2023 CCE Written Exam Review Webinar Series

August 9, 2023, through October 11, 2023

Session #2: Service Delivery Management 2

August 16, 2023

Faculty: J. Tobey Clark, CCE, FACCE, AAMIF, SASHE
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About the host/moderator

- Alan Lipschultz is President of HealthCare Technology Consulting based in Maryland, primarily consulting as an expert witness in legal cases. He is a registered Professional Engineer (PE), Certified in Clinical Engineering (CCE), Certified Safety Professional (CSP), Certified Professional in Patient Safety (CPPS), Fellow in the American College of Clinical Engineering (FACCE), and an AAMI Fellow.

- From 1989 to 2011, Alan was the director of Clinical Engineering @ Christiana Care Heath System in Delaware. He received his Master's Degree in Health Care Technology from Washington University, St. Louis in 1973

Logistics

- **All attendees have their microphones muted during the presentation.**
- **Questions to the faculty must be submitted via the "Q&A" feature in Zoom at any time. They will be addressed at the Q&A portion.**
- **If there is any urgent issue, please use the "chat" feature to communicate with the host/moderator.**
- **Please remember to complete the webinar evaluation after attending. A link will be provided at the end.**

About the faculty

J. Tobey Clark, BSBME, MSEE, CCE, CHTM, FACCE, AAMIF, SASHE

- **J. Tobey Clark,** Co-Director of the World Health Organization Collaborating Center for Health Technology Management at Technical Services Partnership (TSP), University of Vermont (UVM) and serves as a consultant for the Pan American Health Organization. Following 12 years as a biomedical/clinical engineer, he served as Director of TSP from 1985-2017. Tobey is also a part-time Lecturer in both Electrical & Biomedical Engineering and Biomedical and Health Sciences.
- Tobey is the 2017 ACCE Lifetime Achievement award winner. In 2009, he received the 2009 AAMI/ACCE Robert Morris Humanitarian Award and became a Fellow of the American College of Clinical Engineering. He also received the 2002 AAMI Biomedical/Clinical Engineering Career Achievement Award.

Learning Objectives

Service Delivery Management 2

- Service Management – Contracts/Other Payment Options
- Maintenance Software (CMMS) Administration
- Parts/Supplies Purchase and/or Inventory Management
- Technical Library / Service Manuals Management

$78.5 million verdict blamed on poor maintenance & no documentation

A jury in Philadelphia USA awarded a family $78.5 million on behalf of a child who suffered severe brain damage as a result of a delayed cesarean section.

The ultrasound imaging unit initially diagnosed the fetus as dead. This misdiagnosis delayed the C-section for 81 minutes.

There was no documentation that the ultrasound machine had been calibrated or maintained for 10 years, whereas the manual indicates that annual maintenance was necessary

The hospital was found liable.

Reference: https://www.reliasmedia.com/articles/78138-78-5-million-verdict-blamed-on-poor-maintenance-documentation

Managing Your Medical Equipment Maintenance Program

Scope of Medical Equipment

- Level 1 - stretchers, beds, wheelchairs
- Level 2 - physiologic monitors, IV pumps, electrosurgical units
- Level 3 - general radiology, lasers, anesthesia
- Level 4 - CT, MRI, PACS, PET

