

Contract Manufacturing in Life Sciences

The Need for an Integrated Approach

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What is this Contract Manufacturing Thing all About?

Definition of contract manufacturing & CMO

This white paper is written to explain some best practices in the area of contract manufacturing in Life Sciences, from the point of view of the contract-giving company.

For our purposes, we define contract manufacturing as the carrying out of any part of the conversion process of a product by an organization other than that which owns the rights to sell the product under its own brand name. We use it to refer to any situation where some aspect of the product is changed – so a secondary packaging operation can be included, but a simple logistics operation would not fall into this category.

Throughout this document, we will follow industry convention by using the abbreviation ‘CMO’ for Contract Manufacturing Organization, meaning any company which undertakes some product conversion activity on behalf of another.

Use of CMO in Life Sciences

The use of CMO in the Life Sciences industry has been growing fast over the past decade and continues to do so. This trend is constant across all sectors of the industry.

However, this simple picture of growth hides a wide variety of situations – from the ‘virtual’ company that develops drugs but owns no production infrastructure, to a ‘big pharma’ with a global network of manufacturing sites, using contract manufacturers to supplement the internal facilities with additional capacity, specialized technologies, or local manufacturing for particular markets. Shifts are occurring at both ends of the spectrum: many big pharma companies are keen to move further towards a variable cost model, whilst in some cases companies previously operating ‘virtually’, at least in a new area such as BioTech, are now starting to build their own facilities or consider doing so.

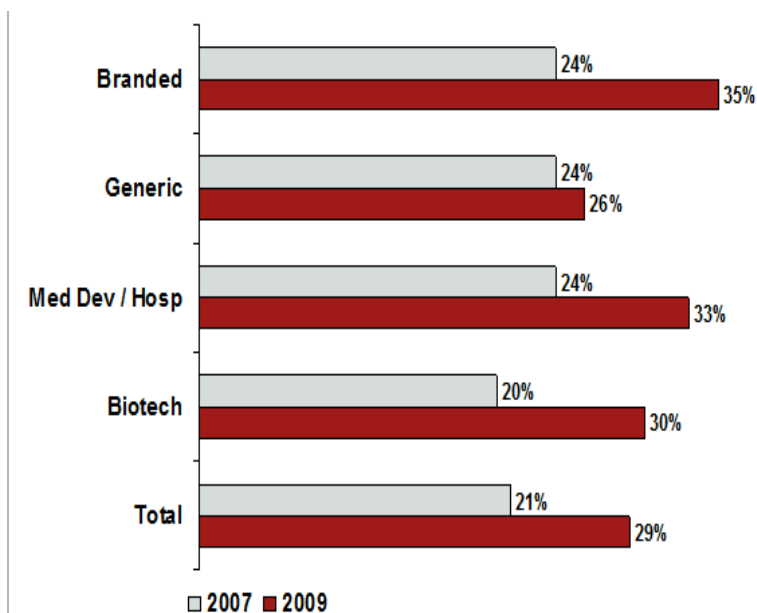


Figure 1: Percentage of Life Sciences manufacturing output produced by third parties

The operating models of companies at different places along this spectrum are of course very different – but many of the principles of operation are similar, and the questions that need to be asked in order to develop a robust and adaptive CMO strategy, a comprehensive governance model, and a flawless method of execution, are essentially the same.

