

Course of «Operations and audit quality»
Master degree in «Fashion, art and food management»
Parthenope University of Naples

PART TWO: design the operation

Process technology

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A general model of operations management

PART ONE: directing the operation

PART TWO: designing the operation

PART THREE: deliver

PART FOUR: development

PART TWO: designing the operation

1. Process design
2. The layout and look of facilities
3. Process technology
4. People in operations

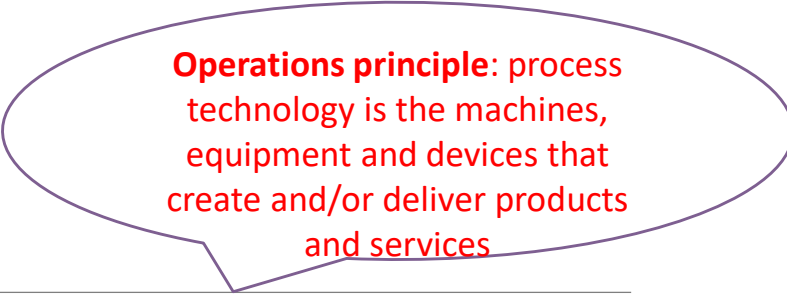
Process design (Agenda)

- What is the process technology and why is it getting more important?
- How can one understand the potential of new process technology?
- How can new process technologies be evaluated?
- How are new process technologies developed and implemented?

What is process technology and why is it getting more important?

- The idea of harnessing technology to make operations more effective is not new! For example the use of some form of automation to replace human work activities has been happening for at least the past 300 hundred years
- What is new, is the **sheer scope**, **sophistication** and **combination** of technologies that are being deployed or developed to be part of operations activities in almost all parts of the economy
- But even more important will be the **rate end extent of change that operations managers will have to cope with**. How operations mangers deal with process technology is now one of the most important decisions that will shape the capabilities of operations


Process technology versus product technology



Operations principle: process technology is the machines, equipment and devices that create and/or deliver products and services

- In this lesson, we shall focus upon **process technology** as distinct from product or service technology
- The formal definition of process technology that we shall use is «**the machines, equipment, and devices that create and/or deliver products and services**»
- Without it, many of the products and services we all purchase would be less reliable, take longer to arrive and arrive unexpectedly, only by available in a limited variety and be more expensive
- Process technology has a very significant effect on **quality, speed, dependability, flexibility** and **cost**

What is «new» in new technologies?



Operations principle: new process technologies can have increased capabilities and greater scope of application

- Why is new process technology becoming so important?...for two reasons!
 1. The first is that most new process technology have a **greater capability** than what they are replacing
 2. Second, these increased capabilities have a **greater scope of application**

Process technology and transformed resources

One common method of distinguishing between different types of process technology is by what technology actually process:

1. Materials
2. Information
3. Customers

Material-processing technologies

- These include any technology that **shapes, transports, stores**, or in any way **changes** physical objects
- It obviously includes the machines and equipment found in manufacturing operations, but also includes trucks, packing machines, warehousing systems and even retail display units
- In manufacturing operations, technological advances have meant that the ways in which metals, plastic, fabric and other materials are processed have improved over time

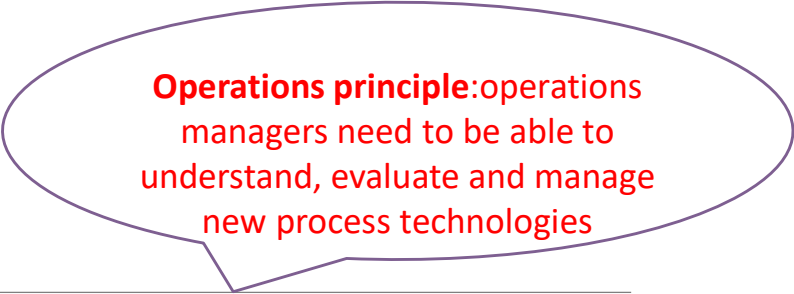
Information- processing technology

- Information- processing technology, or just Information technology (IT), is the most common single type of technology within operations, and includes any **device** which **collects, manipulates, stores or distributes information**
- Initially, it was the use of Internet-Based technology that had the most obvious impact on operations
- Subsequently, other types of information-processing technologies came to provide opportunities for process innovation, particularly those involving some form of analytical capability, such as algorithmic decision making, **artificial intelligence** (AI) and **data mining**

