building OPERATING management presents

Leveraging Equipment Lifecycles:
Solving the Maintain vs. Modernize Equation

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Today's Moderator

Ed Sulivan

Editor

building OPERATING management

Today's Presenter

Steve Maling

Director,
US Field Services Marketing,
Schneider Electric

As a member of the Field Services management team, Steve has played a role in the successful growth and expansion of the Schneider Electric North American, Services Division. Through organic growth and acquisition, this Division has aggressive plans to develop and enhance the service and product offerings to a variety of customers encompassing engineered solutions designed to increase safety, lower life cycle costs and maximize system reliability pertaining to both Electrical Distribution Services and Power Systems Engineering Services. Steve is well versed in breadth of the Services offer across a variety of segments including commercial, industrial, government and utility customers.

As Marketing Director, Steve leads the team to develop and promote new marketing programs, marketing communications activities, training programs, development and implementation of new offers, promotional and resource materials both internally and externally.

Steve studied at the University of South Carolina, Columbia, SC earning a BSEE degree. Prior to coming to Schneider Electric North America, Services Division, Steve held both management and sales positions with Electrical Field Service companies where his career spans over 28 years in electrical services.

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Disclosure:

Today's presenter is currently employed by Schneider Electric, which manufactures the technology referenced in this presentation.

Learning Objectives:

- Identify key market drivers
- Differentiate OpEx from CapEx
- Define key customer concerns
- Define causes of equipment breakdowns
- Define key decision factors
- Define equipment maintenance
- Characterize options to maintain vs. modernize
- Describe equipment modernization solutions

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To ask questions:

Please use the question and answer panel on the right-hand side of the screen, and send to all panelists.

Polling Questions

Today's event will include a series of multiple-choice polling questions. Your participation is appreciated.

Presentation Handouts

All participants will receive an e-mail by the end of the day with a link to download a PDF copy of today's presentation slides.

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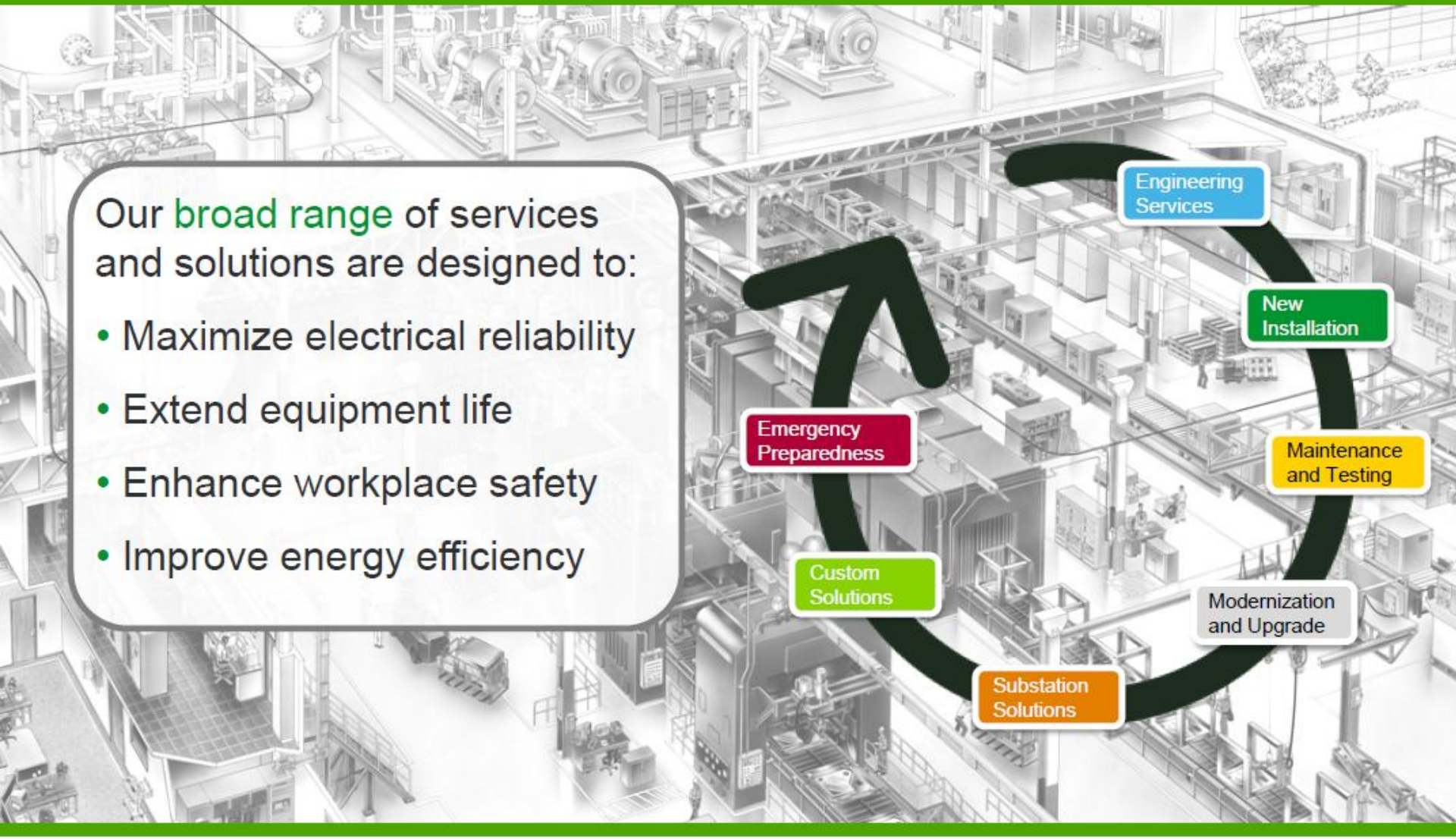

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Solving the Maintain vs. Modernization Equation

Schneider Electric Field Services

Presented by:
Steve Maling, Director
U.S. Field Services Marketing

Schneider Electric

Presentation Objectives

- Identify Key Market Drivers
- Define Opex vs. Capex
- Specify Key Customer Concerns
- Delineate Causes of Equipment Breakdowns
- Detail Key Decision Factors
- Describe Equipment Maintenance
- Characterize Options to Maintain vs. Modernize?
- Describe Equipment Modernization Solutions
- Relate to Project Examples
- Summary
- Q&A

Market Drivers

Critical Facility Management Drivers that are Impacting All Industries

O&M Environment
Aging facilities and budget gaps forcing organizations to maintain with fewer resources

