

SHOULD THE MEAT INDUSTRY DIGEST CIM?

TONY BISHOP and
DAVID SMITH

PA Consulting Group
Cambridge Laboratory, Melbourn, Herts.
SG8 6DP England

INTRODUCTION

The first industrial revolution brought machines to industry. Now we are in the middle of a second industrial revolution, based on computers and telecommunications. Like the first, it is taking time to achieve its full impact. Individual computers have improved the efficiency of specific business functions, such as accounting or warehousing. Gradually, companies are realising the potential to enhance the performance of the whole manufacturing organisation. The new ingredient is **integration**, and Computer Integrated Manufacturing (CIM) is one of the powerful tools which can bring about such changes.

WORLD CLASS PERFORMANCE

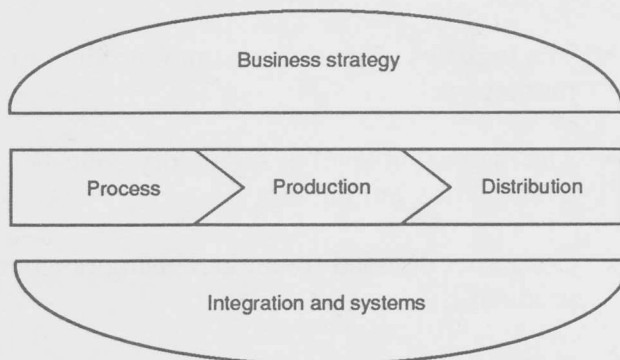
Companies bent on long term survival in global markets are increasingly focusing upon achieving manufacturing excellence of a global standard. Just to enter this race, these companies must have a well-formed vision of the markets in which they intend to be strong, and of the manufacturing and product knowhow they will need to penetrate those markets. They recognise that manufacturing competence is a key weapon of business strategy.

To achieve the necessary standard of manufacturing excellence, they must improve their ability to deliver quality products to market, reduce production costs and tackle a host of similar problems critical to their vision. They must develop a strategic plan, which will define the path from now to the achievement of the vision. To implement this strategy, they will use paradigms, philosophies and

techniques which convey an understanding or provide a useful method.

Some of these are widely recognised, especially Total Quality Management (TQM) and CIM. However, these arose from quite different sources; they overlap in some areas and also leave voids. We need a framework from which to select such approaches. One such framework is represented below, and is (inevitably) called the 'Hamburger bun'!

The 'Hamburger Bun' - a framework for business improvement



At the top, the whole business must be driven by a coherent strategy, which will define long term markets and areas of manufacturing superiority. From such a strategy spring internal goals for the organisation such as quality, time to market and cost. Within the 'meat' of the hamburger are the primary activities which create product value. These can be improved in a variety of ways:

- by improving the way the whole organisation works through better culture and methods. TQM tackles this task from the angle of quality.
- by improving more specific areas through techniques such as JIT, which aims to simplify logistics, and hence create more efficient production.

The lower part of the bun is concerned with integrating the business, largely through the use of computers, networks and automation, and this is where CIM applies.

These approaches have been interpreted and defined in a variety of ways. This is especially true of CIM, where the scope can vary from integrating one area of production in a single factory, to the completely integrated global enterprise. As the key element of CIM is integration, it follows naturally that the scope of a CIM strategy should be the area of business which forms a natural unit of integration.

There is a range of issues in the meat industry which can be addressed through the use of CIM. These include:

- The logistics of getting a natural product to market.
- The increasing level of regulatory control over quality, output, etc.
- Consumer demand for an increasing range of products.
- Continuing cost pressures.

All of these can be improved through better integration of the business, and examples in other industries have demonstrated this conclusively.

WHAT IS CIM?

Because CIM is so diverse in its application, there are many definitions. However, the central concept is that a successful CIM implementation will result in a manufacturing business where all processes are integrated; where production planners and schedulers, operators and accountants share the same data as foremen and process engineers.

The techniques and technologies that make up CIM span **all** the major business functions, including those of related businesses such as customers and suppliers. Some are basically to do with improving the effectiveness of specific functions. Others are more to do with integrating the activities of several functions.

