

Operations Management

MGT355

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Theocharis Papadopoulos, London 2015

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Location, layout and flow



Key operations questions

- ☐ *Where should operations be located?*
- ☐ *What is 'layout' and what are the basic types used in operations?*
- ☐ *What type of layout should an operation choose?*
- ☐ *How should items be positioned in a workplace?*



Location

The aim of the location decision is to achieve an appropriate balance between three related objectives:

- The **spatially variable costs** of the operations (spatially variable = something changes with geographical location)
- The service the operation is able to provide to its customers
- The revenue potential of the operations



Supply-side and demand-side factors in location decisions

Supply Side

- Labour costs
- Land costs
- Energy costs
- Transportation costs
- Community factors
 - Local tax rates
 - Governance assistance
 - Political stability
 - Language
 - Availability of support services
 - Labour relations
 - Environmental restrictions

Demand-side

- Labour skills
- The suitability of the site itself
- Image of the location
- Convenience for customers



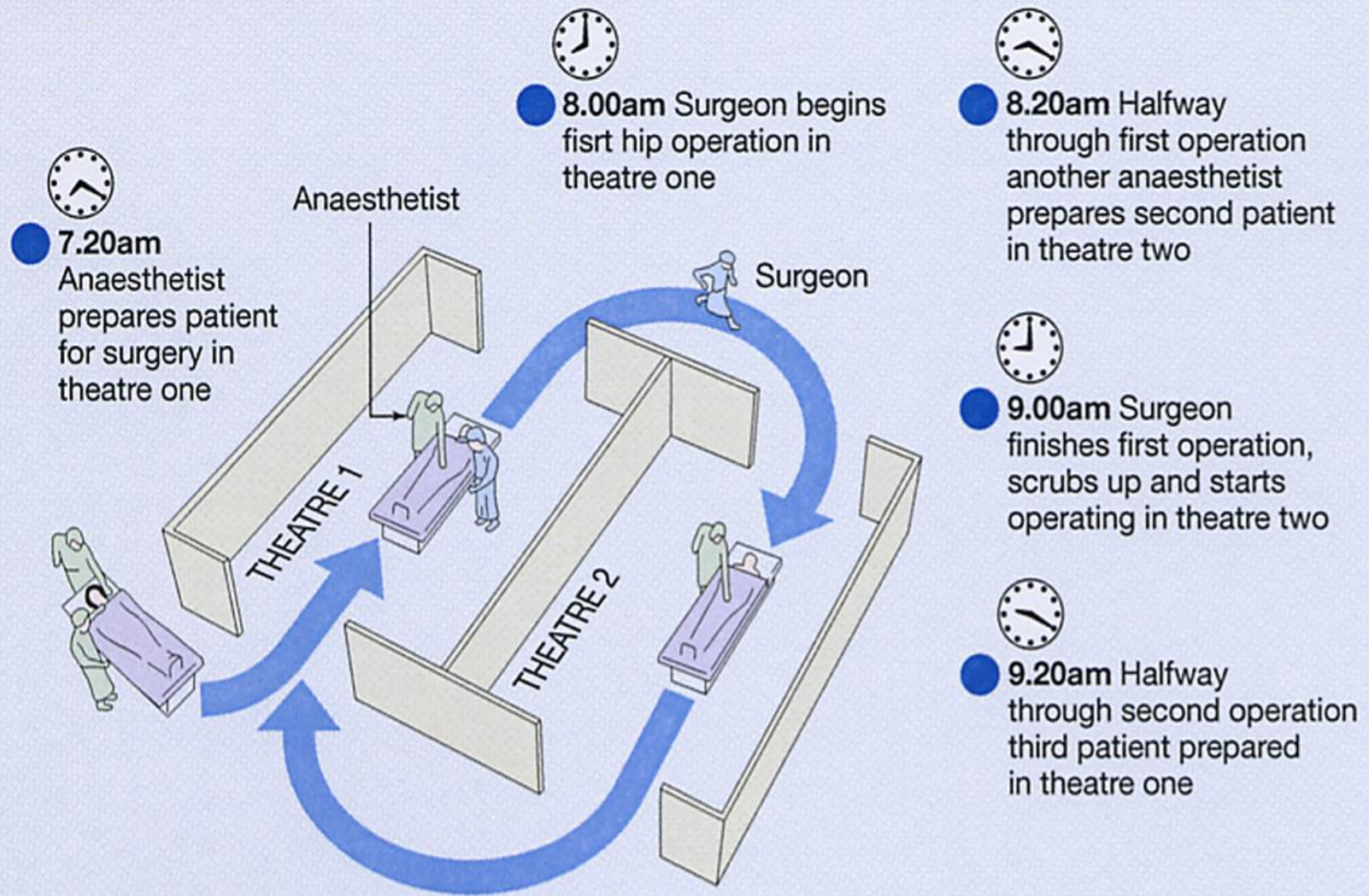
What makes a good layout?

- Inherent safety
- Length of flow
- Clarity of flow
- Staff conditions
- Management coordination
- Accessibility
- Use of space
- Long-term flexibility



An innovative layout in a surgery improves its efficiency

Assembly line surgery



Product flow in Cadbury's

Flow of chocolate in Cadbury's factory



Flow of customers in Cadbury World



Both Cadbury's chocolate factory and its 'Cadbury World' visitor attraction use 'product' layout. But what will be different about the layouts and why?

The basic layout types

- Fixed-position layout
- Functional layout
- Cell layout
- Line layout



Fixed-position layout

- The transformed resources do not move between the transforming resources.
- Instead of materials, informations or customers flowing through an operation, the recipient of the processing is stationary and the transforming resources move as necessary.