Risk Management
Awareness & accountability of facility risks and worker safety is increasing and becoming more complex

Labor Conditions
Increasingly difficult to hire, develop, and retain qualified staff

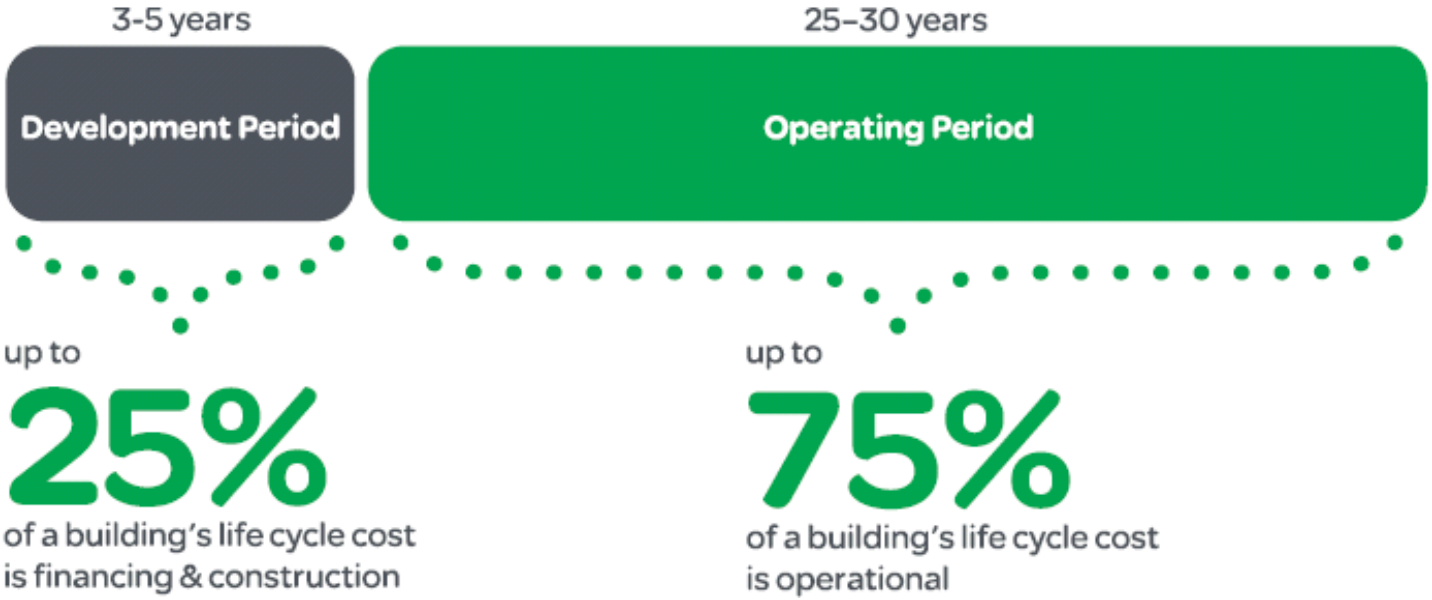
Emerging Technology
Technology will impact how facility managers do their jobs and buildings operate

Outsourcing
Businesses choosing to outsource services and engage in strategic partnerships

Sustainability
Demand escalating for environmentally friendly high performance buildings

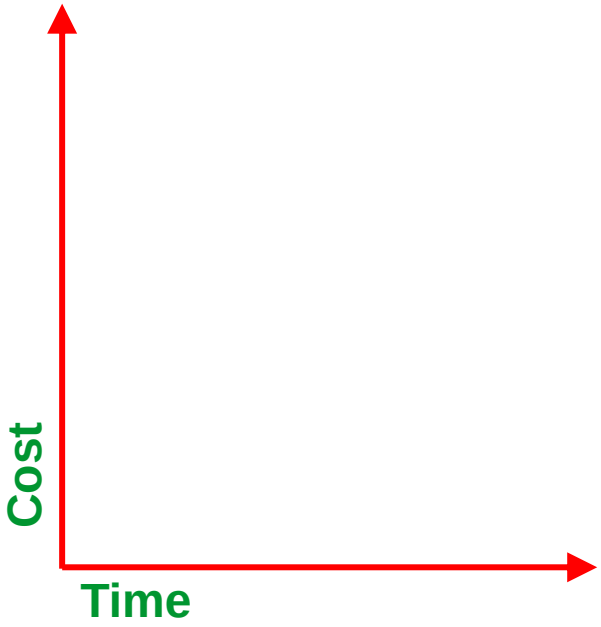
Lifecycle Costs: Opex vs. Capex

- Investment in Technologies vs. Infrastructure Systems
  - Automation & Control technologies are on a 5 to 20 year life-cycle
  - Infrastructure systems are on a 15 to 30 year life-cycle
- Infrastructure Lifecycle

