1. WHAT ARE WE GOING TO TALK ABOUT?

1.1 Introduction

The challenge for Original Equipment Manufacturers (OEMs) is the need to continually develop and market innovative products in the shortest possible time. For complex products, this requires a broad set of technical skills, which often span multiple disciplines. Often only a few of these technical competencies form the key to a distinctive position in the market: the core competencies. The development and maintenance of non–core competencies in a competitive manner can be a significant and sometimes even risky undertaking. Outsourcing (part of) the development of an OEM's product then provides a possible solution.

Such outsourcing does create a huge dependence. The way in which a product is developed is almost by definition unique, whereby changing supplier becomes riskier and more expensive than with other types of outsourcing. Moreover, such outsourcing can have an impact on virtually all disciplines and departments within the OEM's organization. All this makes the implementation of such an outsourcing complex. Specialist knowledge on the subject is still developing and there is little practical literature available. This book, therefore, aims to provide a tool to shape this new trend towards open innovation.

1.2 Target markets for this book

The subject matter of this book is applicable to a wide range of potential OEMs and suppliers. These are located in the following markets, for example:

- **Machinery and equipment industry: e.g. semiconductor, printing, healthcare, food, and analytical.**
  In these markets, an OEM generally owns the technical core competencies for the development of a competitive product. The supplier is then asked to provide the non–core competencies. This may include the development of frames and sheet metal, but could also mean an advanced opto–mechatronic system for the manipulation and precise positioning of the product made or analysed in the machine or device.
  An example of a major OEM is ASML, which develops and manufactures lithography machines for the chip industry. ASML has built a dominant position for itself in its market by focusing on developing the lithography process, and on the system integration of its lithography machines. ASML outsources many of its non-core system modules. Another major OEM is Elekta, which is developing its MR-linac, a combination of MR imaging and radiation therapy, providing real-time visualization of tumours with the ability to adapt the dose. Elekta decided to focus on system architecture, system integration and application software, while outsourcing the development and life-cycle management of key system modules. These are all global players in their markets, which have already made far–reaching choices in outsourcing the development of parts of their product.

  The NEVAT report *Raising the Bars* from 2008 (1) described the trend towards outsourcing from the perspective of the suppliers to this type of OEM.

- **Consumer products: e.g. cars, telephones, and televisions.**
  In these markets, the OEM owns a primary brand, access to distribution channels, and an organization that serves its customers. The OEM's technical competencies can vary greatly, especially so depending on the market in which they operate. On one side of the spectrum, they are a systems integrator (e.g. for cars) and possess a number of distinctive core technologies (e.g. motors that deliver a distinctive performance or are particularly efficient). At the other end of the spectrum, they do not have any distinctive technical competency. In this case, they make full use of the work of 'white label' developers and manufacturers, and are distinguished only by an industrial design and a user interface, for example. Instances of the latter category are the markets for white goods, personal computers, and telephones.

The contents of this book will be applicable to both markets, especially in the early stages of innovation. In consumer markets, for a product component the role of the supplier is often in the end comparable to that of an OEM: the supplier is responsible for the entire life–cycle management of a component. Examples include integrated circuits, new generations of displays, and car parts.

Gradually, the development of products by suppliers is growing. In the Build–to–requirements model, the OEM provides a requirements specification and the supplier develops a product that meets those requirements. In this case, specific agreements on life–cycle management will need to be made in the form of a Service Level Agreement (SLA). This is elaborated on in Chapter 4.

TABLE 3 – Build–to–Requirements features

BUILD–TO–REQUIREMENTS	OEM	SUPPLIER
Requirements	×	
Design		×
Manufacturing methods		×
Manufacturing		×
Life–cycle management	SLA	SLA

In the next step, the OEM pays the supplier for the product's full development and life–cycle management. The outsourced module is a product number in the OEM's logistics system. The supplier takes full responsibility for the functionality, quality, and cost of the outsourced module. Here are two business models.

