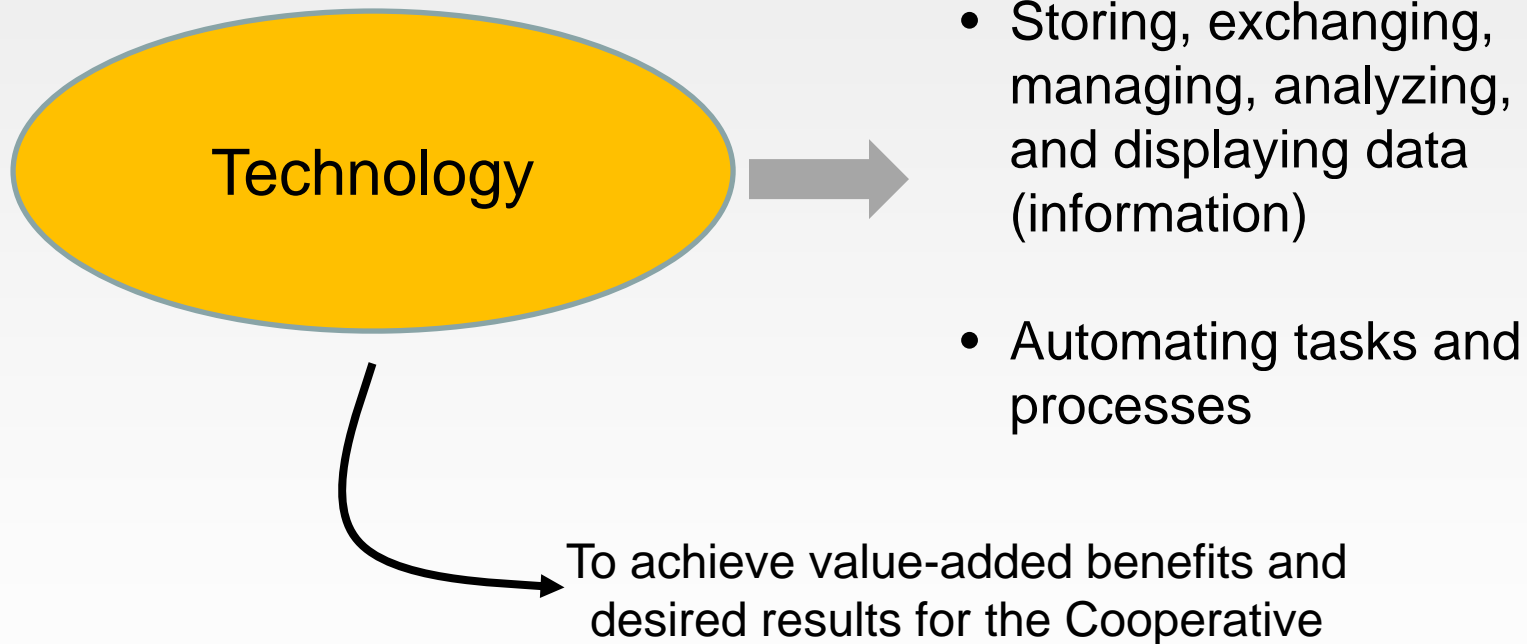


Course 923.1
Emerging Technology
Additional Slides

Instructor:
Henry Cano
henry.cano@nreca.coop
602-621-3905





1. Essential to the business
2. Improve efficiency
 - Able to do more with same or less resources
3. Add value for the consumer
 - Make it easier for consumer to do business with Cooperative

Additional Forces

Legislative

- Green power demands
- Reliability requirements
- Demand side management
- Security (Physical & IT)
- Employee regulations