Customer-processing technology

- There are three typers of customer-processing technologies
- The first category includes active interaction technology such as automobile, on line shopping, fitness equipment ans self-checkout stations. In all of these customers themselves are using the technology to create the service
- By contrast, mass transportation systems, elevators, **cinemas** are passive interactive technologies; they process customers in some way, but do not expect the customer to take a direct part in the interaction
- Some customer-processing technology is aware of customers but not the other way around, for example, security monitoring, or face recognition technologies on shopping malls. The objective of these «hidden technologies» is to track customers' movements or transactions in an unobrusive way

How should operations managers manage process technology?

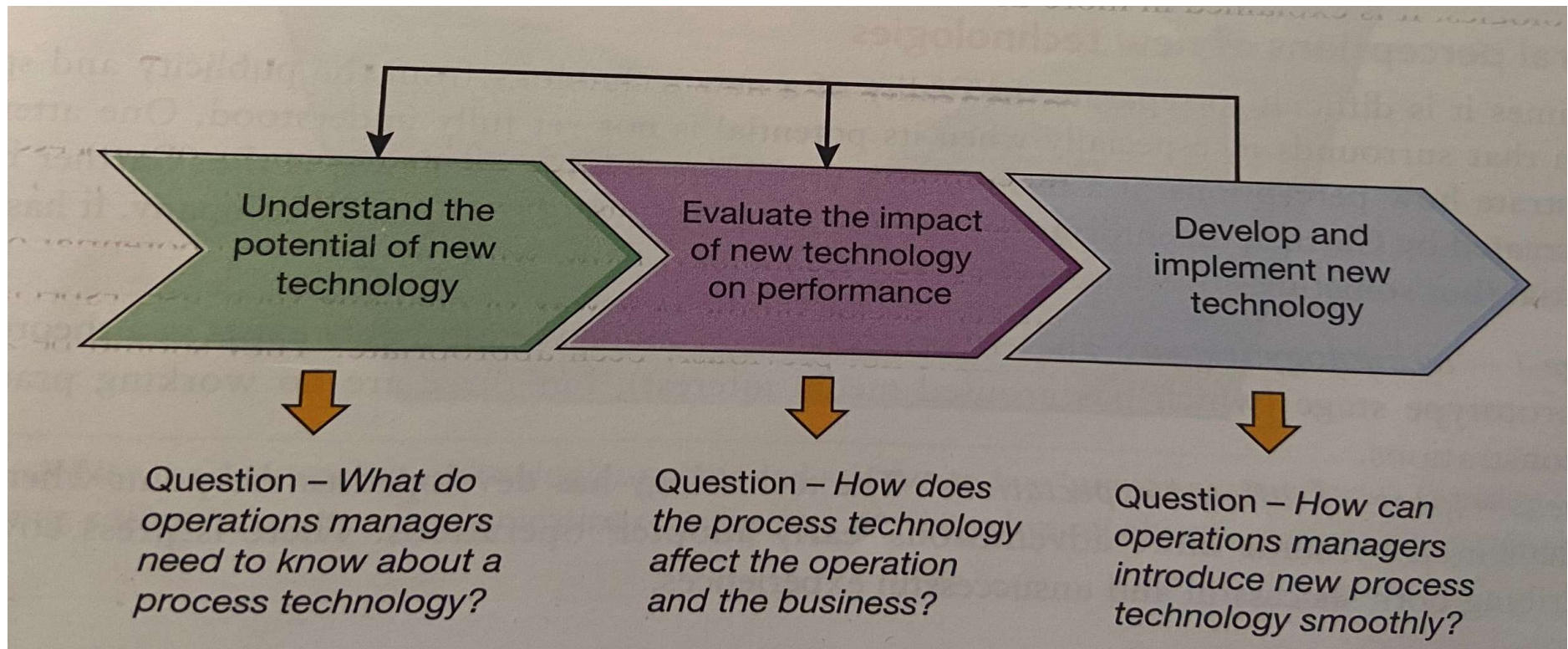


Operations principle: operations managers need to be able to understand, evaluate and manage new process technologies