- The module is designed exclusively for the OEM: in this book we will call it the Black Box model.
- The provider can also sell the developed module to third parties: in this book we will call this the Original Module Manufacturer (OMM) model.

TABLE 4 – Black Box / OMM features

BLACK BOX / OMM	OEM	SUPPLIER
Requirements	×	
Design		×
Manufacturing methods		×
Manufacturing		×
Life–cycle management		×

In the rest of this book we will elaborate on the differences between these forms of outsourcing, the pros and cons, and the business models that can be used to make these partnerships effective.

FIGURE 2 – Complexity in collaboration and expertise of the supplier

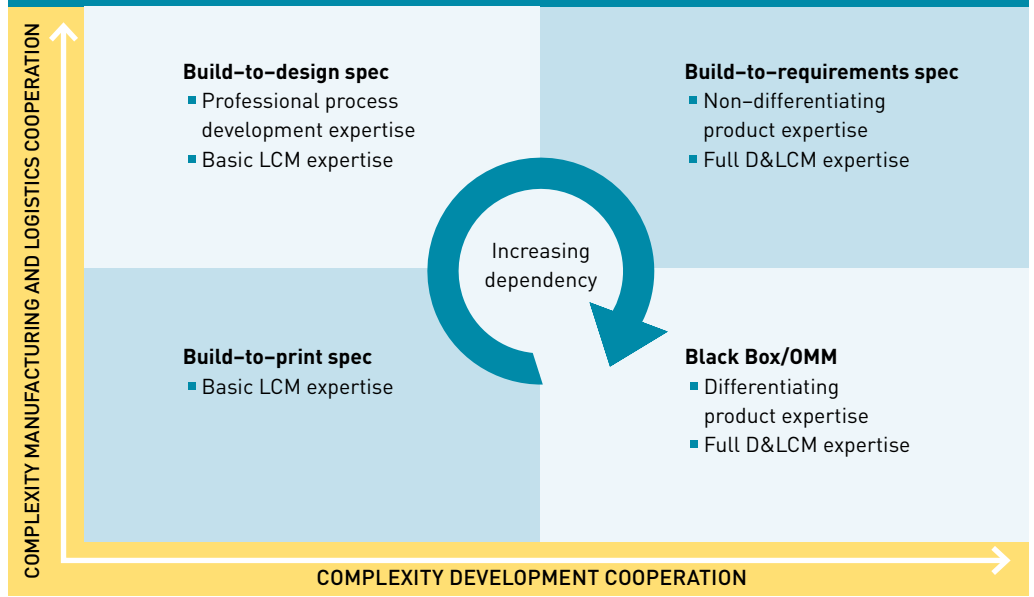

Figure 2 shows the different models in relation to their complexity in the cooperation between OEMs and suppliers, both in manufacturing and logistics, and in terms of development. Also for each model, the typical supplier who fits that model is characterized. From here, suppliers who offer the complex form of development cooperation will be denoted by the term development & life–cycle management (D&LCM) suppliers.

1.4 The creation of an open innovation network

The trend described above contributes to the development of an open innovation network (3) (4). Because OEMs and suppliers learn to cooperate effectively at all levels of the innovation value chain, innovation can be achieved with optimal quality and speed. Figure 3 shows a simplified structure of this open innovation network. OEMs already make use of the same production partners for longer periods. A new category of vendors (D&LCM suppliers) makes it possible for OEMs to outsource product development in combination with (parts of) life–cycle management. In the figure, OEM A is doing its own non–core development, while OEM B has decided to outsource this development.

2.2 The strategic assessment

Outsourcing D&LCM requires numerous, often complex, considerations. As the importance of outsourcing is so great, a structured and thorough approach is recommended. Such an approach also ensures that the outcome of deliberations done in a structured and thorough manner can be explained to the OEM's own organization and to any future partner.

