

Software Tools to Assist and Promote Laboratory Safety

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CHEMISTRY &
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Laboratory Safety

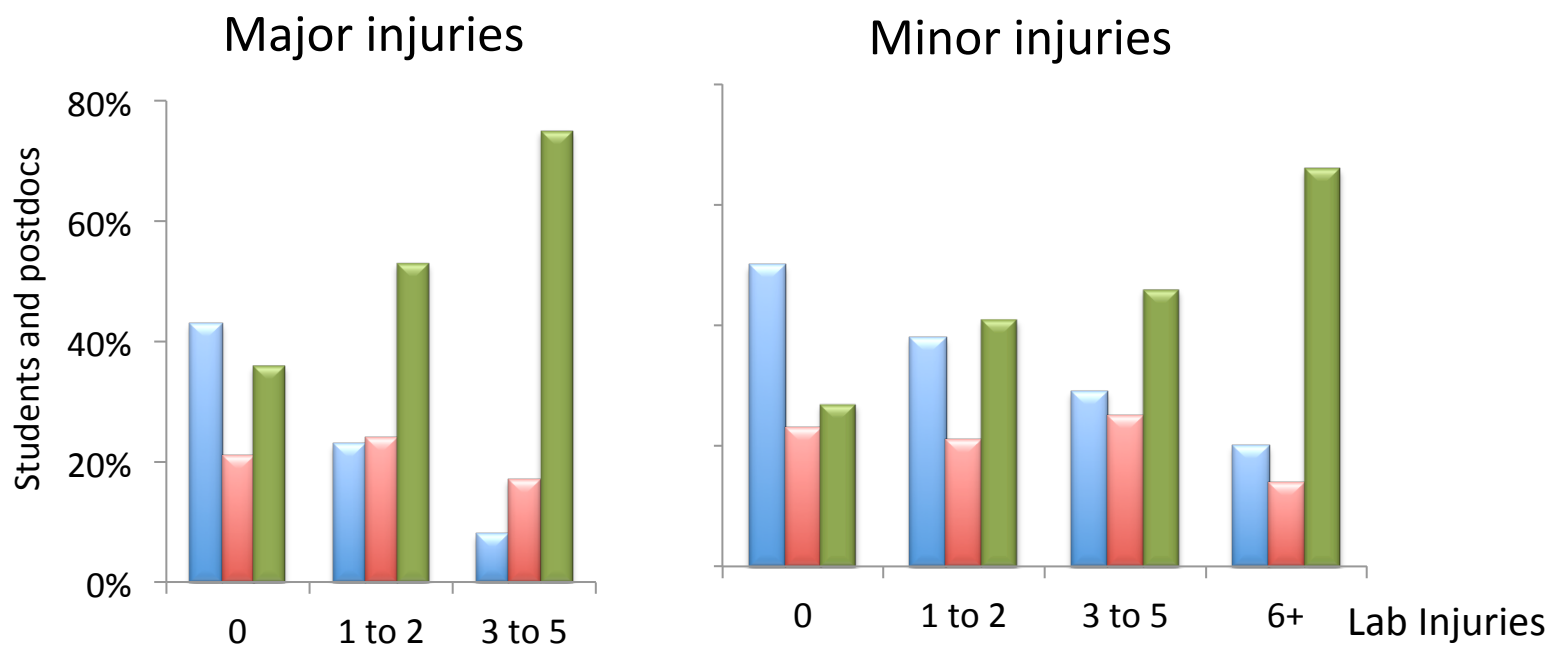
University of California
Risk & Safety Solutions

A Perspective on Safety Challenges

- Safety must be integrated into laboratory research for better protection of lab workers from the myriad hazards encountered in a wide variety of laboratory environments.
- Ultimately the Research Director / PI must be the leader for a truly effective lab safety program and a deep culture of safety in the lab.
- Engagement by the PI is in fact the major determinant of safety outcomes in laboratories.

Impact of PI Safety Engagement on the Number of Injuries Laboratories

Injuries witnessed or personally experienced by students and postdocs (n=406)



■ PI monitors lab safety

■ PI may or may not check safety

■ PI does not monitor lab safety

Key:
Faculty Engagement

A Perspective on Safety Challenges

- There are many demands on the PI.
(A reality, but not an excuse.)
- The institution and EH&S can only go so far in hand-holding for the PI.
- Can software tools can be utilized to aid the PI and make up for limited safety personnel?



