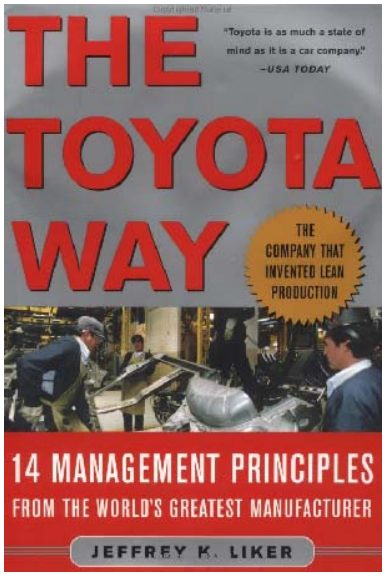


Standardization

All tasks/procedures performed the same way

- Consistent quality
- Accurate estimate of time required to complete work
- Enhances teamwork; discourages individualism
- Starting line for continuous improvement initiatives

Traditional Standardization

STANDARD OPERATING PROCEDURE

SOP Number/Revision:

Supercedes:

Effective Date: November 26,2002

SIGNATURES

PREPARED BY: _____ DATE _____

REVIEWED BY: _____ DATE _____

APPROVED BY _____ DATE _____

1 **OBJECTIVES:**
The objective of this Standard Operating Procedure (SOP) is to provide daily monitoring and veterinary support to all laboratory animals housed and used at Massachusetts General Hospital (MGH) by the Center of Comparative Medicine and Laboratory Animal Services (CCM).

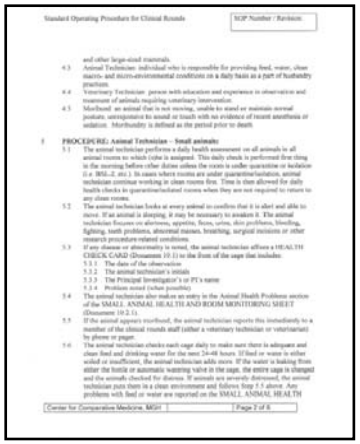
2 **SCOPE:**
This SOP for clinical rounds includes all vertebrate animal species housed or used at MGH.

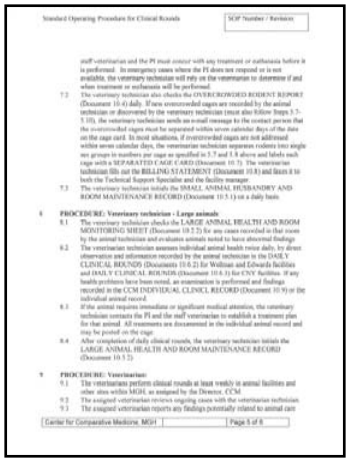
3 **RESPONSIBILITY:**
The veterinarian and veterinary technician are responsible for clinical rounds. They are responsible for assuring and providing adequate animal care, such as prevention, diagnosis, control and treatment of disease, in accordance with federal, state, and local laws and regulations and international accreditation standards. The clinical rounds staff, along with animal facility managers and animal technicians, are responsible for providing effective animal care on a daily basis. Clinical rounds staff is responsible for training animal technicians on those activities pertaining to animal health.