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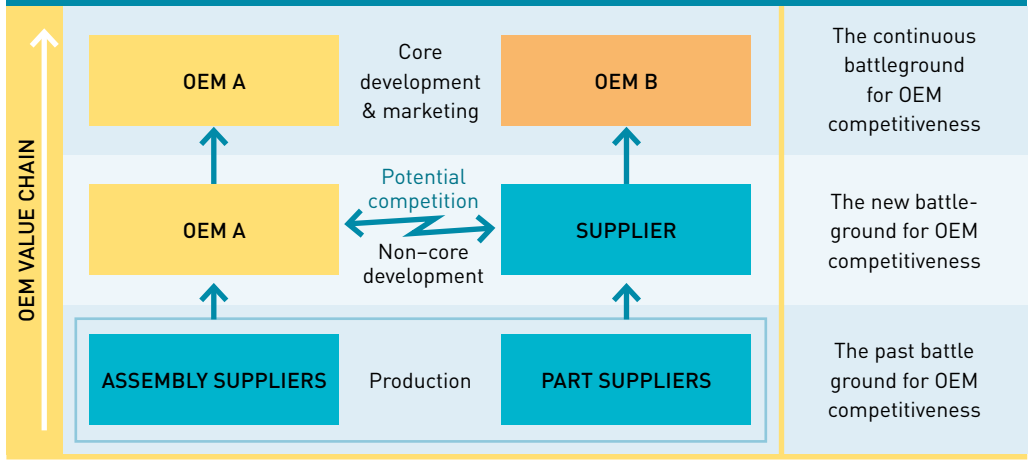
FIGURE 8 – A new battle called Open Innovation



In Figure 8 we return to the Open Innovation Network discussed in the previous chapter. It shows that an OEM is constantly struggling with its competitors in the field of its core activities in development and marketing (the top level of Figure 8). In–house development focuses on activities that enables the OEM to differentiate itself in the market, whether or not they are accompanied by the development of relevant intellectual property.

In the last few decades there has been a battle about competition on the terrain of production assembly and parts (the lowest level in Figure 8). This was a battle between departments within the OEM's organization and suppliers of these kinds of services and products. That struggle is by and large over, and there are mature suppliers and purchasing departments within the OEM's organization that play an outsourcing game in a professional way. Over the last few decades we have seen totally vertically integrated OEMs making way for open supply chains. The development that is now underway will lead to a similar conflict between the OEM's development departments and D&LCM suppliers (the middle level of Figure 8). This relates to competition on the terrain of development competencies outside the OEM's core competencies. This is a whole new struggle with huge consequences. Open Innovation here is not only consciously presented as an interesting 'opportunity', but also as a battle that must be fought with total understanding and energy.

FIGURE 9 – Open Innovation is not an obligation–free consideration

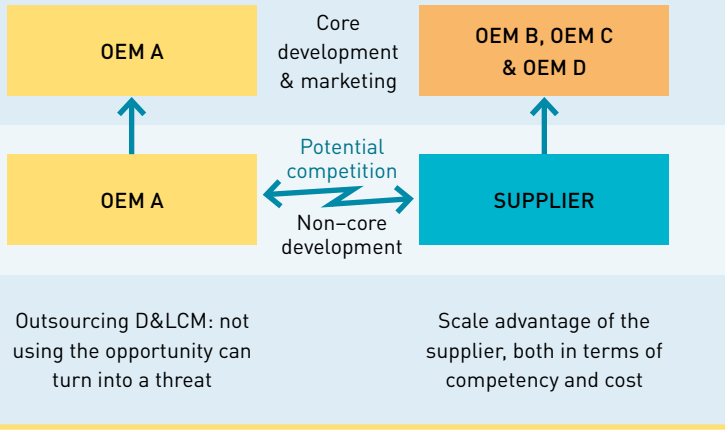
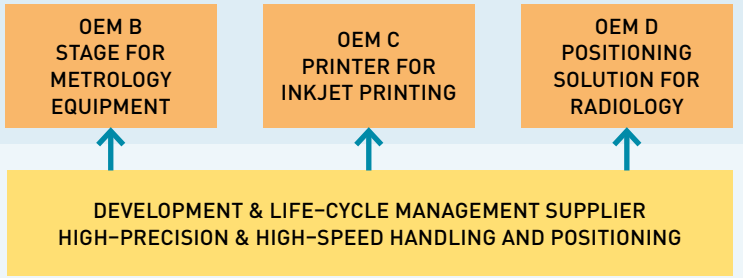