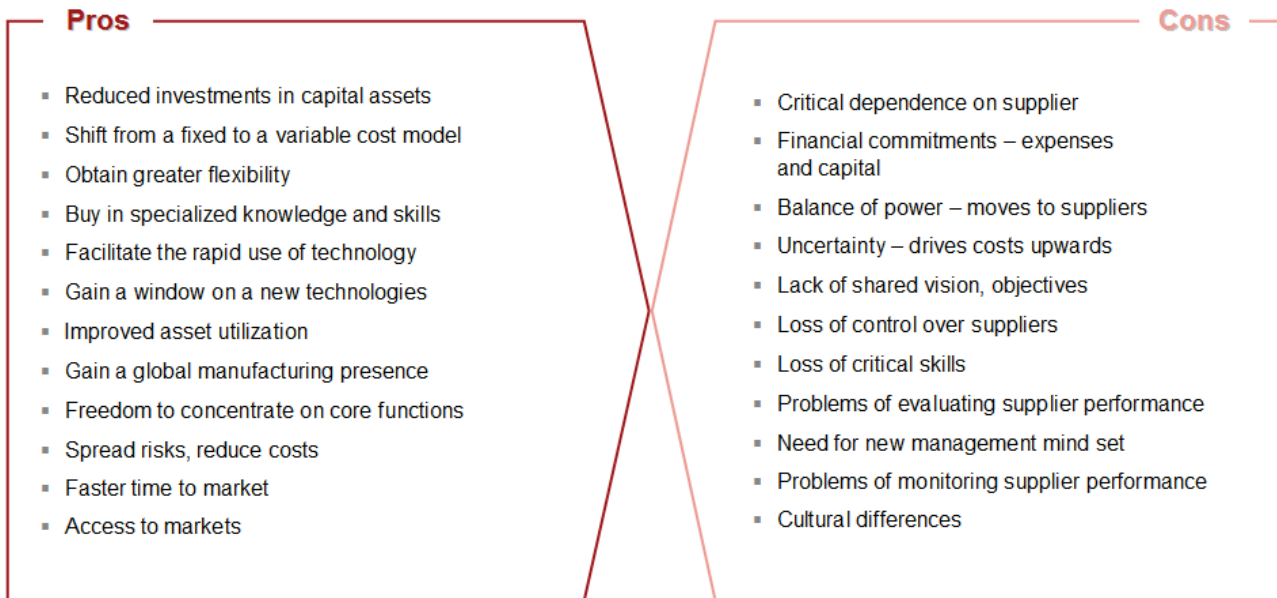
Drivers for using CMOs

The most common reason given by companies choosing to outsource is ‘cost’. Certainly, most companies would not choose to outsource if it were more expensive than producing it in house – but there are three main drivers for this cost differential, which can be regarded as the underlying reasons for outsourcing. These are access to capacity, access to technology, and access to markets.

External manufacture required by licensing-in deals is a special case of outsourcing in order to get access to markets: the deal is done in order to gain the product and thus access to the market for that product. The best practices discussed in this document apply whether the external manufacture is mandated by contract or is a free choice, and whether the driver is capacity, technology, or market access.

Advantages & disadvantages of using CMOs

Whatever the original driver behind the decision to outsource, there are a whole set of advantages and disadvantages to using CMOs, some relating directly to the original driver for outsourcing and some supplemental to it. Some of the common pros and cons are given below:



The pros are real – and these benefits are why so many companies turn to outsourcing. However, the cons must also be considered and, where necessary, reduced or mitigated to ensure that they do not outweigh the gains. This white paper aims to show the way to getting the pros and managing the cons.



Why is an Integrated Approach to CMO Use so Important?

Typical problems experienced with CMO use

As discussed above, there are real gains to be had from using CMOs but too many companies are not seeing the benefits they had envisaged. In our experience there are a four common 'headline issues' that companies experience with their use of CMOs:

Headline issue	Typical causes
Contract cost	<ul style="list-style-type: none"> Contracts formed with the wrong objectives in mind – e.g., optimized for development not for commercial production Contracts do not allow enough flexibility for demand uncertainty and have punitive penalty clauses No mechanism built into contracts to incentivise yield and efficiency improvements over time
Complexity	<ul style="list-style-type: none"> Operating models not defined Internal CMO management structure not in place – too many or too few people responsible Lack of defined processes for exchanging information with CMOs
Working capital	<ul style="list-style-type: none"> Lack of visibility over supply leads to introduction of large buffers No end-to-end supply chain inventory planning
Operational deficiencies (process / quality issues)	<ul style="list-style-type: none"> Wrong CMO chosen – poor technical or cultural fit Little or no integration of information systems between parties Lack of clarity on objectives Insufficient sharing of information

Just as 'cost' is the catch-all reason for using CMOs, it can also be said that all of these issues come down to cost, either directly or because the costs of managing the problem become too high. Often, these potential costs have not been properly evaluated up front.

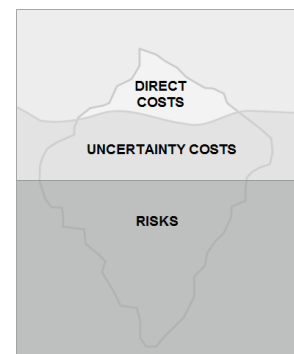
The 'cost iceberg' of contract manufacturing

The direct costs of contract manufacturing tend to be well understood – the conversion cost, the cost of materials you supply, the cost of maintaining your own CMO management structure. In order to get the most out of using CMOs, it is necessary to understand that these are not the only costs. Indeed, these direct costs can all too often be only the tip of the iceberg.

Also significant, and in some cases larger than the direct costs, are the uncertainty costs. These are the costs built into the supply chain because of a lack of trust between different parties. The biggest of these is typically inventory – the additional working capital tied up in the chain because of fear of supply interruptions, and caused by lack of visibility, poor communications, and lack of systems integration.

Potentially the biggest costs, and certainly those which are located in the murkiest depths and which are least well understood, are the risks. How can you quantify the potential loss of future competitiveness by failing to maintain the right technological competencies in-house? Or the reputational cost of a wrongly chosen and poorly managed contractor making an error which compromises quality?

Many companies originally consider only the direct costs of contract manufacturing – but unless uncertainties and risks are appropriately controlled, the direct costs can be just the tip of the iceberg.



Each of these cost categories needs to be understood and addressed, whatever the driver for using CMOs.