4 **DEFINITIONS**

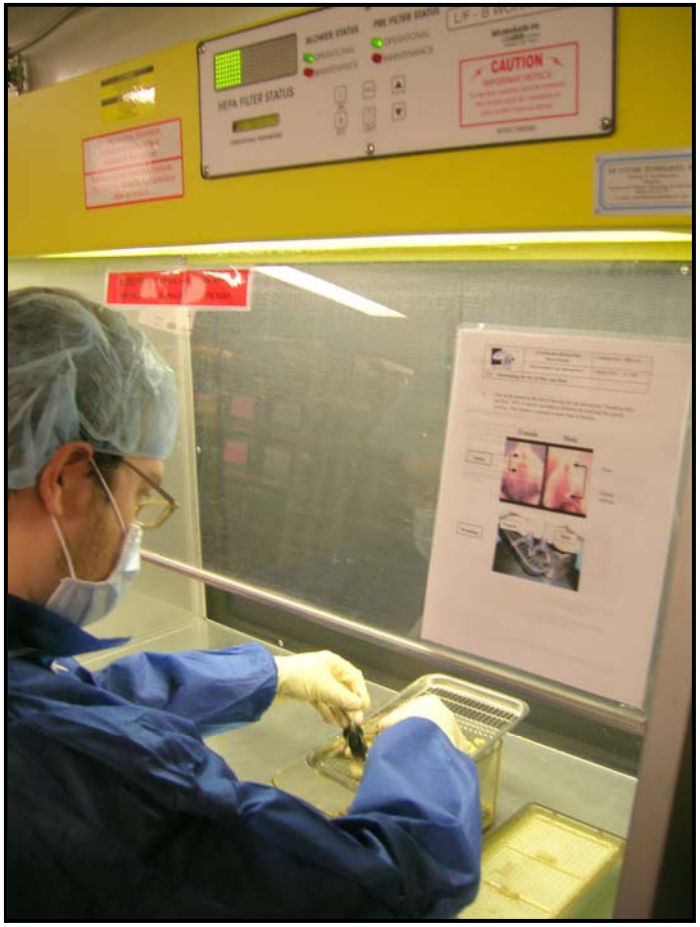
4.1 Small animals: include mice, rats, hamsters, guinea pigs, frogs, zebrafish and other small-sized vertebrate species.

4.2 Large animals: include rabbits, non-human primates, sheep, goats, pigs, dogs, cats





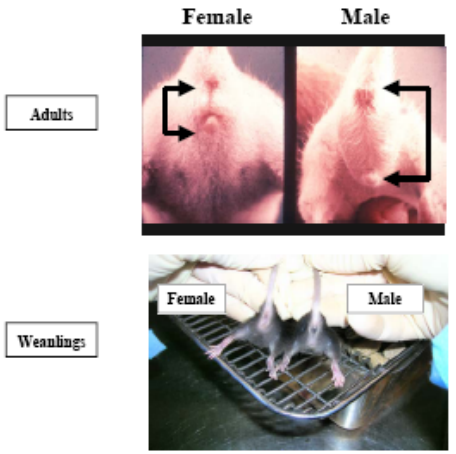
1-Page SOPs (“Visual Insurance”)



STANDARD OPERATING PROCEDURE	Tracking Code: OCC—1
Overcrowded Cage Management	Effective Date: 4/ 3/06

