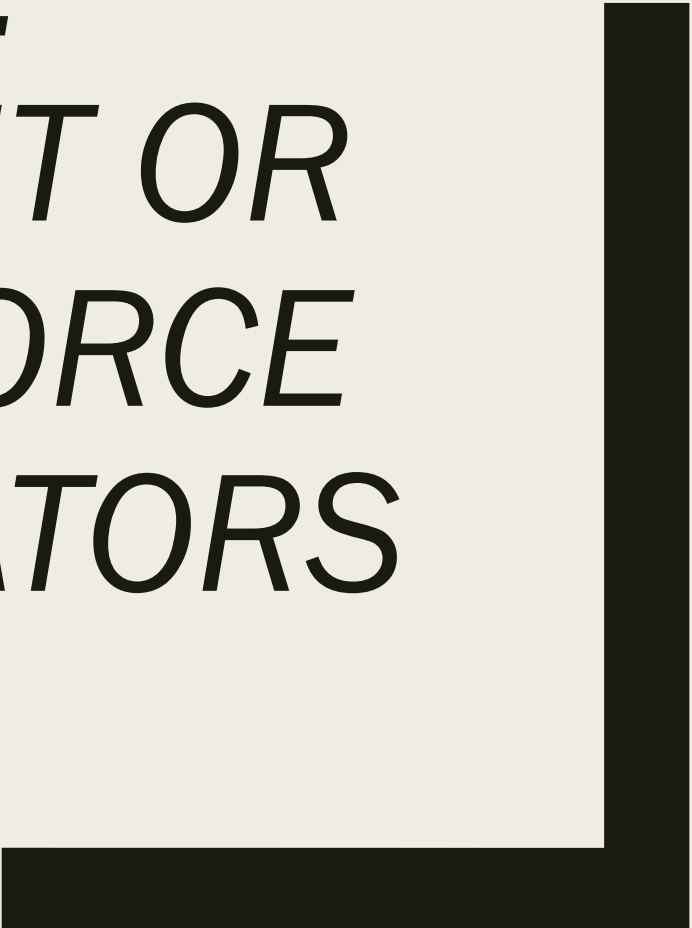


*AUTOMATION:  
EXTINCTION EVENT OR  
EVOLUTIONARY FORCE  
FOR PLANT OPERATORS*

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# Agenda

- Background
  - *Working group at Center for Operator Performance*
  - *Part of industry trend*
- Knowledge worker
  - *What does that mean*
- In process control
  - *Changes in nature of work*
- Implications for future
  - *Selection*
  - *Training*
  - *IT*
- Summary
- Additional Reading

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# Center for Operator Performance

[www.operatorperformance.org](http://www.operatorperformance.org)



# Operator of the future

- It's not about tasks, but the type of person doing the work
- Need knowledge workers
- Need systems to support them
  - *In-time training*
  - *Access to data*

# 50-Year Trend

- The productivity of knowledge and knowledge workers will not be the only competitive factor in the world economy. It is, however, likely to become the decisive factor, at least for most industries in the developed countries. – Peter Drucker, 1957 [3]
- The most valuable assets of a 20<sup>th</sup>-century company were its production equipment. The most valuable assets of a 21<sup>st</sup>-century institution, whether business or non-business, will be its knowledge workers and their productivity. [3]
- Manual workers are a cost. Knowledge workers must be considered an asset. [3]
- The function of technology is often to eliminate manual work...to simply make some physical activities no longer necessary. The knowledge age is made possible by new technologies properly applied and by integrating technologies in such a way that they encourage knowledge sharing within and among communities. [6]
- Mechanization (replacement of human muscles) and automation (replacement of human judgement) [7]
- Auto mechanics (1970s) [2]
- Assembly lines (1980s)

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# Knowledge Worker [6]