Ideally CIM develops coordination among business functions (the people, their roles, and their methods of operation) and also helps refine, modify or reorganise some functions to meet customer needs and competitive pressures, regardless of today's organisational structure. A completely integrated data flow from receipt of order to delivery of the product is the ultimate CIM configuration.

Streamlining tasks in this way moves functions closer together in terms of completeness and timeliness of information flow, providing more accurate data, better control and faster execution. It obliges people in all functions to seek common ground for sharing information.

CIM is not a product. You cannot rush out and buy it for immediate installation. On the contrary, CIM is a strategic approach that takes several years of development. It begins, not with a decision to invest, but with a clear understanding by top management of the markets they operate in. What will they be making in the years ahead and what are their competitors likely to be doing then? Based on that vision of the future, top management can then - and only then - begin to build a picture of the technologies they need, to create a manufacturing operation that will be competitive in the long term.

These technologies are not fixed. They are being added to constantly. Companies must learn to develop CIM whilst continuously drawing upon relevant advances in technology. To do so they must bring together business, research, engineering, production, data processing and human resources experts into a dedicated manufacturing technology team.

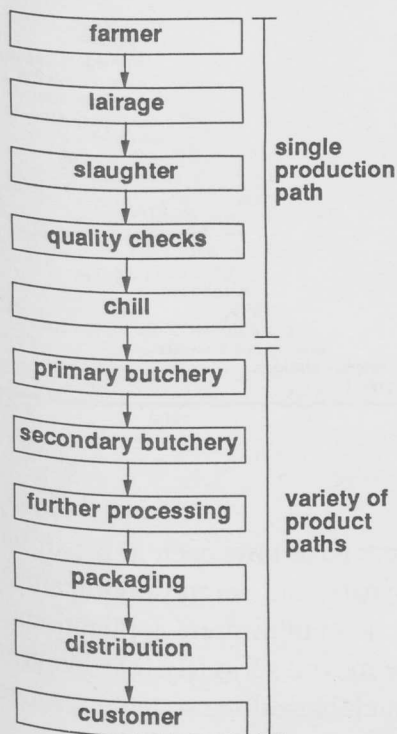
The investment required is substantial, in terms of capital cost, training, and in management time. CIM frequently also leads to major changes in the patterns of thinking and behaviour throughout the organisation. Trying to apply it as a bandage to cover up the shortcomings of archaic practices will not effect a cure.

THE CONSTITUENTS OF CIM

It helps to think of CIM as a toolkit of techniques and technologies, applied within a clear strategic framework. Some tools are available off-the-shelf as products from vendors, for example, production control software. Others are essentially philosophies, themselves involving a variety of management techniques.

One useful way of looking at the constituents of CIM is through the concept of value chain analysis, popularised by Harvard Business School's Michael Porter. Porter argues that the whole objective of a manufacturing business is to add value to the product. Value is directly added by any process which moves the product from raw material through to the market.

Primary value chain for a meat producer



Everything else is there to support this primary value chain. Processing instructions and plans are needed to facilitate a process, as are the raw materials. Storing and moving data or materials do not add value themselves.

Note that the value chain cuts right across conventional departments. It focusses the mind on removing the barriers, and hence on integration.

We can break down all CIM technologies into these three categories:

1 Adding value

There is a class of CIM applications which apply to specific functions, and contribute directly to one element in the value chain. These technologies improve the efficiency of each specific activity and, where they capture data in a suitable electronic form, lay some of the foundations for integration. They are called **value technologies**.

Since the added value which the slaughtering and butchery processes give to an animal is small and under increasing pressure, optimisation of each stage in the process is critical to the profitability of the industry. Particular examples of value technologies are the dividing of a carcass into its primal cuts; removing the bones; and accurate portion control.

2 Materials handling

This category includes automated warehouses, conveyors, guided vehicles and stackers - what we can call **materials technologies**. They provide the means of moving materials from one operation to another and for storing them in intermediate buffers if necessary. Such operations do not add value, and should be avoided if at all possible. If essential, they should be done economically. The economical approach often involves automation, in which case the machines need to be told what to do and when. They, in turn, must report completed tasks and any problems.

3 Information handling

Here we include all activities associated with the acquisition, storage, transfer, retrieval and analysis of data. So progressing, inspection and cost accounting are included, along with the computers, databases and

telecommunications which support such functions. These are labelled **information technologies**.