Advantages and disadvantages of Fixed position layout

Fixed position layout	
Advantages	<ul style="list-style-type: none">Very high product and mix flexibilityProduct/customer not movedHigh variety of tasks for staff
Disadvantages	<ul style="list-style-type: none">Very high unit costsScheduling space and activities can be difficult

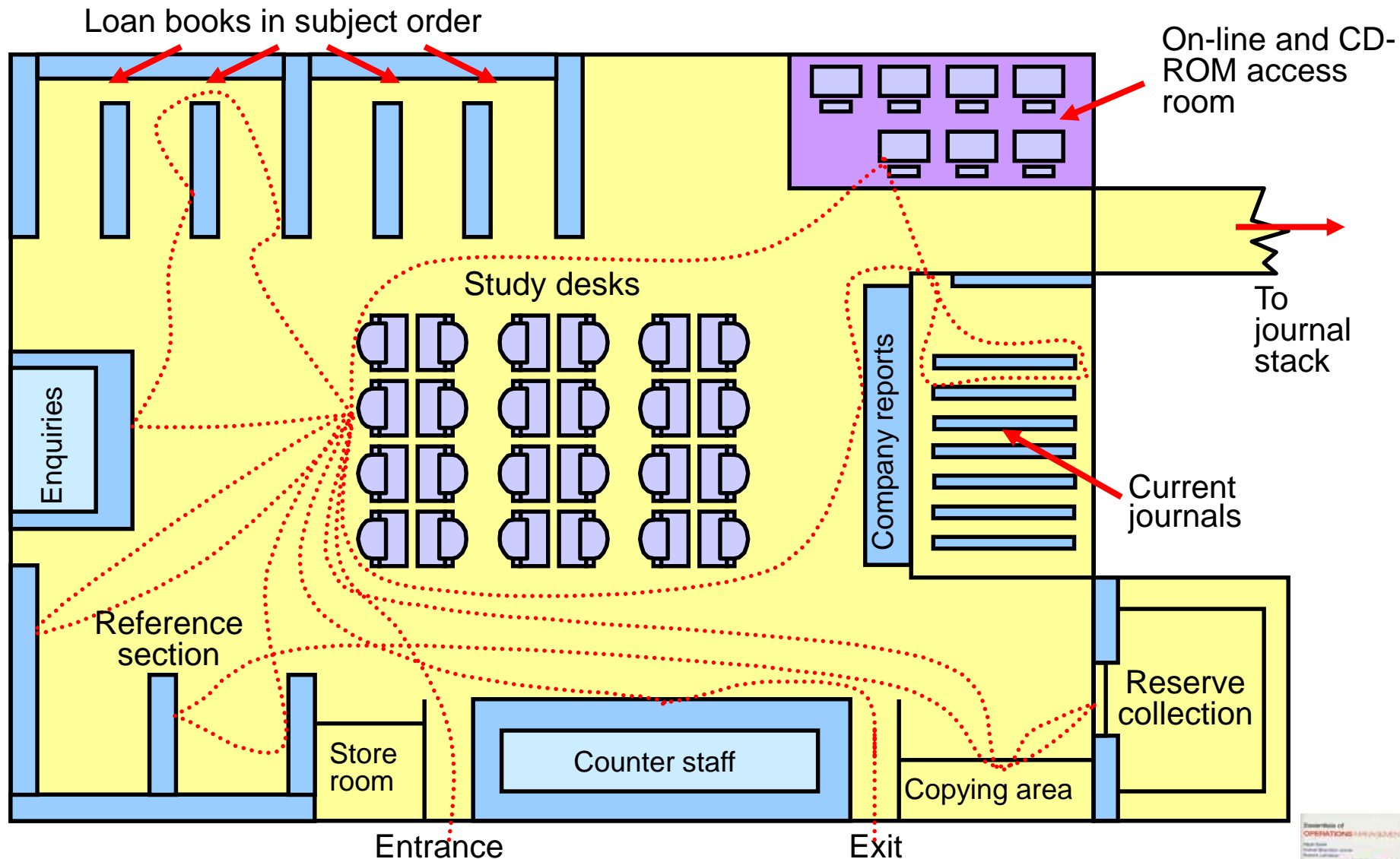


Functional layout

- It conforms to the needs and convenience of the functions performed by the transforming resources within the process.
- Similar resources or processes are located together.
- The combinatorial complexity of functional layouts makes optimal solutions difficult to achieve in practice.



Functional layout in a library - the path of one customer



Advantages and disadvantages of Functional layout

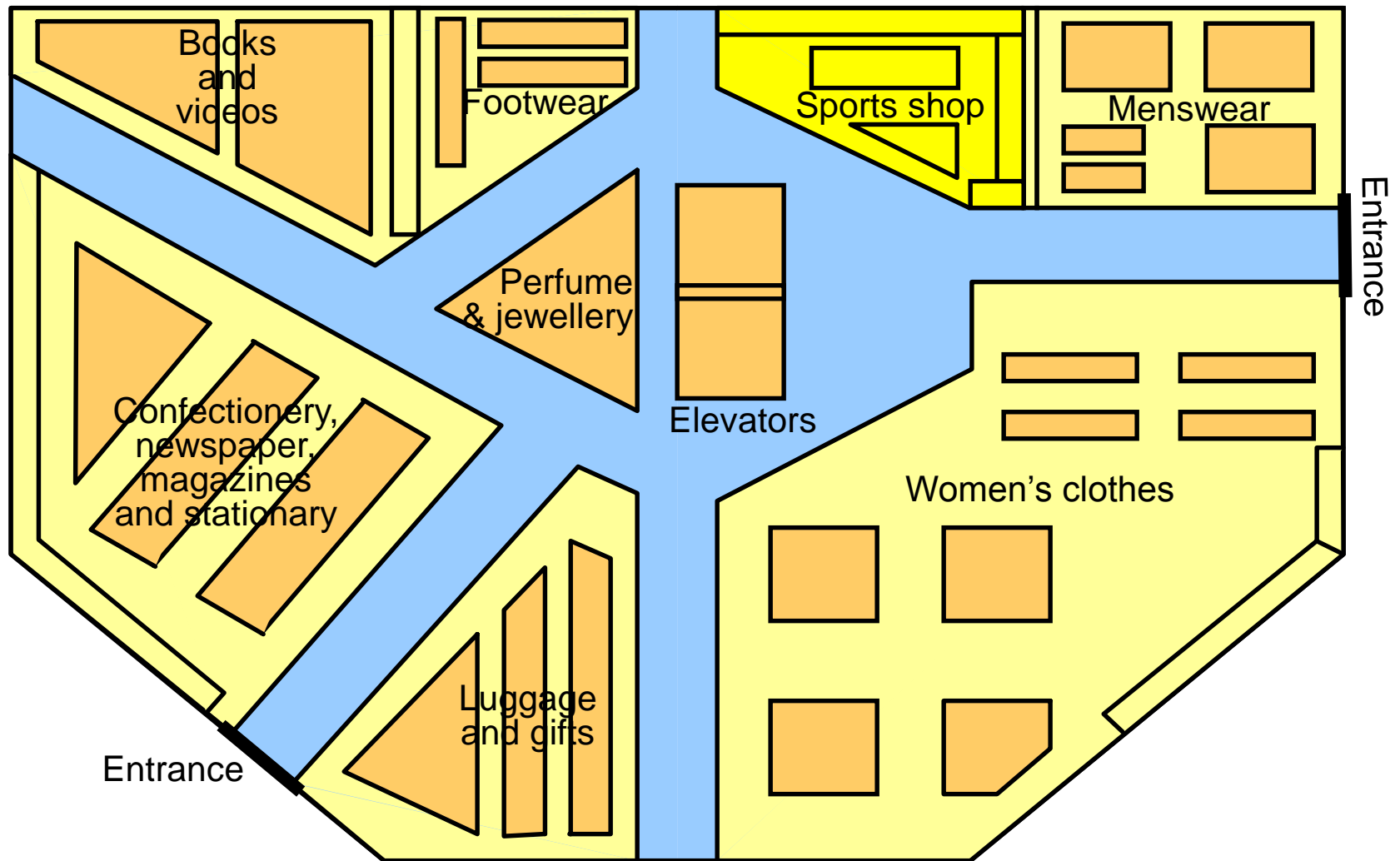
Functional layout	
Advantages	<ul style="list-style-type: none">High product and mix flexibilityRelatively robust in the case of disruptionsEasy to supervise
Disadvantages	<ul style="list-style-type: none">Low utilizationCan have very high WIPComplex flow