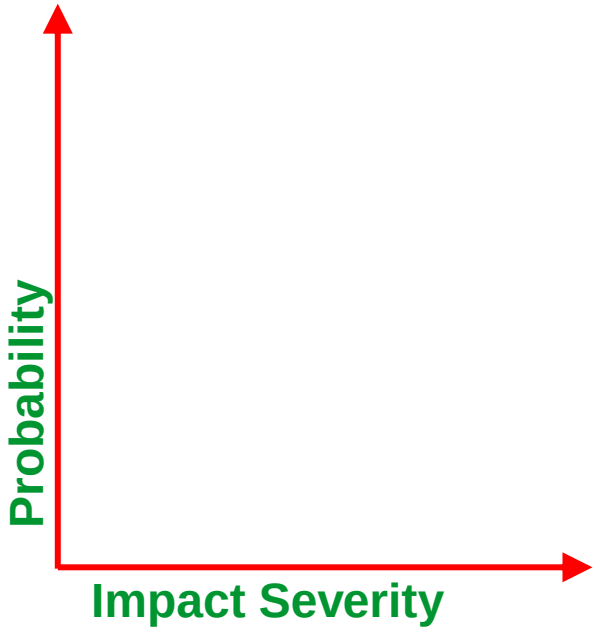


Key Concerns

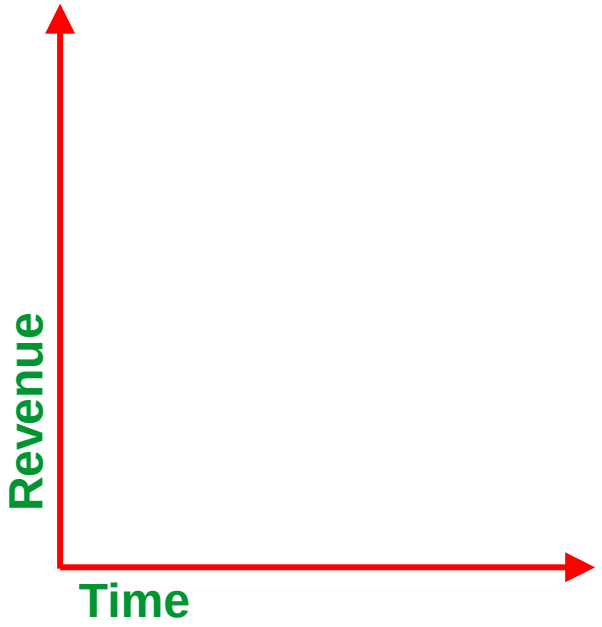
Cost Reduction



Risk Mitigation



Financial Performance



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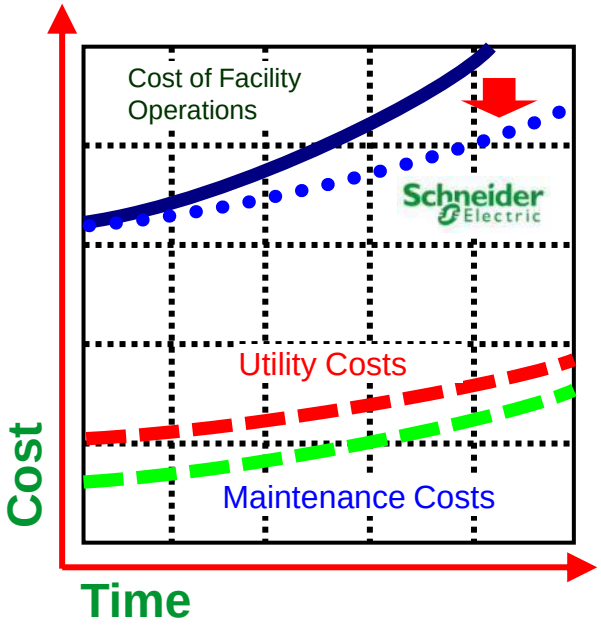

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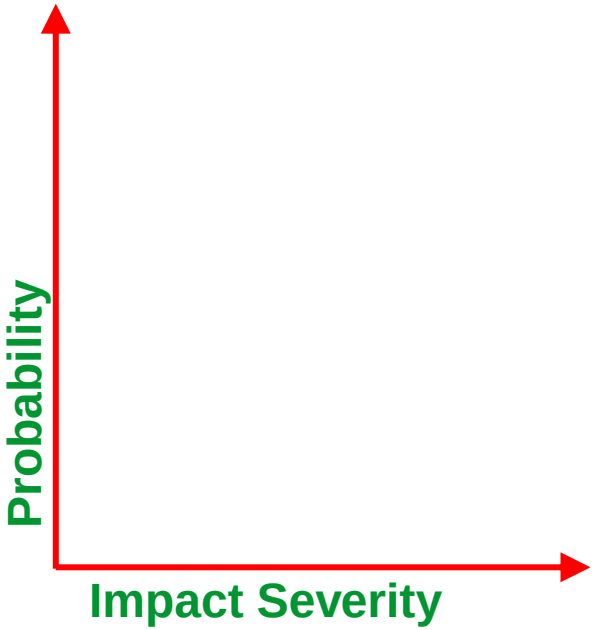

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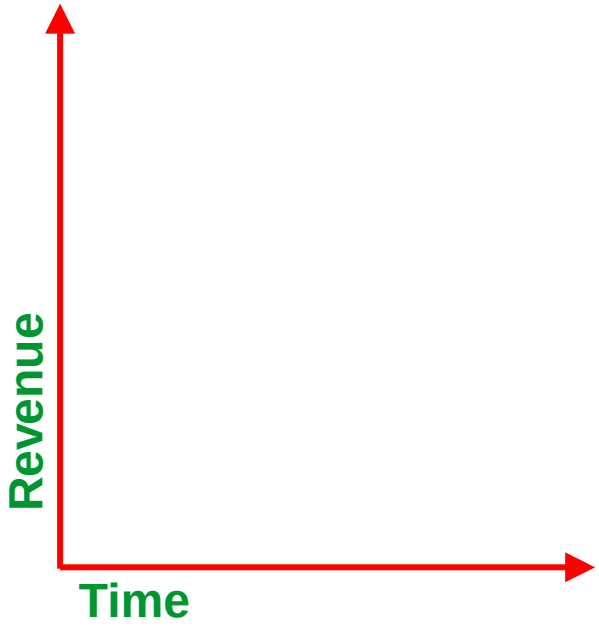

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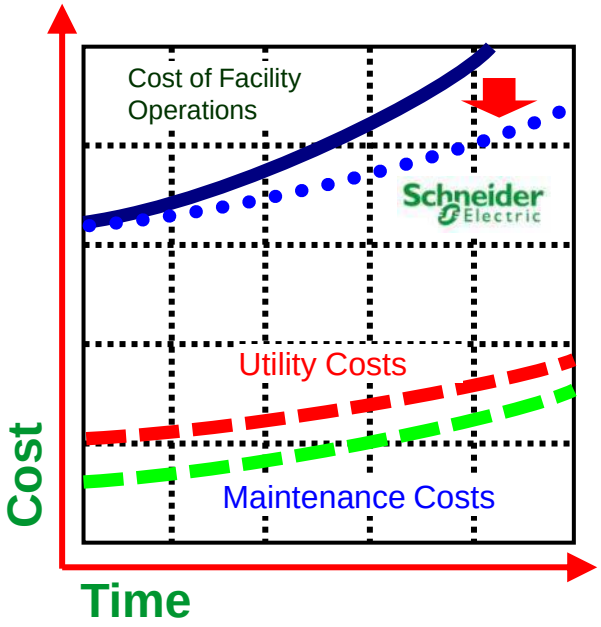