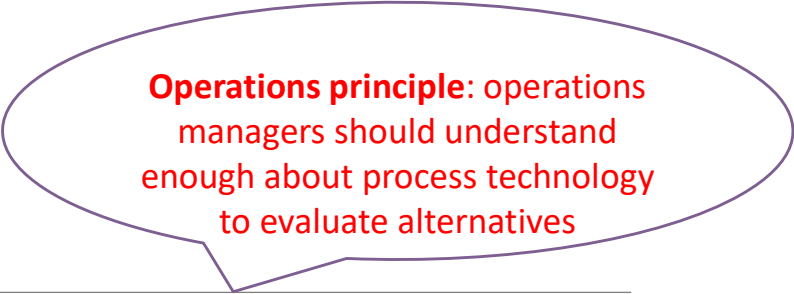
What are the responsibilities of operations managers as regards the management of process technology? They should be able to do three things:

1. They need **to understand the technology** to the extent that they are able to articulate what it should be able to do
2. They **should be able to evaluate alternative technologies**, particularly as they affect the operations they manage
3. They **must be able to manage the technology** so that it can reach its full potential in contributing to the performance of the operation as a whole

The three stages of process technology management



Understanding the potential of new process technology (1)



Operations principle: operations managers should understand enough about process technology to evaluate alternatives

- The first responsibility of operations managers is to gain an understanding of what a process technology can do
- «Understanding process technology» does not mean knowing **the details** of the science and engineering embedded in the technology....
- ... it **means knowing enough about the principles behind the technology** to be comfortable in evaluating some technical information

Understanding the potential of new process technology (2)

The four key questions

In particular, the following four key questions can help operations managers to grasp the essentials of the technology

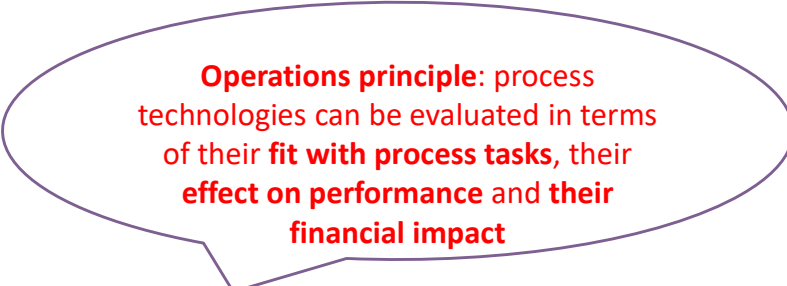
- What does the technology do which is different from other similar technologies?
- How does it do it? That is, what particular characteristics of the technology are used to perform its function?
- What benefits does using the technology give to the operation?
- What constraints or risks does using the technology place on the operation?

For example, look at the worked example on QB House to think through these four key questions

Worked example- QB House's barber

[Case studies\Lesson 9 Worked example QB house .jpg](#)

How can new process technologies be evaluated?



Operations principle: process technologies can be evaluated in terms of their **fit with process tasks**, their **effect on performance** and their **financial impact**

Three sets of criteria:

1. All technologies should be appropriate for the **volume-variety** characteristics of the task for which they are intended. *Does the technology fit the volume-variety characteristics of the task for which it is intended?*
2. All technologies should be evaluated by assessing the impact that the process technology will have on the operation's **performance objectives (quality, speed, dependability, flexibility and cost)** and other operational factors. *What aspects of the operation's performance does the technology improve?*
3. All technologies should be **evaluated financially**. This usually involves the use of some of the more common evaluation approaches, such as net present value (NPV). *Does the technology give an acceptable financial return?*

Worked example- Legacy versus fintech in financial service

[Case studies\lesson 9 legacy versus fintech.pdf](#)

How are new process technologies developed and implemented?

