Introduction to Individualized Quality Control Plan (IQCP) The New QC Policy from CMS

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Disclaimers

- I work for Alere
- Alere produces testing devices for use at POC
- Working with customers is my passion!

Four key CMS regulations for moderately complex tests

493.1253	• Test method verification accuracy, precision, reportable range and reference ranges
493.1254	• Maintenance and function checks
493.1255	• Calibration and calibration verification
493.1256	• QC procedures

CLIA

CMS

CMS 2004 brochure on how to complete the initial “performance verification.” p.2

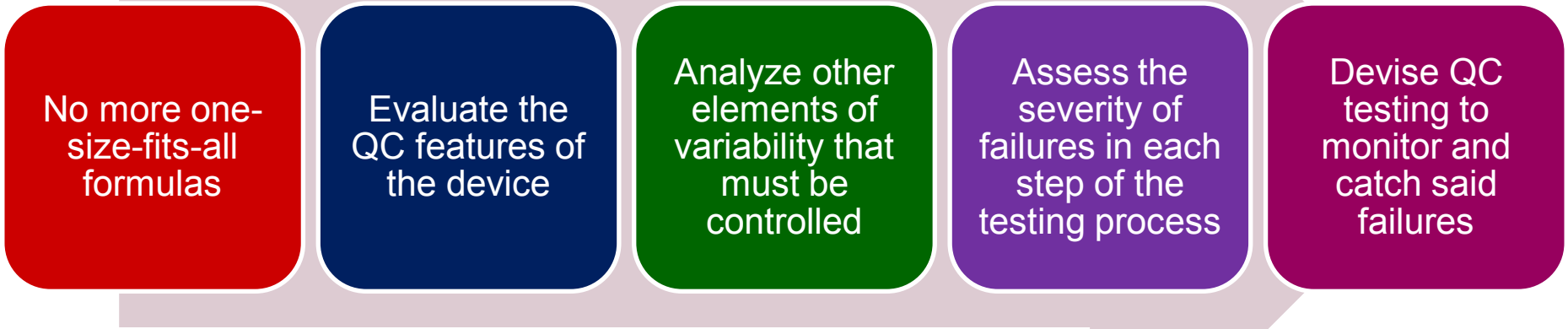
493.1256 – QC procedures

For each test system, the laboratory must test, at a minimum, two levels of external QC materials each day it performs a nonwaived test.

However, the regulations now allow the laboratory to reduce the frequency of testing external QC materials (equivalent QC procedure) for certain test systems.

What is the future for QC of POCT?

A Risk Management approach to Quality Control



This represents a shift from "Quality Compliance" to true Quality Control

CLSI to the Rescue!!!

EP23

User Defined QC Protocols for *In Vitro* Diagnostic Devices Based on Manufacturer's Risk Mitigation Information and the User's Environment

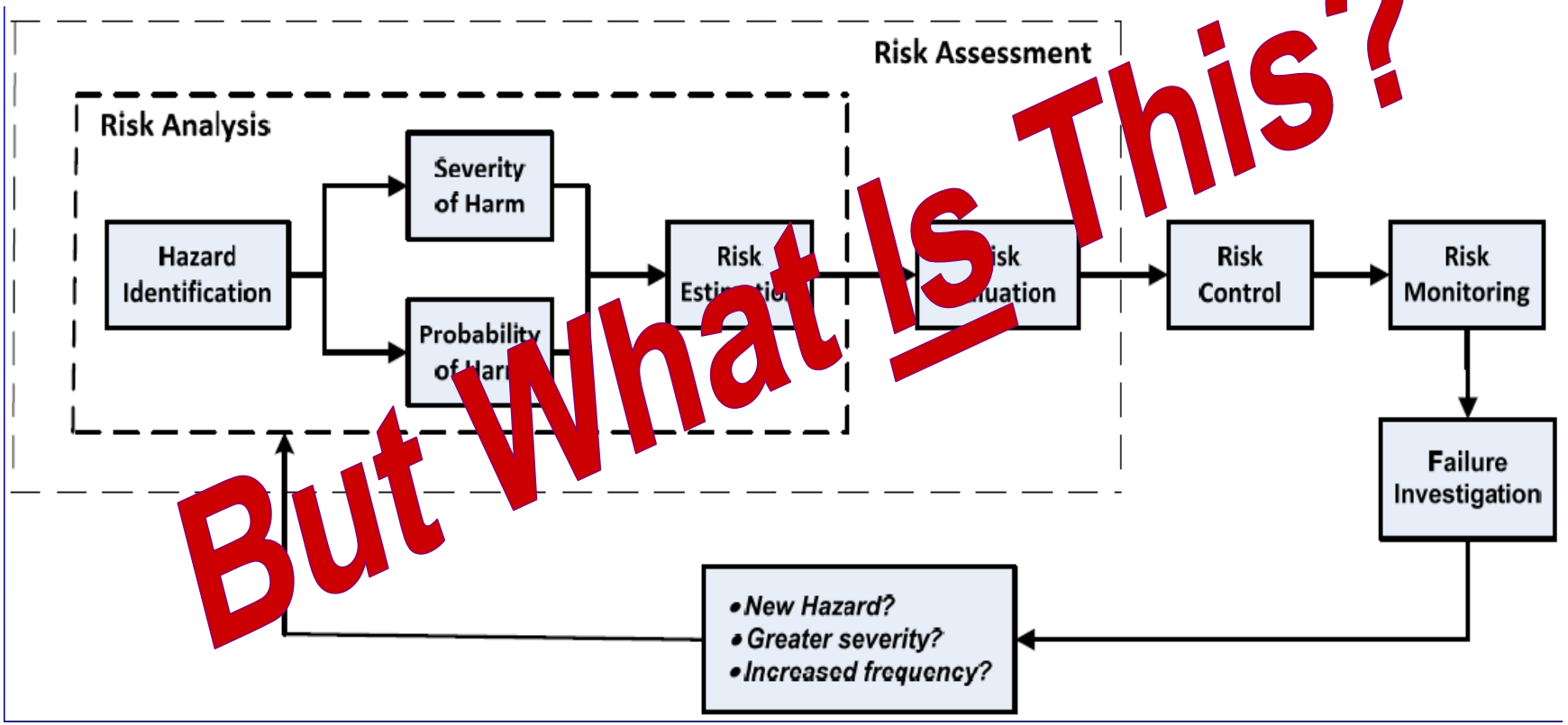
"Portions of the EP23-A document capture the principles of our intended policies."

EP18

Risk Management Techniques to Identify and Control Laboratory Error Sources

CLSI. *Laboratory Quality Control Based on Risk Management; Approved Guideline.* CLSI document EP23-A. Wayne, PA: Clinical and Laboratory Standards Institute; 2011. S&C:13-54-CLIA 2013

Do This!!!



Life-Cycle Risk Management Process

08/16/13 CMS Official Memorandum

Key concepts from EP-23 will be an acceptable alternative QC policy. The New CLIA QC policy will be entitled Individualized Quality Control Plan (IQCP)

IQCPs are a formal representation and compilation of Risk Assessment (RA), Quality Control Plan (QCP), and Quality Assessment (QA).