Title: **Determining the Sex of Mice and Rats**

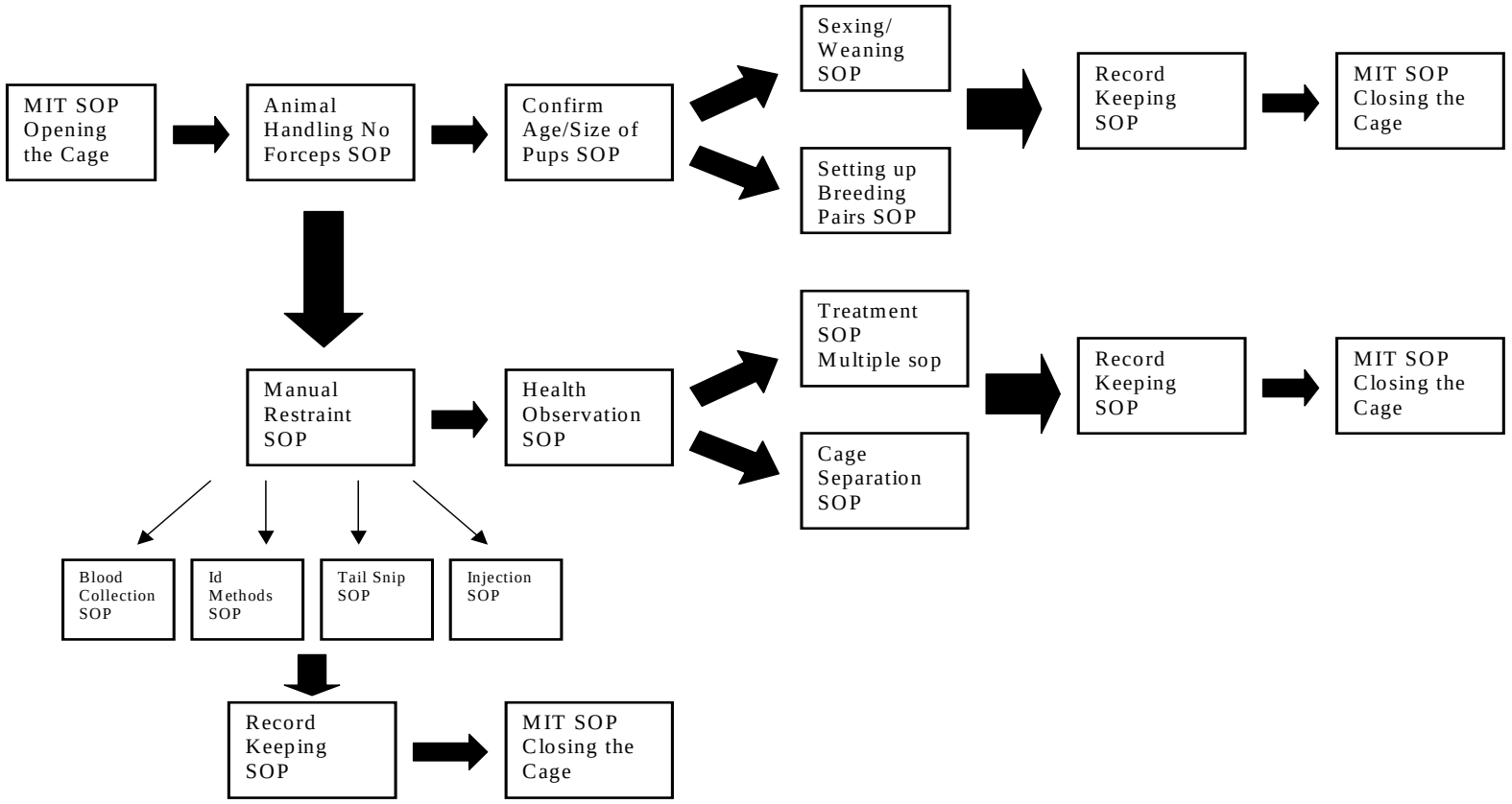
1. Pick up the mouse by the base of the tail, per the appropriate “Handling Mice and Rats” SOP, to observe the distance between the anus and the genital opening. This distance is greater in males than in females.



Facility Entrance - PPE

Understanding Workflow

Use Process flow mapping/Value Stream mapping to visualize connections; uncover quality issues, rework or excessive “work-in-process”



Seven Types of “Waste”

1. Overproduction
2. Waiting
3. Unnecessary transportation or conveyance
4. Over processing/ Unnecessary steps
5. Excess Inventory
6. Unnecessary Movement/ Walking or Ergonomic Concerns
7. Defects

Waste: Value Stream Perspective

- Output Problems
  - Producing Wrong Thing
  - Producing defective product
  - Batch producing
  - Producing less than what's needed
  - Producing too late (waiting)
  - Variations in output rate and quality
  - Spikey demand
  - External inspection
- Flow Problems
  - Waiting for material, information, decisions
  - Duplicating effort
  - Rework and correction
  - Over producing
  - Work interruptions
  - Frequent & uncoordinated handoffs
  - Unbalanced workload
  - Incomplete information
  - Day or Week end push
  - No standard work