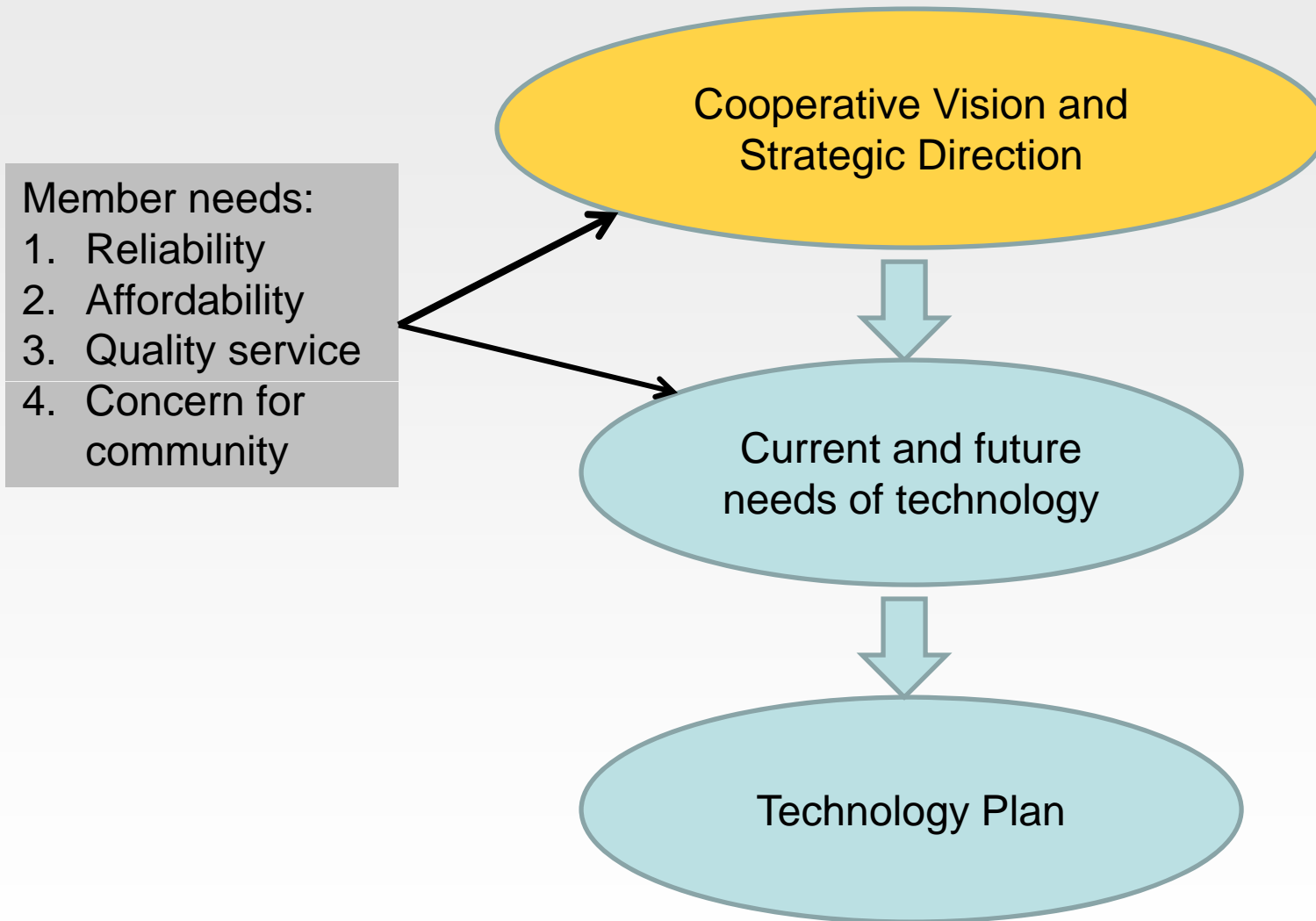
Market/Demographic

- Aging workforce
- Aging infrastructure
- Changing customer base
- Customer demands
- Training/process improvement
- Costs & availability of raw materials