An integrated approach to CMO is an essential capability

To make a success of outsourcing, you need to know how to take advantage of the potential benefits while minimising the risks and eliminating as far as possible the uncertainty costs. The only way to do this is to take an integrated approach to contract manufacturing from defining the strategy right through to what happens on the ground – ensuring the actions people take are consistent with, and directed towards, the objectives you have defined in your strategy.

Organizing yourself to keep down direct costs, working with your partners to minimize uncertainty costs, and understanding the risks in order to make appropriate choices, are all part of the essential capability that is being able to work with CMOs.

Whatever your objectives are for using CMOs, it is important that you – and everyone in your company – have a clear understanding of them. We will cover this topic in the section 'Strategic agenda'. Once that is clear, you can focus on how to organize the relationship with the CMO to deliver the benefits you want to realize, and how to organize yourself internally to deal with the CMO – covered in the section 'Tactical agenda'. Finally, you need to manage the people, processes, and systems, in order to actually execute (Operational agenda).

What are the Best Practices for Using and Managing CMOs?

Strategic agenda: Decide where and why you want to use CMOs

For a 'virtual' pharma company, the decision on where to use outsourcing is relatively easy – the decision is taken by the business model, and all production will be outsourced.

For a company with an existing asset network, the question is far more complex. What does your network currently look like? Which technologies and capabilities do you want to retain or develop internally? Are CMOs to be relied on for capabilities you do not have yourself, or just to be used for additional capacity? Do you decide on outsourcing on a product by product basis, or do you take a whole portfolio view? Do you differentiate by product volume? By market? By product life cycle stage? What are the implications on cost, risk, and your internal asset network of taking those decisions?

Operational capabilities and competencies

In order to start to answer these questions, you need to start off by developing a clear understanding of the capacity and capability requirements of manufacturing your likely future portfolio, looking out 10 years into the future. This is the way to ensure your entire company has adequate time to think through the really big decisions, and evaluate what to invest in developing internally and what to outsource.

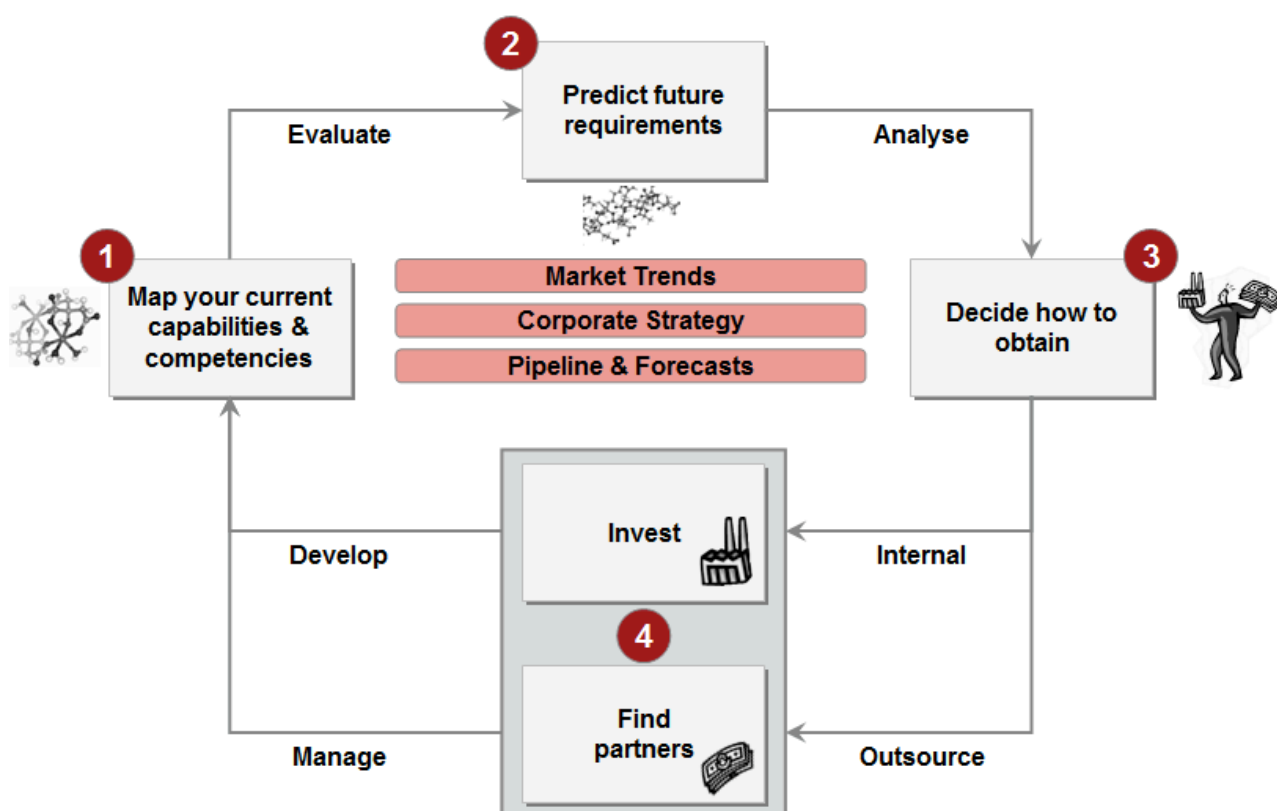


Figure 2: Establish clarity on what capabilities and competencies are core today, and what should be in the future.