Such activities can often be simplified. Most businesses collect a lot of irrelevant information, whilst missing out on more vital facts. However, there are often complex regulatory requirements to be met. For example, there may be regulatory requirements that every carcass must be tracked and legal records kept. These do not add value, but the activity is mandatory.

In the case of the meat industry, we are dealing with a natural food which is produced on an extended cycle and which can suffer from variable weather. And yet the consumer demands an even supply, and in ever increasing variety. Control over the whole chain is needed to maintain an efficient supply, and optimising in this manner is already being practiced in the food industry.

Automation has already been applied extensively to all stages up to the chiller, but thereafter there is still much scope. The wide variety of processes (dependent upon the final product) have made this difficult to address; but developments in technology now make many improvements possible, especially in the area of packaging.

Quality is an area which is attracting more attention. Farmers in some countries are paid according to the inspected quality of the meat. Storage of information about quality is desirable so that consumer complaints can be tracked down to a specific carcass and sequence of operations. This all implies the collection and processing of more data; data which has to be collected from all parts of the value chain.

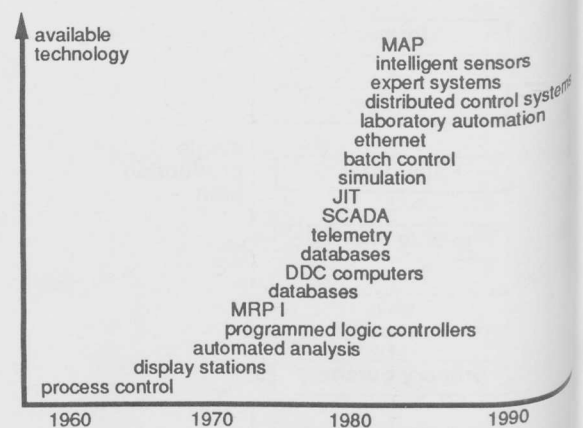
WHERE IS CIM TODAY?

The early history of automation has largely been a process of replacing people with computers and machines, creating 'islands of automation'. In essence, CIM's role is to

integrate a whole range of manufacturing and related activities, which until recently have operated independently. This poses a number of challenges to managers: not only do the various makes of hardware have difficulty coordinating with each other, but the functions they manage are usually organised differently. The managers of these functions also tend to have different and firmly held views of the world. The information technology department sees the issue in computer terms; the shop floor is only concerned with production problems.

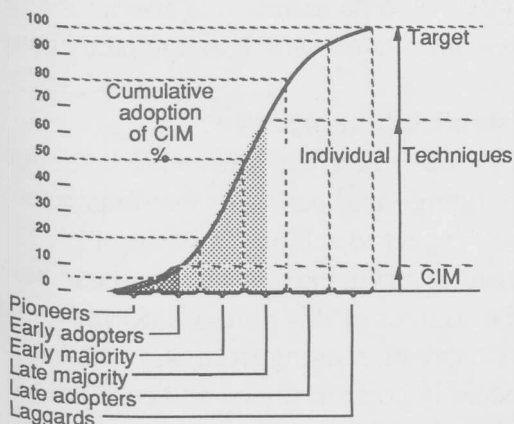
A clear understanding of the company's need for integration has to underlie all decisions on technology purchase, systems, database design and organisational restructuring. The range of CIM technologies has developed rapidly over the past three decades. Some of the tools with the greatest potential are among the most recent and hence are the least mature.

Technology development



Computers have now been in use in industry over 30 years, and yet most companies still only use them in discrete applications. Only a few have moved seriously into integration, and those which have done so have achieved many benefits.

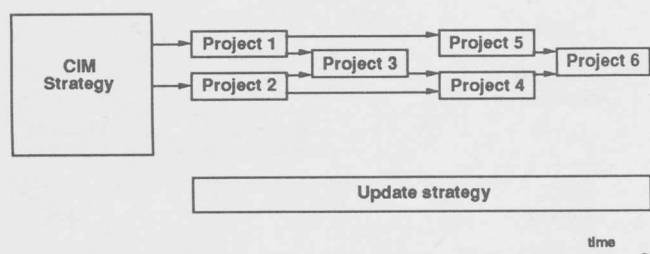
The adoption of CIM



The output from the strategy includes a programme for a series of discrete, inter-related, manageable projects. These are prioritised on the basis of the Pareto benefits they bring to the client. Early projects should be aimed at achieving some short-term sustainable benefits.