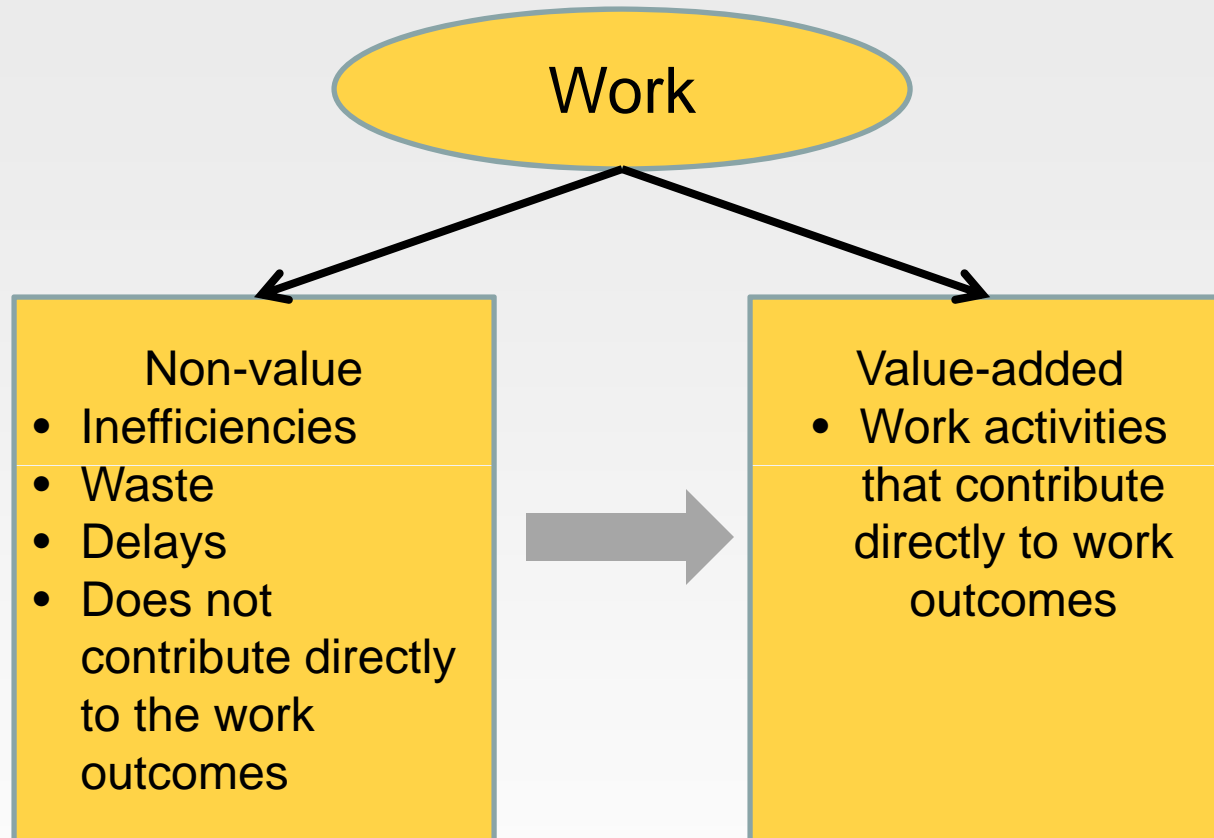
Technology

- Communications
- Embedded microprocessors
- Information & web-enabled application
- Renewable, storage and other DG
- Power electronics

Technology Driven from Strategic Direction



Role of Technology



- Technology enables to improve work shifting from non-value to value added activities.
- Requires change with redeployment of people tasks and jobs

Electric Utilities Continue to Face Challenges

Issues

- Electric grid stressed by increasing electricity demand and aging infrastructure
- Retiring of utility skilled workforce (Lineman and Engineers)
- Increasing scrutiny of power outages and service restoration