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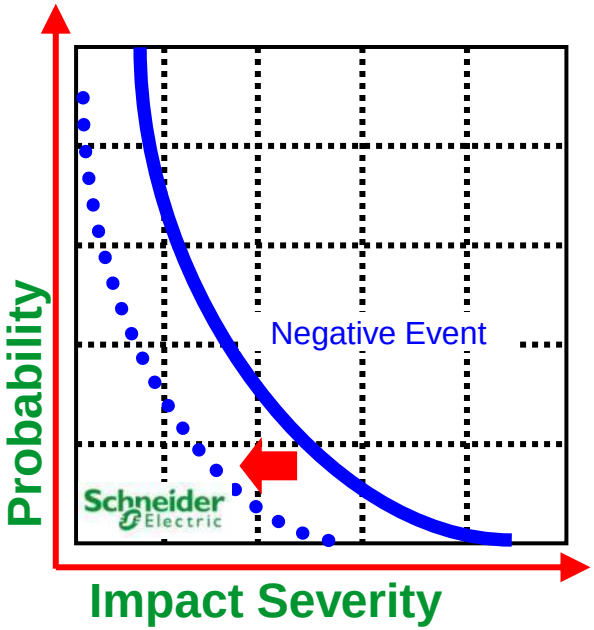

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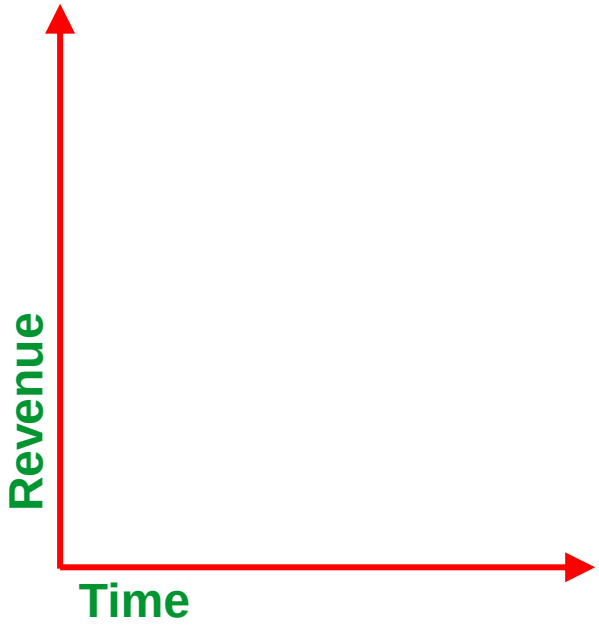

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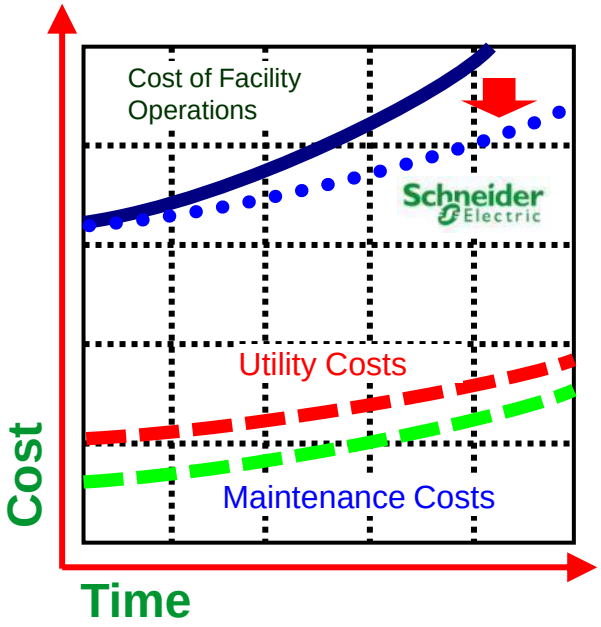

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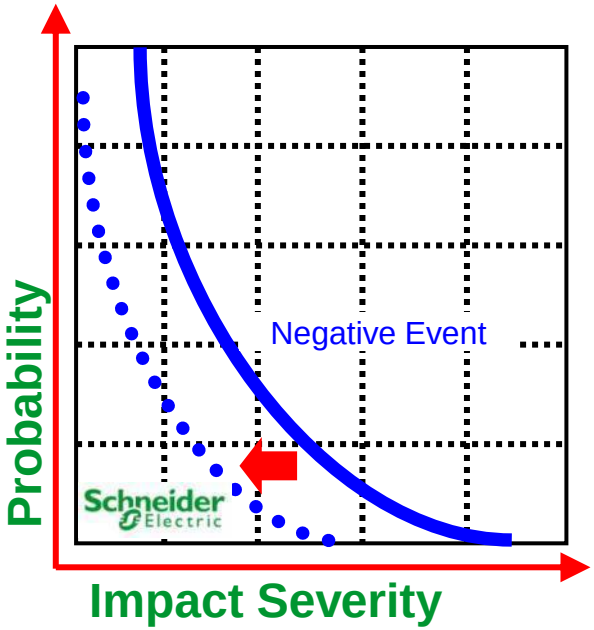

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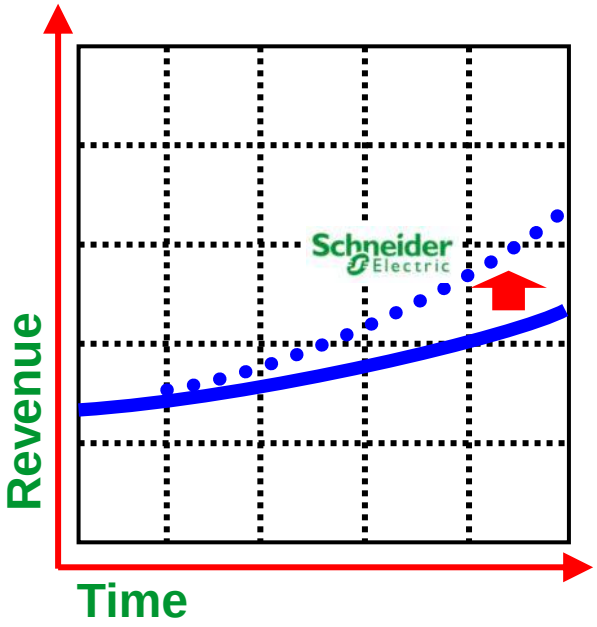