Cell layout

- Transformed resources entering the operation are pre-selected (or pre-select themselves) to move to one part of the operation (cell) in which they meet their immediate processing needs.
- After being processed in the cell, transformed resources may go on to another cell.
- An attempt to bring some order to the complexity of flow which characterizes functional layout.



Department store with sports goods 'shop-within-a-shop'



Advantages and disadvantages of Cell layout

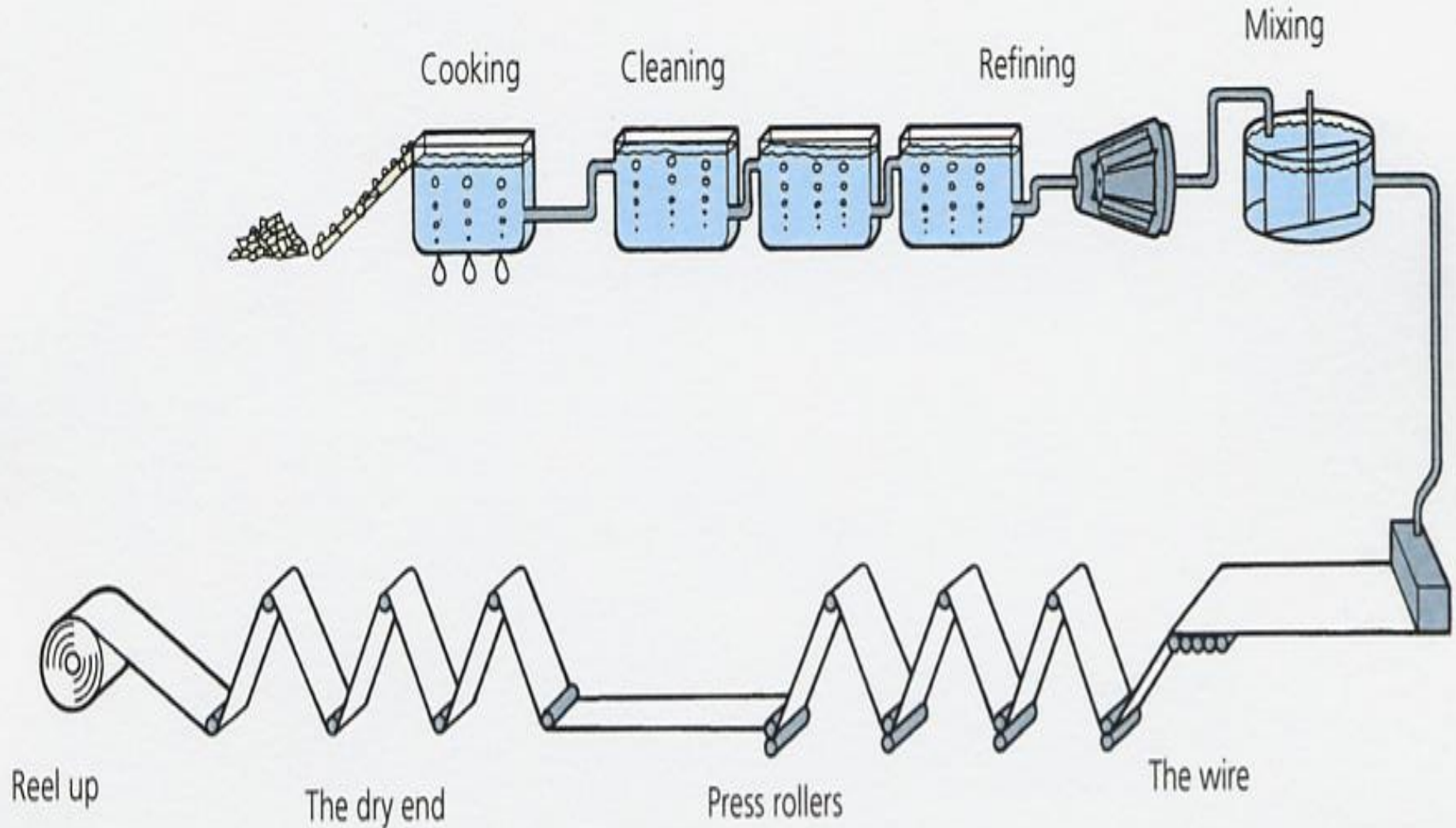
Cell layout	
Advantages	<ul style="list-style-type: none">Can give good compromiseFast throughputGroup work can result in good motivation
Disadvantages	<ul style="list-style-type: none">Can be costly to rearrange existing layoutCan need more plant

Line layout (product layout)