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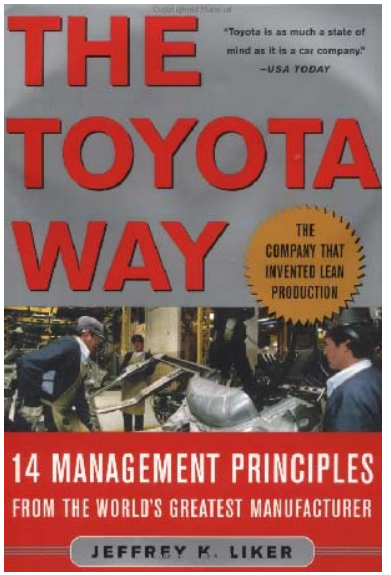


Traditional Problem-Solving

- Short-term resolutions
- See a problem and fix it
- Get the problem taken care of and move on
- One year to resolve a problem:
  - 3 months planning
  - 3 months implementing
  - 6 months tweaking/reacting to new problems that surface

Lean Problem-Solving

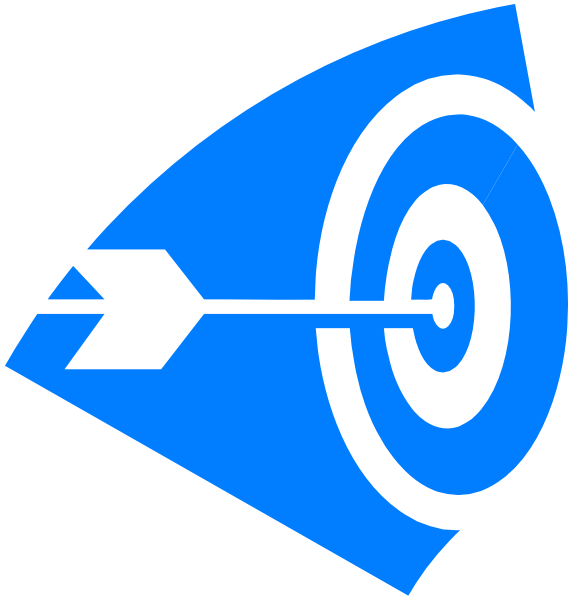
Long-term resolutions

Fix the overall system and problem goes away forever

Empower staff to own improvement; enhance desired problem-solving skills

One year to resolve a problem:

- 11 months planning
- 1 month implementing
- 0 months tweaking/reacting to new problems that surface