It is important to note that this does not only apply to technical capabilities, and that decisions on what competencies to have yourself are not independent of each other. If your organization decides a new technical capability will not be built up in-house, then that decision implies that you will need to maintain or develop your capability to manage and partner with outsourcing organizations.

Network and asset configuration

In order to fully answer the questions on where and for what purposes you want to use CMOs, you need to have a comprehensive operations strategy planning process which enables you to make fact-based decisions appropriate to your corporate strategy and your appetite for risk. This will typically include modelling the business and simulating different options in order to understand the dynamics in a quantitative manner before deciding the direction and setting targets.

Sourcing strategy

Sourcing strategy is the product-centric view of the strategic agenda. Obviously a full asset network and capability review is not to be conducted every time you set up the supply chain for a new product – but the impacts of product-level decisions on the wider business do still need to be taken into account. Sourcing strategy does this with the objective of securing a reliable supply of product in a cost- and tax-effective manner. It is a complex area and involves many trade-offs between, for example:

- Tax
- Service
- CoGS
- Capability/capacity/quality
- Internal vs. external (impacts on internal network/alignment with strategic objectives)
- Risk management (supply, financial, reputational)
- Contingency planning - dual vs. single sourcing

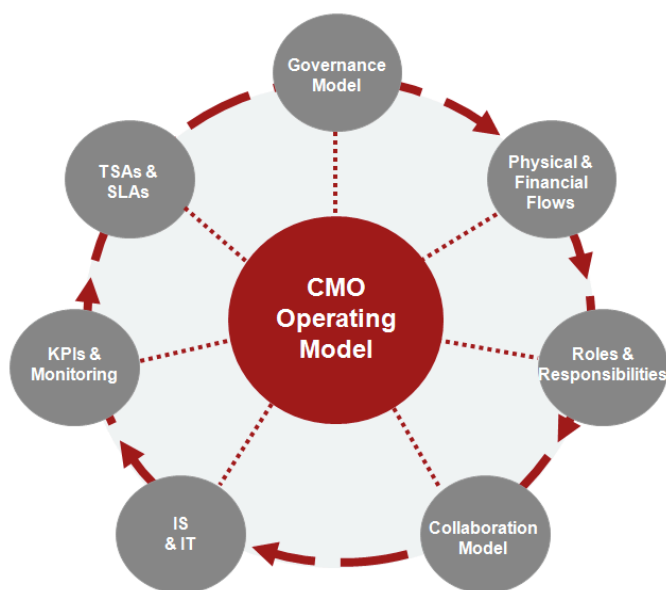
Many outsourcing decisions are driven by licensing and acquisition commitments, but for those that are taken freely, this process should also give you an understanding of what will be the appropriate type of relationship to set up with a contractor – whether you are looking for a long term strategic partner, or a low cost commodity service provider.

Tactical agenda: Organize yourself and your CMO relationship

The tactical agenda regarding how to organize yourself and your CMO relationship all flows from an understanding of your business driver – without that understanding, you won't know what you need to focus on in choosing and managing your partner. For example, a business driver of gaining access to a new technology without investing in it yourself will imply setting up a long term relationship and relying on the technical knowledge of the CMO. If the intention is to gain additional capacity of a commodity process, then unit cost is likely to be the most important factor. If your contract manufacturer is intended as a back-up sourcing option, then the total cost of maintaining the back-up option will be more important than the individual unit cost of items you may source from them.

Operating models

Once you know what you want to use CMOs for, and what the benefits are that you intend to obtain from it, you are ready to start looking at how to set that up in practice. For that you will need to define your operating model: how you will work with the CMO. If you use – or plan to use – outsourcing for a range of different situations, ongoing management can be greatly simplified by defining a set of operating models which are implemented in a relatively standardized way. There may be a number of these appropriate for different situations (e.g., one operating model for the outsourcing of a single step in the production of a strategically important product, another for secondary packaging in a local market, and a third for biologic API production). Most organizations that undertake this exercise find they can categorize their outsourcing relationships into around 6 – 8 high level operating models.



Operating models set out how the relationship with CMOs will be structured. Defining a set of these is a helpful tool in managing the complexity of using many different CMOs since it specifies what is important to focus on for each different type of relationship.

At the most basic level, the operating model defines what the physical flows of the product look like, which party has responsibility for it and which owns it at each stage, and how monetary flows will be organized. Toll manufacturing, where the contract giver retains legal title to the goods and pays a unit fee for processing, is a fundamentally different operating model to buying in API under license.