- That meant workers basically fell into two categories: knowledge workers (in offices) and manual workers (in factories)
- Industrial worker is being transformed into knowledge worker, who is responsible for understanding the nature of the work and the purpose for which it is done.
- Knowledge always requires context for it to be of value. Context is the bridge that links information together to create knowledge.
- As professionals become part of the work process, many of the tasks once performed by professionals are transferred to technicians, often working under the direction of the professional. Professionals become workers and workers become professionals.
- Collaboration becomes critical. Collaboration requires that people understand what others are doing and how their work fits together with the work of others. It requires a higher level of interdependency for success in the work than cooperative environments do. Collaboration is a win-win situation because all those involved have a common goal.
- The difference between collaboration and cooperation is the difference between playing a team sport and simply playing at the same time. --- Collaboration takes place when we all play the same game, with the same goals and a common understanding of what the game is about.



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Was standard for operator	Becoming common
Fill lube oil on rotating equipment	Lubrimist
Start/Stop rotating equipment	DCS
Open/Close Valves	DCS/Don't run on bypasses
Feel for vibration	Internal sensors
Listen for unusual sounds	Internal sensors
Use senses to detect problems	Area sensors/ drones
Start/stop fin fans	Variable speed motors
Take/Run samples	On-line analyzers/portable meters
Isolate lines in upset	EIV
Track equipment status (which pump "on")	DCS
Check accuracy of instrumentation	Smart transmitters
Oversee maintenance	
Prep equipment for maintenance	
Backflush coolers	PLC
Clean screens and filters	
Detect safety opportunities	
Blowdown KO/boots/drums	Control valves
Verify line-ups	Valve positioners
Local readings/ Tank Gauging	Wireless instrumentation

# Change from tasks to activities

Function	Previously (task)	Future (Activity)
Rotating equipment reliability	Ensured lube oil, felt for vibration	Collaborate with rotating equipment engineers and maintenance to optimize runtime
Control performance	Verified instruments on DCS match field	Collaborate with console, instrumentation, and process control to ensure instrument reliability
Product quality	Took samples	Collaborate with console, lab, and process engineers to reduce variance in product specs

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# Selection: Select for different skill sets (assembly line worker selection example)<sup>[5]</sup>

Teamwork and Analytic	Harvard business school case study	Applicants are given a scenario (production of new model has resulted in more defects, injuries, and low morale) along with data, memos, worker complaints, and control charts. They are to analyze the situation and come up with recommendations
	Teamwork	Groups of six are told they are small company making circuit boards. They can choose to produce one of five types of circuit boards with varying cost, profit, and difficulty. They are given \$25 seed money to start. There is a discussion period and a production period. They must sell the boards along with necessary paperwork to buyer, who can refuse if everything is not correct without explanation. This tests teamwork and handling pressure. (Apparently fights have broken out on this one)
	Personal Touch	As a reward for hitting production goals, Toyota is giving each member of the team \$10 that can be used in on a variety of options. The group must make a unanimous decision on which option to pick.

And so a trade that was once largely mechanical is today primarily technical, and therefore requires workers to be skilled computer users, strong readers, and able mathematicians.

# Training: Learning, not training [8]

- The idea of knowledge workers stemmed from the old-fashioned practice of getting knowledge from an apprenticeship.
- That practice has taken modern shifts through college learning and internships, with people gaining the specific skills they need in professional, university, and vocational training that translates directly to the workplace.
- But there's one major difference in today's modern workplace—we can instantly learn anything, anywhere.
- This new movement is the age of the “learning workers.”
- Instead of having a set of specific skills, learning workers have the skills to learn as they go, adapt, and apply their learning to new situations and issues.