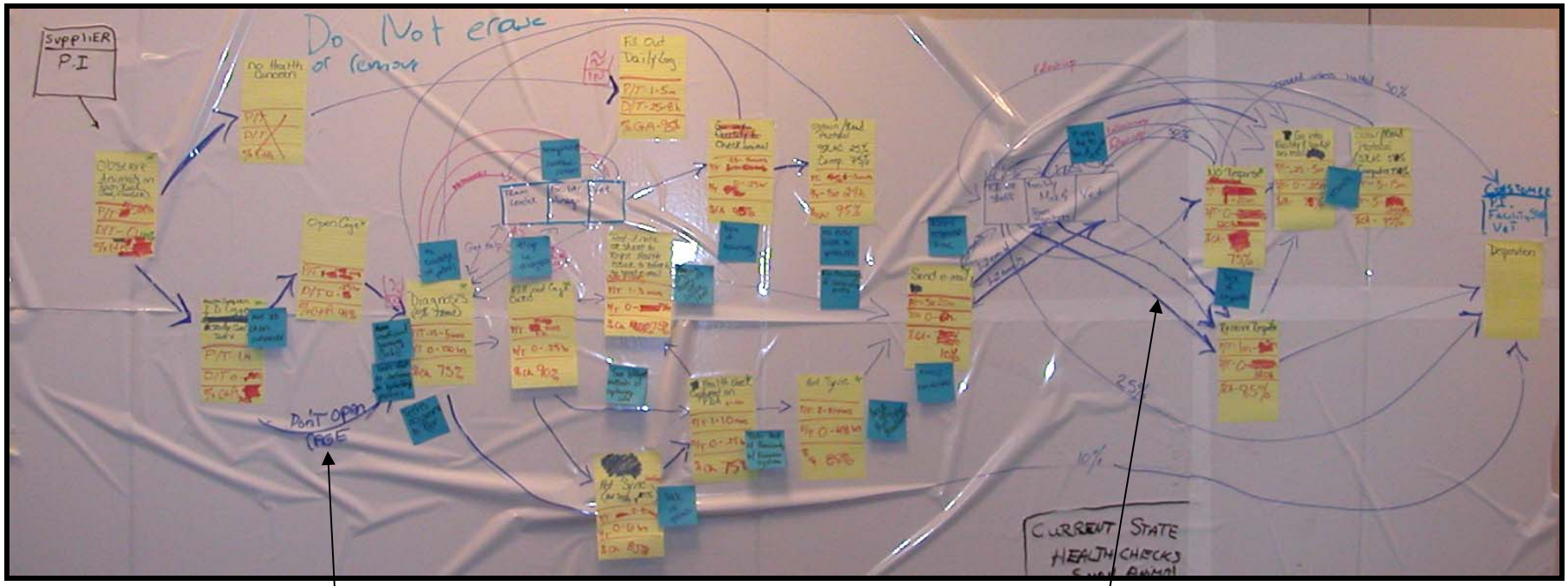


Animal Welfare Value of TPS

Rodent Health Program – Baseline Data

Template type	Response rate	Average Response Time	Maximum Treatment Delay
Old Customized Version	50%	4-5 days	12 days

Rodent Health Alert Process
Original Value Stream Map



Initial diagnosis

Email communication

5 Whys Root-Cause Analysis

Identified Problem: *Initial diagnosis takes a long time*

First Why: AC staff makes the observation and wait for veterinary diagnosis and RX plans for each individual case

Countermeasure: Have AC staff call vets on each case

Second Why: Each case is considered unique and process is two-tiered between AC staff and Veterinary staff

Countermeasure: Create one-tier process for observations/diagnosis/RX plans

Third Why: No standardization of diagnosis and RX plans

Countermeasure: Standardize Diagnosis and RX plans whenever possible

Fourth Why: CCM has not formalized such a program

Countermeasure: Dept initiative to standardize diagnosis and RX plans whenever possible; make one-tier through AC staff training

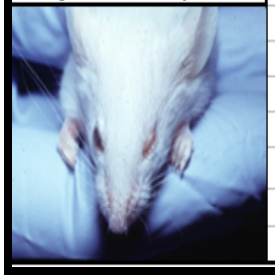
Fifth Why: Delays were not visible to Leadership

Countermeasure: Create tracking process

Dx & Rx Standardization

- Developed by vets and animal care staff
- 15 most common health concerns, with standardized treatments
- Posted in all rodent rooms for immediate reference