Benefits and Beneficiaries

System-Wide Software Tools:

- Reduce risk by creating systems of checks and balances
- Create administrative efficiencies by replacing paper-based, stand-alone processes
- Standardize processes across the UC system
- Assist the UC system in meeting state and federal compliance regulations

Decision Makers: Principal Investigators, Lab Managers, Lab Personnel, Hazardous Waste Staff, EH&S Professionals

Organizations: Science Departments, Environmental Health and Safety Departments, Fire Departments, Medical Centers

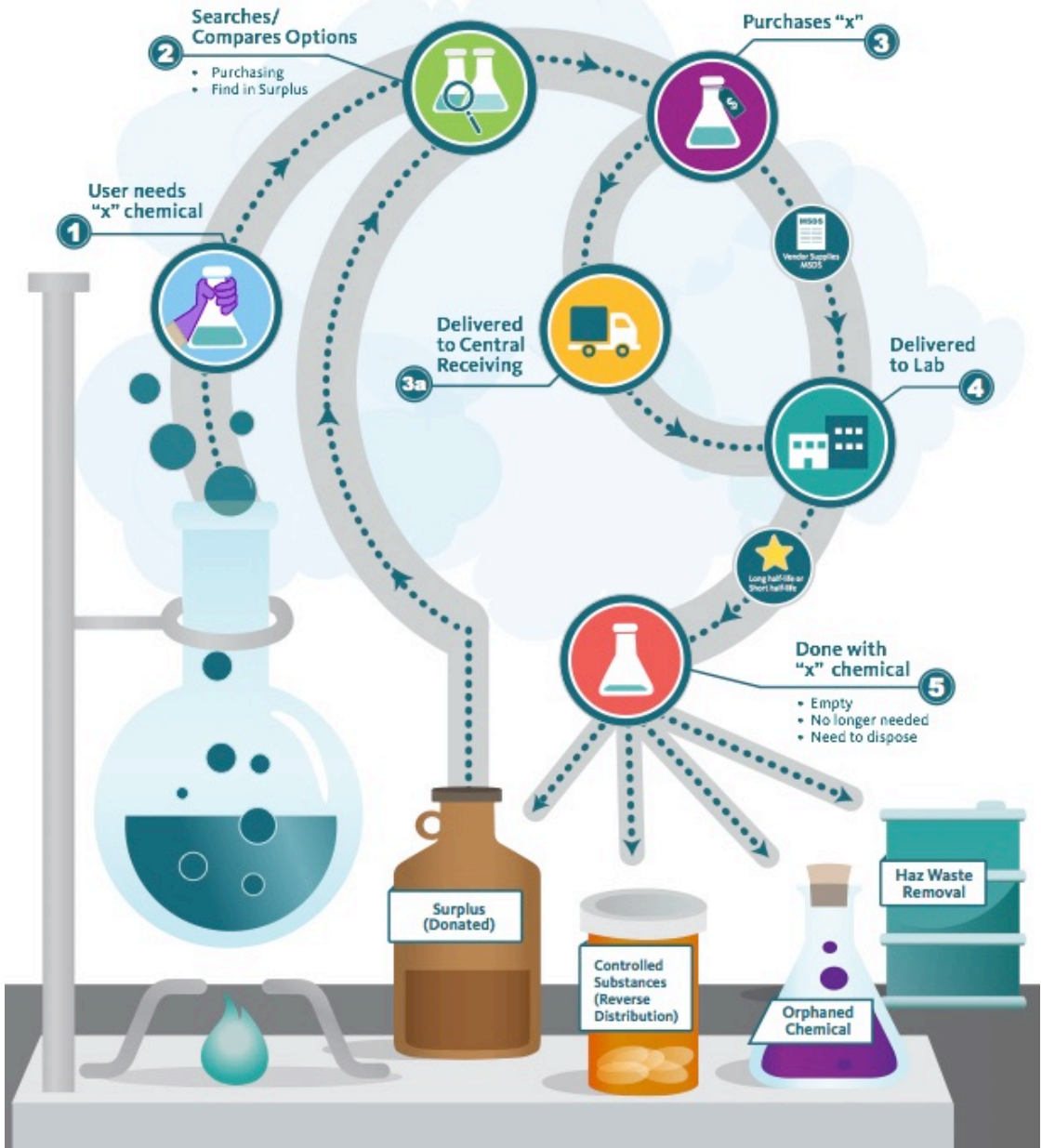
Requirements of the Laboratory Standard

Minimize exposure of workers to hazardous chemicals in laboratories through:

- Develop and implement a Chemical Hygiene Plan
- Designate a Chemical Hygiene Officer
- Establish standard operating procedures
- Require personal protective equipment
- Establish engineering controls and waste disposal procedures
- Train laboratory personnel
- Monitor work environment for selected chemical levels
- Require labeling of hazardous chemicals

All of these safety requirements and many others can benefit from automation and safety software tools.