Managing Your Medical Equipment Maintenance Program

Level 1 or “low-tech” equipment

- Usually, in-house program

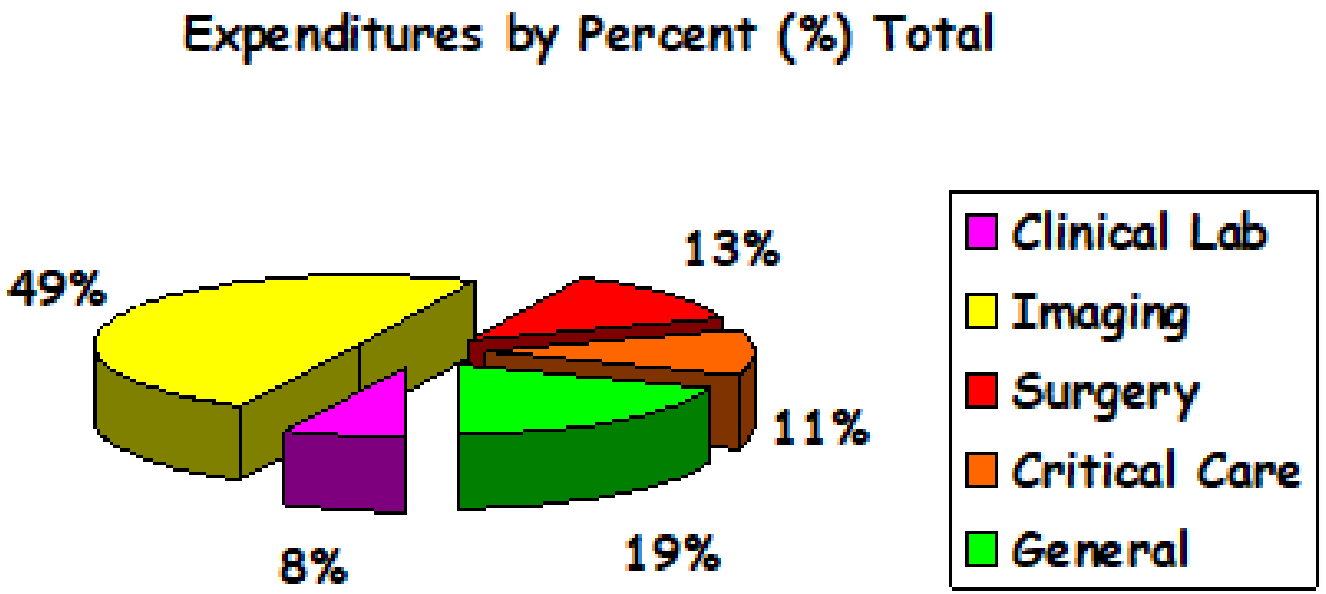
Level 2 or “medium-level” equipment

- Usually, in-house program

Level 3 & 4 or “high-tech equipment

- Usually, a mix of manufacturer, independent service organization and in-house

Breakdown of Medical Equipment Maintenance Expenses



Quick Question

RANK DOWNTIME COSTS FOR THE FOLLOWING EQUIPMENT TYPES BASED ON AVERAGE LOST REVENUES OF AN EXAM. ONE (1) IS THE HIGHEST COST, AND FOUR (4) IS THE LOWEST COST.

- CT SCAN
- X-RAY
- MRI
- NUCLEAR MEDICINE

Maintenance Payment Options

Options for Maintenance Coverage

Provider

Manufacturer service contract

- A number of options

Health system

- Department of Biomedical/Clinical Engineering

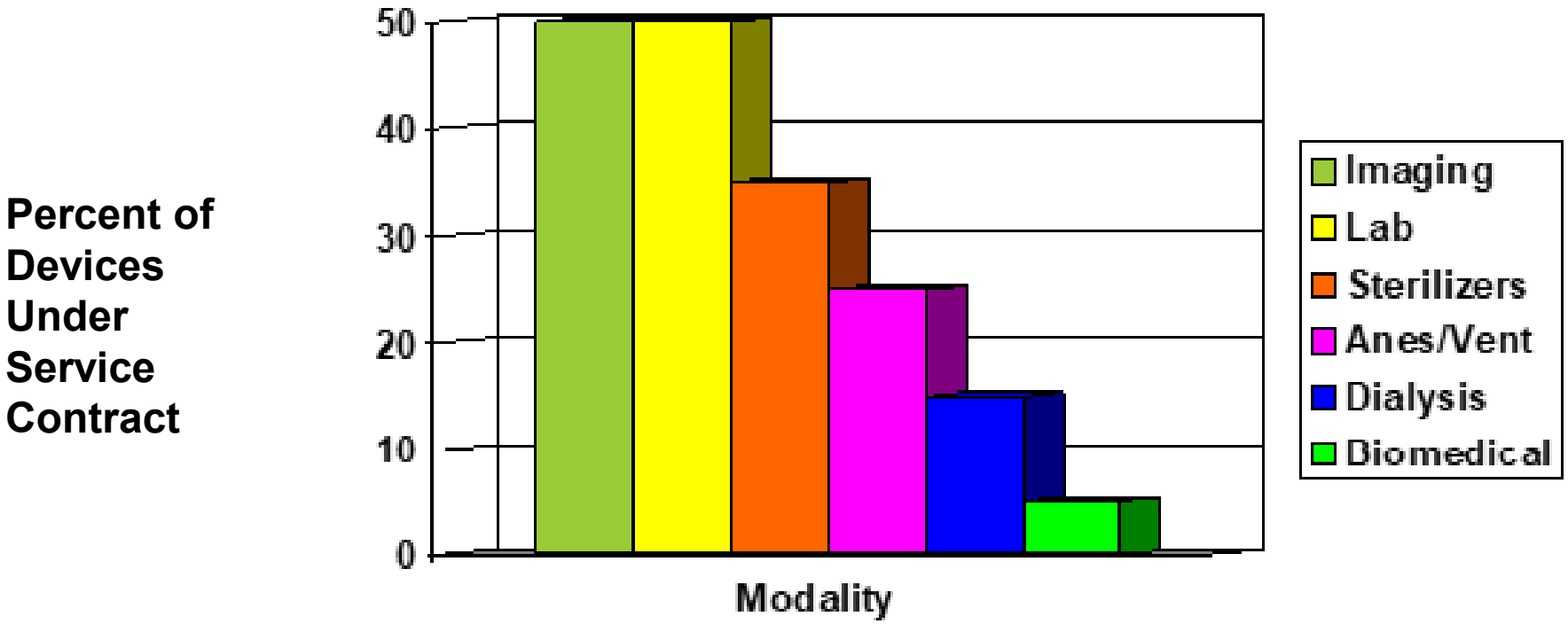
Independent service organization

Maintenance insurance

Plans

Contract, pay by the hour/parts, lease, other

What type of equipment is typically under service contract?