# IT: Information technology increases in importance [6]

- No amount of information or data will answer the question, “Is it a good idea to ...?” But data and information may be required in order to help us answer the question properly.
- Managing knowledge differs fundamentally from managing information. It is about providing an environment, nurturing community, with supporting technology so that judgements can be made – the work of knowledge workers.
- An integrated digital environment is one in which there is immediate access to information needed to do work.
- Information exchange is at the heart of the work community. Information, as it grows and prospers, takes on additional meaning and life.
- Technology overload - information overload, communication overload, and system feature overload

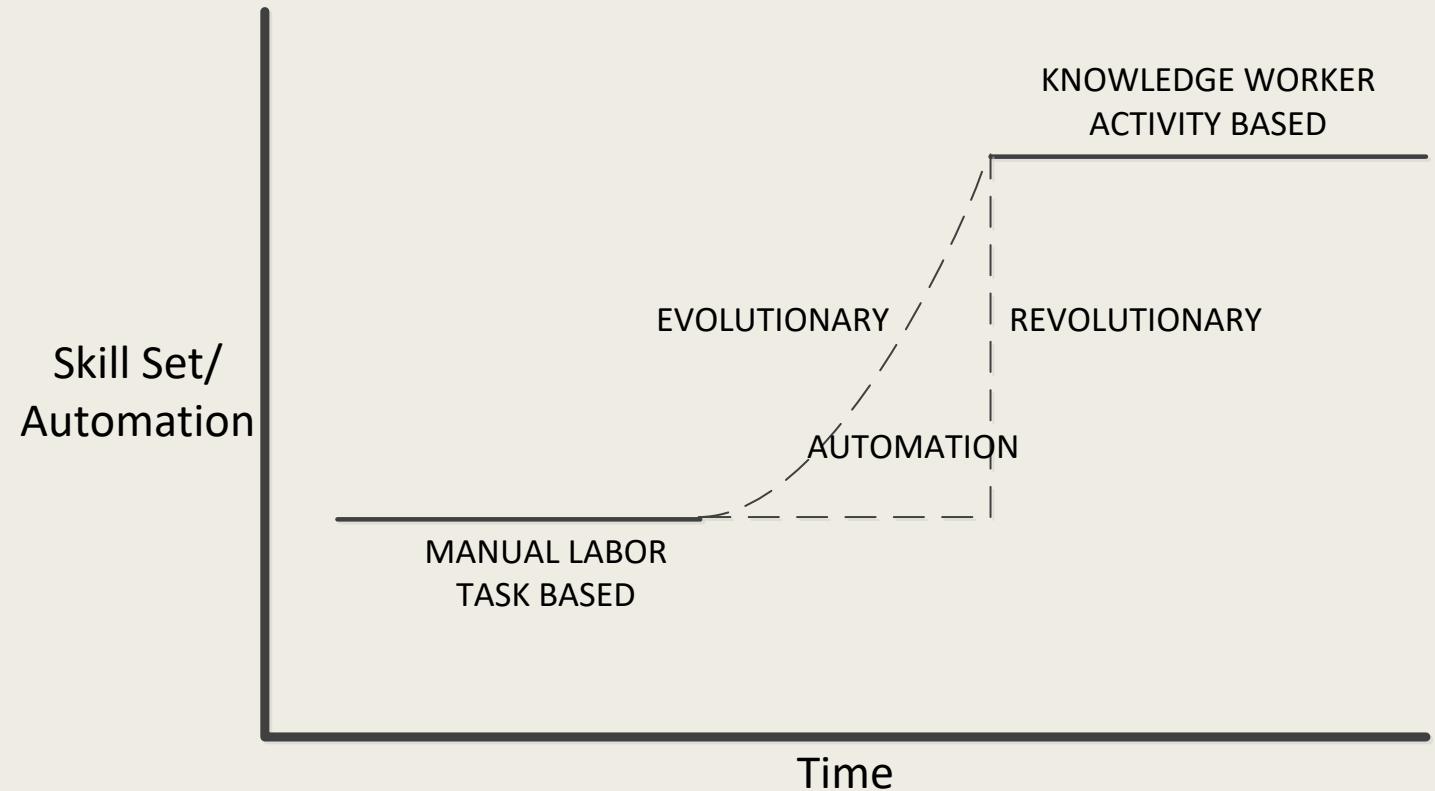
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# Summary

- Automation is requiring new species of operators
- Will the change at your plant be evolutionary or revolutionary?



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- **Additional Reading**

# Additional Reading

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