CHEMICAL LIFE CYCLE

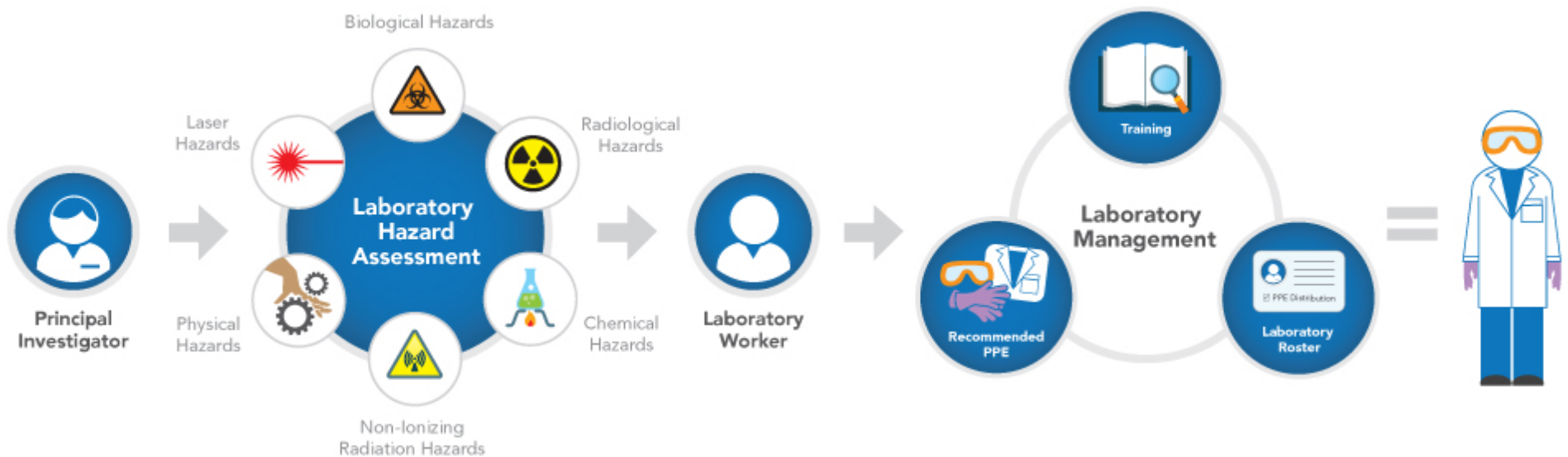


UC Suite of Safety Software Tools

- **LHAT** – Laboratory Hazard Assessment Tool
- **BIO** – Biosafety Information Online
- **CIS** – Chemical Inventory System
- **HACEM** – Hazard Assessment & Chemical Exposure Monitoring
- **OHSS** – Occupational Health Surveillance System
- **RADiCAL** – Risk Assessment Determinations in Chemical Academic Laboratories
- **SIT** – Safety Inspection Tool
- **SOP GT** – Standard Operating Procedure Generating Tool
- **WASTe** – Waste Accumulation Storage Tracking electronically

Laboratory Hazard Assessment Tool

- Safety tool for Principal Investigators, lab workers, and EH&S staff
- From laboratory hazards assessment through PPE issuance



Laboratory Hazard Assessment Tool

Principal Investigators:

- Identify hazards that are present in the lab
- Communicate lab hazards to lab workers
- Identify what PPE is needed based on the hazard assessment
- Provide PPE training to lab workers
- Maintain records of hazard assessment and PPE training of lab workers

Lab Workers:

- Receive information about hazards present in the lab
- Receive information about PPE needed to work in the lab
- Receive training on the necessary PPE
- Certify review of lab hazards assessment, PPE training and PPE receipt

Environmental Health & Safety (EH&S):