Service Coverage: *Manufacturer Service Contract*

ADVANTAGES

Simple to set up

Known service provider

Resources including tools & parts

Service arrangements can be built into the purchase

Typically, fast service once on-site

Upgrades can be built in

Perception of preferred status

Perception of less paperwork and management

DISADVANTAGES

Usually most expensive approach

Hidden cost due to contract exclusions

Many contracts to negotiate and manage

Locked into OEM service

No incentives for clinical staff to manage maintenance

May be point of sale contract made by Supply Chain/Purchasing

Agreement language

Limited flexibility

Difficult cancellation or automatic renewal

Service Coverage: *Independent Service Organization*

ADVANTAGES

Lower rates (and less travel) lowers the cost- by up to ~25%

Typically, local

If local, shorter travel reduces overall down-time

May be able to cover multiple brands or device types (specialists)

DISADVANTAGES

May encounter OEM reluctance to provide support for competing ISOs

Training & parts resources may be limited

Quality variable

Stability

Reliability

Service Coverage: *Maintenance Insurance*

ADVANTAGES

Consolidation of financial risk can reduces the cost - by up to ~25%

Eliminating contracts in favor of T&M improves flexibility

Detailed T&M service reports create good service histories

Good budget control

Good documentation

Single contract can cover all clinical equipment

DISADVANTAGES

Requires careful management

Reimbursement may lead to cash flow delays

Claims may be rejected

Administrative effort may be significant

No incentive to control cost

Service Coverage: *Time and Materials*

ADVANTAGES

Best documentation

Maximum flexibility

Information allows management to understand service patterns

Enables a self-insurance risk pool

DISADVANTAGES

Difficult to predict cost

High ongoing management – including parts research and ordering

Vulnerable to expensive repairs

Service Coverage: *Internal CE/self-managed program*

ADVANTAGES

Lower labor costs and zero travel can reduce total cost up 50%

Faster response reduces overall down-time

On-site/local staff to provide end user support

Vendor-neutral technical staff to assist with replacement planning and equipment selection

DISADVANTAGES

On-site staff may be diverted to other duties

Usually staff are generalists and must obtain specialist training

Training is expensive

Access to documentation and parts may be limited

SERVICE PROVIDER COMPARISON

	Original Equipment Manufacturer (OEM)	Independent Service Organization (ISO)	In-House
Response Time	Questionable: in some cases, the service personnel must come from other states	Reasonable: usually these groups have better local presence	Good: the service personnel is always in the facility
Expertise	Good: manufacturers have large R&D facilities and resources	Reasonable: a large portion of their service personnel comes from the manufacturers	Variable: larger facilities can do a better job at maintaining up-to date expertise
Experience	Good: manufacturers work on a large number of similar devices	Reasonable: these groups can increase their experience by supporting multiple facilities	Variable: there is only a limited number of similar devices to service.

SERVICE PROVIDER COMPARISON

	Original Equipment Manufacturer (OEM)	Independent Service Organization (ISO)	In-House
Spare Parts	Good: manufacturers support a large number of similar devices	Reasonable: these organizations share the cost of specialized purchasing groups among multiple facilities	Variable: larger facilities can dedicate staff to purchasing functions
Training	Good: manufacturers have adequate training facilities and resources	Reasonable: expensive training can be justified by supporting multiple facilities	Variable: expensive training is hard to justify when the number of similar devices is small
Price	High: large overhead and cost shifting (sales to service). Usually over 8% of equip. acquisition cost	Moderate: duplication of some hospital functions. Usually around 5% to 7% of equip. acquisition cost	Low: cost oriented and low overhead. Usually 4% to 6% of equip. acquisition cost.