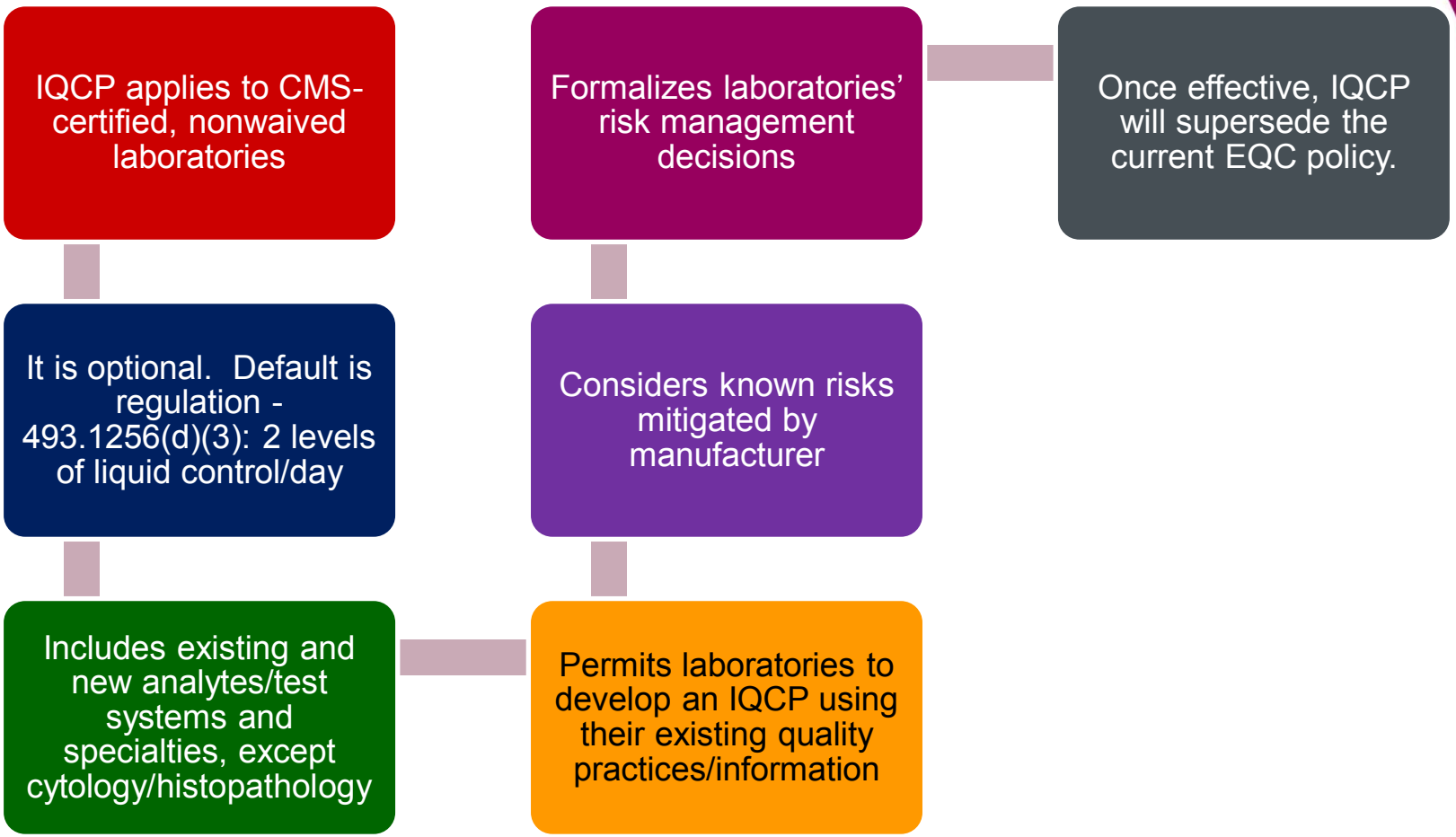
IQCPs must at minimum have a RA evaluation of the following components: specimen, environment, reagent, test system, and testing personnel

IQCP will be voluntary: Laboratories will have two choices for QC compliance: 1) Two levels of QC per day or, 2) IQCP. Package insert requirements must be met.

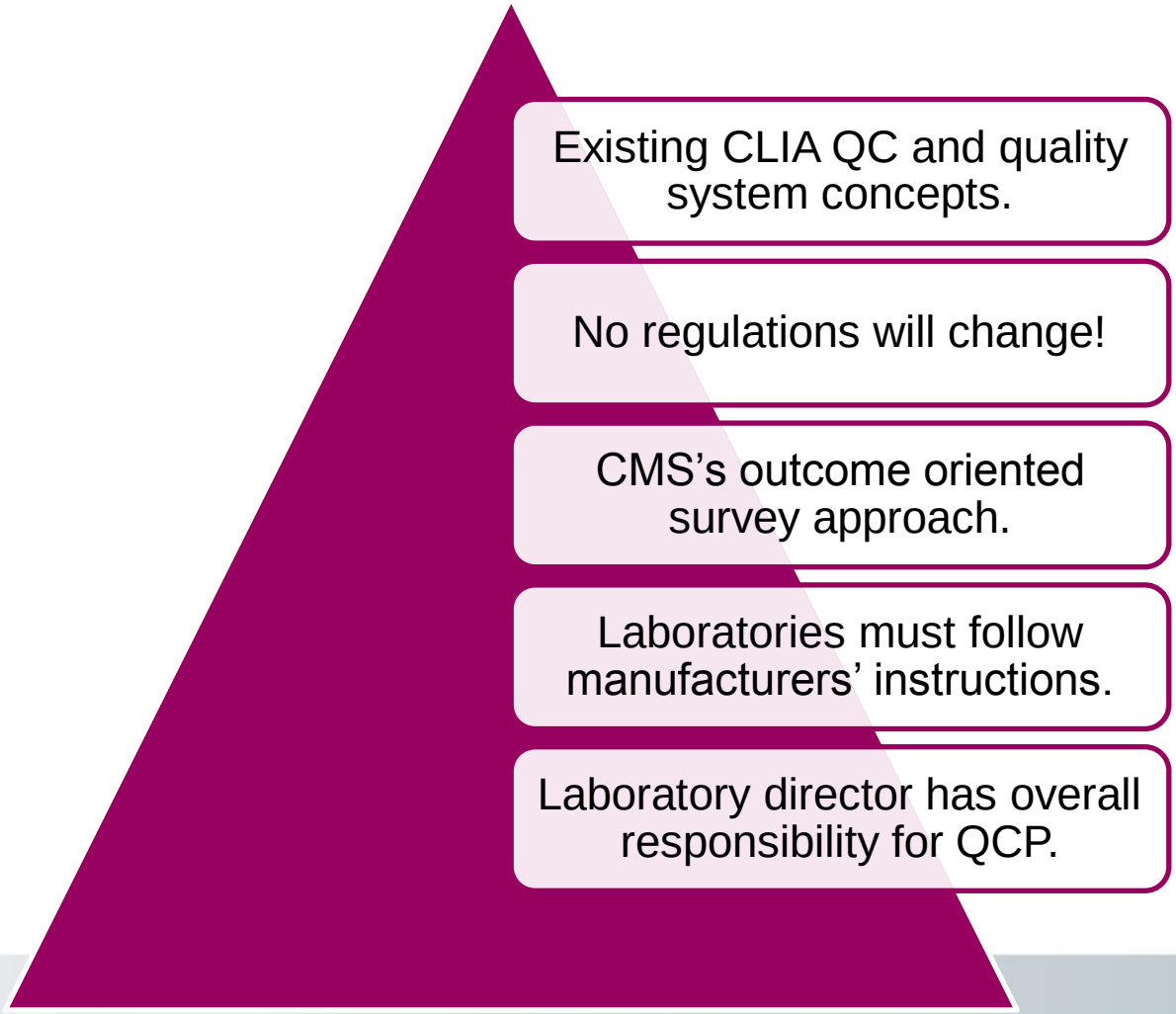
Education and transition period begins 01/01/2014

EQC will be phased out at the end of the education and transition period on 01/01/2017.