Building Systems need Maintenance and/or Modernization

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Electrical distribution

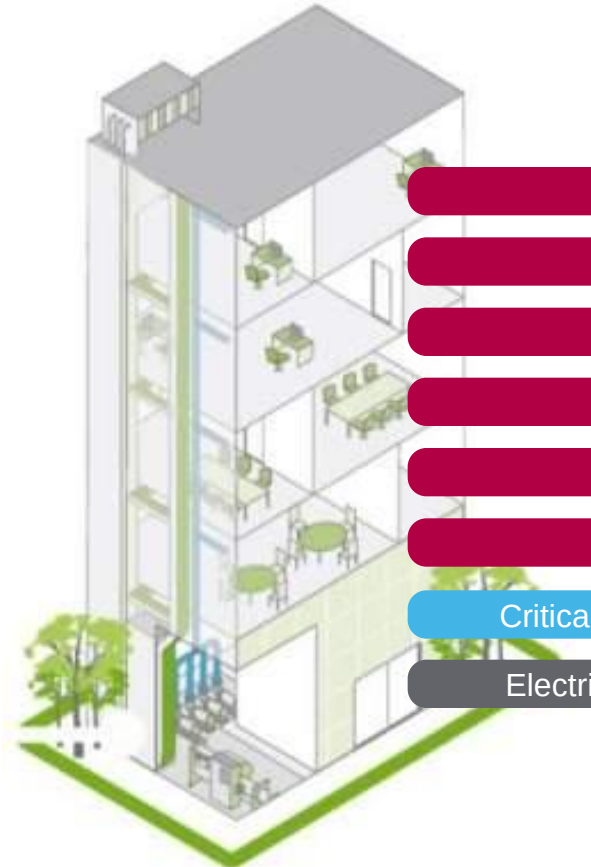
Safe: Protect people and assets

Building Systems need Maintenance and/or Modernization

Critical Power & cooling **Reliable**: Prevent power outages & quality variance

Electrical distribution **Safe**: Protect people and assets

Building Systems need Maintenance and/or Modernization



- HVAC control
- Lighting control
- Energy monitoring & control
- Motor control
- Access control
- Security

Efficient & productive:
- Measure and control energy, automate, provide relevant diagnosis
- Manage processes
- Make all the utilities of any Infrastructure more efficient

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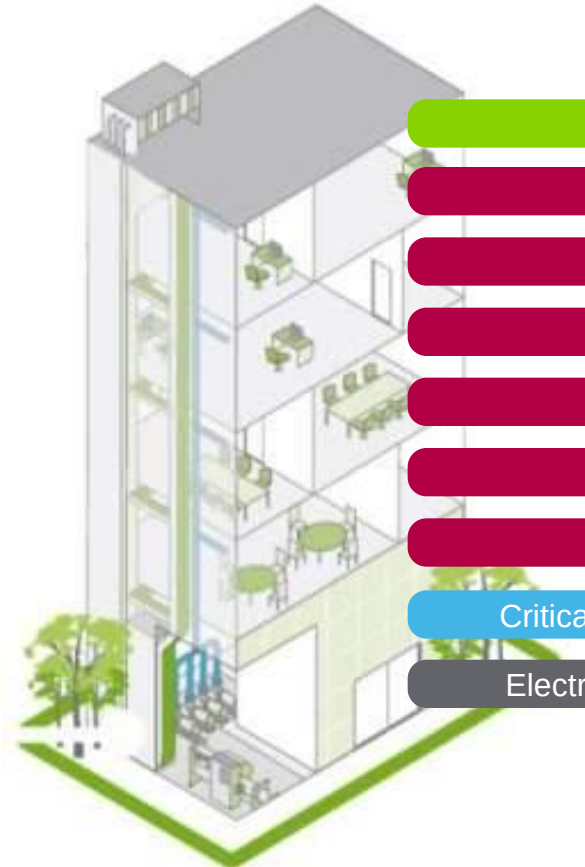
- Electrical distribution — **Safe**: Protect people and assets

Building Systems need Maintenance and/or Modernization



- Renewable energies
- HVAC control
- Lighting control
- Energy monitoring & control
- Motor control
- Access control
- Security
- Critical Power & cooling
- Electrical distribution

Green: Ensure systems function properly to impact energy savings

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Reliable: Prevent power outages & quality variance

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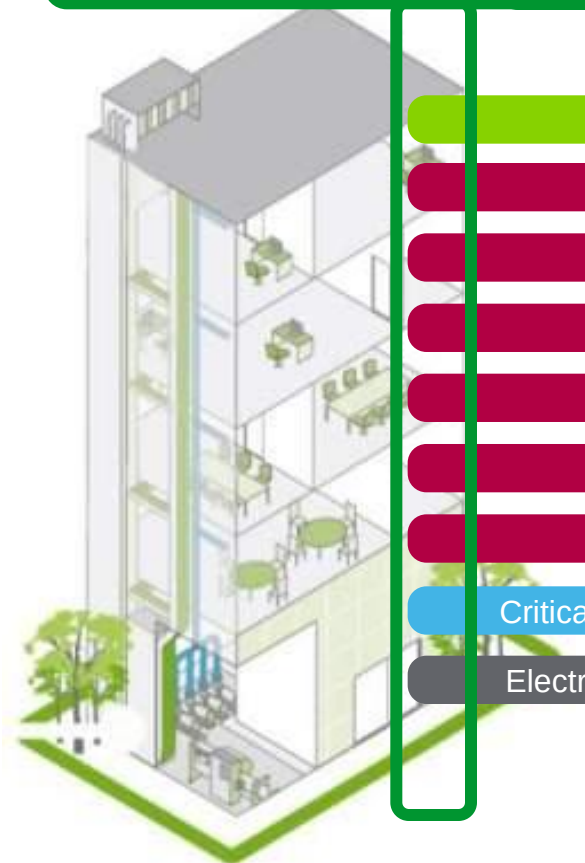
Building Systems need Maintenance and/or Modernization

System Maintenance



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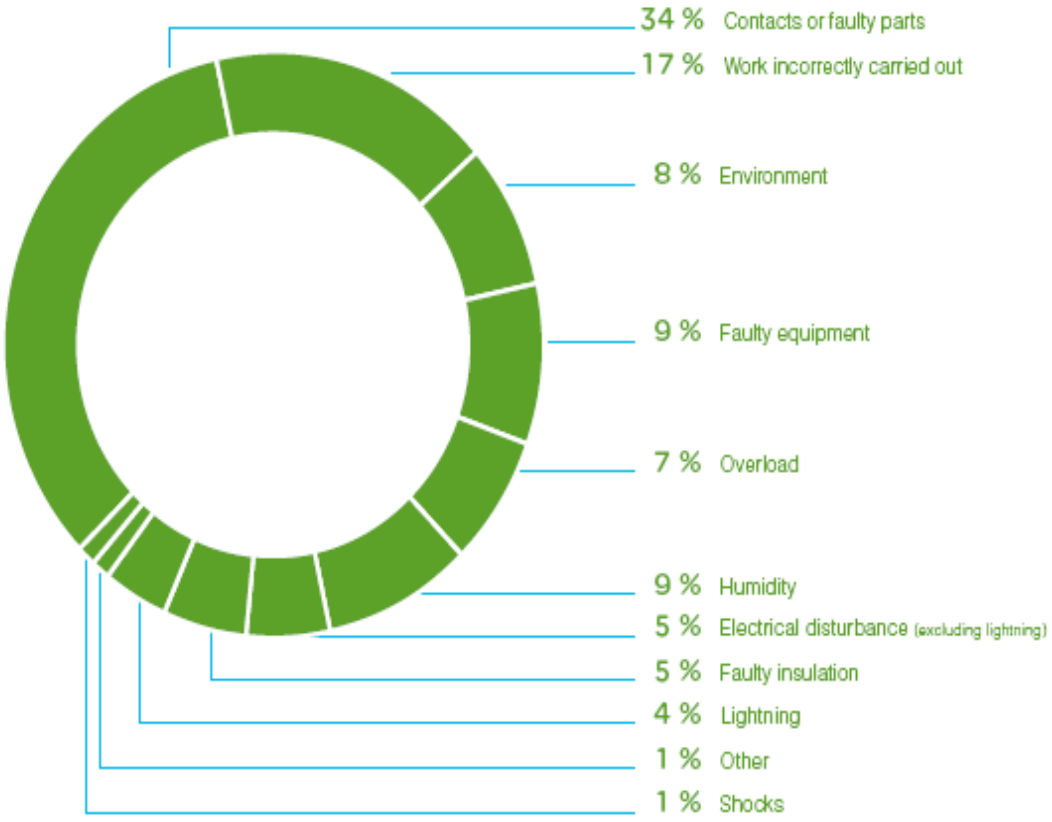
Causes of Equipment Breakdown

Source: Schneider Electric expert assessment & Hartfold Boiler Steam



According to IEEE, the rate of electrical component failures is three times higher in facilities that do not perform preventive maintenance on their electrical systems.

Causes of Equipment Breakdown

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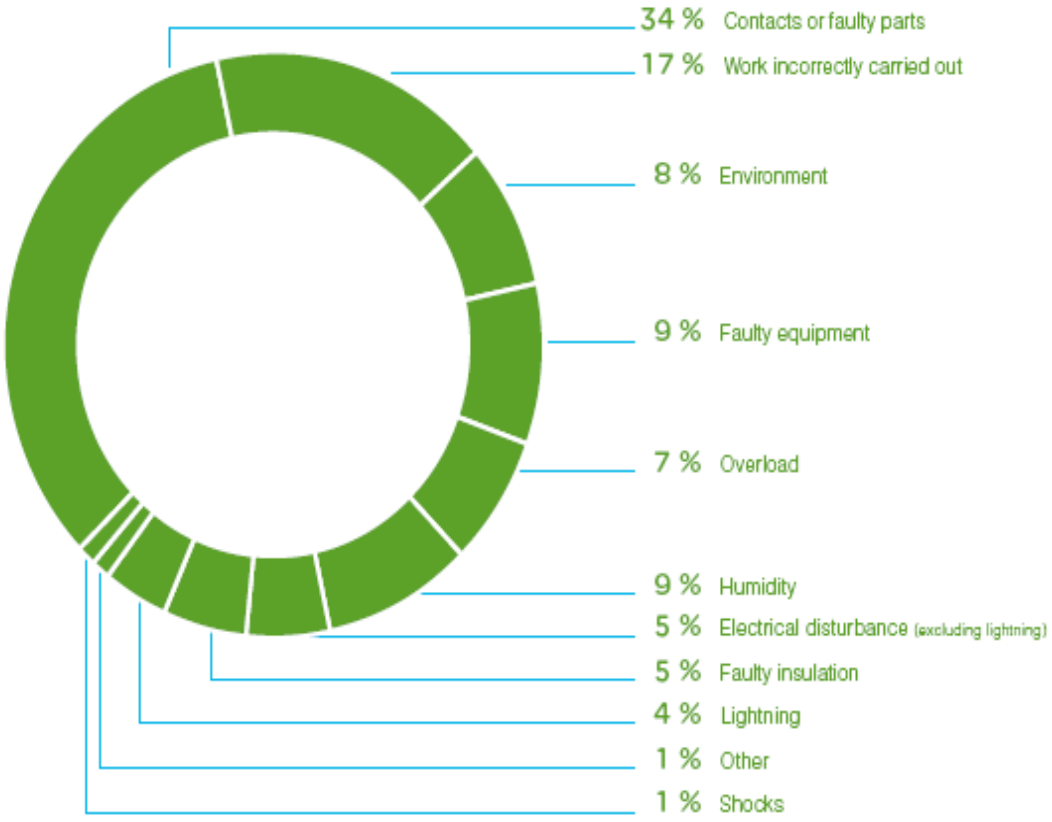


According to IEEE, the rate of electrical component failures is three times higher in facilities that do not perform preventive maintenance on their electrical systems.

3X

Cost of Equipment Breakdown

- Tangible Costs
  - Equipment replacement costs
  - Contractor costs
  - Loss of production
  - Additional inventory/spares
  - Impact to personnel/medical costs/lawsuits
- Intangible Costs
  - Fixed and variable costs wasted during downtime
  - Possible loss of customer orders due to inability to fulfill shipments
  - Time spent in internal/external meetings
  - Personnel resources allocated to the repair

True Cost of Downtime

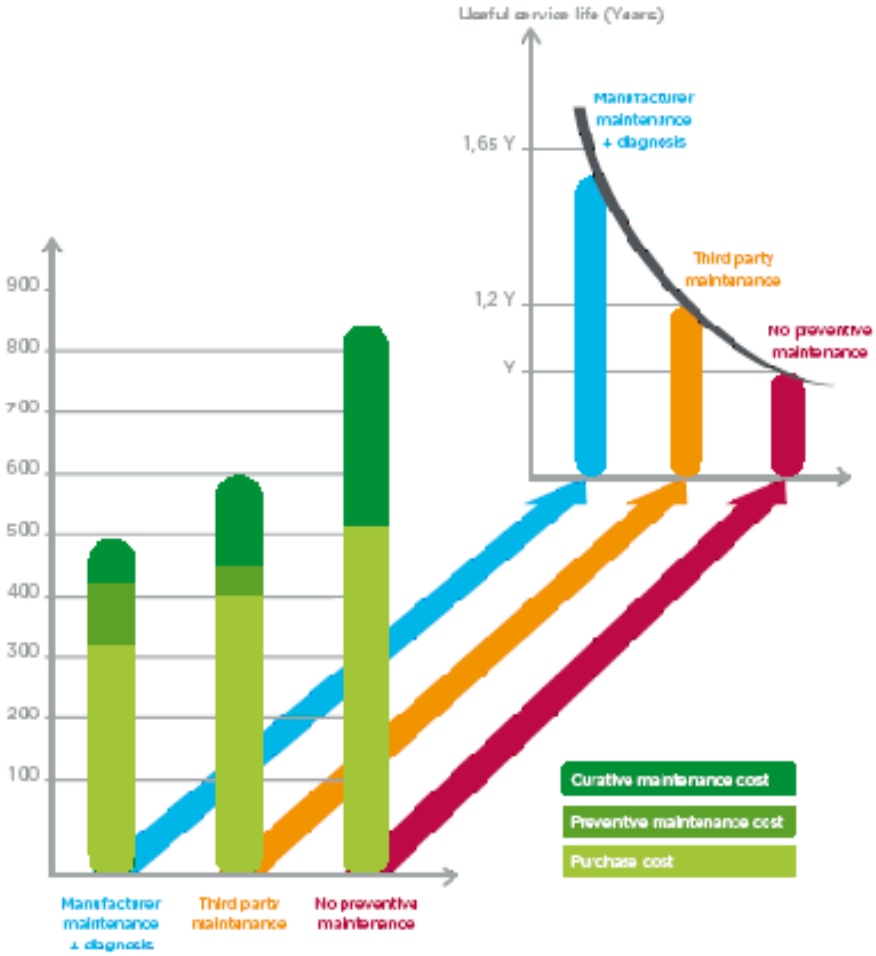
Application	Loss**
Heathcare	Human Lives
Stock market transactions	$12,600,000
Credit card sales	$3,600,000
Petrochemical	$140,000
Automobile	$40,000
Food Processing	$30,000

Source: Contingency Planning Research and Schneider Electric

** Based on 1-hr. production shutdown

Impact of Maintenance on Costs

- "Total Costs" are lower as the useful service life of the equipment is longer.
- Preventive maintenance limits the cost of curative or reactive maintenance (reliability).



Example of complete costs for a device, shown in yearly costs.

Polling Questions

Today's event will include a series of multiple-choice polling questions. Please make your selection to the right of this screen.

Balancing Key Decision Factors

- First Level of Needs
  - Safety
  - Cost
  - Uptime
- Second Level of Needs
  - Business effectiveness
  - Environment conditions
  - Product quality
  - Safety concerns
  - Energy efficiency
  - Operational costs

The question is not whether the equipment will malfunction, but **WHEN**!

"I think my spell checker is broken, it keeps changing l-u-c-k to m-a-i-n-t-e-n-a-n-c-e!"

Maintenance of Equipment

"Active" components consist of the protective devices that protect both people and assets.

Mechanical Components

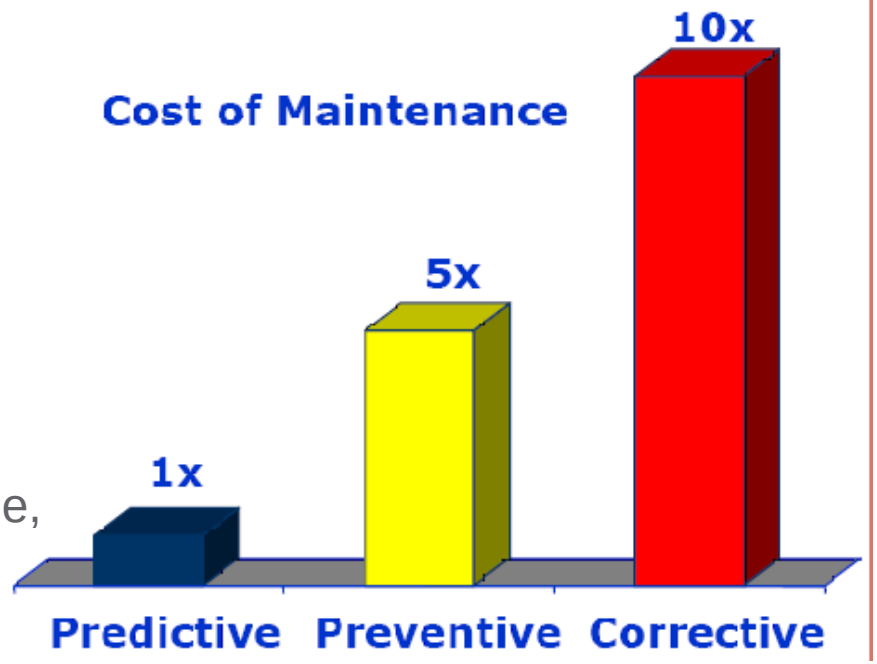
- Involve moving parts and must be maintained in order to operate as intended
- Will wear out over time
- Some components require replacement upon use

Solid State Components

- The rise in utilization gives rise to another mode of failure that cannot be easily detected
- Inspection and verification for proper functionality
- Obsolescence is a key consideration

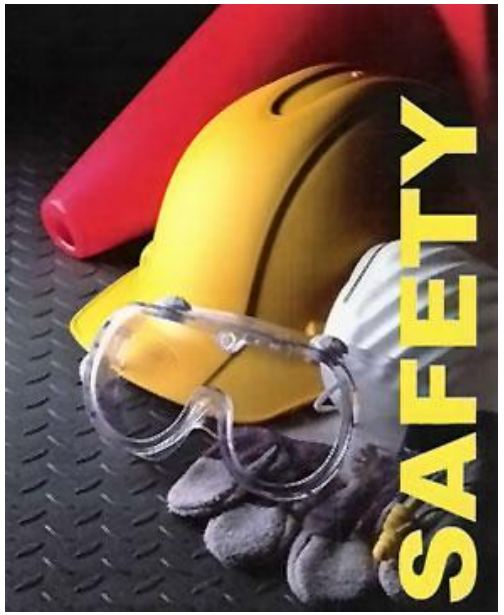
Approaches to Maintenance

- Corrective Maintenance
  - Repair work conducted after a failure or breakdown.
- Preventive Maintenance
  - A specified list of inspections, cleaning, testing and part replacement during a pre-defined, time-based schedule.
- Predictive Maintenance
  - Scheduled based on diagnostic evaluations. Also factors in equipment age, environmental stresses, criticality of equipment, etc to decide on schedule.