The physical, legal, and financial flow structure will then determine many other aspects of how you should work with the partner organization. Most obviously, quality responsibility legally rests with the company owning the product at the time – so how you organize your quality function and processes will necessarily vary according whether you own the product when the partner is processing it or only when you have it in your physical possession. Similarly, the kind of information you need to share with the other organization, the information systems to underpin that, and the kind of KPIs and service level agreements you have will all vary depending on the structure of the flows.

Incorporating CMO oversight into your organization structure

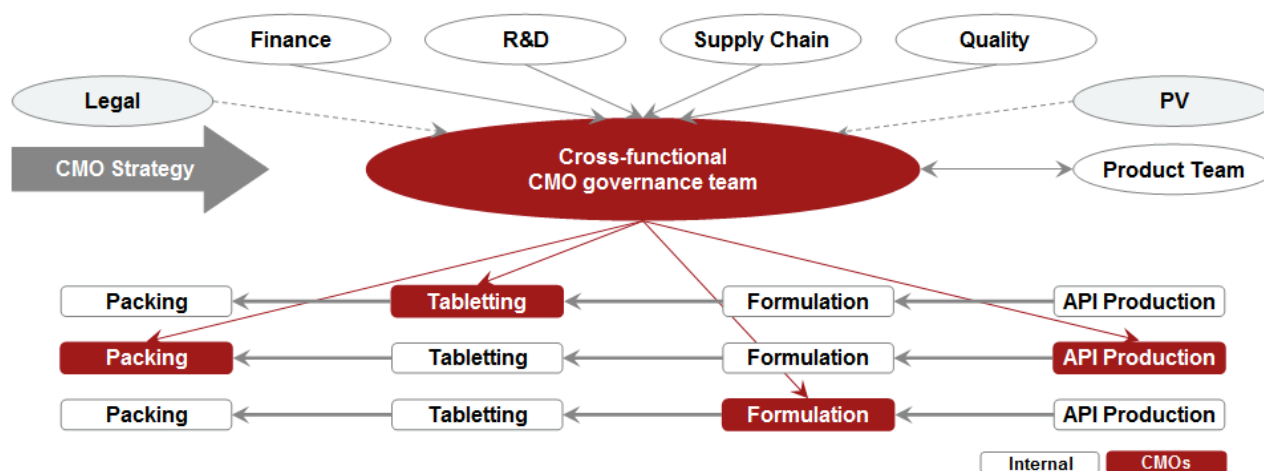
The most important factor regarding fitting CMO oversight into your organization’s governance structure is less how it is done, than the fact it is done at all. Too many companies have no clearly defined method for managing CMOs, and thus nobody is accountable for the performance of key parts of the supply chain. If using contract manufacturers is a part of your strategy, then someone needs to be responsible for delivering on it.

There are a number of options regarding how to organize this, but the one around which the industry seems to be converging as a best practice is to have a single person ultimately responsible for the whole external network, reporting in to the head of the supply chain organization. There is a trend towards the external manufacturing network being treated like an internal site for the purposes of reporting and performance monitoring. This ensures the CMO network receives the attention it deserves.

The ideal reporting structure for CMO responsibility varies between organizations – but in all cases where outsourcing is an important part of the supply chain, performance accountability must be clear.

Cross-functional CMO interaction team

It is also important to look at your organization structure at the level of dealing with an individual CMO. The practice of having a cross-functional team to ensure that all aspects important to the relationship are represented is now becoming well established.



This type of setup brings its own challenges, however. When representatives of so many different functions are in direct and frequent contact with the CMO, ensuring they speak with one voice and everyone is aware of the agendas of others can be complex. Some organizations are now adding a relationship management role to the team, whose prime responsibility is to co-ordinate the actions and objectives of the different functional members on the team. The advantages of this are that it preserves the direct functional communication (for example, it is essential that your quality people talk directly to the quality people at your CMO) while ensuring the coherence of the cross-company communication.

A further issue for debate is whether to have these functional experts inside the CMO oversight structure and dedicated to working with contract manufacturers, or to have them reporting to their own functional structures. If CMO use is an important part of your strategy, there are strong arguments for taking the dedicated expert approach.

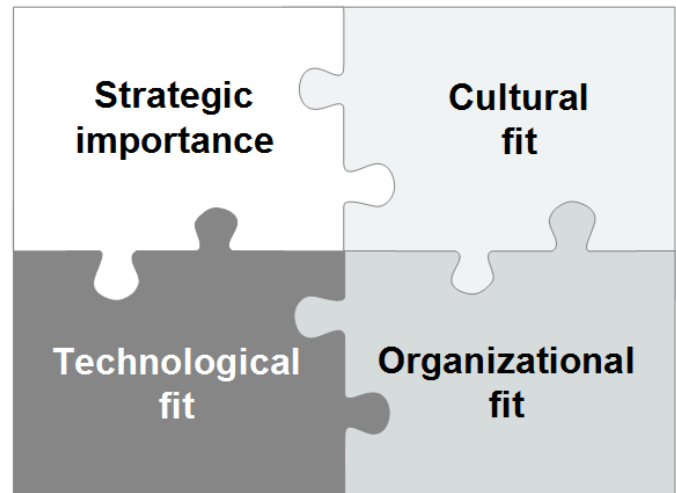
Partner selection

When the time comes to choose an individual CMO for a particular purpose, you should use a structured process, the selection elements of which must be defined before you start talking to any candidates. Such a structured and carefully thought through process is the only way to ensure a win-win relationship over the entire lifecycle of the contract.