CMS: The "Right QC" Is IQCP



What Won't Change?



- Existing CLIA QC and quality system concepts.
- No regulations will change!
- CMS's outcome oriented survey approach.
- Laboratories must follow manufacturers' instructions.
- Laboratory director has overall responsibility for QCP.

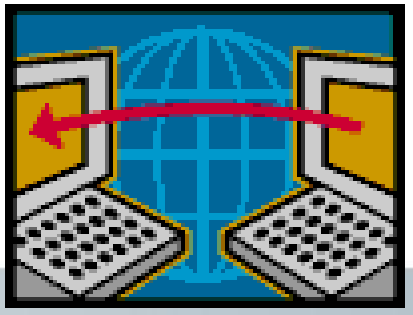
CAP? TJC? COLA?

Accrediting organizations (AOs) and exempt states (ES) must decide to incorporate IQCP into their standards. Any related standard changes must be approved by CMS.

Accredited laboratories should continue to meet their accrediting organizations' QC standards until they receive notice from their AOs.

Where to Obtain Information

- **CMS/CLIA Website:**
  http://www.cms.hhs.gov/clia/
- **CMS CLIA Central Office:**
  410.786.3531
- **IQCP Link:**
  IQCP@cms.hhs.gov
- EP23 Workbook



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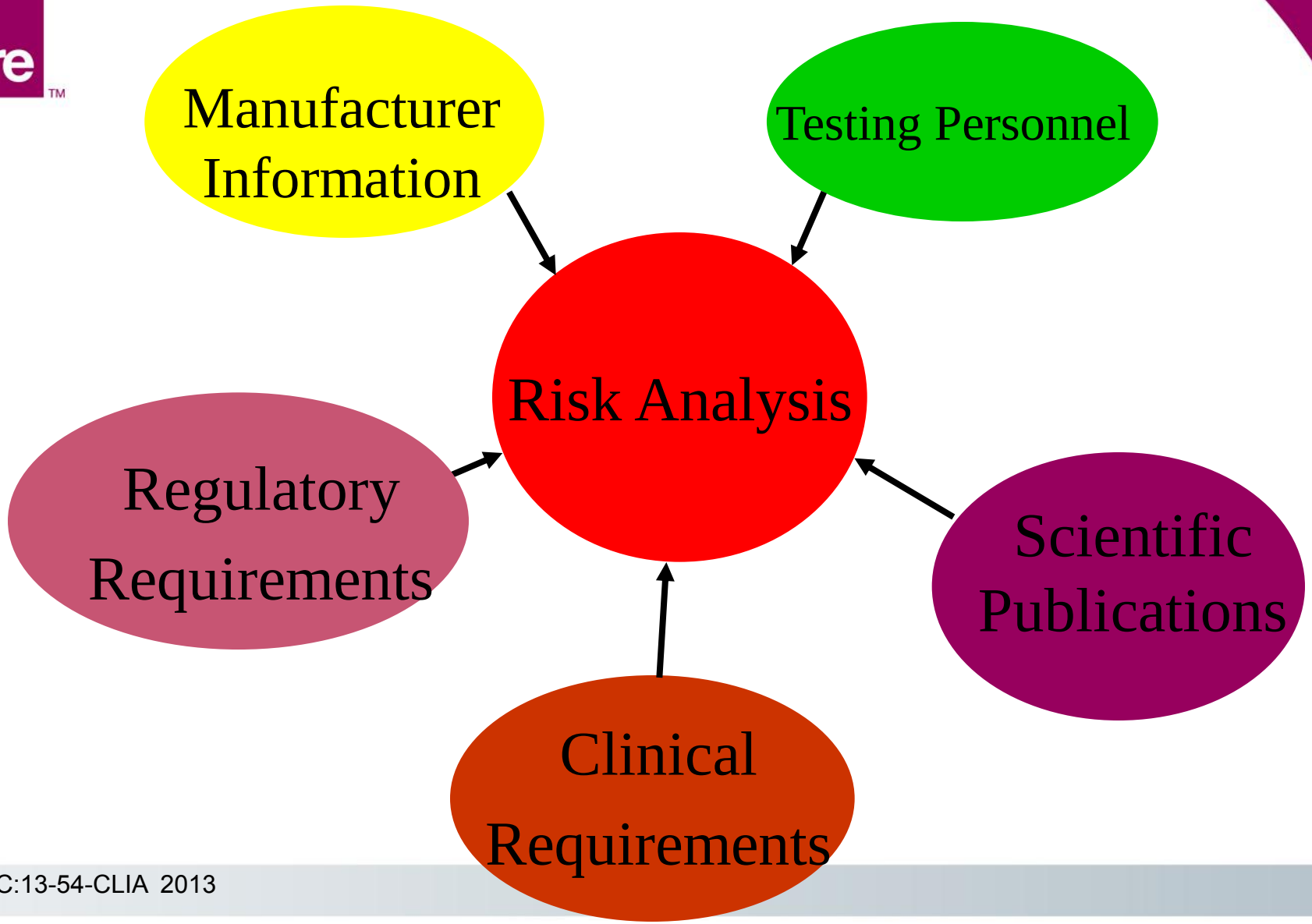
Risk Management approach to QC