Figure 9 illustrates that outsourcing D&LCM is not an obligation–free consideration. What was true in the past for production companies now applies to D&LCM suppliers: that by offering their services to multiple OEMs they can potentially work better, faster and cheaper.

Example

FIGURE 10 – D&LCM supplier with various OEM markets



An example of a D&LCM supplier with competency in high–precision and high–speed handling and positioning that can be employed by multiple customers in diverse markets. This provides economies of scale for the provider that the OEMs' development departments will have to compete with.

Not outsourcing D&LCM for non–core activities can therefore potentially undermine an OEM's competitive strength. Thus it is important to make the decision to outsource carefully and to make a longer–term assessment of how the technology and the D&LCM suppliers will develop.

After the Feasibility phase come the phases in which one should rely on the partner's expertise: product design, product testing, and testing the production process.

3.3 Change Management

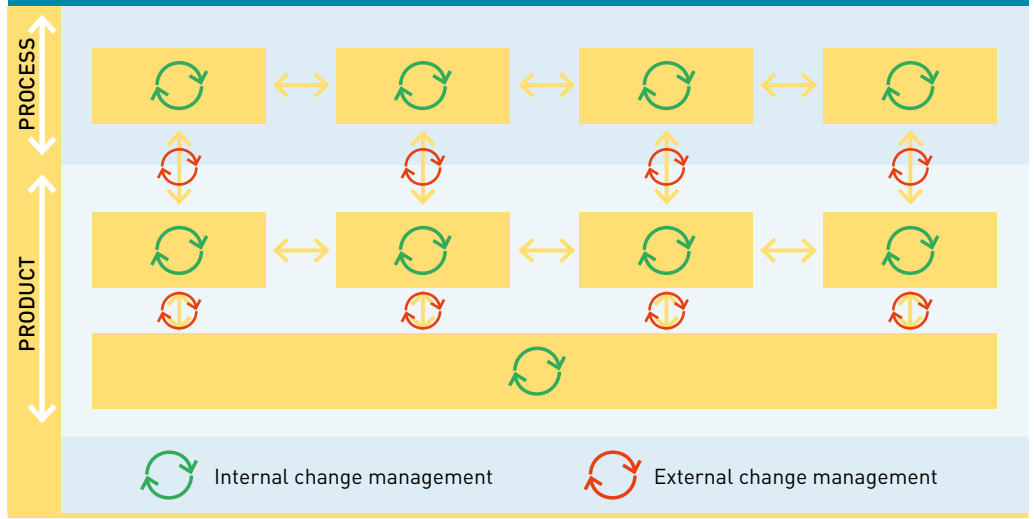
In any development project, special attention needs to be paid to change management. As the OEM or supplier grows in understanding over the course of the project, either one can come up with ideas on how to further improve the product's development. It requires clear agreement and discipline to deal wisely with this. With every change, even small changes (see box), the project will formally return to the Definition phase. The change must be well defined and thought must be given to the implications that it has for the duration of the project, the cost of the project and the product, and product quality and delivery. Only after careful consideration of these factors can a decision about changes be made. Lastly, it should be clearly agreed that for any product changes, the OEM bears the consequences for the business case (e.g. cost, time–to–market).

Figure 15 illustrates once more the importance of a good and stable modular architecture in relation to change management. Such an architecture allows changes to be made that may be limited to a process step or a module. Such 'internal' change can often be implemented with relatively little impact, partly because the implementation of such a change is relatively easy to organize. The moment a change has an impact on several modules and/or process steps, it becomes rapidly more difficult, costly, and risky to implement. The project manager and system architects have an important role in limiting changes in general and changes with system impact in particular.