What is the typical coverage?
A mix

In-house

Vendor time and materials

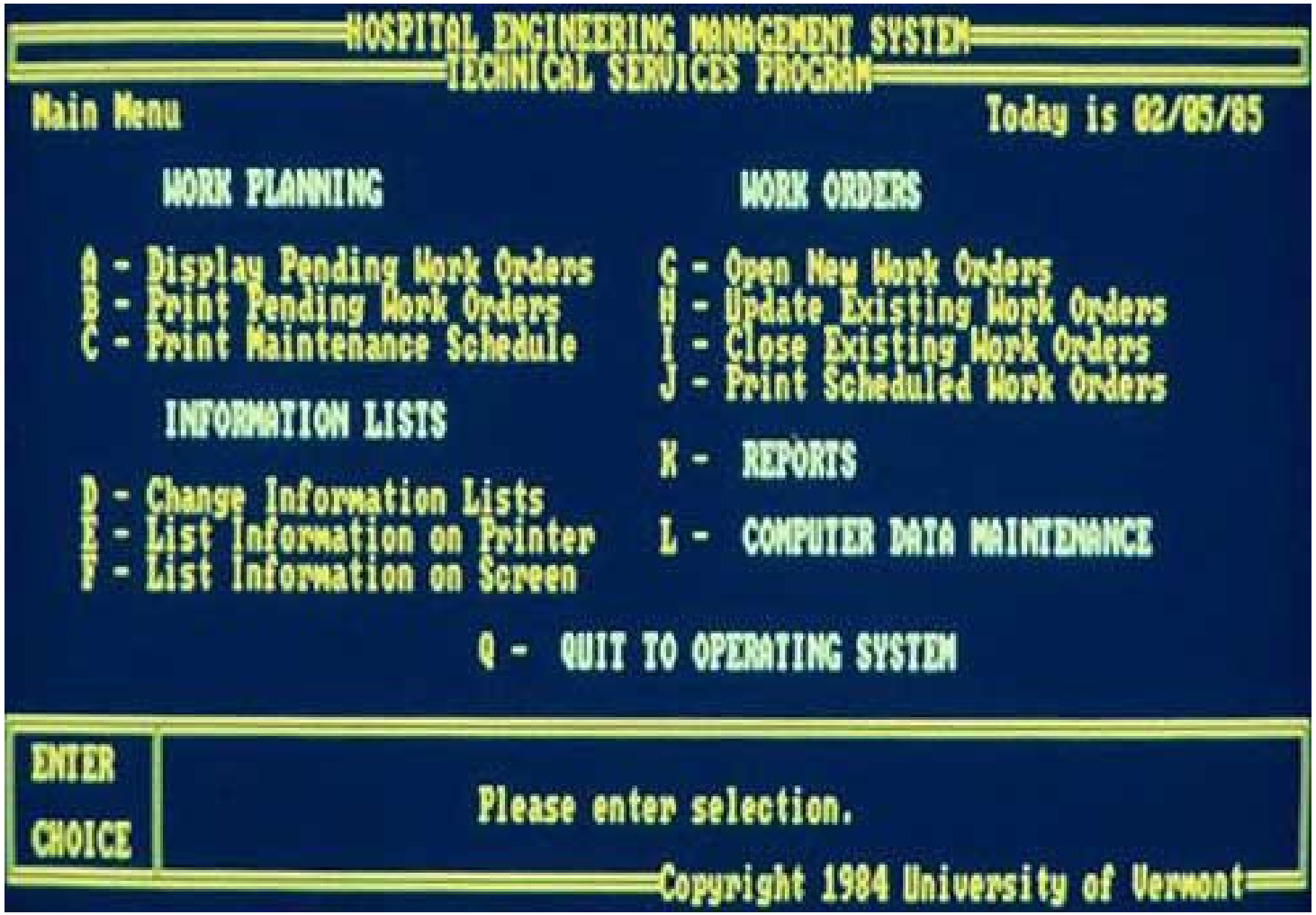
Service contract and/or

Managed maintenance insurance

Question 2

WHAT ARE THREE STEPS TO TAKE TO MANAGE VENDORS PROVIDING SERVICE CONTRACTS ON MEDICAL EQUIPMENT?

CMEMS AND REPORTING



Computerized Medical Equipment Management Systems (CMEMS)

Basic CMEMS

Equipment Inventory

Work Order Management

Incoming Inspection/Installation

Planned maintenance (PM)

Unscheduled/Corrective Maintenance (CM)