The selection process should funnel down the prospective candidates through the following stages:

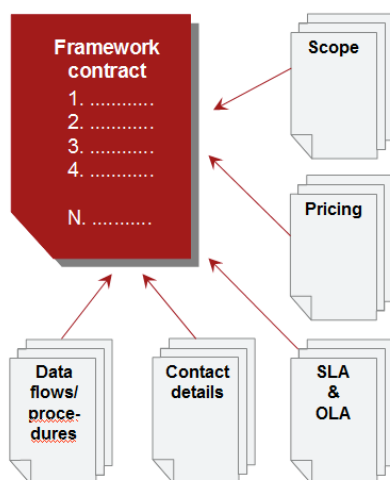
- RFI will assess the capabilities and structure of the CMO
- RFP will determine the match between you and the CMO on quality standards, daily management, liabilities, etc.
- RFQ will determine the financial impact it will have on your total cost of ownership

When selecting a CMO, you need to already be thinking about how closely you will collaborate with them – so you need to choose an organization with a fit which will allow the level of collaboration appropriate to the strategic importance of the relationship.



Contracting

The contracts between you and your partners are vital to the success of the relationship and should be treated as living documents, used on a daily basis rather than being stuck in a filing cabinet somewhere. This is easiest to achieve if you make use of multi-level contracts and develop them with usability in mind. Once the contract is signed, negotiations should be halted and the focus moved instead to periodic reviews.



Contracting is not just about price. Some of the other aspects that need to be considered and included are:

- What information you will need to exchange
- How to ensure there are incentives in place to drive the behaviours you want – such as continued cost reduction, yield improvements, quality. Think about how benefits realised by these things will be shared.

In setting up the contract, you need to make sure you are taking into account not just your needs now but also your long term goals, defined by your strategic planning process. Think holistically: about the needs of the whole portfolio (and thus the whole range of CMOs with which you deal); about the needs of an individual product over its entire lifecycle (make sure you won't be locked in to a contract which is no longer appropriate when the product moves into a new lifecycle phase); and about the needs of the relationship with the CMO over the entire lifecycle of the relationship you want to have with them.

Operational agenda: Work together to achieve flawless execution

Once you and the contract manufacturer chosen to meet your strategic needs have signed the deal structured to maximise the benefits, the hard work is done, isn't it?

Well, yes and no. It is true you have put the building blocks in place to allow the relationship to be as successful as possible – and by doing this you have determined the scope and extent of the benefits that can be delivered by the relationship. However, ensuring that those planned benefits are actually delivered in reality is what the operational agenda is all about. The operational agenda really is where excellence is won or lost.



Integration

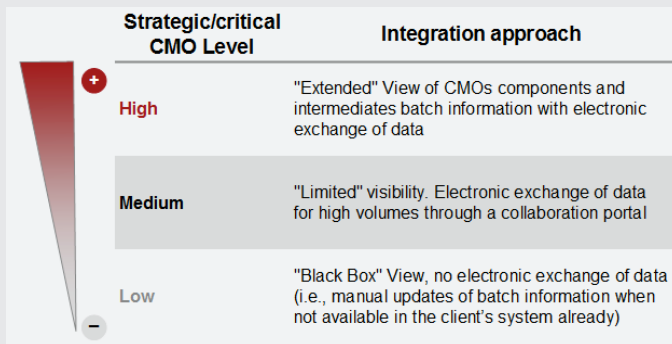
The biggest challenge in operating effectively with a contract manufacturer is communication – at the company level, at the level of individuals, and at the level of processes and systems. Integration of systems and processes is about allowing communication to happen without hindrance, in order to get visibility, cut costs, and anticipate risks.

Planning, procurement, supply, quality, and financial data and documents must be shared and synchronized on a daily basis. A business process platform is commonly used to automate and structure these information flows. Some companies now demand that systems are integrated to the point of giving the ability to see “straight through” the CMO – see the case study on batch traceability.

Case Study: Batch Traceability

An often neglected area when it comes to systems integration with CMOs is that of batch traceability. Real excellence in the CMO operations means you are as completely prepared to react if something goes wrong with a product that has passed through a CMO as you are with internal manufacturing.

A ‘Big Pharma’ company recently undertook a project with Lodestone to define and implement the exchange of batch information with their CMOs. This was prompted by an internal audit which tested procedures in the event of a quality incident. Different levels of system integration, requiring correspondingly different levels of manual input, were evaluated. It was judged most appropriate to match the level of integration to the level of strategic importance of the CMO. The fully automated data exchange – by far the most challenging technical implementation – was reserved for the most strategically important CMOs.