Small product changes with big impacts – to underline the importance of disciplined change management, here are examples of changes and descriptions of their consequences. Seemingly trivial, but taken from practice:

- A part of a machine needs to make a faster movement: this requires a heavier motor and a firmer machine foundation in order to maintain the desired accuracy. In critical designs it can lead to a whole new concept.
- An additional sensor is needed to measure the quality of a process (e.g. temperature or position). The processor which controls the machine has reached its maximum number of inputs, so a new processor and a new PCB layout are required. This can lead to months of delay and significant extra cost.

FIGURE 15 – Change management and system modularity

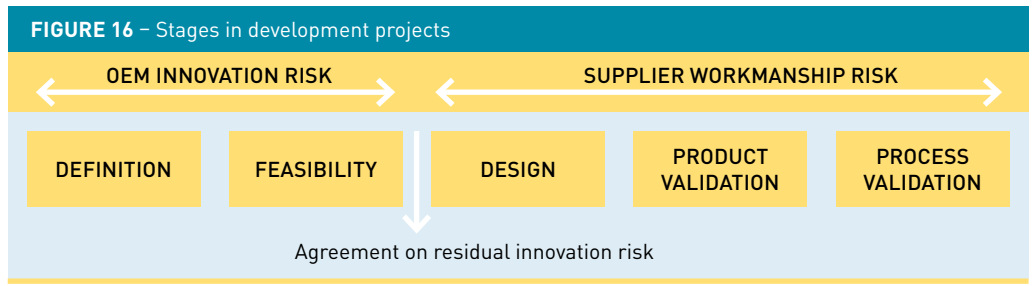


It is advisable to organize change management in stages, in line with the system architecture: module and process change management in sub–project teams, and system change management in the system project team. Chapter 4 from source (11) gives a good overview of how change management between partners can be organized.

3.4 The innovation risk

Figure 16 describes the relationship between development project phases and project risks.

FIGURE 16 – Stages in development projects



The OEM is the entrepreneur with a business plan. The OEM knows the market, invests, and thereby weighs the risks of an uncertain innovation. As a reward, the OEM receives a large gross margin on the product, if the product is successful in the market.
In contrast, the supplier generally has a costs–plus business model: it provides a service (D&LCM) and is paid for it, and receives a smaller profit.

6. SELECTING THE D&LCM PARTNER

The OEM now knows what it wants: to outsource D&LCM. It also knows why it wants to and what it means to implement such a plan. To use the metaphor of a human partnership: the man or woman concluded somewhere in their youth that they wanted to start a family in a permanent relationship. Then a picture emerged of what that would mean and what it would take. Now comes the hardest part of the process in establishing a partnership: the selection of the partner. And as people proceed in this using a mixture of reason and emotion, so does an OEM when selecting a D&LCM partner. This chapter will help you find the right mix and the right partner.

6.1 Introduction to the selection process

In previous chapters we introduced Total Cost of Ownership as part of the considerations involved in coming to a decision to outsource D&LCM. It is also a part of selecting a supplier. In this chapter we analyse the qualitative criteria for supplier selection extensively.

There is a great deal of literature on the selection of partners. In this chapter we summarize and identify the most important criteria that are specific to outsourcing D&LCM. We also provide the Total Quality Model (see Figure 25, Annex E and (8)) as a framework for selecting a partner and for managing the partnership.

- This chapter: for selecting a D&LCM partner we evaluate the partner's 'Enablers' and look at the 'Results' for the partner's existing customers.
- In Chapter 7 we use the Enablers analysis as the basis for the implementation of the partnership.
- In Chapter 8 we further develop the Enablers, and use the Results from the partnership through Innovation and Learning for the development of the partnership.

FIGURE 25 – The Total Quality Management model