Since the overall CIM activity is long-term, the strategy must be updated on a rolling basis. CIM is not a once-only exercise. It is part of a new culture of continuous improvement.

Achieving CIM by stages



It is important to recognise that the world will move on during the implementation of, say, a five year implementation plan. Therefore, the goals of the business will change and one must expect to re-define the strategy periodically to meet the new goals.

The early stages will involve the whole organisation in becoming committed to a common vision of the future. This corporate commitment is essential to achieving any large measure of change in a company, and is one of the most difficult elements to accomplish in such a plan. In most cases, the organisation can benefit from a radical re-think before expensive automation is applied. There is little point in plastering expensive computer systems over the cracks of a poor organisation. Concepts such as Total Quality Management, Just In Time and Integrated Logistics can be applied in the early stages to develop the shape of the organisation and the way in which it thinks.

ACHIEVING CIM

The radical nature of CIM implies that it cannot easily be achieved with a 'big bang' approach. Instead, a gradual implementation process has to be designed, which is more manageable, but which can still bring about some early benefits. A CIM strategy is an important first step, to map out the architecture and scope. The strategy is needed to define the objectives of the CIM development, the scope of the work, the dependencies between each element of CIM, the architecture of the systems, an estimate of the benefits, costs and potential risks and to set the criteria to measure success. It is vital that by the end of the strategy phase, all senior executives have a clear understanding of:

- the issues they face
- the decisions they must make
- the options available and a clear picture of the CIM direction they have chosen
- the costs, benefits and risks associated with the work
- the factors by which they can monitor progress and success
- and the resources and commitment they must make.

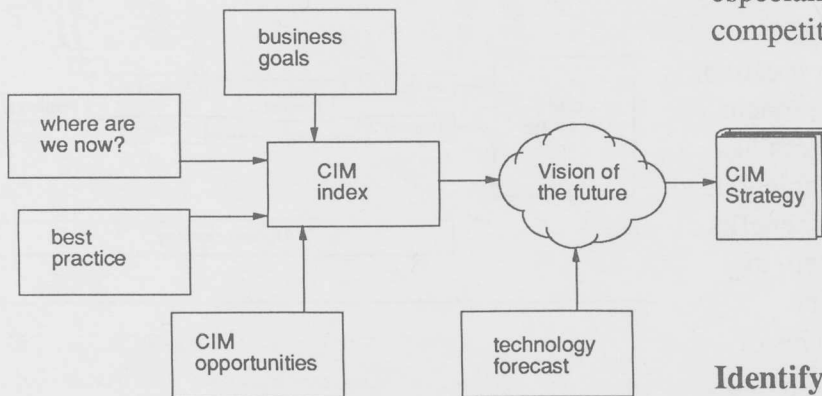
Senior staff must be committed to making the CIM development a success. They must also know what is required of them to support the work.

CIM is a journey, not a destination. A healthy organisation will always establish new business goals before it achieves the old ones. Only by creating new challenges can it hope to stay ahead of the competition.

CIM STRATEGY

The process of achieving CIM starts with the CIM strategy. This typically takes six months to prepare. It requires measurable stages to monitor progress.

Developing the strategy



The main stages are:

Define the business goals

The overall business strategy for the organisation will not normally be expressed in manufacturing terms. Those parts that are relevant to manufacturing and its support systems need to be interpreted in terms of CIM.

Establish where we are now

Managers often do not know in sufficient depth how the current organisation operates, but a detailed understanding of this is essential before implementing CIM. Modelling the current organisation involves analysing the type and nature of the company's activities; what data is used around the organisation and how it is disseminated; the control systems and how effectively they perform for each activity. This modelling activity is based on the identification of the value chain and upon measuring major parameters related to the chain, such as time or cost. Such analysis is vital to help senior

managers understand the nature of the changes that have to be made. It is also used as a baseline against which to compare changes.

Establish best practice

Here we seek to establish what other companies are doing - and perhaps more importantly, what they expect to achieve in terms of manufacturing performance and technology. The sources of this kind of information are widespread, ranging from published articles to specially commissioned and confidential research. Increasingly, other companies - especially companies which are not direct competitors - may be willing to exchange information. Do not limit best practice data gathering to competitive companies. The most significant technology breakthroughs are more likely to occur in other industry sectors, in other countries.