FIRST UNDERSTAND THE DIFFERENCE BETWEEN HAZARD AND RISK

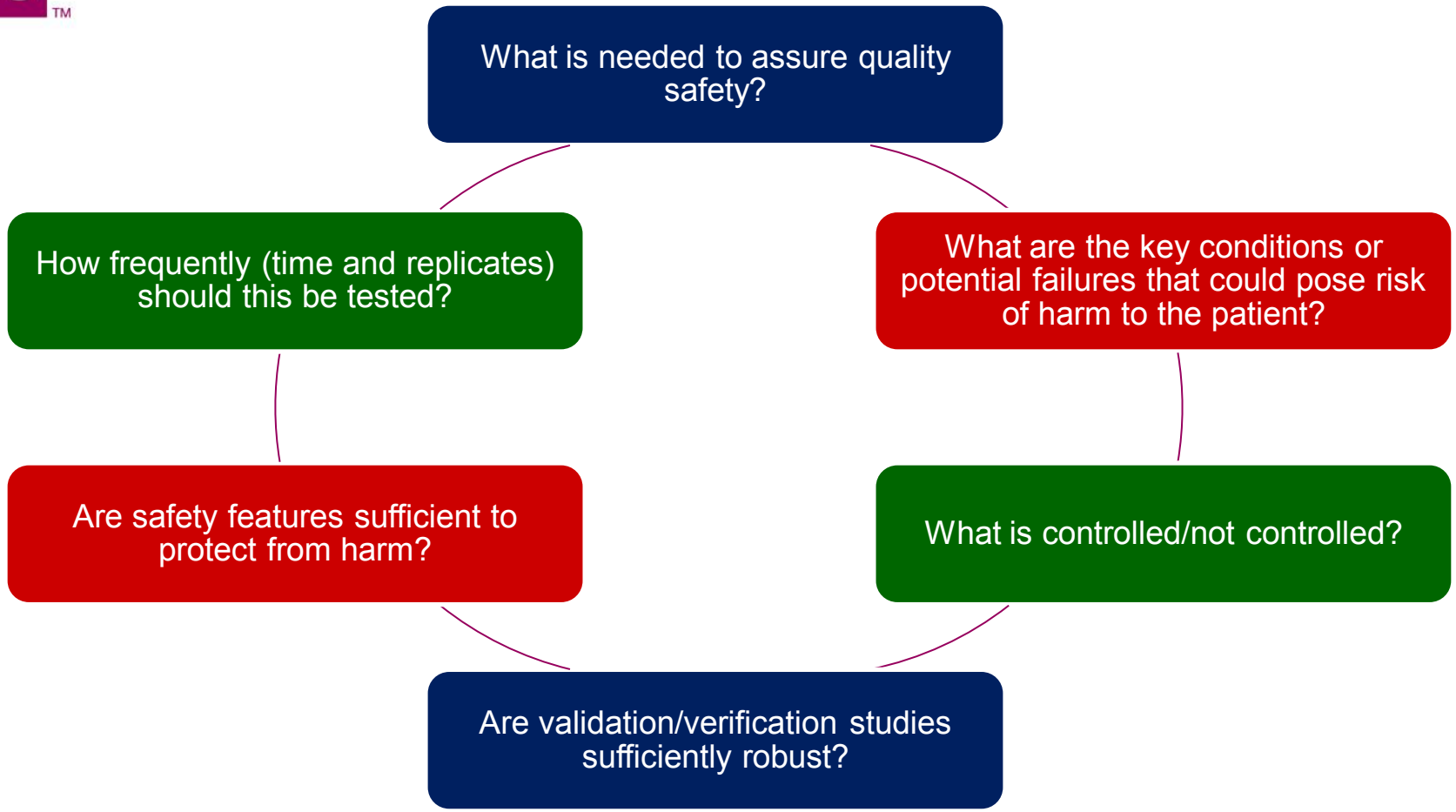

Manufacturer Information
Testing Personnel
Risk Analysis
Regulatory Requirements
Scientific Publications
Clinical Requirements

Risk Management approach to QC

Ask the right questions

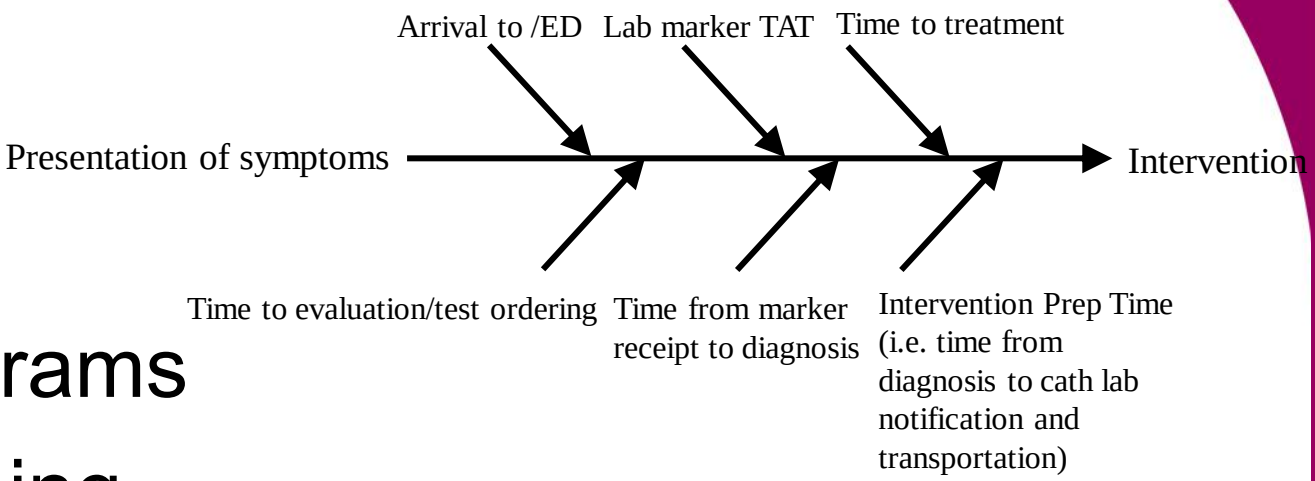
- What is needed to assure quality of test results? Does the manufacturer recommendation for QC minimize laboratory risk to an acceptable level?
- What are the key conditions or potential failures that could occur in the laboratory that pose risk of harm to the patient?
- What is controlled/not controlled?
- Are validation/verification studies sufficiently robust
- Are EQC features sufficient to protect patient from harm?
- How frequently (time and replicates) should QC be tested?

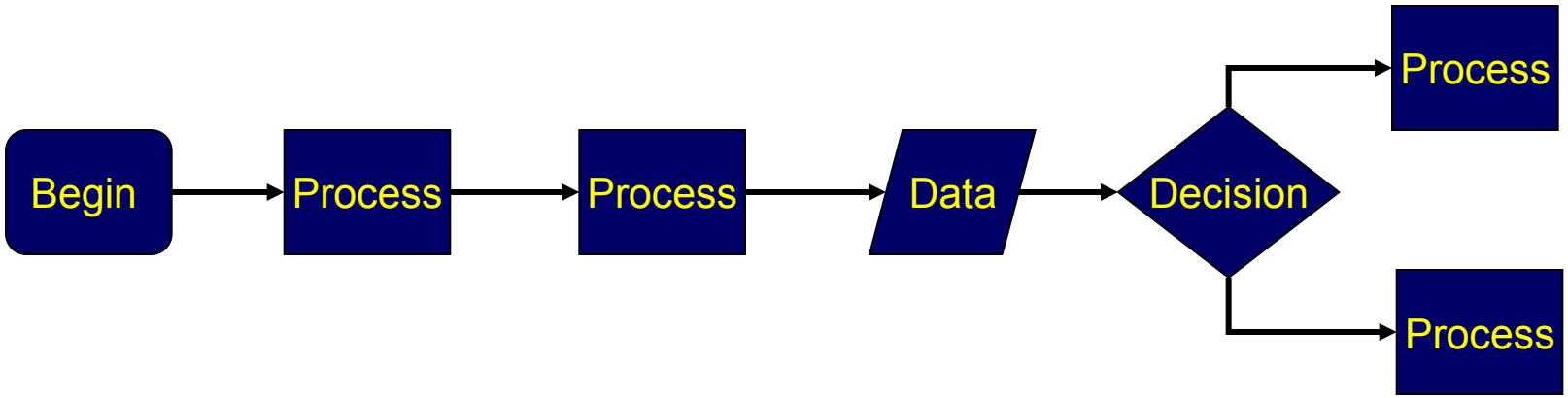
Risk Management approach to QC



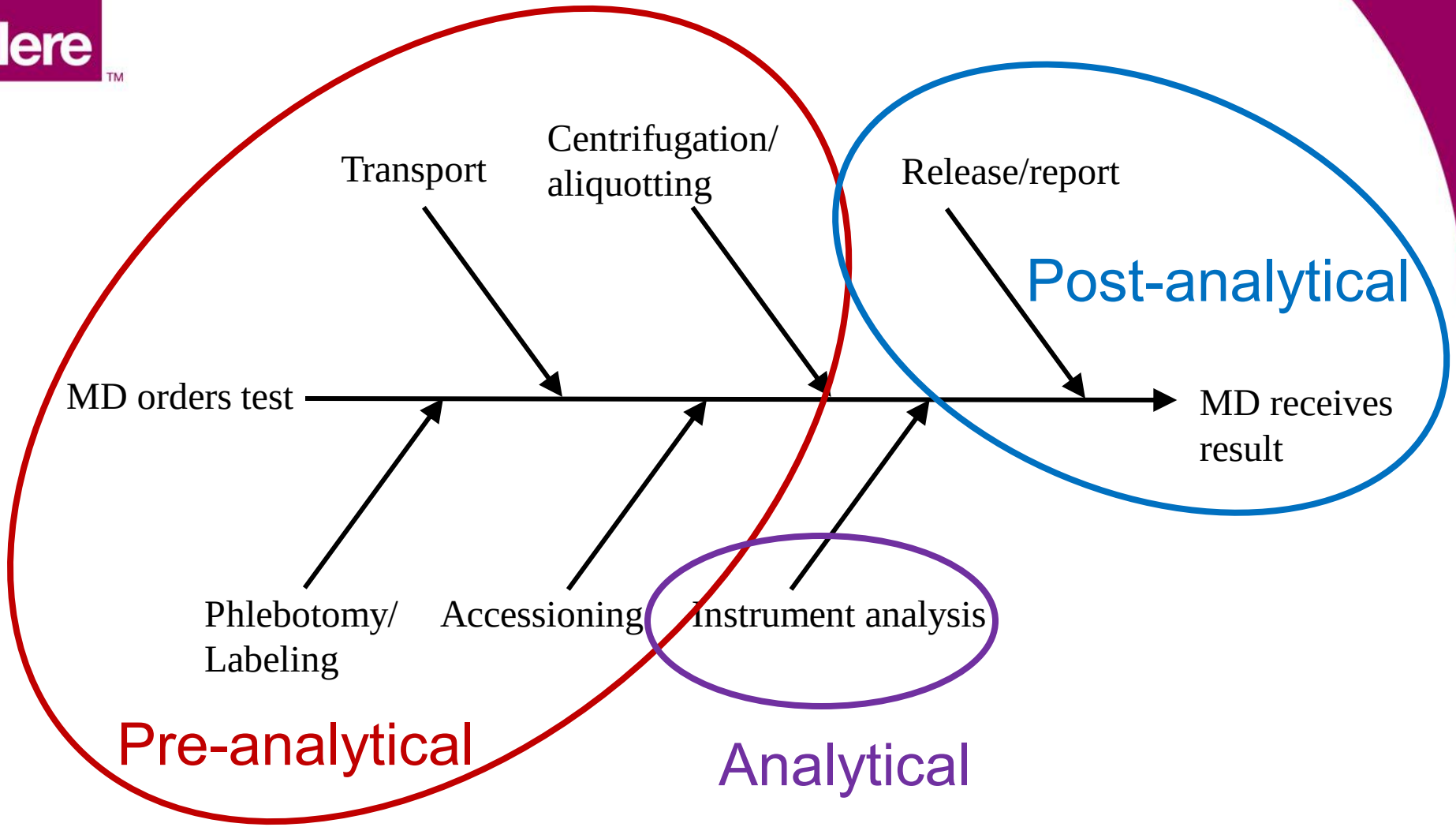
Risk Assessment Tools

- Brainstorming
- 5 Whys
- Fishbone diagrams
- Process mapping





Testing Process Fishbone Diagram



EP23 Workbook Key Process Steps

1. Operator training and competency
2. Reagent/calibrator/parts procurement and storage
3. Patient sample acceptability evaluation
4. System startup
5. System calibration
6. Loading and testing of patient samples
7. Proper device function
8. Test result review

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Develop an FMEA

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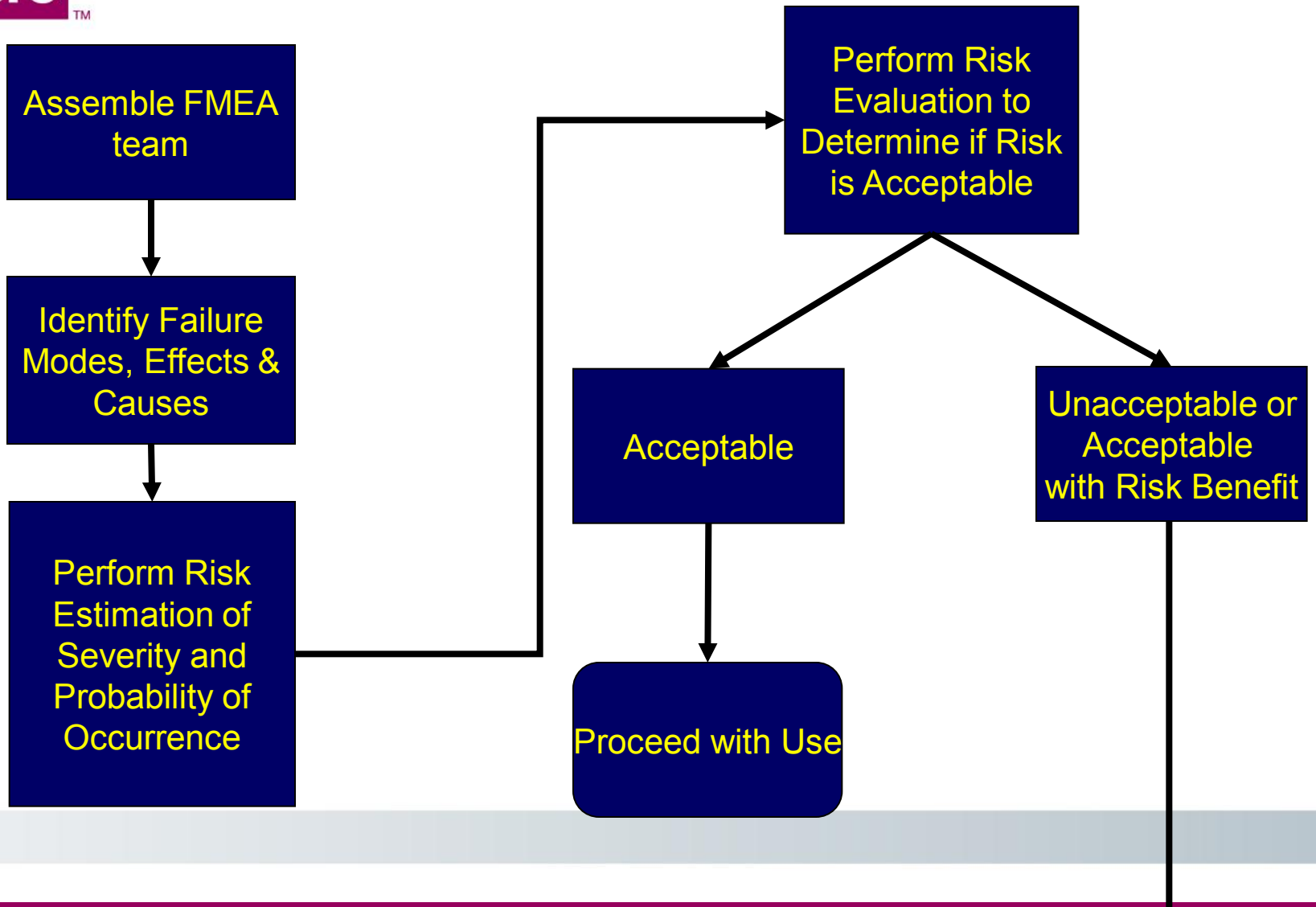
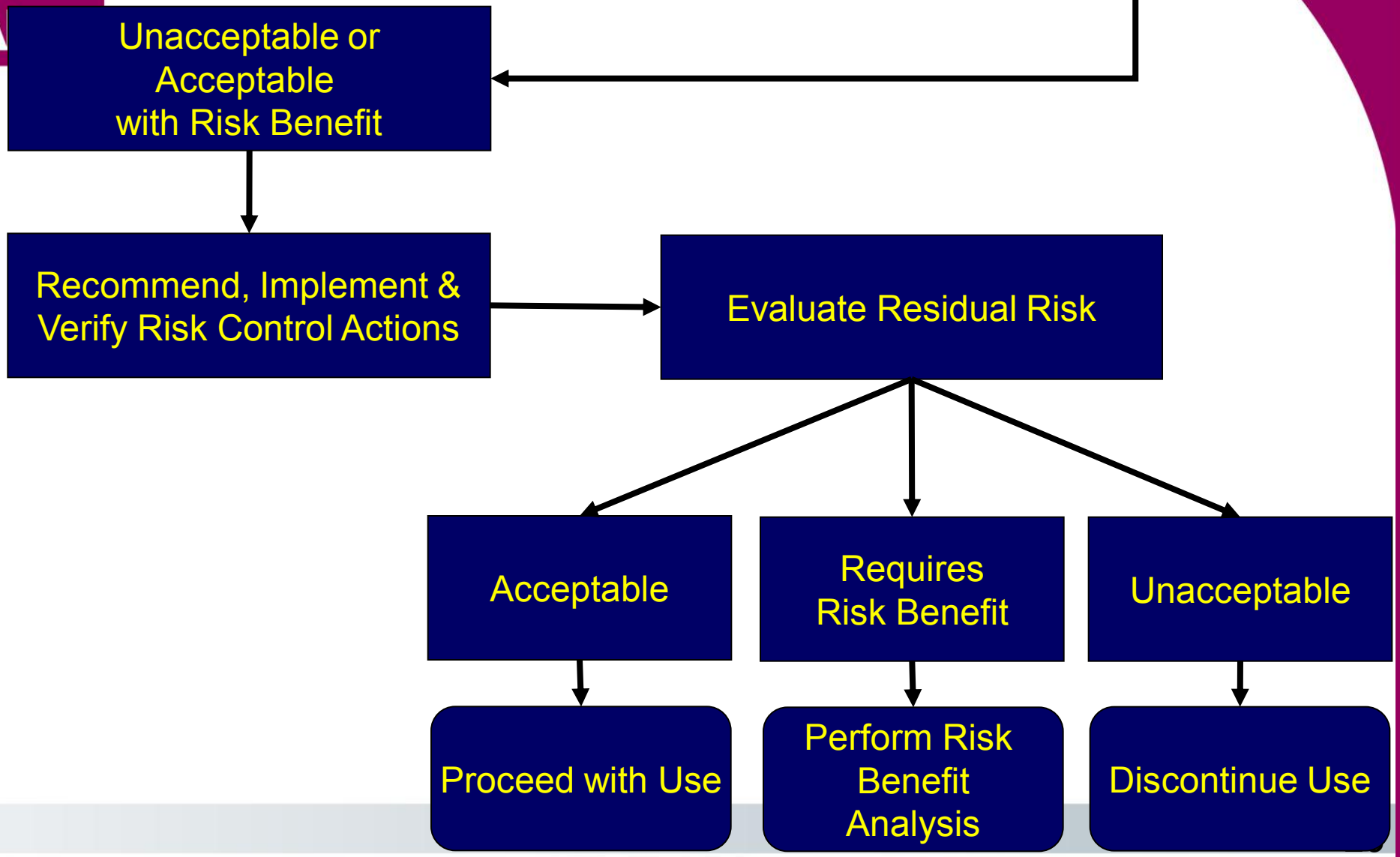
Think in terms of the five elements of a process.

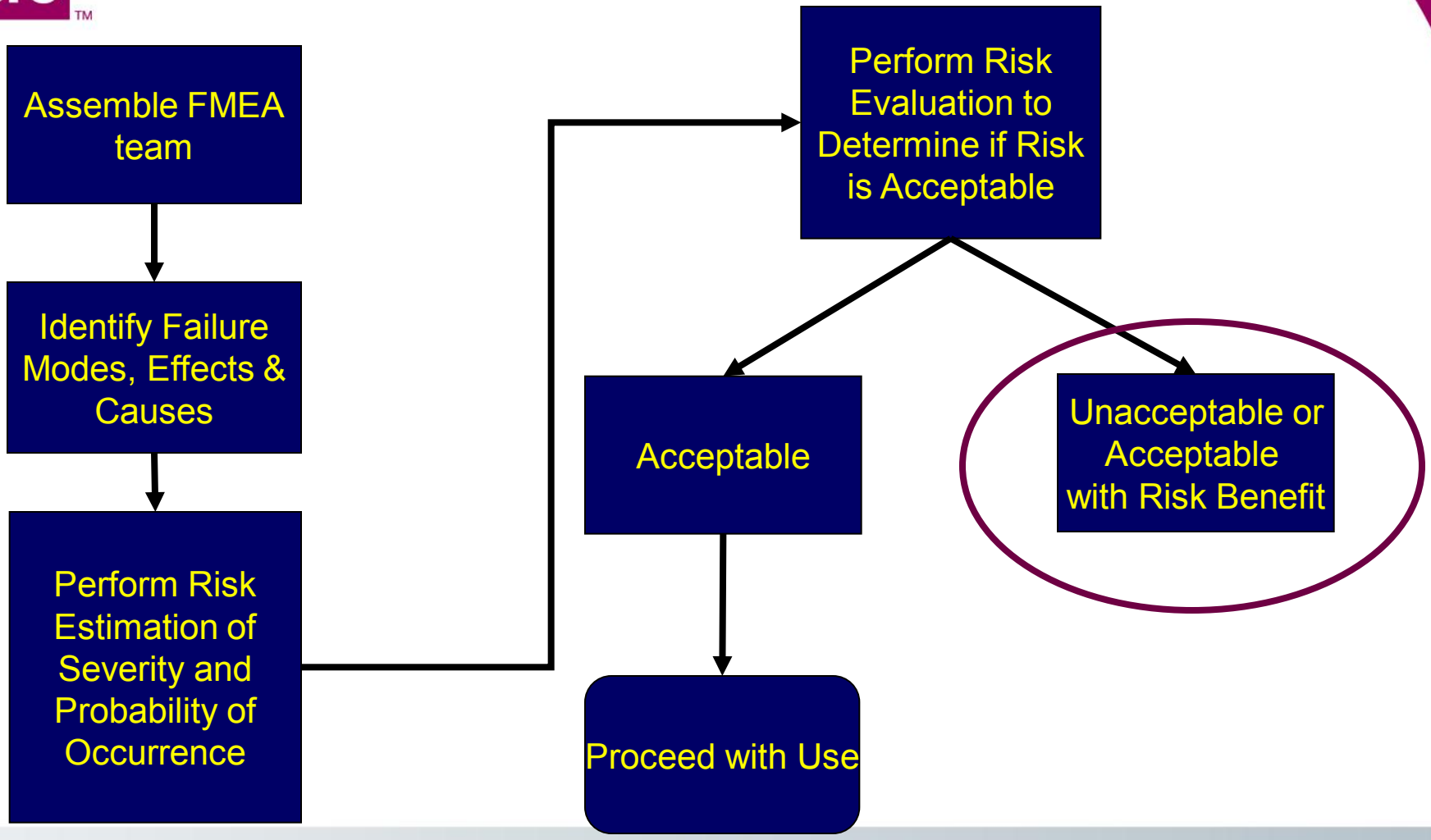
People: Training, Experience, Attitude	Materials (Reagents and consumables): Integrity, Storage, Reconstitution, Preparation (mixing), Use	Equipment (Hardware and Software): Use, Maintenance, Reliability	Methods: Calibration, Capability, Sensitivity, Specificity, Accuracy, Precision	Environment: Temperature, Humidity, Air flow, Power supply, Water quality

"Use"Failure Mode and Effects Analysis (FMEA) Flowchart




Unacceptable or Acceptable with Risk Benefit
Recommend, Implement & Verify Risk Control Actions
Evaluate Residual Risk
Acceptable
Requires Risk Benefit
Unacceptable
Proceed with Use
Perform Risk Benefit Analysis
Discontinue Use

FMEA flowchart



Variables to Consider

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Environmental conditions: Temperature, humidity	Intended medical use of test result: HIV vs triglyceride	Clinical setting: Main lab, POC, Outpatient, ER, ICU, Ambulance, Non-traditional setting
Time lapse: Are result acted on immediately or not?	Testing frequency, testing personnel and turnover	Condition of ancillary equipment: Centrifuges, refrigerators, heat baths
Power requirements/ fluctuations	Radio and electromagnetic waves	Age of the device

FMEA Basics

Function	Failure Modes	Effects of Failure	Severity	Cause of Failure	Probability			

FMEA Steps 1 and 2

- Function
  - Proper function of reagents
- Failure modes
  - Incorrect storage
  - Expired reagents
  - Mechanical failure
  - Reagent drift

Function	Failure Modes	Effects of Failure	Severity	Cause of Failure	Probability			
Reagent function	Incorrect storage							
	Expired reagents							
	Mech. failure							
	Reagent drift							

FMEA Step #3

- Function
  - Proper function of reagents
- Failure modes
  - Incorrect storage
  - Expired reagents
  - Mechanical failure
  - Reagent drift

- Assess the effects and severity of each failure
  - Falsely elevated results
    Elevations > x% = ???
  - Falsely depressed results
    Depressions < y% = ????
  - No results = delayed results
- Determine the cause of each failure (expect overlap) and the probability of that occurrence

Function	Failure Modes	Effects of Failure	Severity	Cause of Failure	Probability			
Reagent function	Incorrect storage	FP, FN						
	Expired reagents	FP, FN						
	Mech. failure	No results						
	Reagent drift	FP, FN						

Ranking Severity of Failure and Probability of Harm

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Negligible
- Inconvenience or temporary discomfort

Minor
- Temporary injury or impairment not requiring professional medical intervention

Serious
- Injury or impairment requiring professional medical intervention

Critical
- Permanent impairment or life-threatening injury

Catastrophic
- Results in patient death

Frequent
- Once per week

Probable
- Once per month

Occasional
- Once per year

Remote
- Once every few years

Improbable
- Once in the life of the test system

Risk Acceptability Matrix

	Severity of Harm				
Probability of harm	Negligible	Minor	Serious	Critical	Catastrophic
Frequent	X	X	X	X	X
Probable	OK	X	X	X	X
Occasional	OK	OK	OK	X	X
Remote	OK	OK	OK	OK	X
Improbable	OK	OK	OK	OK	OK

Rank Severity of Risk – Consequence or Harm

Effect	Severity of effect	Ranking
Hazardous, without warning	May endanger patient. Involves non-compliance with gov't. regulation without warning.	10
Hazardous, with warning	Same as above only with warning	9
Very High	Major injury to patient requiring emergency intervention	8
High	Minor injury to patient; patient dissatisfied	7
Moderate	Results acceptable; not cosmetically satisfactory	6
Low	100% of results may have to be retested; some patient dissatisfaction	5
Very Low	Timing/efficiency defects noticed by most users	4
Minor	Same as above, but, defect noticed by average user	3
Very Minor	Same as above, but, defect noticed only by the discriminating user	2
None	No effect	1

Adapted from Quality Support Group, Inc

Process Occurrence – Probability or frequency of failure

Probability of Failure	Possible Failure Rates	C_{pk}	Rankings
Very high, failure is almost inevitable	> 1 in 2	< 0.33	10
	1 in 3	≥ 0.33	9
High, repeated failures	1 in 8	≥ 0.51	8
	1 in 20	≥ 0.67	7
Moderate, occasional failures	1 in 80	≥ 0.83	6
	1 in 400	≥ 1.00	5
	1 in 2000	≥ 1.17	4
Low, relatively few failures	1 in 15,000	≥ 1.33	3
	1 in 150,000	≥ 1.50	2
Remote, unlikely	≤ 1 in 1,500,000	≥ 1.67	1

Adapted from Quality Support Group, Inc

Process Detection – Probability that will be detected before harm

Qualitative probability	Quantitative probability of not detecting	Ranking
Remote likelihood that erroneous results would be undetected • detection reliability at least 99.99% • detection reliability at least 99.80%	 1/10,000 1/5,000	 1 2
Low likelihood that erroneous results would be undetected • detection reliability at least 99.5% • detection reliability at least 99%	 1/2,000 1/1,000	 3 4
Moderate likelihood of detection • detection reliability at least 98% • detection reliability at least 95% • detection reliability at least 90%	 1/500 1/200 1/100	 5 6 7
High likelihood that that erroneous results would be undetected • detection reliability at least 85% • detection reliability at least 80%	 1/50 1/20	 8 9
Extreme likelihood that erroneous results would be undetected	1/10 +	10

Adapted from Quality Support Group, Inc

Full Blown FMEA Form

Process step and/or #	Process step function	Potential failure mode	Potential causes of failure	Potential effects of failure	Existing conditions					Action plan	Results					Responsibility for action taken
					Current control	Occurrence	Severity	Detection	RPN		Actions Taken	Occurrence	Severity	Detection	RPN	

Now….What Needs Fixing?

- Identify those conditions that lead to unacceptable levels of error severity and frequency.
- Determine operating processes or tests (quality control) to detect those conditions