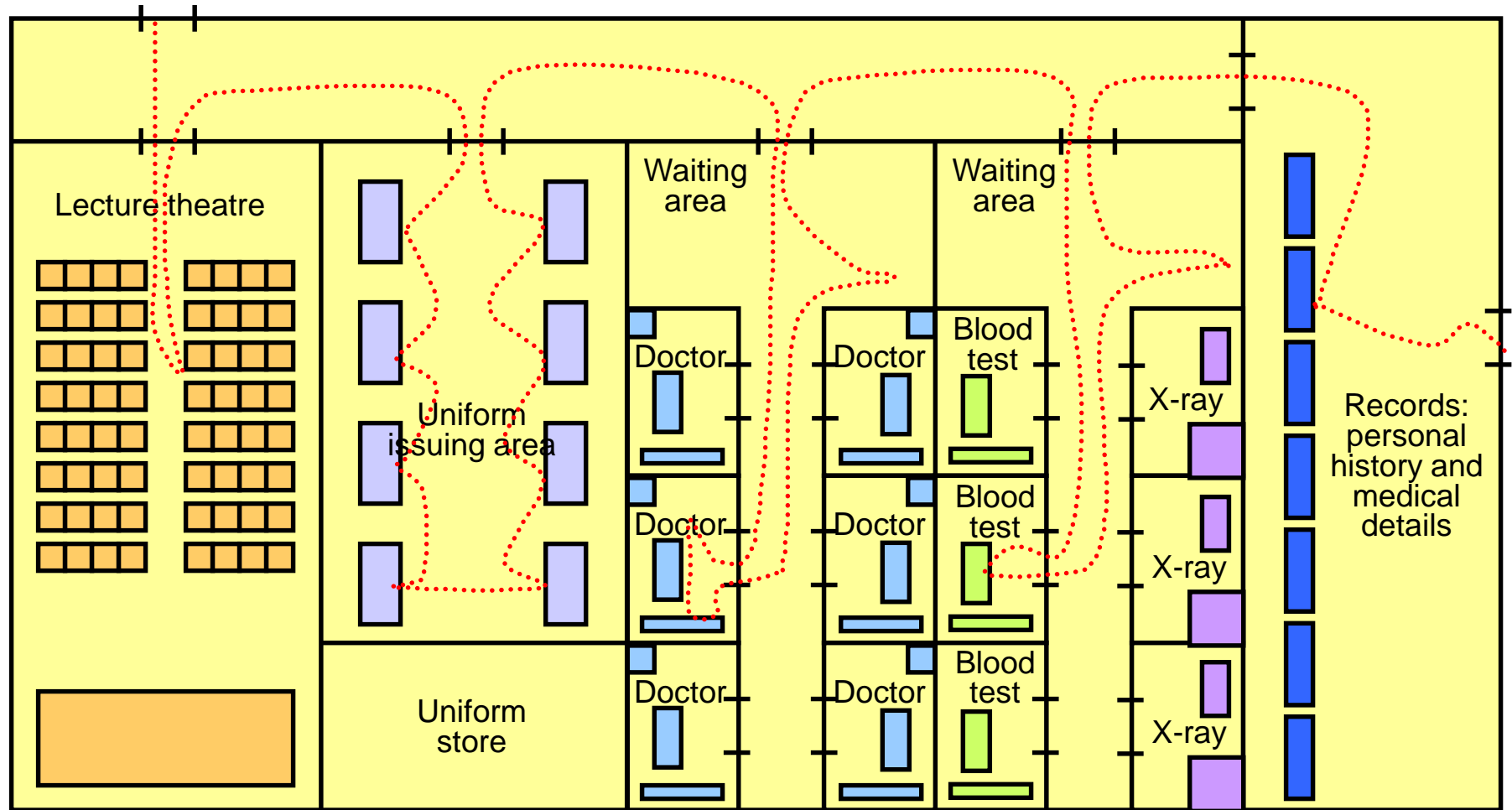
- Locating the transforming resources entirely for the convenience of the transformed resources.
- Customers, products or pieces of information follow a prearranged route in which the sequence of activities that are required matches the sequence in which processes have been located.
- The transformed resources “flow” as in a “line” through the process.
- Flow is predictable and therefore relatively easy to control.



A product layout in a paper manufacturing operation



An army induction centre which uses product layout



Advantages and disadvantages of Product layout

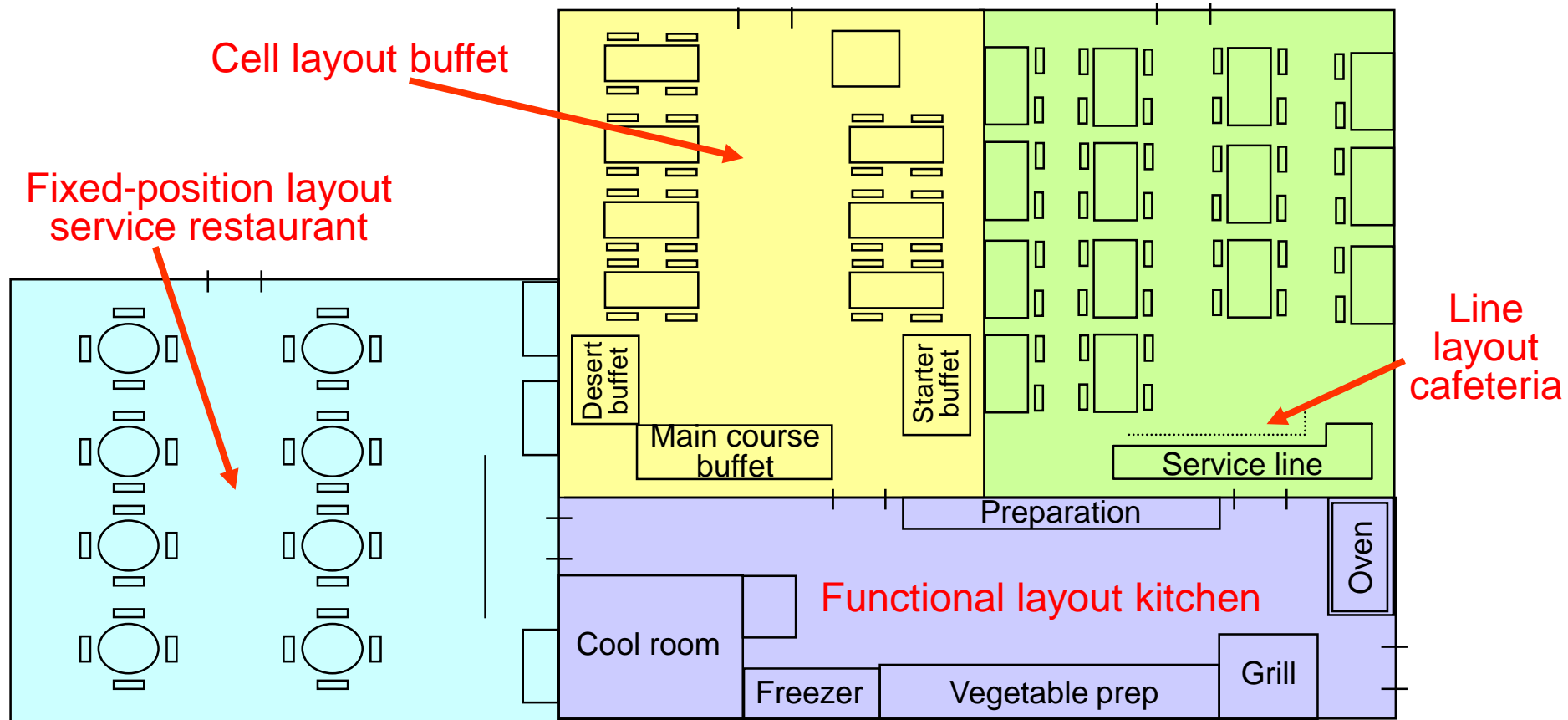
Product layout	
Advantages	<ul style="list-style-type: none">Low unit costs for high volumeOpportunities for specialization of equipment
Disadvantages	<ul style="list-style-type: none">Can have low mix flexibilityNot very robust in the case of disruptionsWork can be very repetitive