- Receive a hazard assessment from each lab
- Record information on the types of labs and types of hazards present on campus
- Record training of PIs and Lab Workers on PPE
- Enable distribution of system-wide or campus-funded PPE to lab workers

Core Services

UC Safety

I am a researcher with tools to manage compliance

- People
- Relationships
- Locations



Biosafety Information Online

Manage the Biological Use Authorization (BUA) process

- Submit / Amend / Renew BUA
- Maintain BUA Personnel Roster
- Access database of organisms
- Manage BUA sharing with research staff and collaborators
- Centralized BUA location and real-time viewing



Chemical Inventory System

EH&S Functionality:

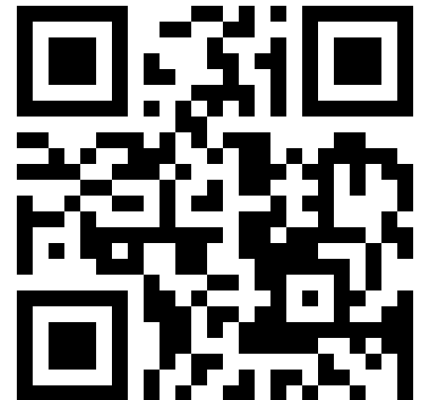
- Maintains and tracks chemical information required by regulatory agencies
- Meets CalEPA requirement for the Unified Program information
- Assists UC to comply with: Cal/EMA, California Fire Code, PA, Cal/OSHA and CUPA requirements