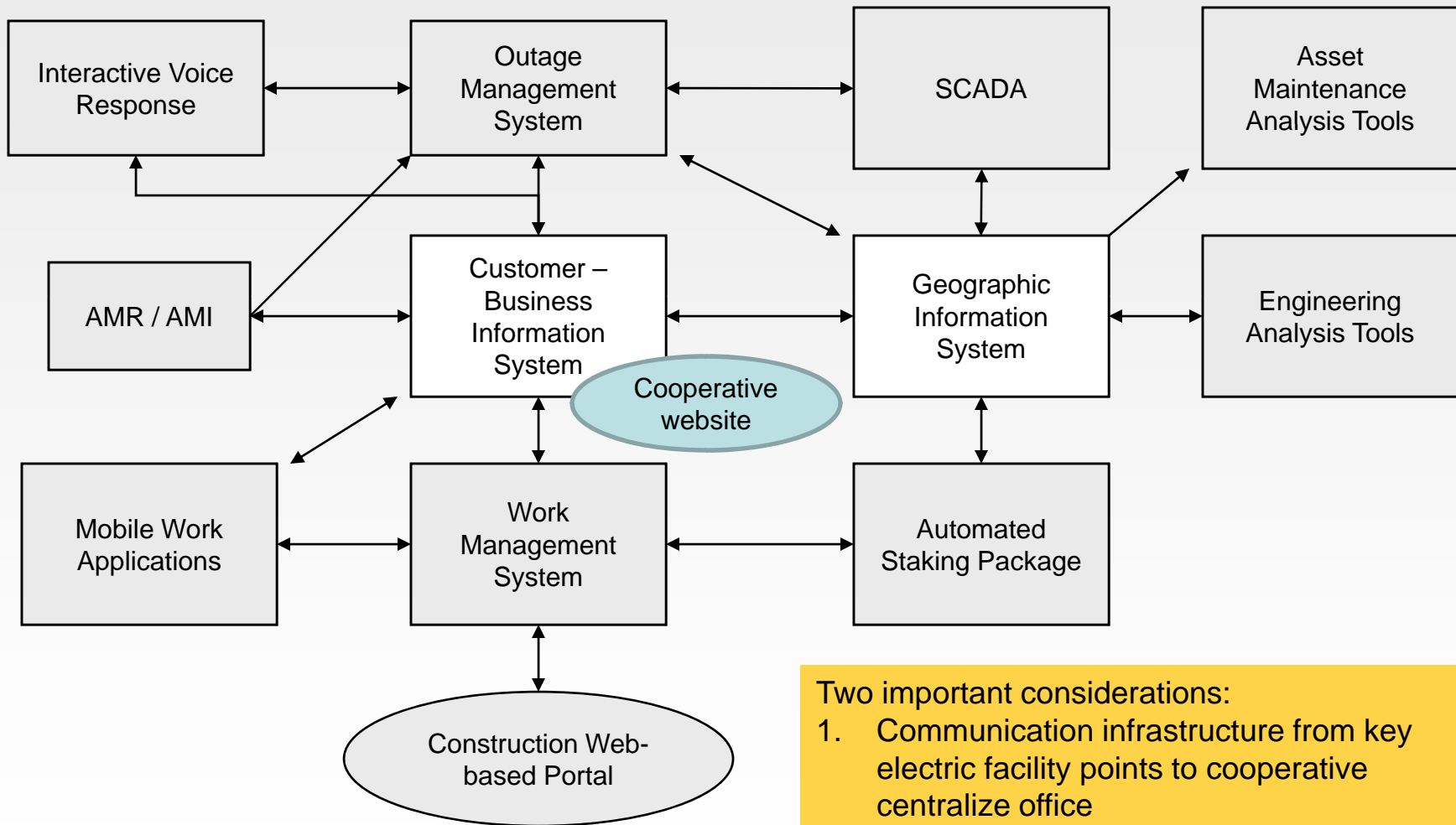


Drivers of Automation

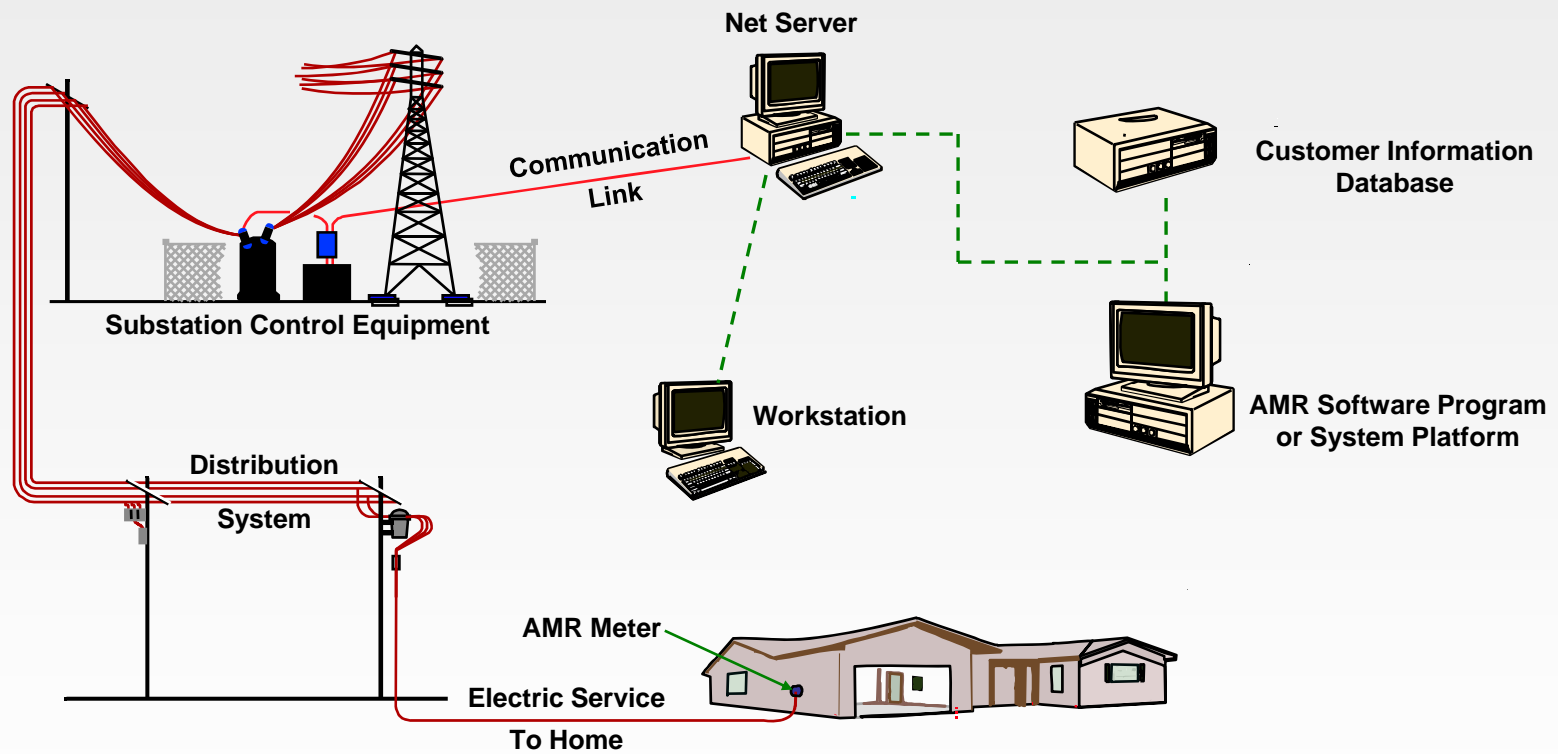
- Energy Efficiency – grid efficiency and demand management
- Productivity – operational and asset productivity
- Reliability – outage prevention and restoration