Digital Paradigm "Symptoms"	MILD	MODERATE	SEVERE	Email template
Ataxia	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	
No Picture Available	Unsteady gait WHAT TO DO: Monitor Enter in Bioware, send email	Unsteady gait, turning in circles WHAT TO DO: Monitor Enter in Bioware, send email	Unable to right, keeps falling over, spinning WHAT TO DO: Euthanasia required within 24 hours Enter in Bioware, send email	Ataxia
Barbering	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	
	Complete hair loss with regular, smooth borders, no visible lesions WHAT TO DO: Monitor	Complete hair loss with regular, smooth borders, no visible lesions WHAT TO DO: Remove dominant mouse (mouse with no hair loss) Monitor	Complete hair loss with regular, smooth borders, lesions visible WHAT TO DO: Due to the lesions, this is now dermatitis, refer to ulcer, dermatitis for action	Barbering
Conjunctivitis/blepharitis	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	
	Inflammation, no discharge RECOMMEND TREATMENT: Apply antibiotic eye ointment daily for 2 weeks Enter in Bioware, send email	Inflammation, slight discharge, eye shut RECOMMEND TREATMENT: Apply antibiotic eye ointment daily for 2 weeks Enter in Bioware, send email	Inflammation, redness, discharge, lesions WHAT TO DO: Euthanasia required within 24 hours Enter in Bioware, send email	Conjunctivitis/Blepharitis
	Slightly hunched posture, fur slightly ruffled, lethargic dehydrated, swollen abdomen, difficulty breathing WHAT TO DO: Check teeth, check water supply, supportive care, monitor Enter in Bioware, send email	Thin, hunched posture, ruffled fur, dehydrated, swollen abdomen, difficulty breathing WHAT TO DO: Check teeth, check water supply, supportive care, monitor Enter in Bioware, send email	Emaciated, hunched posture, sunken eyes, lethargy WHAT TO DO: Euthanasia required within 24 hours Enter in Bioware, send email	Poor Body Condition
Diarrhea	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	
	Soft feces WHAT TO DO: Supportive care, monitor Enter in Bioware, send email	Wet feces around tail & in cage, hunched posture, dehydration WHAT TO DO: Supportive care, monitor Enter in Bioware, send email	Wet feces around tail & in cage, sunken eyes, thin, lethargic, hunched posture WHAT TO DO: Euthanasia required within 24 hours Enter in Bioware, send email	Diarrhea
Dystocia			SIGNS/SYMPTOMS	
	N/A	N/A	Pups visibly stuck in birth canal, or pregnant female lethargic, hunched, distended abdomen labored breathing WHAT TO DO: Euthanasia required within 24 hours Enter in Bioware, send email	Dystocia
Fighting/wounds	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	
	Mice observed fighting, small wounds on back, tail, forelimbs, wounds look dry in appearance WHAT TO DO: Monitor, provide additional enrichment Enter in Bioware, send email	Mice observed fighting, open lesions or fresh blood, scabs visible RECOMMEND TREATMENT: oral sulfatrim in water for 2 weeks WHAT TO DO: separate out aggressor Enter in Bioware, send email	Poor body condition, infected areas, large lesions, paralysis, blood visible in cage WHAT TO DO: Euthanasia required within 24 hours Enter in Bioware, send email	Fight Wounds

Conjunctivitis/blepharitis	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	SIGNS/SYMPTOMS	
	Inflammation, no discharge	Inflammation, slight discharge, eye shut	Inflammation, redness, discharge, lesions	Conjunctivitis/Blepharitis
	RECOMMEND TREATMENT:	RECOMMEND TREATMENT:	WHAT TO DO:	
	Apply antibiotic eye ointment daily for 2 weeks	Apply antibiotic eye ointment daily for 2 weeks	Euthanasia required within 24 hours	
	Enter in Bioware, send email	Enter in Bioware, send email	Enter in Bioware, send email	

What we Learned from Pilot…

Requires significant standardized vet-directed training program

Severity descriptions allow for minor individual interpretations

Incorporate into daily welfare checks and scheduled cage changing process for workflow efficiency

Animal Welfare Value of TPS

Full Implementation Results

Template type	Response rate	Average Response Time	Maximum Treatment Delay
Old Customized Version	50%	4-5 days	12 days
New Standardized Version	90%	0-1 days	3 days

Championing Continuous Improvement

Senior Leaders
- Communicate Department Status
- Set Goals
- Organizational Development/Lean Champions
- Approve Continuous Improvement Initiatives

Facility/Program Leaders
- “On-The-Floor Gemba” Walks
- Assure Full Analysis/Comprehensive Solving
- Avoid living with “band-aids”
- Process Stakeholders

“On the Floor” Leaders
- Bring ALL problems to the surface
- Watch/Validate Current State
- Process Stakeholders

www.virtualvivarium.com