Chemical Inventory System

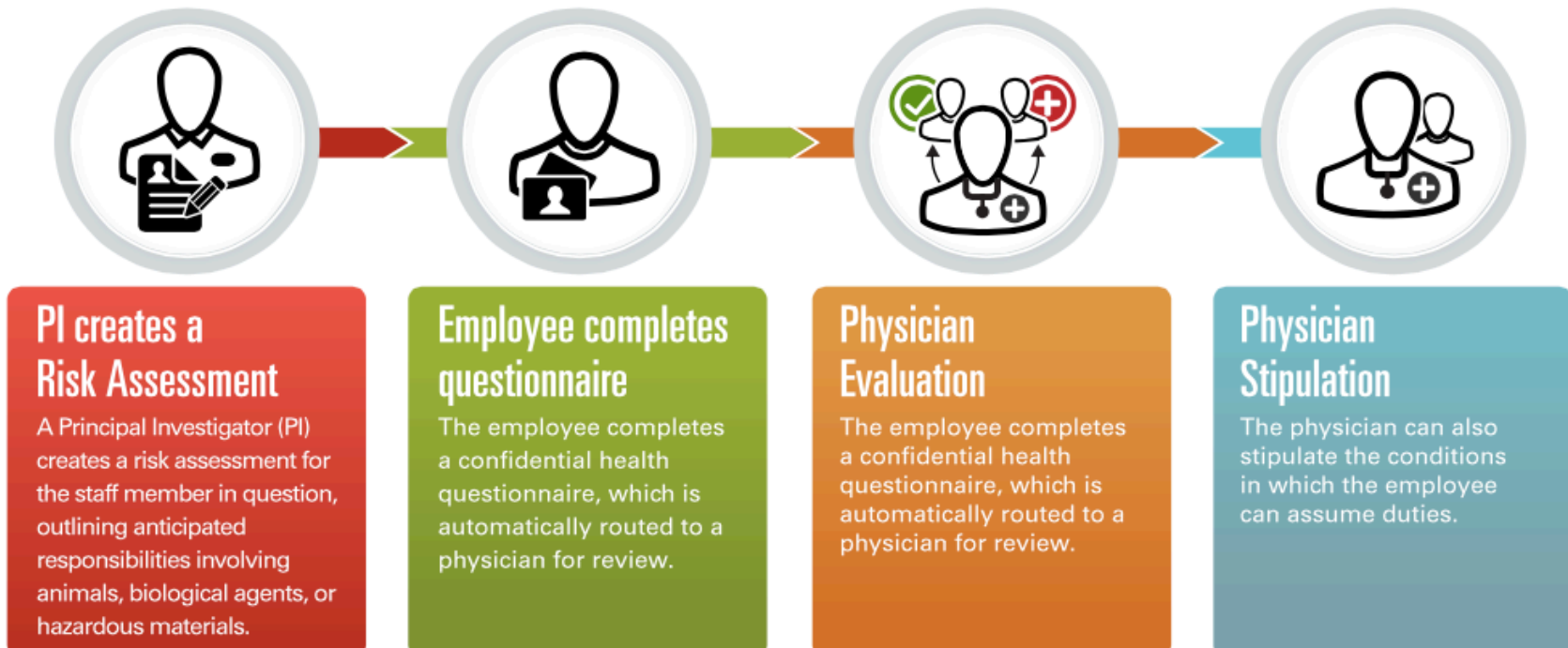
Researcher Functionality

- Home-built system best met researchers AND EH&S needs
- Cell phone readers for QR codes
- Ties to chemical databases
- Ties to safety databases
- Easy location tracking
- Easy inventory management



Occupational Health Surveillance System

Electronic system for laboratory employees to receive medical clearance for their work duties



Risk Assessment Determinations in Chemical Academic Laboratories

Risk management tool to determine a control-banded Standard Operating Procedure (SOP) to provide researchers with pertinent information to safely conduct new experiments.

RADiCAL

FEATURES



WORKFLOW

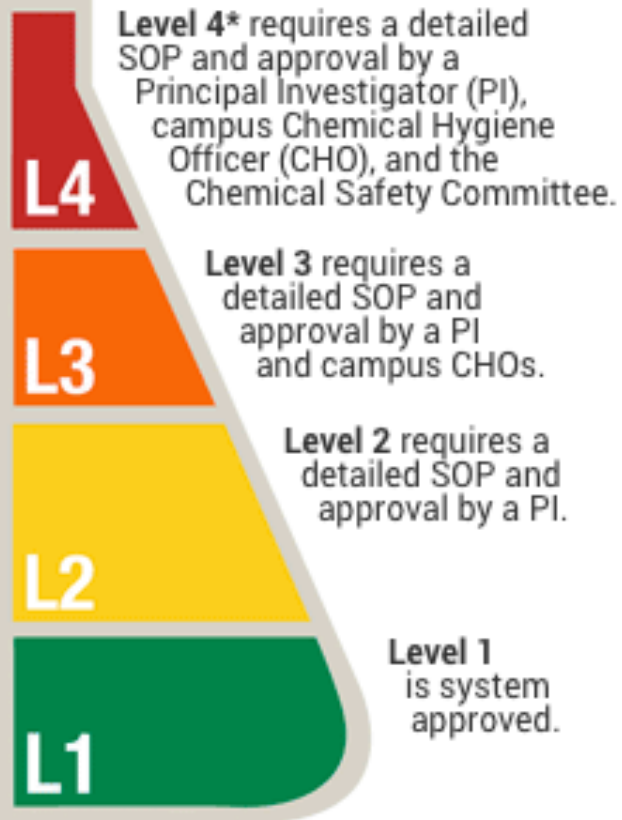


RADiCAL

WORKFLOW



CHEMICAL SAFETY LEVELS



Safety Inspection Tool



Safety Inspection Tool

- Mobile-cloud based solution to automate inspection process
- Offers a flexible inspection model that accommodates scheduling, item tracking and generation of automated notifications
- Helps identify safety improvements and establishes greater compliance to improve the safety environment
- Flexible feature set allows application to many types of safety programs

SOP GT

Standard Operating Procedure Generating Tool

- Rapid identification of needed SOPs
- Creation of SOPs
- Training on SOPs
- Management of SOPs



SOP GT

Serve PIs, Lab Workers, and EH&S

- Link to chemical inventory and hazard assessments to identify needed SOPs
- UC-wide library of chemical and process SOPs
- Create research group library of SOPs
- Train and certify training on SOPs
- Cloud updates of SOPs
- Link to safety databases
- Documents, pictures, videos, lessons learned

WASTe: Waste Accumulation Storage Tracking electronically

Work flow for chemical waste:



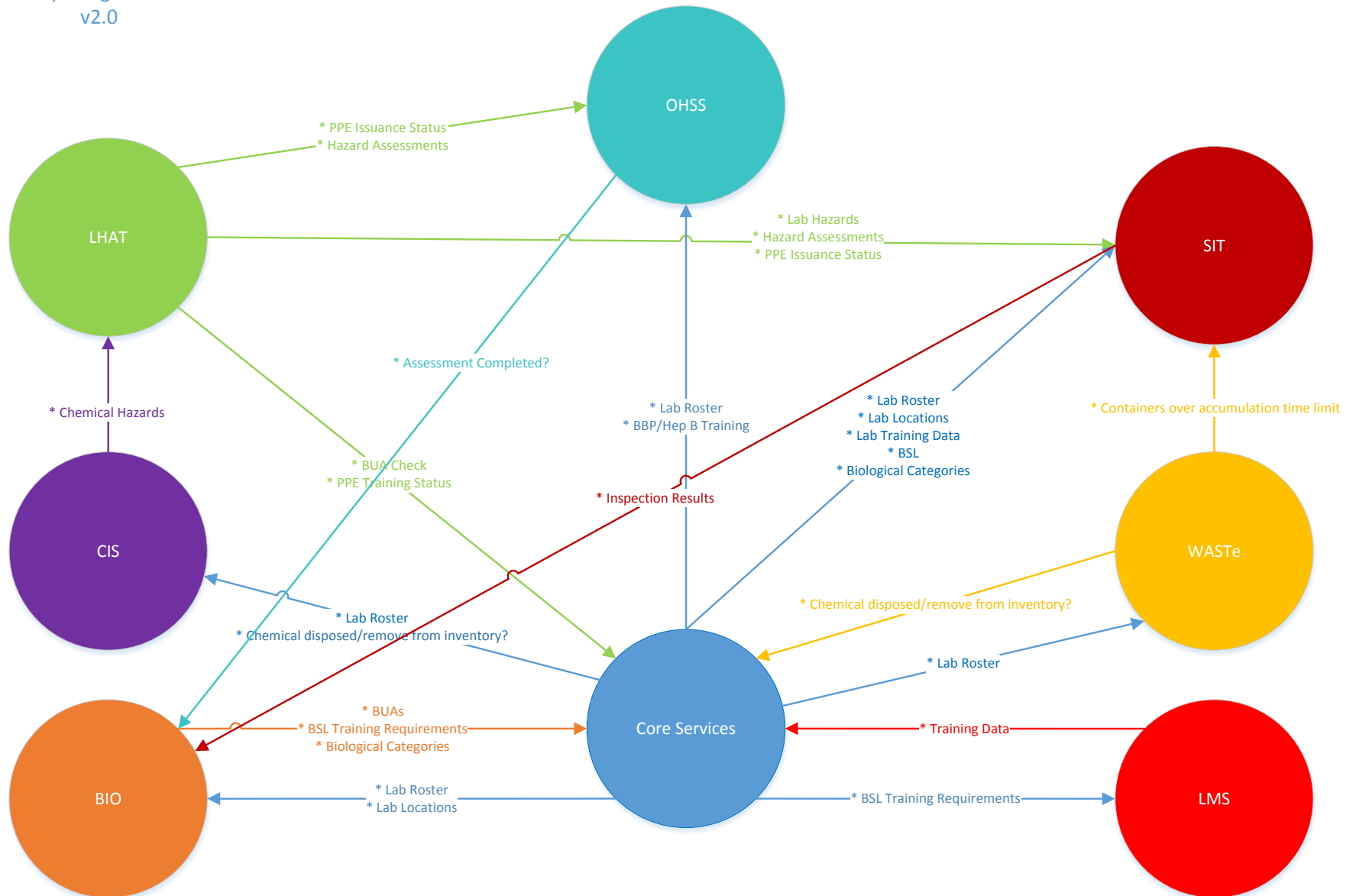
Many points to benefit from automation

WASTe: Waste Accumulation Storage Tracking electronically

- Allows user to create a tag in less than 60 seconds
- Tracks inventory and accumulation time
- Meets regulatory requirements for labeling hazardous waste
- Accommodates different types of hazardous waste
- Auto-notifies EH&S staff when containers have reached accumulation time limit
- Web-based and mobile compatible
- Scanning and reporting capabilities

Software Integration: Power and Liability

UC Safety Integration Points
v2.0



Status Report

- All software tools developed at least to prototype level
- Software developed System-wide and by individual campuses
- Web and mobile enabled platforms
- Integration links not complete
- Menu approach to adoptions adds complexity but helps “island nation” campuses
- Limited adoptions can occur when a “cool tool” has only one champion
- Power improving with complexity
- PIs, Lab Workers, and EH&S Staff all using software tools to transform the integration of research and safety

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