Electric utilities are looking for automation solution to improve reliability, productivity, and energy efficiency

Careful planned architecture is needed for total integration to maximize investments in new technology applications



- Two important considerations:
1. Communication infrastructure from key electric facility points to cooperative centralize office
 2. Integration of technology applications



Focus on the Member

- Remember: when designing technology (e.g. IVR, cooperative website, etc.) with consumer interface or any processes and practices with consumer touch-points,

Design with the member in mind!

- Research shows that 60-70% of technology projects fail:
 - Cost more than planned
 - Take longer than planned
 - Provide less functionality than promised
- Why?
 - Weak technology planning

Key Questions to Ask For Proposed Technology

1. Are the objectives clear
 - Are we doing the right thing?
2. Are we doing it in the best way?
 - Other alternatives evaluated?
3. How do we know how well we are doing?
 - Effective project management controls?
4. What are the impacts to the business?
 - Do we have the right support for the project?

Key Questions to Ask For Proposed Technology (continued)

5. Is the project cost effective?

- Are the cost realistic?
- Have we done an appropriate cost analysis:
 - a) What the deliverables of the project?
 - b) What are the targeted benefits
 - Tangible (or quantifiable) benefits
 - Intangible benefits
 - c) What are the cost for the life of the project?
 - Upfront cost
 - Recurring (e.g. maintenance and operating) cost

6. Is there clear accountability for the project?

- Who owns the project?

7. Are key assets protected?

- Is IT security adequate?
- Can the IT infrastructure support it?
- Are appropriate resources skills and capabilities available to support the project?

Summary – Board’s Role with respect to Technology

- Recognize the strategic aspects of technology and that technology is considered within the Cooperative Strategic Plan
- Ensure technology initiatives and technology plan is consistent or aligned with the Cooperative Strategic Plan and Direction
- Ensure technology investments are presented with a sound business case and are achieving desired results
- Monitor management’s implementation goals

Smart Grid Elements

- ✓ **Enabling informed participation by customers**
- ✓ **Enabling new products, service, and markets**
- ✓ **Accommodating all generation and storage options**
- ✓ **Provide the power quality for the range of needs in the 21st century economy**
- ✓ **Optimizing asset utilization and operating efficiency**
- ✓ **Addressing disturbances through automation prevention, containment, and restoration**
- ✓ **Operating resiliently against all hazards**



Additional smart grid goals:

- End-to-end connectivity from generation to end-use consumers
- To empower consumers to make better choices on how to manage and control their energy consumption

Seven characteristics of the smart grid, as identified by the U.S. DOE