Maintain Equipment vs. Modernize?

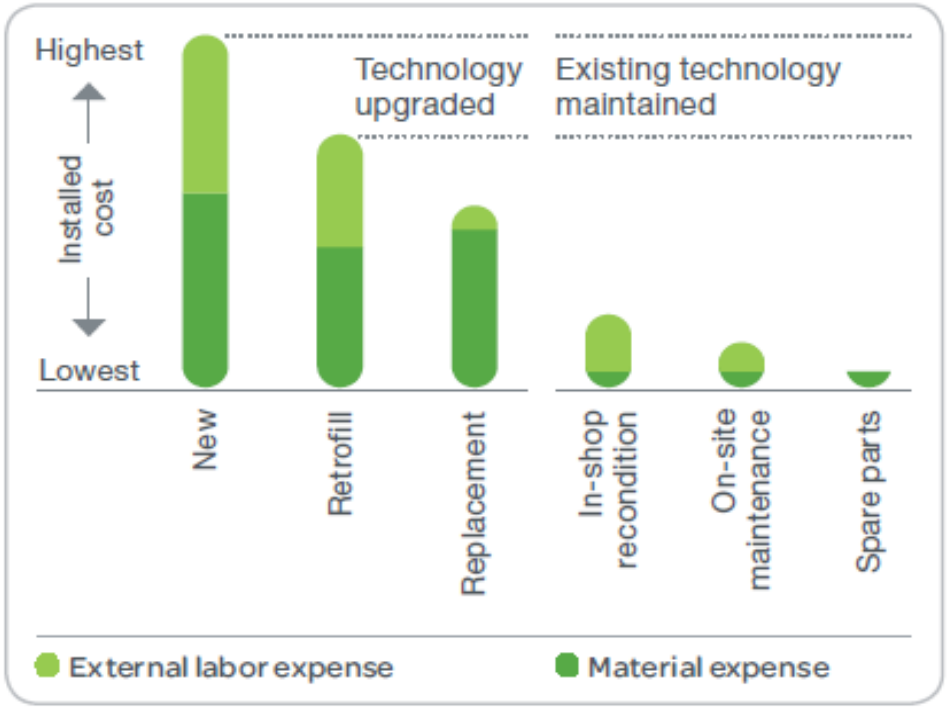
- Even properly maintained equipment is subject to two key phenomena:
  - Ultimately degrades and reaches the end of its useful life
  - No longer sustainable solution due to technological advances
- Factors to consider:
  - Age of equipment
  - Operating environment
  - Availability of spare parts
  - Reliability of system components
  - Cost of ongoing maintenance
  - Emerging technology
  - Worker safety



Modernization Solutions

- Cost-effective options
  - Reconditioning
  - Replacement
  - Retrofill
- Benefits
  - Reduced maintenance and operating costs
  - Improved reliability
  - Increased capabilities*
  - Less downtime and cost for installation vs. new equipment

** Applicable to Retrofill and Replacement, not Reconditioning*



Bar chart compares the total installed costs for low-voltage switchgear installations. Costs are representative of price differences. Actual cost differences depend on the content and circumstances of each project.

Modernization Project Example

- LV direct replacement breakers and monitoring system install
- Each feeder/main breaker trip unit communicates data for energy analysis
- Enhanced safety features of upgrade and improved system reliability
- Existing asset upgraded at reduced cost/downtime compared to a new install

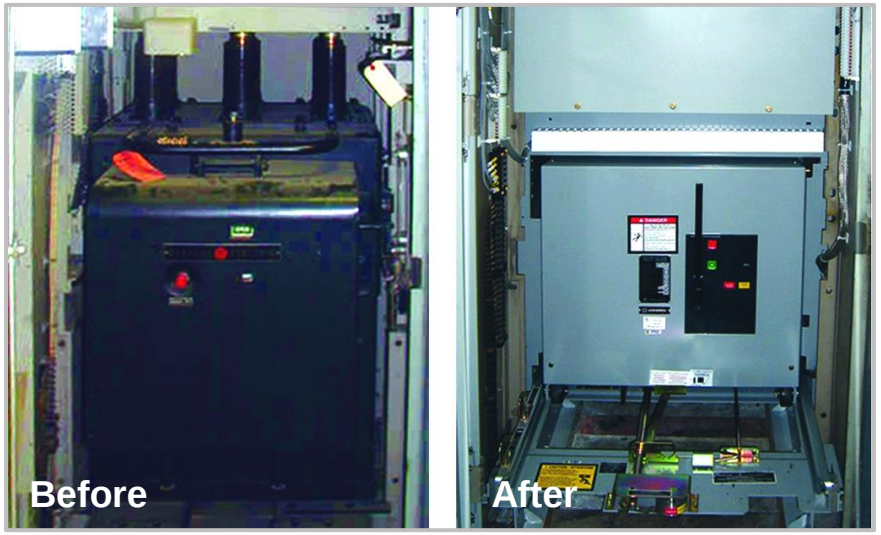
Before

After
(180° view)

Modernization Project Example

- Retrofill outdated MV switchgear with 19 circuit breakers and solid-state digital relays
- New circuit breakers' vacuum bottles prevent exposure to an arc
- More consistent trip unit reaction time
- Old elevator-type racking system was eliminated, reducing risks to electricians
- More reliable electrical distribution system
- Significant cost savings as opposed to a total switchgear replacement

Did You Know? New switchgear is usually smaller than the equipment it is designed to replace. The existing conduit may need to be moved and cabling replaced or spliced. Both are expensive and time consuming tasks, often costing more in labor and material than the cost of the new equipment.



Summary

- Equipment Preventive Maintenance is Critical
- Equipment Ages and Will Eventually Fail
- Key Factors to Consider in Maintain vs. Modernize Equation:
  - Age of equipment
  - Operating environment
  - Availability of spare parts
  - Reliability of system components
  - Cost of ongoing maintenance
  - Emerging technology
- Cost Effective Options are Available to Modernize Aging Equipment
- Maintaining and Modernizing Equipment will:
  - Reduce costs
  - Mitigate risks
  - Improve productivity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Questions?