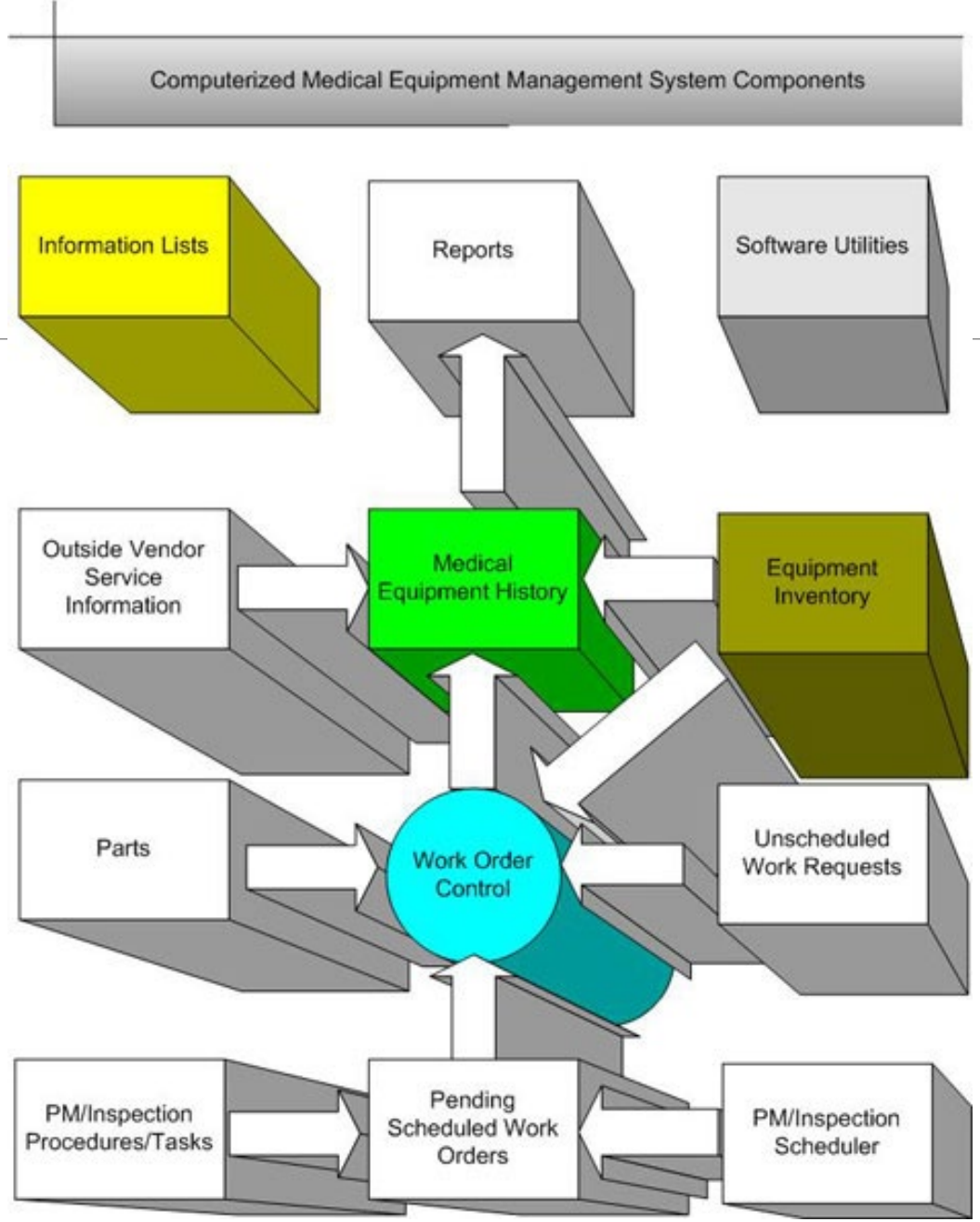
Recalls/Alerts

Incidents

Projects

Reports

Consolidated Device History



Data Integrity

Data quality: Good data quality is mandatory for good decision making (converting data to actionable information)