Identify the list of potential CIM projects

With the basic understanding of the business drivers and of the level of technology needed to remain competitive, you can next begin to match business needs to specific CIM technologies. For example, in the meat industry, one is likely to include in-line inspection systems, logistics planning, packaging automation, and a range of commercial systems. This type of list can be drawn up with a wide knowledge of the state-of-the-art in available CIM technologies together with information on potential suppliers.

Draw up a CIM Index

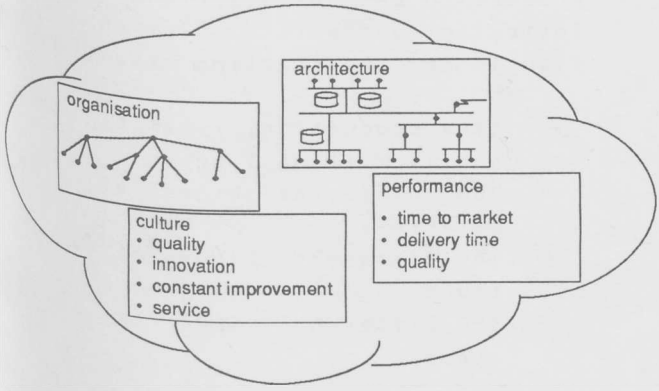
The CIM Index is a straightforward means of assessing CIM priorities against business goals. Each business goal is weighted in terms of importance and each CIM application is weighted in terms of its contribution to each business goal. This provides an initial picture of which applications will have most impact on the business. That picture may subsequently be modified by an examination of dependencies between applications - for example, although

creating a product data base may not in itself produce major cost savings (indeed, it may incur a net cost) it is an essential preliminary to technologies such as CAE.

Define a vision of the future

Senior managers are now in a position to pull together a relatively complete picture of where the company could (or should) be in manufacturing terms in five years' time. This vision should include the architecture of the manufacturing process; what kind of cultural changes are needed; and how the organisational structure will have to change. There may be fewer levels within the organisational hierarchy, as computers simplify the assimilation and dissemination of information. Work will increasingly be handled by teams formed to tackle specific projects. We also have to overcome the vertical command and control structure which inhibit horizontal integration.

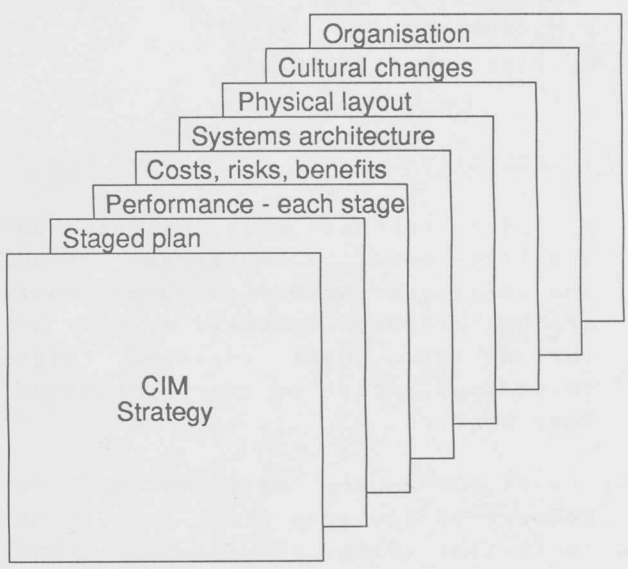
Vision of the future



Build the complete CIM Strategy

There is a natural sequence to building most CIM systems, in that it makes sense to start at the front end of the business, and first install those systems which have to generate the initial data. Within a process business it is sensible to start with the low level control systems and their sensors, before building higher level control systems which require the data from lower down.

Finally, one can sequence all the projects, taking account of dependencies and resource constraints.



CONCLUSION

CIM is not an easy option, but the benefits are such that it may become an essential route for successful businesses during the 1990s. Careful planning is essential, in order to ensure that only relevant, cost-effective technology is applied. The human aspects of CIM are equally important; the culture and organisation need to be developed in concert with the technology.