Implementing process technology means organizing all the activities involved in making the technology work as intended

4 particularly important issues affect technology implementation:

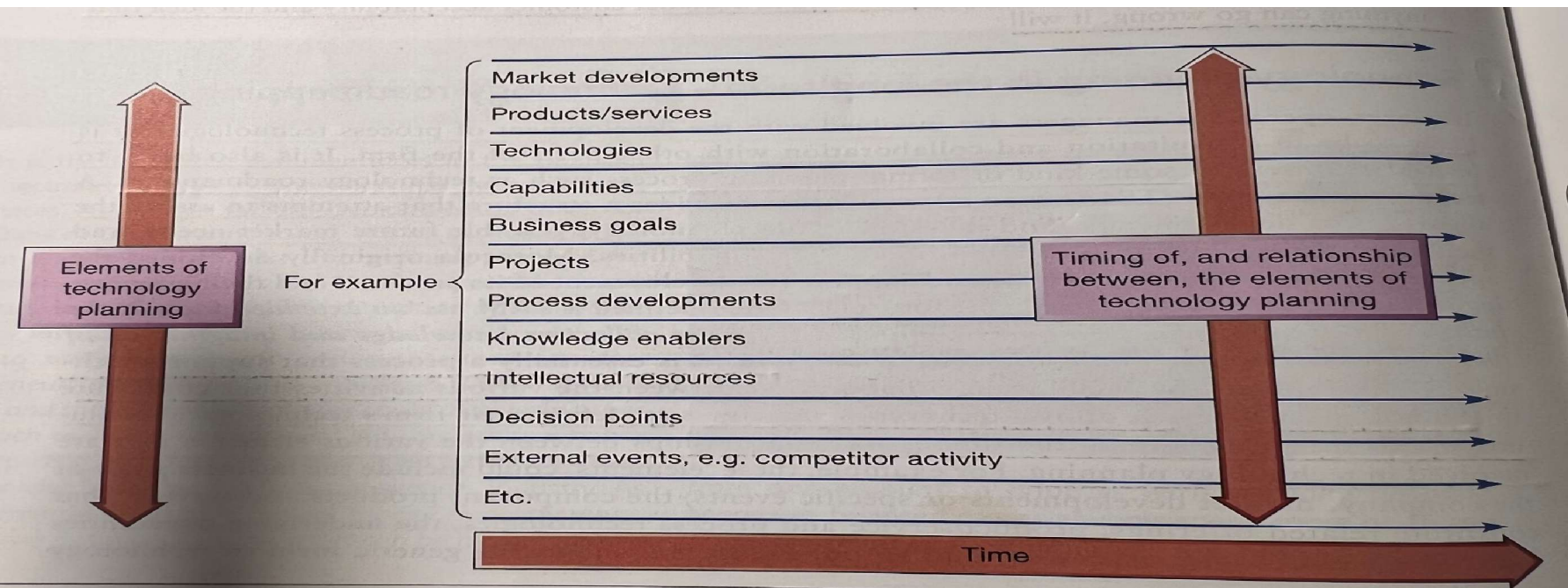
1. The way technology is planned over the long term;
2. The idea of resource and process «distance»
3. The need to consider customer acceptability
4. The idea that if anything goes wrong, it will

1. Technology planning in the long term technology roadmapping

(The way technology is planned over the long term) (1)

A technology roadmap (TRM) is an approach that provides a structure that attempts to assure the alignment of developments (and investments) in technology, possible future market needs, and the new development of associated operations capabilities

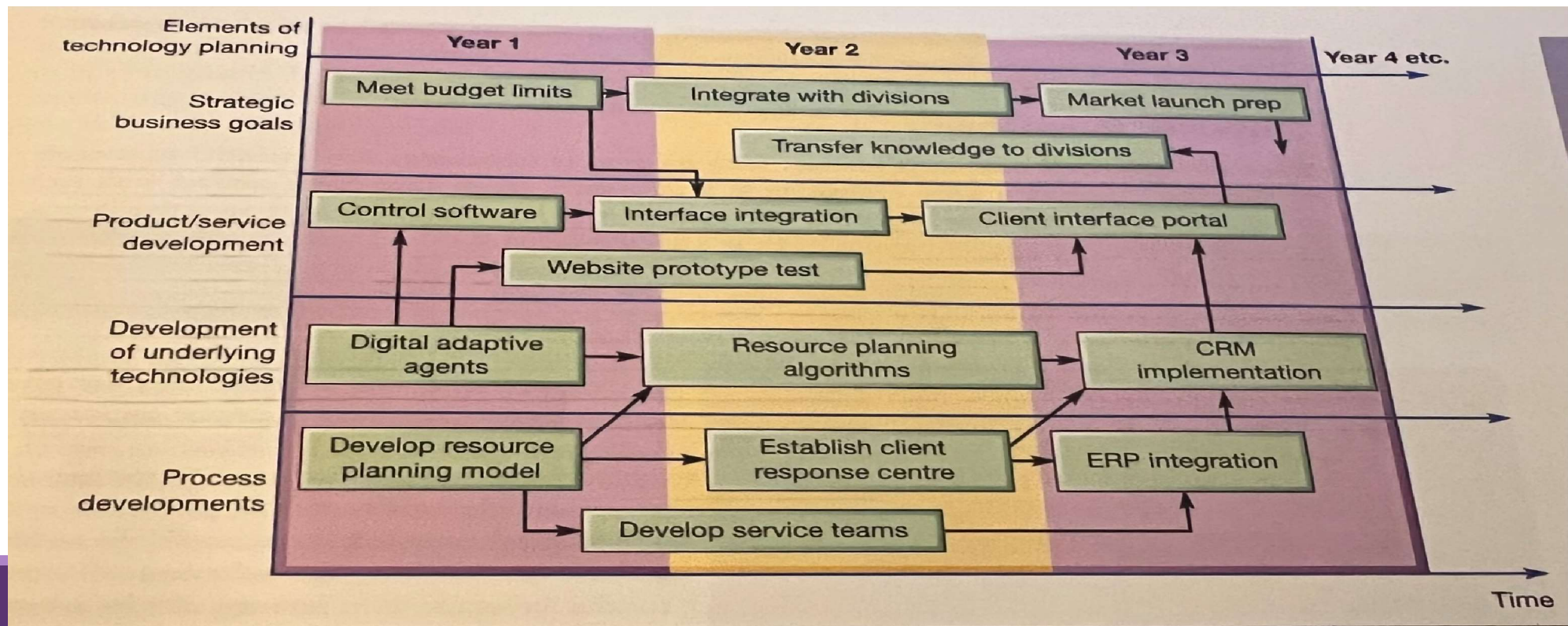
Figure- The generic form of technology roadmaps



1. Technology planning in the long term technology roadmapping

(The way technology is planned over the long term) (2)

Figure- simplified example of a technology roadmap for the development of products/services, technologies and processes for a facilities management service



2. Resource and process «distance» (*The idea of resource and process «distance»*)

- The resource and process distance implied by the technology implementation will indicate the degree of difficulty
- The degree of difficulty in the implementation process technology will depend on the degree of novelty of the new technology resources and the changes required in the operation's processes
- The less that the new technology resources are understood, the greater their distance from the current technology resource base of the operation
- The greater the resource and process distance, the more difficult any implementation is likely to be. This is because such distance makes it difficult to adopt a systematic approach to analysing change and learning from mistakes.

3. Customer acceptability (*The need to consider customer acceptability*)

Customer acceptability may be a barrier to implementation in customer-processing technologies
(*The need to consider customer acceptability*)

4. Anticipating implementation problems (*The idea that if anything can go wrong, it will*)

It is necessary to allow for the adjustment costs of implementation



How are new process technologies developed and implemented?

Implementing process technology means organizing all the activities involved in making the technology work as intended

1. A technology roadmap (TRM) is an approach that provides a structure that attempts to assure the alignment of developments (and investments) in technology, possible future market needs, and the new development of associated operations capabilities (*The way technology is planned over the long term*)
2. The resource and process distance implied by the technology implementation will indicate the degree of difficulty (*The idea of resource and process «distance»*)
3. Customer acceptability may be a barrier to implementation in customer-processing technologies (*The need to consider customer acceptability*)
4. It is necessary to allow for the adjustment costs of implementation (*The idea that if anything can go wrong, it will*)

Case study

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