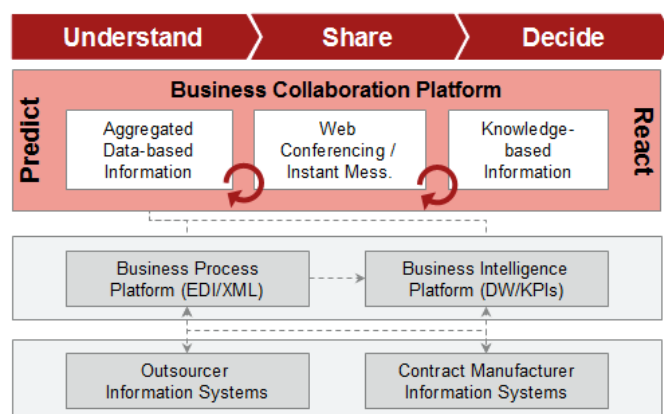
For strategic CMOs, nothing short of fully automated, complete batch information is required.

A high level of integration with the strategic CMOs is aimed at giving management the peace of mind that whatever happens, they have immediate access to full and completely accurate information on all strategic products, wherever they are made.

Collaboration

Collaboration is also about how people and technologies talk to each other – but taking things a step further than just integration. Collaboration is a mindset in which you treat your CMO as a real partner, and both organizations actively work together to make things go more smoothly for the other as well as to achieve your common goals. The more important the CMO to you, the richer the communication should be. From an operations point of view, there is no substitute for walking the floor at the CMO to see how things really are working on the ground. However, you are not going to be having face to face meetings on a daily or even a weekly basis. It is thus critically important that you have processes and information systems in place to facilitate and actively encourage the continuous sharing of information.

Collaboration – consisting of the sharing of knowledge-based as well as transactional information, and of joint decision making – is what will allow you to minimize the uncertainty aspects of the ‘cost iceberg’.



Process management and control

The final best practice we recommend is to institute a dynamic and reactive process to monitor and continually improve performance, whilst also managing the relationship with your CMO. This will be a meeting-based process (whether in person or remote) to facilitate cross-functional decision making. It can be run at different levels of your organization and at different horizons (strategic versus operational).

The objective of this process is for both parties to align resources in order to:

- Review KPIs
- Deliver one committed plan
- Respond to demand and supply variability
- Track and monitor business performance and continuous improvement
- Predict and anticipate risk

With a collaborative mindset in place, this kind of process allows both parties to look forward together and define or adjust the course on a regular basis, leading to better performance, lower variability in supply and ultimately lower costs.



Our Approach to Working with Clients on CMO

We are frequently called in by clients who see a particular aspect of their management of CMOs as problematic or broken. This may be high cost (frequently driven by contracts that were optimized for development not for commercial production), complexity (many big companies find themselves unable even to say how many different CMOs they deal with), excessive working capital, simple lack of visibility, or any one of a whole range of problems. Whatever the initial symptom, we often find the root cause to be a disconnect between the strategy and the implementation, so that decisions are taken with a sub-optimal planning horizon and there is no clear cascade of objectives. This experience has led us to develop our integrated approach, treating CMO management as a vital function within the supply chain.