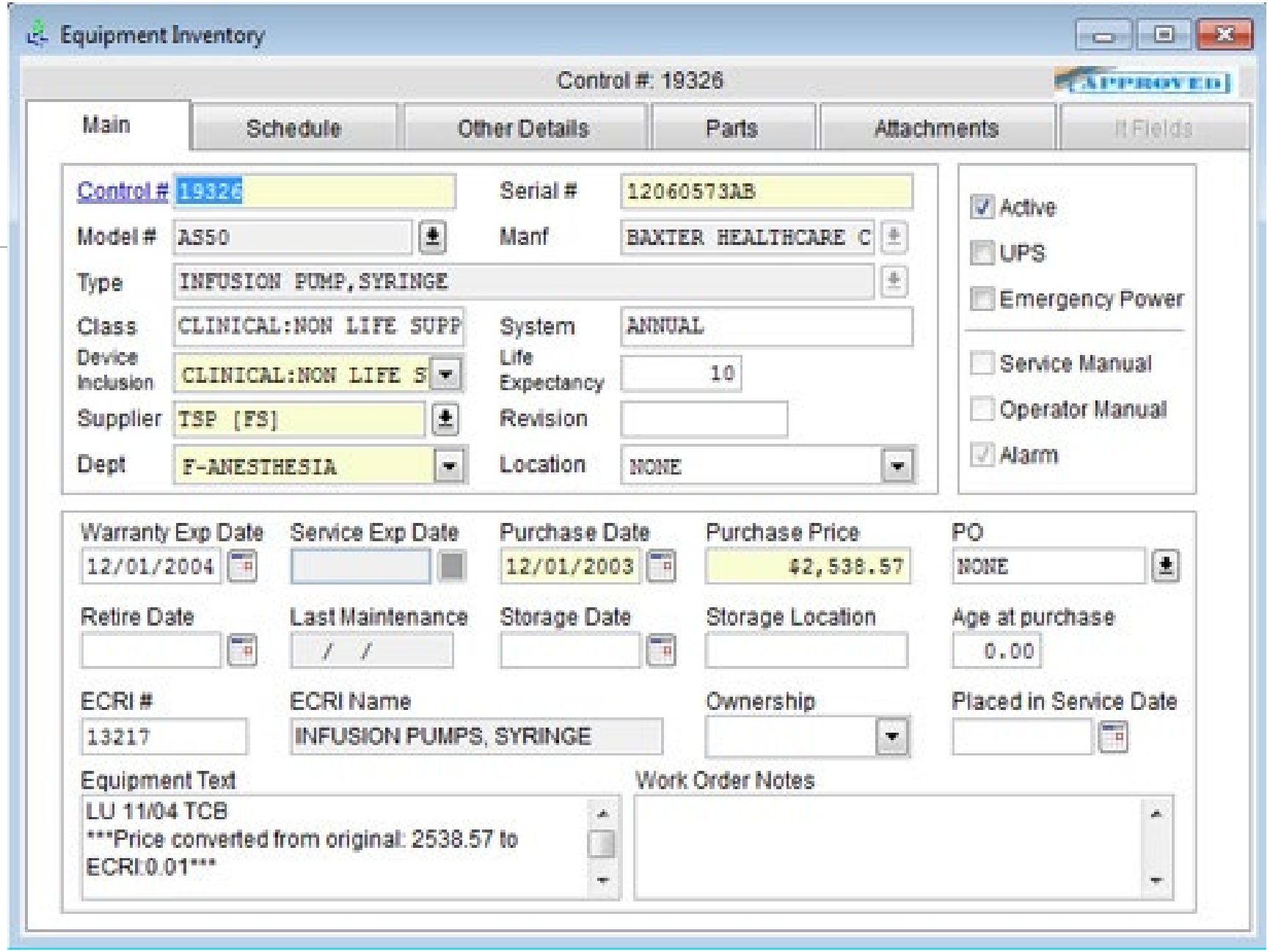
Accurate and complete

Data access

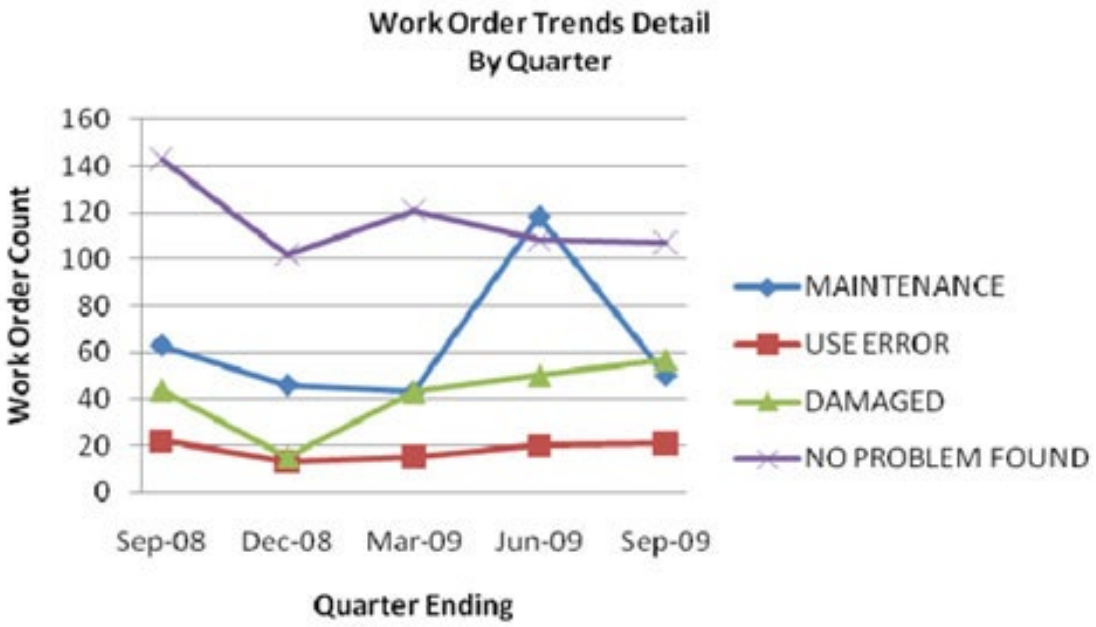
Unfortunately, poor data quality is common in CE/HTM

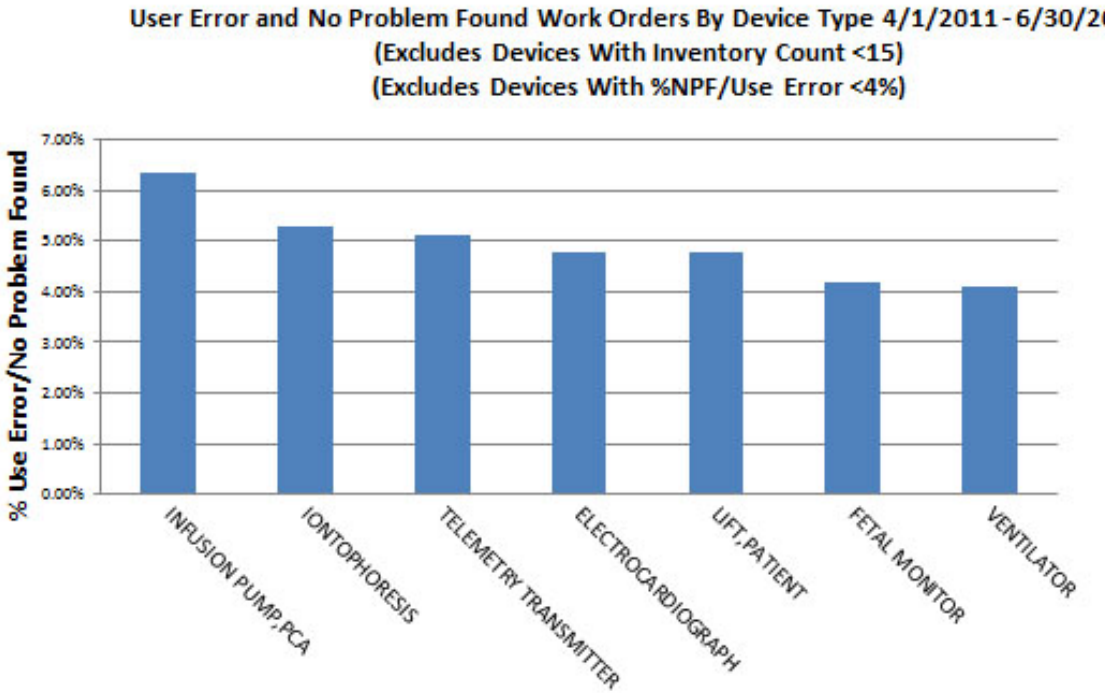
Inventory

- Unique ID
- Manufacturer
- Model
- Type
- Serial number
- Location
- Warranty
- Purchase Date & Cost
- Maintenance