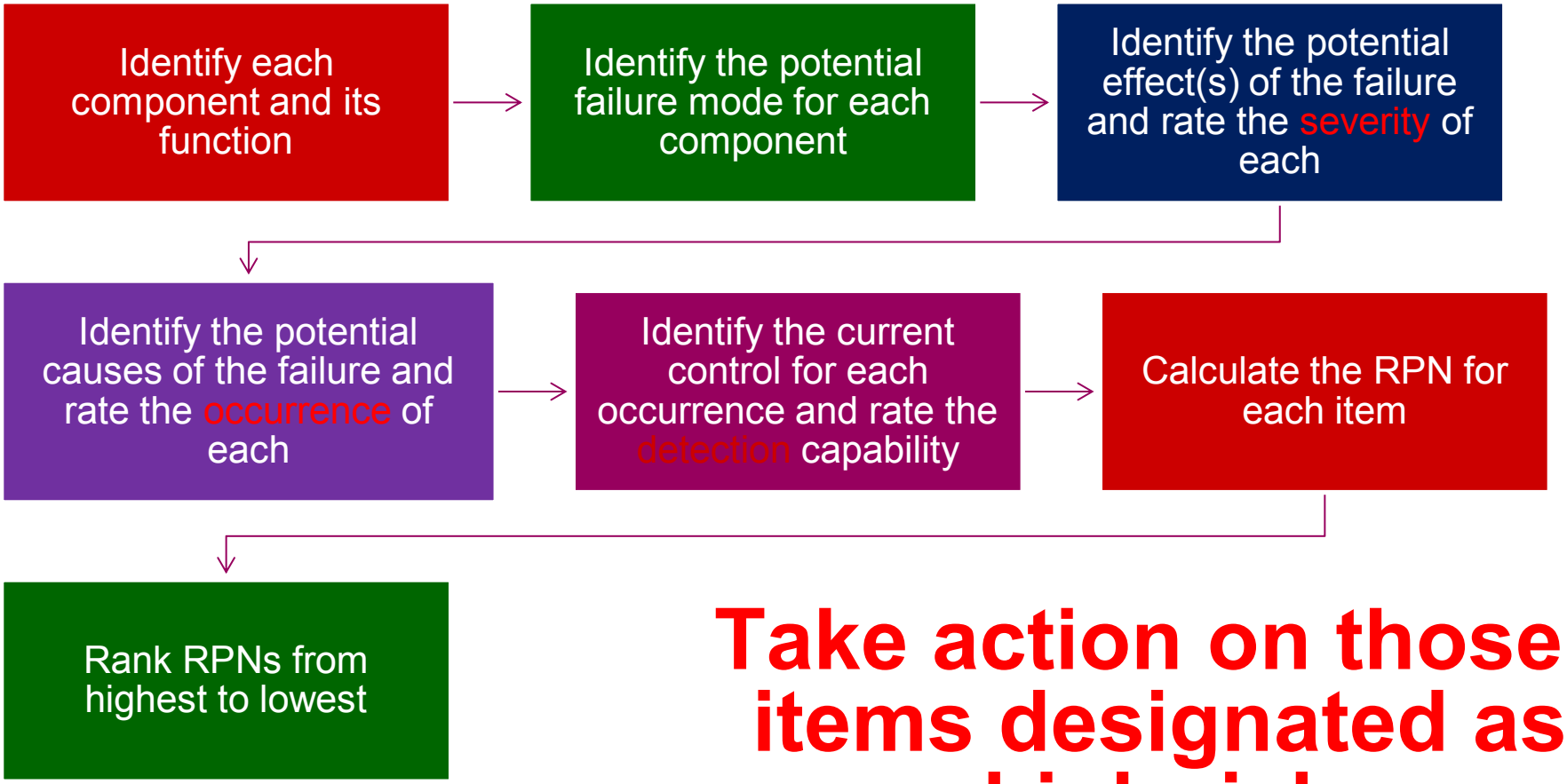
1st
- Eliminate causes of failure so that it does not OCCUR

2nd
- Reduce probability of OCCURRENCE

3rd
- Reduce SEVERITY of the failure

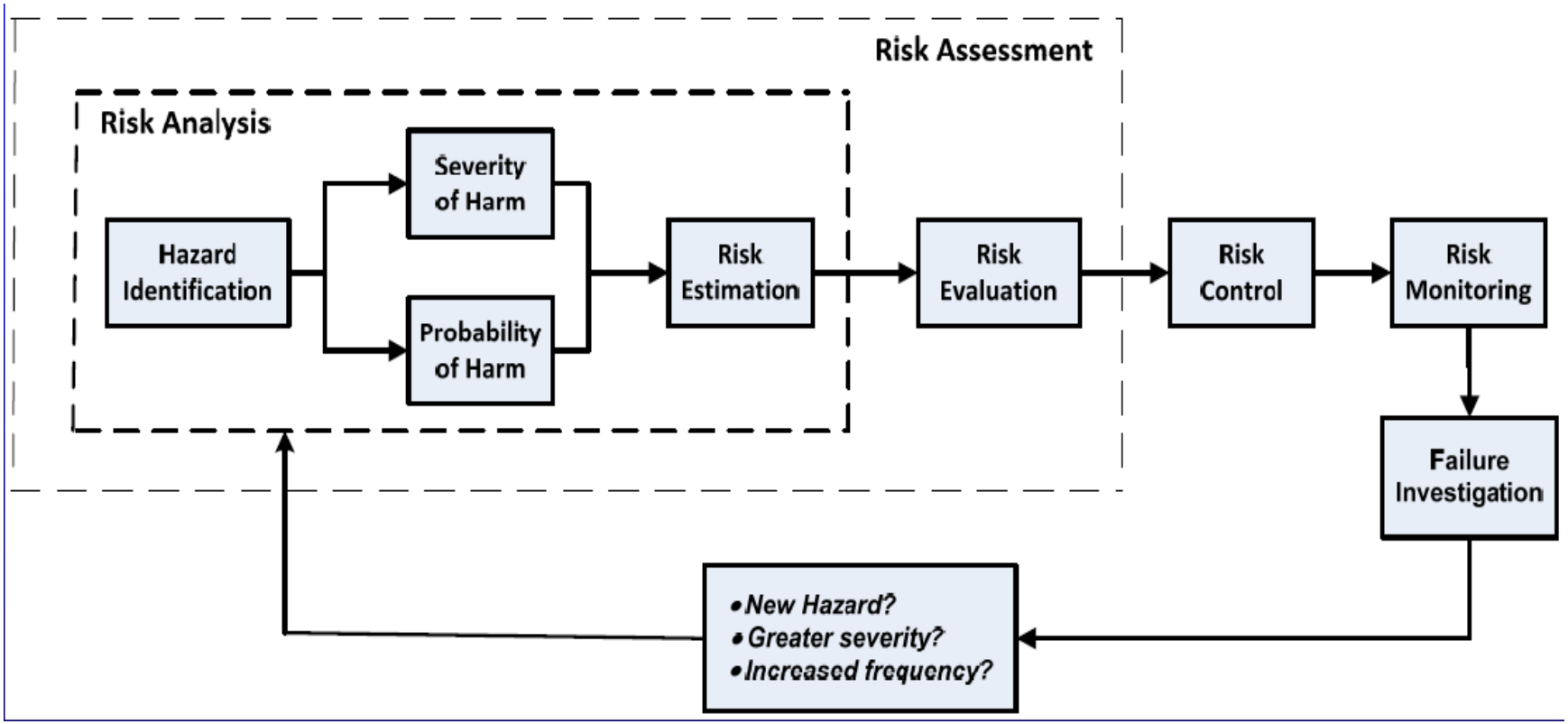
4th
- Improve DETECTION of the failure

As a Result You Will



Take action on those items designated as high risk

Do This!!!



Life-Cycle Risk Management Process

Other Resources

- ISO (www.iso.org)
  - ISO 9000:2005 Quality Management systems-Fundamentals and vocabulary
  - ISO 14971:2007 Medical Devices-Application of risk management to medical devices

- But how are you supposed to understand all the instrument features that could mitigate risk?

What's Next?

Device manufacturers need to provide LOTS more information about their QC features

- Detailed descriptions of device risk mitigation features
- Identify the targeted failure mode for each mitigation
- Descriptions of how the risk mitigation feature or recommended action performs its intended function
- Known limitations of the risk mitigation feature or recommended action
- Studies performed to verify the feature or recommended action achieves the intended purpose

EP22-Presentation of Manufacturer's Risk Mitigation Information for Users of *in vitro* Diagnostic Devices

- Guidance to Vendors
- Document design features that detect and/or control test system variability and/or failures.
- Describe failure modes, risk reduction features and data to support the effectiveness of those features

EP22 Items Vendors Would Have Addressed

Reagent deterioration • During shipment • Over time	Expired reagents	QC sample degredation	Calibrator degredation	Sample data entry error
Operator certifications	Low/High sample volume	Clots/ bubbles/ particulates	Sample carryover	Wear & tear on replaceable parts
	Environmental limitations	Sample limitations	QC maintenance	

Suggested Entries

- Targeted failure mode
- Test system feature or recommended action
- Description how the feature or recommended action is intended to function
- Known limitations of feature or recommended action
- Actions required to address known limitations
- Studies performed to demonstrate the ability of the feature/recommendation to achieve intended purpose
- Summary of study including a RA for each location where testing is performed on same test systems.

But What Will IQCPs Really Look Like?