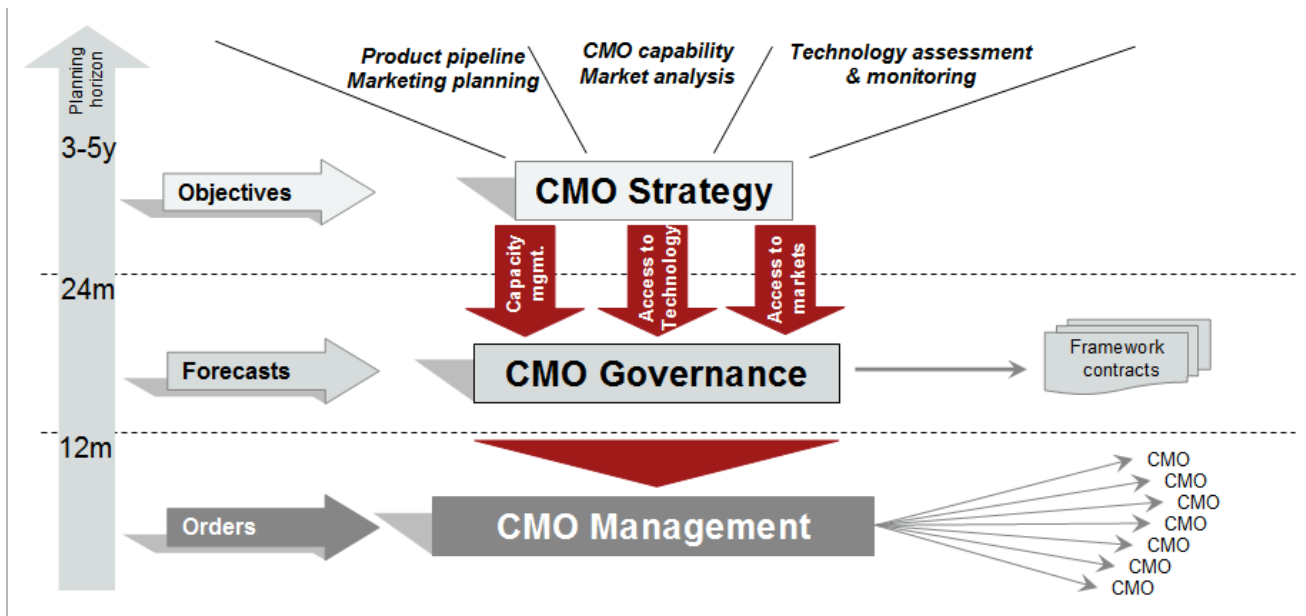


Figure 3: A holistic and integrated approach to CMO covering strategic, tactical, and operational layers

With this approach as a framework, we are able both to solve specific pain points – for example, to implement a batch traceability solution in SAP, or a strategic network design solution with simulation modelling – or to come in for a diagnostic review of the entire operation, from which we can identify where the biggest benefits are to be found.

Conclusions




Working with contract manufacturers is a complex topic and there is no single right answer. There are however a right set of questions to ask before you start to engage with CMOs – based on defining what you want from them and how they fit into your strategy, your network, and your risk and reward profile. The answers to these questions will then determine how you can best operate with a CMO, how you should organize internally to manage the CMO, and what you should look for in potential partner. Within each of these areas are a number of best practices, which should be selectively applied where they will bring real business benefit.

Although CMO usage in Life Sciences has only really taken off in the last decade, it has been prevalent for far longer in other industries such as electronics and automotive. Lessons from these other industries have been woven into the best practices recommended in Section 3 “What Are the Best Practices for Using and Managing CMOs?”

An important insight to come out of use of CMOs in other industries is that direct unit cost gains tend to be relatively small, and transitory (with exchange rate and fuel price fluctuations they can be wiped out overnight). The real gains come from the change in business model allowed by having a different approach to capacity, and the more strategic alliances based on access to technology or access to markets.

Realizing the gains from using contract manufacturing is thus not just a matter of controlling contract costs – it requires treating CMO management as an important capability for the contracting organization to develop.





Authors

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Wouter is part of Lodestone's Business Excellence practice and has 15 years of experience in the Life Sciences industry. He has held positions across the extended value chain working in quality, production, R&D and operational excellence. For the last 5 years he has been consulting in supply chain strategy and operational excellence. Wouter has worked at a global level with companies such as Abbott Diagnostic, Sony Ericsson, Devgen, Novartis, Roche and Johnson and Johnson.

Key areas of professional interest include strategic planning, contract manufacturing and operational excellence for the Life Science industry.



Anna Lowe – Managing Consultant, UK

Anna is part of Lodestone's Business Excellence practice and has eight years of operational experience prior to her five years in consulting. Her areas of expertise are strategic planning and E2E lean supply chain. She has worked predominantly in the electronics and Life Sciences industries. Anna's interest in developing an integrated approach to contract manufacturing stems from her earlier operational role with responsibility for a global electronics supply chain spanning three continents with multiple contract manufacturers.



Lorenzo Lotto – Director, Switzerland

Lorenzo is part of Lodestone's Business Excellence practice and has 15 years of experience in business process and system integration consulting in different industries. He has held positions across the extended value chain working as project manager specialized in supply chain, logistic and maintenance for multinational global companies. For the last 3 years he has been consulting in supply chain and contract manufacturing for major Life Sciences companies.



Patrick Bachet – Director, France

Patrick has more than 10 years of consulting experience for multinational companies mainly in the area of consumer packaged goods, Life Sciences and apparel. He is an experienced project manager, specialized in supply chain management, procurement and purchasing. For 7 years he has been dedicated to the design and implementation of collaborative organization and processes thanks to the new technologies. He is convinced that collaboration is where excellence will be won or lost. Patrick has been a lecturer in HEC France business school in both supply chain and program management 2.0 fields.



Richard Holmes – Partner, UK

Richard is the Practice Lead for Business Excellence in Lodestone. As a business leader and management consultant, he specialises in advising his clients in the formulation of operational strategy and the leadership of strategic change. He focuses on the Life Sciences and consumer goods sectors, with deep expertise in operations strategy, network design, operating model design & implementation, and post-merger integration. He joined Lodestone with the acquisition of SmartChain, which he had founded and led through five years of growth. Prior to that Richard was an associate partner with PricewaterhouseCoopers Management Consulting for 11 years and before this worked for the ICI Group of companies for 11 years in a range of roles in european manufacturing and supply chain operations.