Graphic Reporting





Data Analytics:

Use Case: *Equipment replacement planning*

- Mean Time Between Failures (MTBF)
- Equipment age and condition
- Service history and maintenance costs
- Manufacturer end of support date

Data Analytics:

Performance monitoring

- Downtime %
  - Hard down hours ÷ system operating hours
- Response time
  - First Response Date/Time - Request Date/Time
- Turnaround time
  - Equipment back in-service Date.Time - First Response Date/Time
- Effective hourly rate
  - Internal costs ÷ Productive hours

Prepaid Service contracts

Track in CMEMS to the asset, account etc

Fields:

- Start and end dates
- Costs
- Invoice frequency
- Equipment covered
- Detailed notes on coverage (e.g., shared, parts only, PMs, uptime guarantees, exclusions etc)
- Copy of contract

Clinical Engineering Benchmarking

DEFINITION: A measurement of the quality of an organization's policies, products, or programs, and their comparison with standard measurements, or similar measurements of its peers.

The objectives of benchmarking are to:

- *determine what and where improvements are called for*
- *analyze how other organizations achieve their high-performance levels,*
- *use this information to improve performance.*

Clinical Engineering Benchmark Data

Cost of service ratio (COSR)

- Annual service cost = X %

  Acquisition cost

  - Maintenance Cost to Acquisition Cost Ratio (COSR): 5.46% *

Staffing *

- Devices per technician: 1,087
- Hourly Cost of In-house Maintenance: $89.85 USD

Ted Cohen, Staffing Metrics: A Case Study, **Biomedical Instrumentation & Technology** July/August 2011
**Average of all 2010 respondents (135)*

COSR Numerator

Staff expenses

Non-staff expenses

Training, test equipment

Non-staff expenses (external)