Mixed layouts

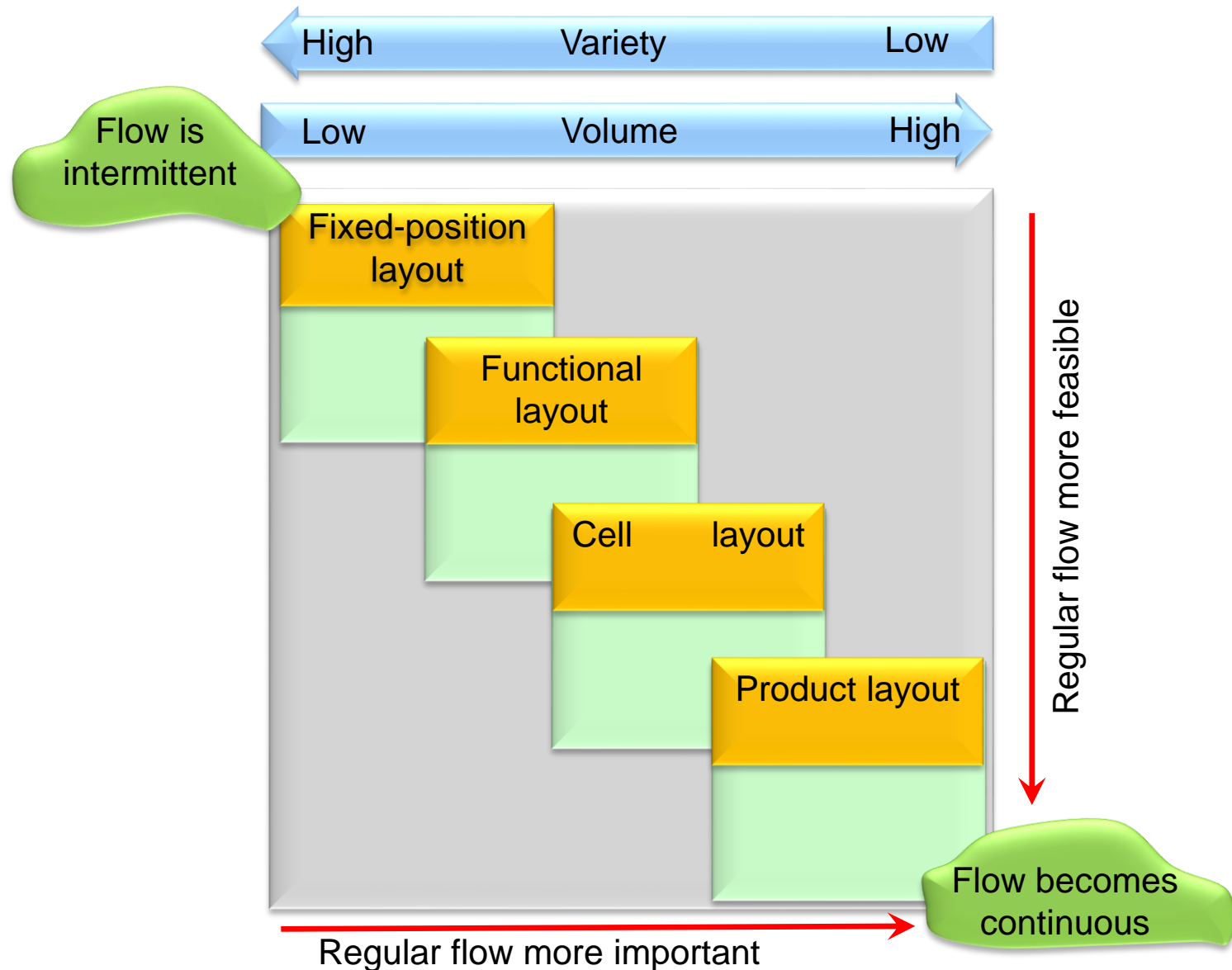
- Hybrid layouts which combine elements of some or all of the basic layout types.
- Use the “pure” basic layout types in different parts of the operation.



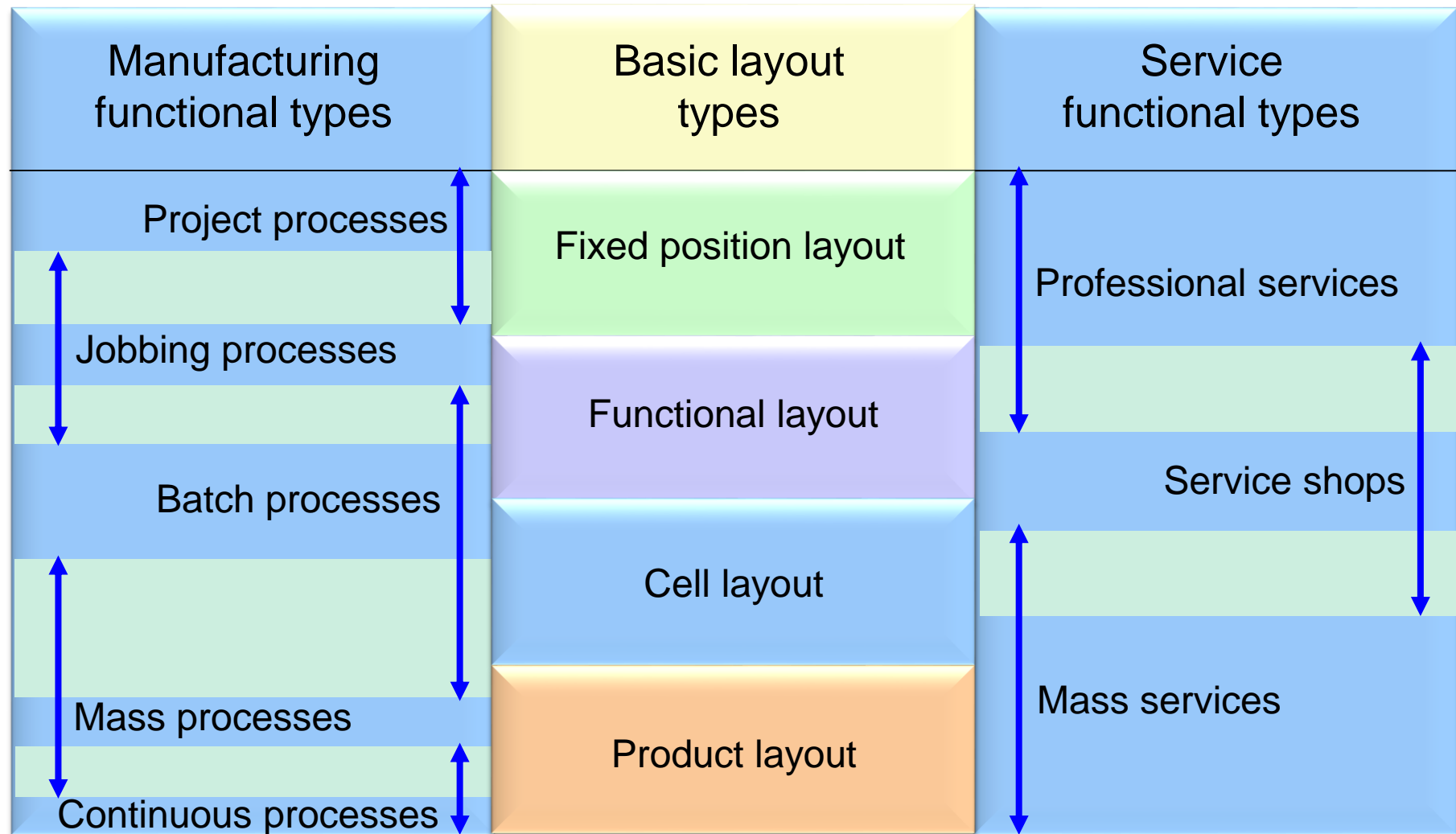
A restaurant complex with all four basic layout types



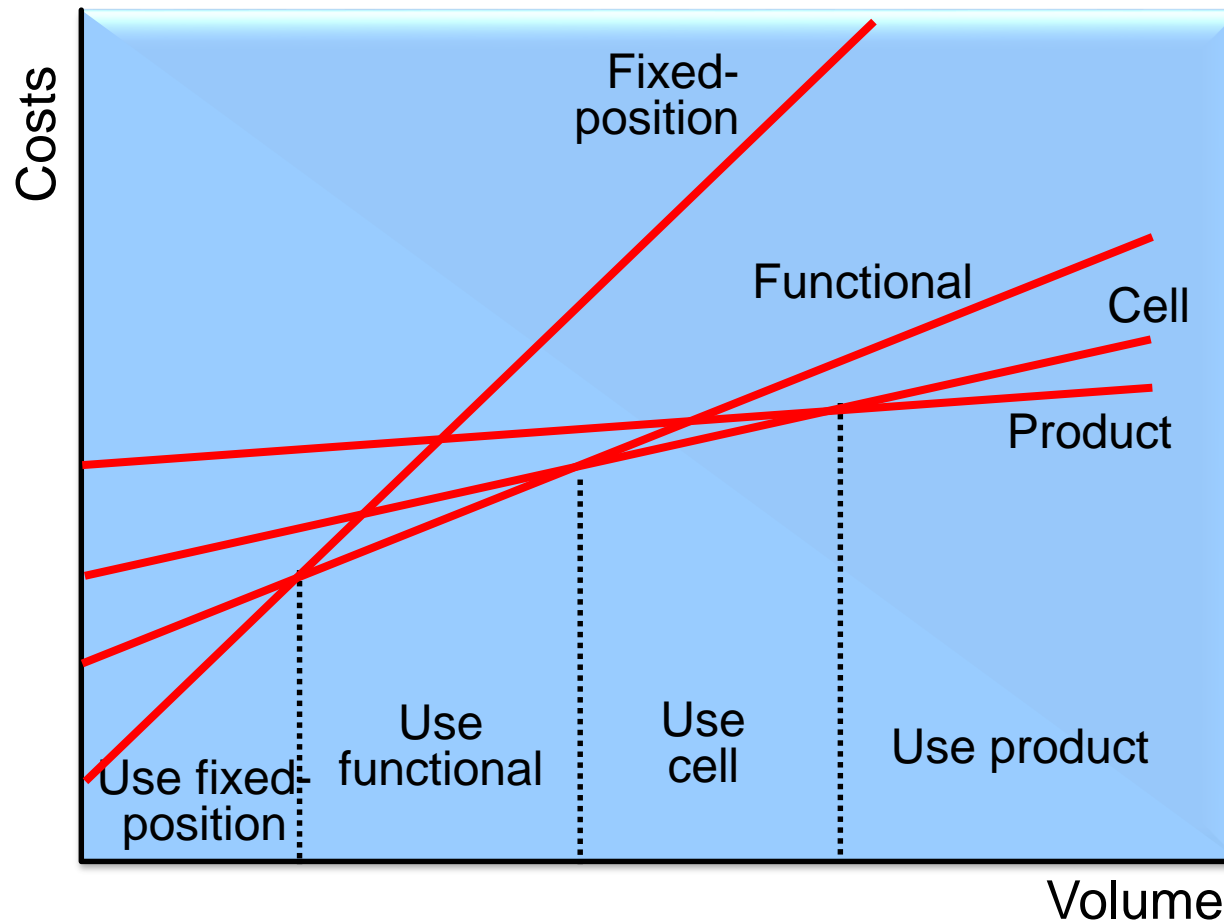
Volume and variety characteristics of layout types



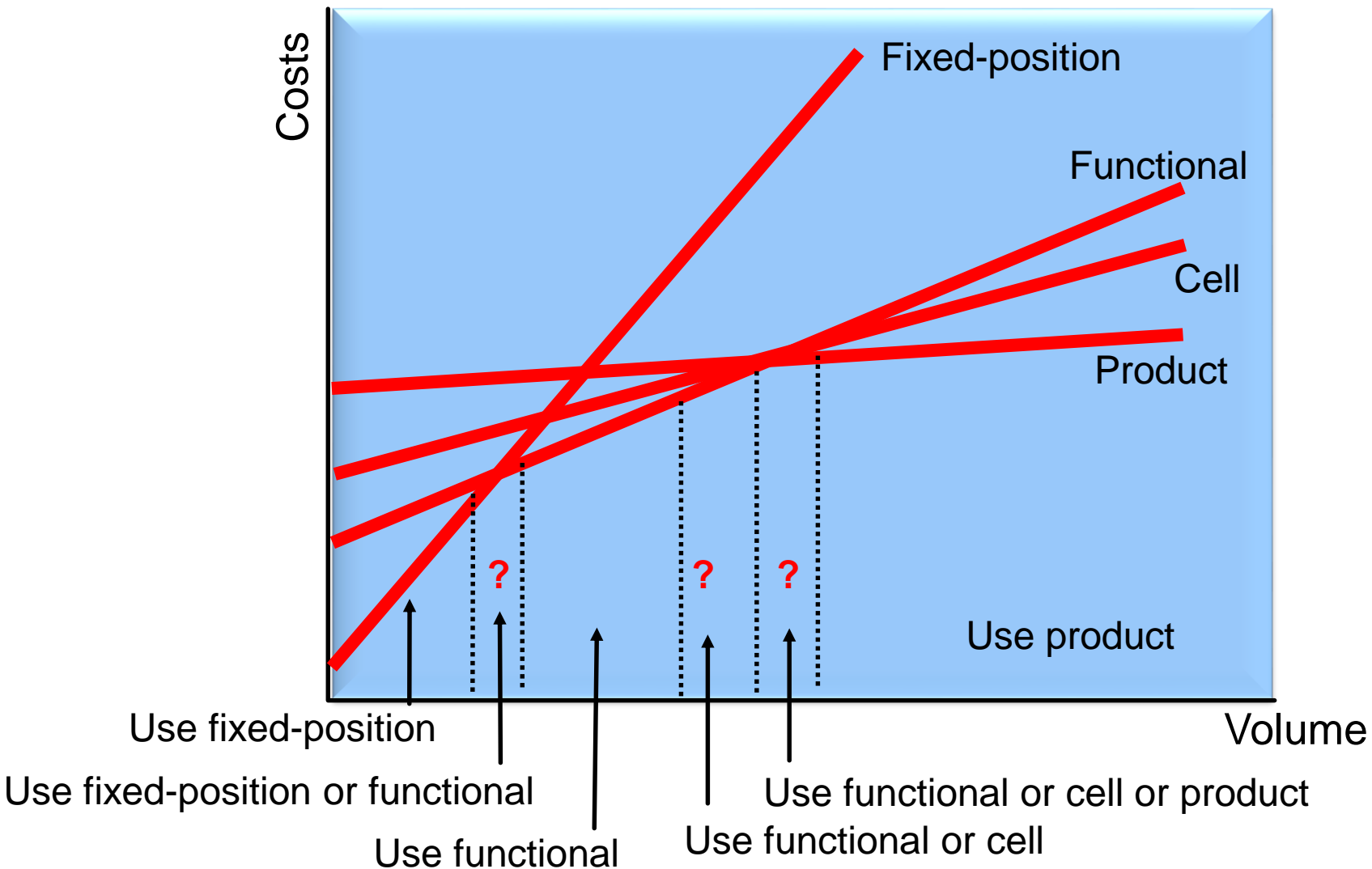
The relationship between functional and layout types



Basic layout types have different fixed and variable costs that seem to determine which one to use.

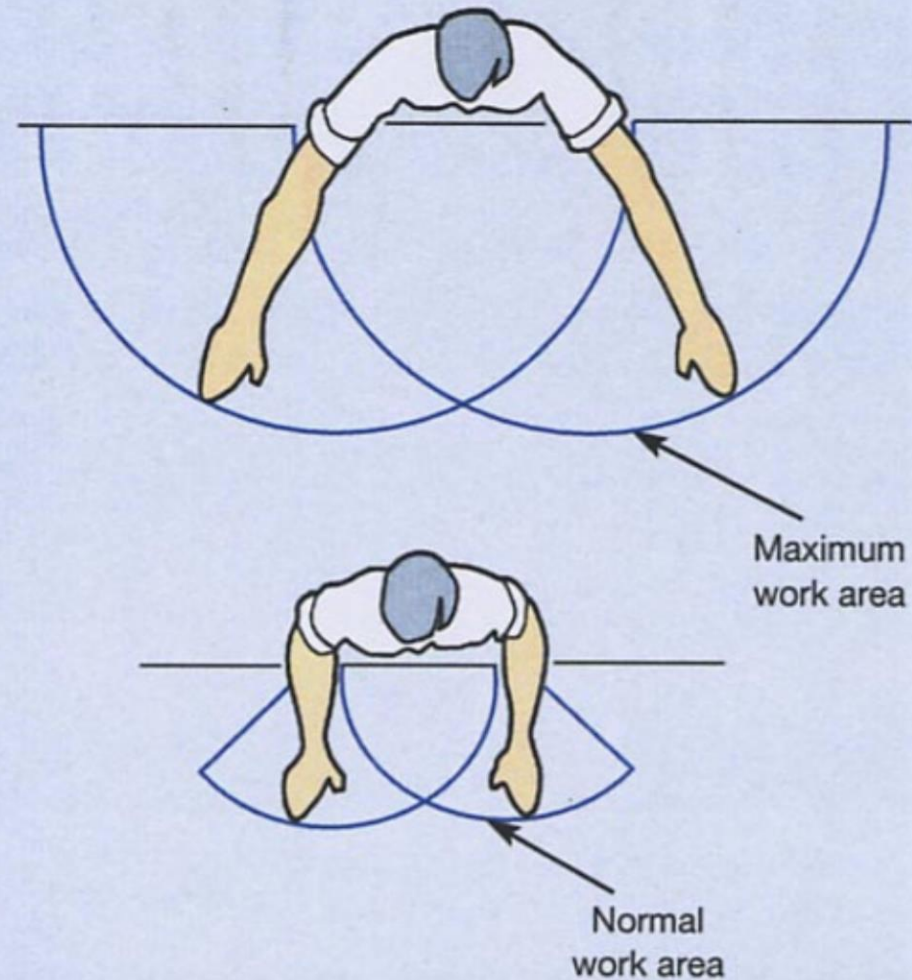
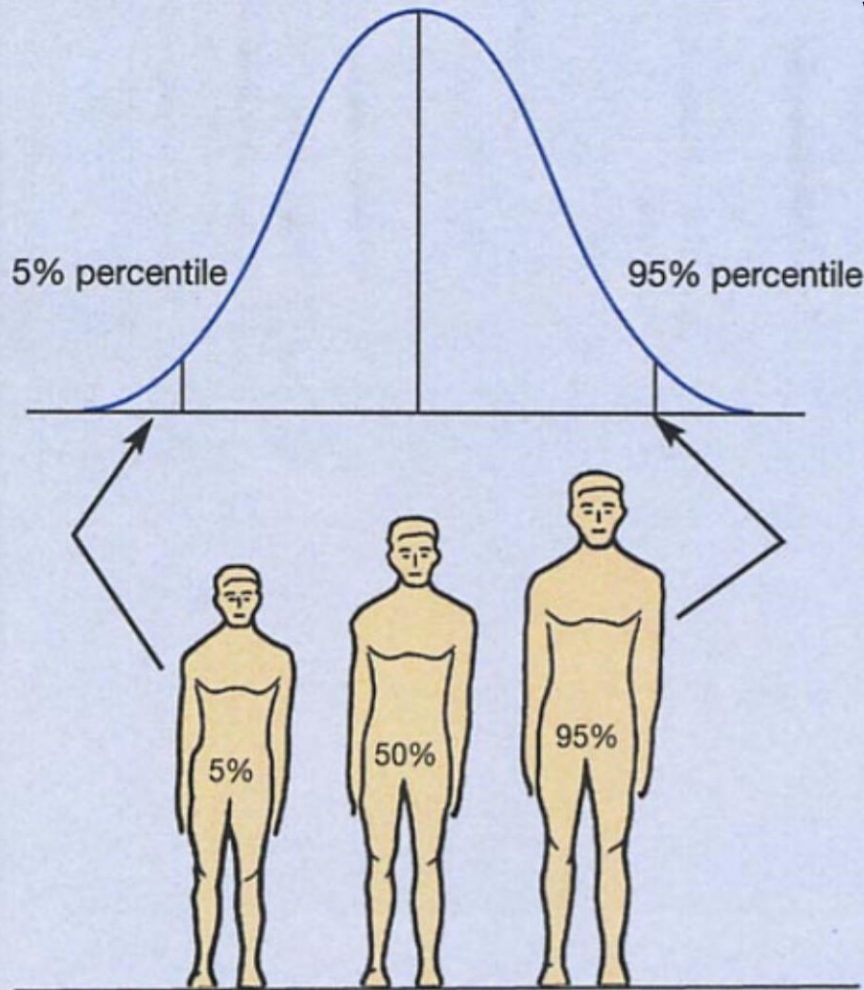


But uncertainty about exact fixed and variable costs means the decision can rarely be made on cost alone



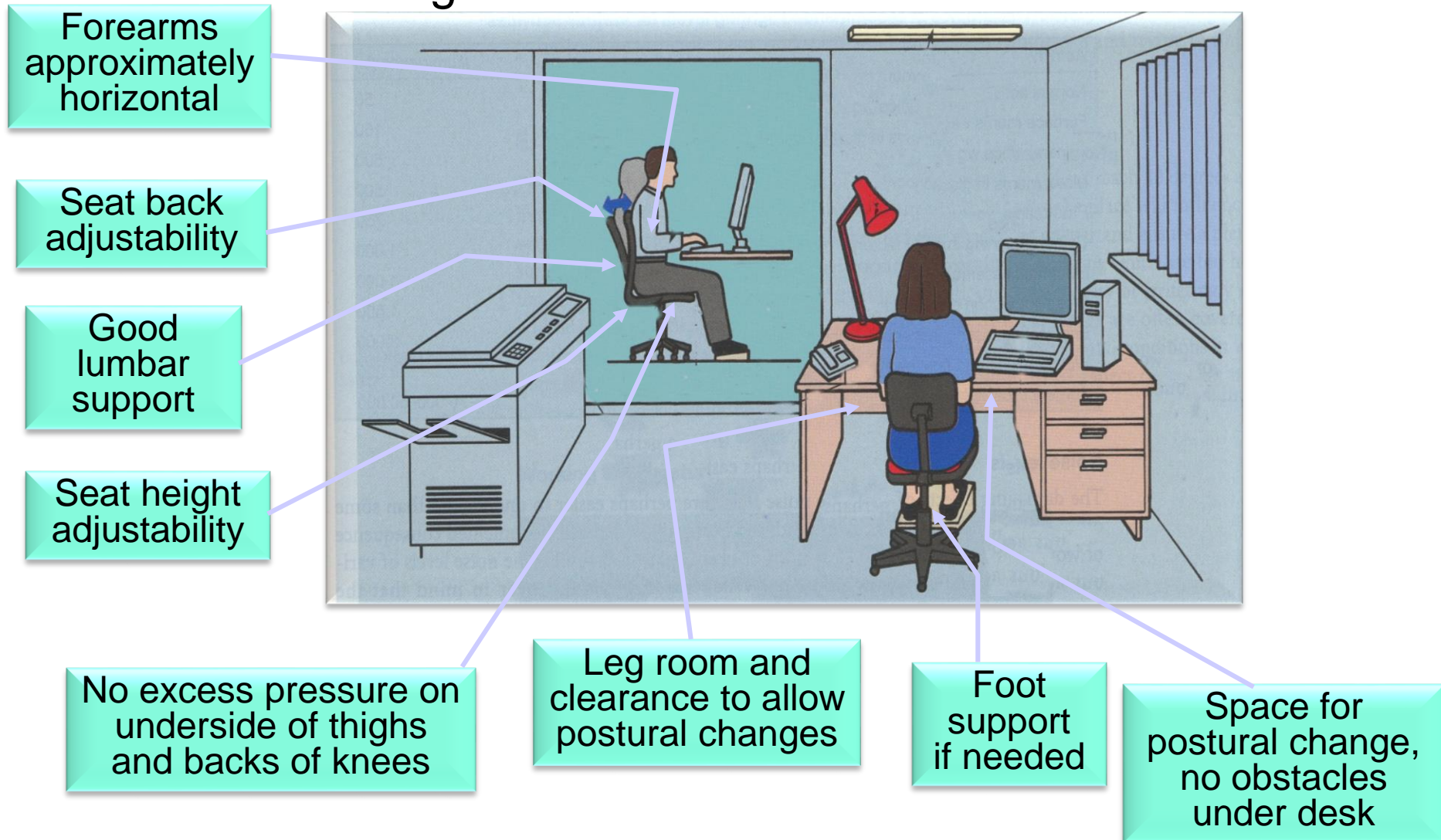
Workplace layout

Using anthropometric data, ergonomics can guide how people interface with their workplace



Workplace layout

Ergonomics in the office environment



Workplace layout

Ergonomics in the office environment