Service contract expenses

Vendor time and materials

Cost of Service Ratio – Benchmark

4-5% is the goal

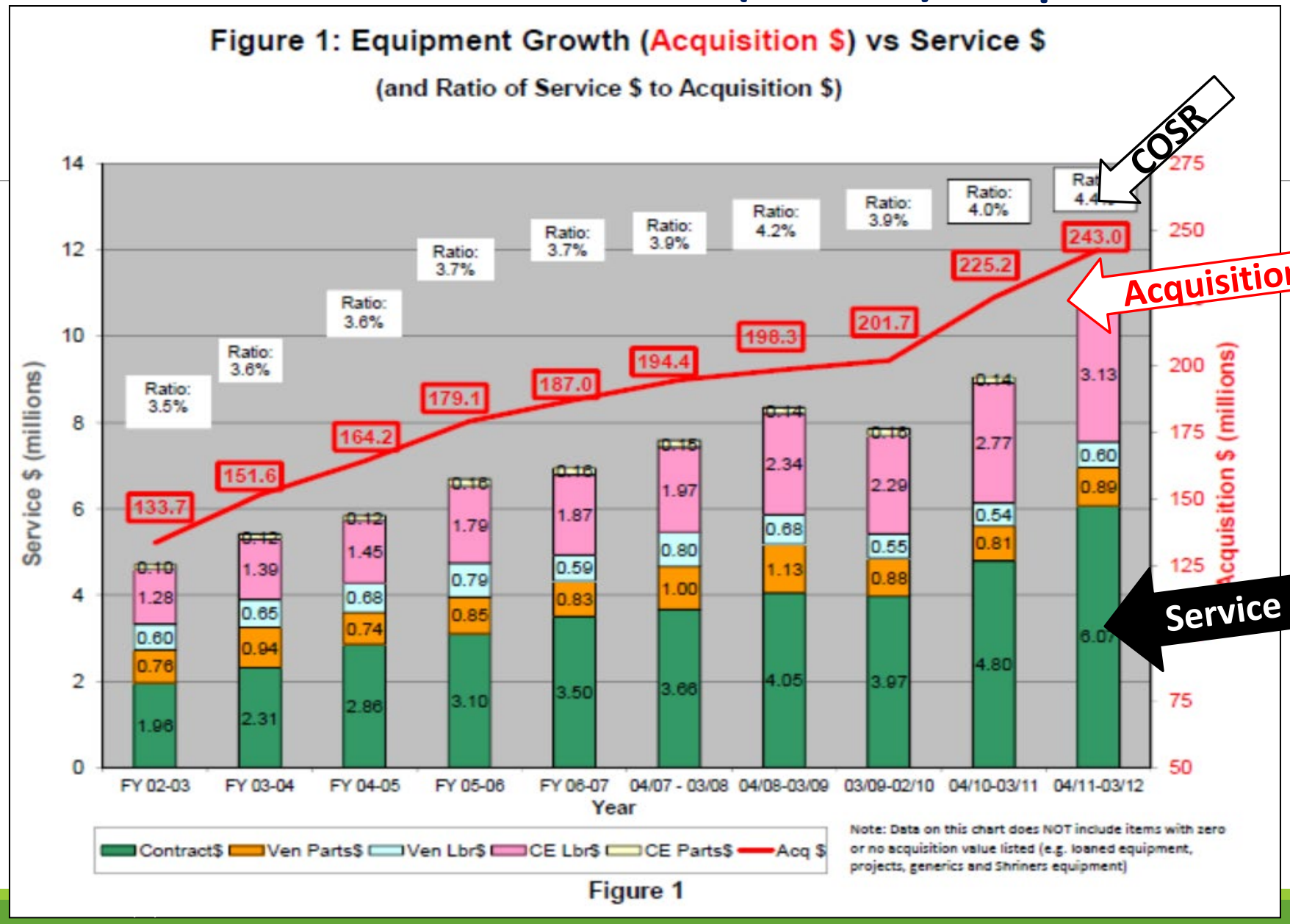
COSR

- $$COSR = \frac{\Sigma\ Annual\ Maintenance\ Costs}{\Sigma\ Equipment\ Acquisition\ Costs}$$

COSR Denominator

- Equipment value
  - Acquisition cost

Cost of Service Ratio (COSR) Report



Ted Cohen, Staffing Metrics: A Case Study, **Biomedical Instrumentation & Technology** July/August 2011
**Average of all 2010 respondents (135)*

Question 3

EXAMPLE CMEMS REPORTS WERE SHOWN FOR THE AREAS OF WORK ORDER TRENDS, USE ERROR/NPF, AND COSR.

WHAT IS ANOTHER EXAMPLE OF A USEFUL REPORT FROM THE CMEMS DATABASE?

WHAT ARE THREE KEY DATA ELEMENTS THAT THE REPORT WOULD INCLUDE?

Parts

Purchasing parts and vendor services

Vendor cost and service info (stock parts, fee-for service parts and labor and service contracts) need to be entered into CMEMS

Processes vary a lot from healthcare delivery organization (HDO) to HDO including:

- Inside CMEMS
- Totally outside CMEMS and in other HDO Supply Chain management software (e.g. Lawson, Infor, PeopleSoft, etc.)
- Variations and mix of above based on PO cost thresholds

Stock parts

"Just-in-time" more and more common

Stock parts ONLY needed for common PM parts and supplies:

- Batteries
- Misc common hardware and electrical supplies
- PM kits that are used often (e.g., ventilators, anesthesia machines)

Common failure parts where you know the part will be used

Stock parts

Stock parts should be centrally managed within CE so all techs can access them (i.e. minimize “bench stock”)

The CMEMS should contain:

- Stock part number
- Manufacturer name and part number
- Part description
- Part location
- Quantity on hand
- Minimum re-order level
- Vendor(s) info

Service Documentation

Service manuals/technical library

Operator and service manual on every new equipment purchase

- *PDF, online, printed, etc.*
- *Updates, passwords, other required attributes*

Reference NFPA 99 2012

- *Chapter 10 (required documentation)*

Service manuals/technical library

CMEMS reference to shared local resource (e.g., pdf)

CMEMS link to manufacturer service manual website (url)

CMEMS index to manual library (paper)

PM procedure (checklist or entire procedure) entered into CMEMS

References:

Evidence-Based Maintenance of Medical Equipment: An Outcomes-Based Method of Keeping Medical Equipment Safe and Reliable, Binseng Wang, 2020

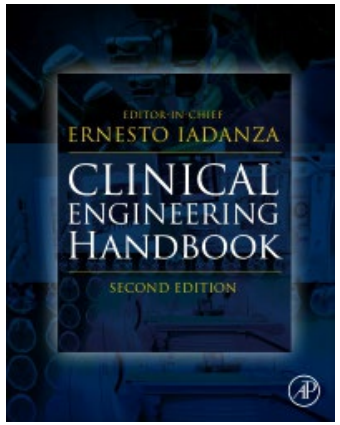
WHO Respiratory Equipment Training Over the Life Cycle

Computerized Maintenance Management Systems for Healthcare Technology Management (3rd edition), Cohen & Baretich, 2017 AAMI

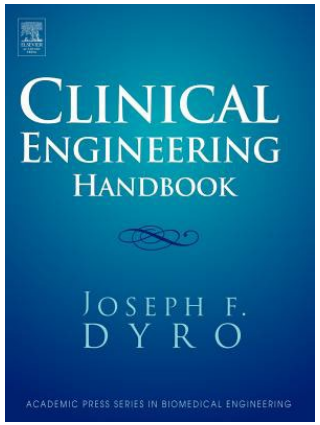
OneSource

Frank's Hospital Workshop

References



Clinical Engineering Handbook, 2nd edition, 2019



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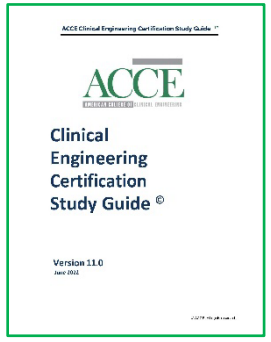

ACCE CCE Study Guide, v12.0, 2023

Questions & Discussions

Please complete the evaluation form at: https://www.surveymonkey.com/r/2023eval-CCE

or scan the QR code: