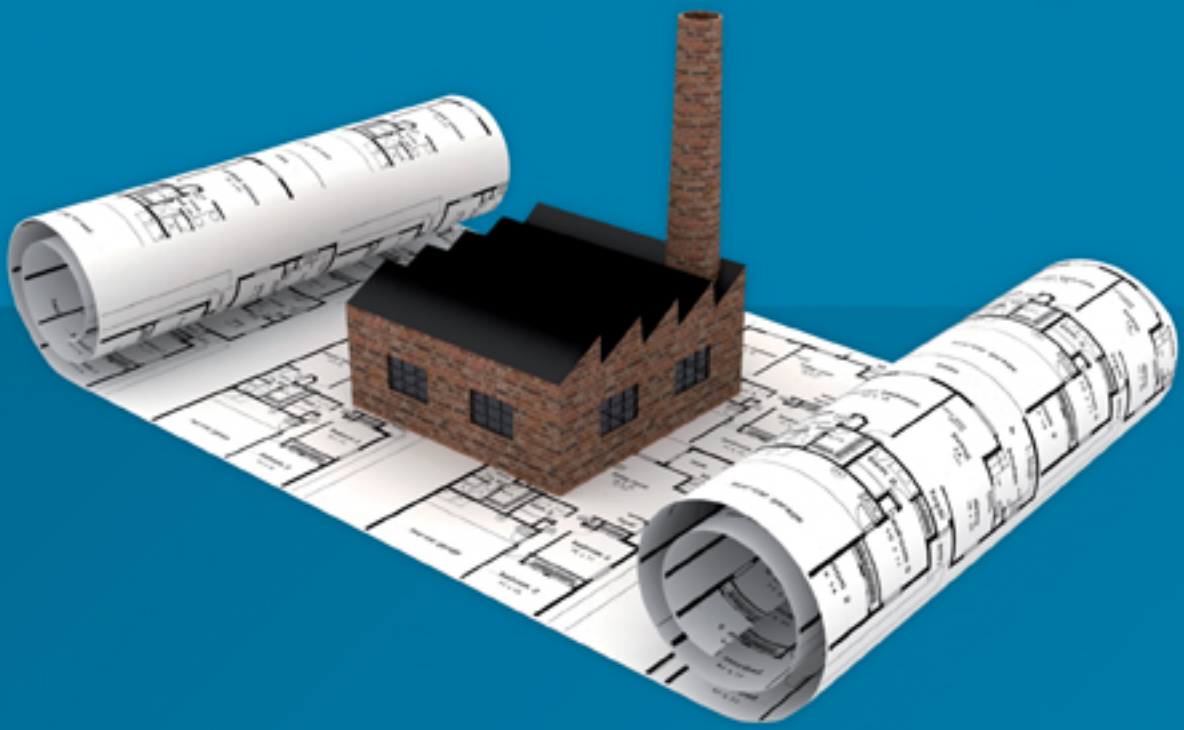
The IT Factory



Supply Chain Management for IT Infrastructure Services Using the SCOR Model

Hans van Aken

Van Haren Publishing

The IT Factory

Supply Chain Management for IT Infrastructure Services: Using the SCOR Model

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Preface

Am I losing it? Is it me getting older and unable to keep up to speed, or is it the IT industry at large doing a great job turning simple things into complex matters? Have I reached the limits of my comprehension considering that in my daily job, I'm frequently baffled by difficult academic terms and definitions? Not to mention people's ability to abuse important nouns such as flexibility, agility and adaptability. I often encounter these words coined as generic business requirements for IT Core Infrastructures without further context or meaning. Dozens or sometimes even hundreds of hard to understand, non-intuitive processes, procedures or routines aggravate the level of my confusion. And when I'm not paying attention, I'll probably add some of the complexities myself.

Much to my relief however, I'm seeing more and more evidence that many of us struggle with the same questions and that it's not just me losing it. Working from those premises, we can infer that we (as in the IT industry) really excel in complexity. For some reason we seem to lose ourselves in elaborate explanations, and rigid definitions; we lack the ability to explain things in a more down to earth way such that my neighbor's teenager might understand. It is therefore not so strange that outsiders who need to interact with the IT world have a hard time understanding any of it, let alone acting on it.

In my own endeavors to explain what's going on within my area of expertise in a clean-cut way, I was led to an investigation, the results of which are captured in this book. Interestingly enough, it turned out that I've been applying most of the factory and supply chain approaches described here successfully without even realizing it. If I had been more aware of all my dormant knowledge about the world of manufacturing, I would have had a much easier time communicating goals, structures and tangible results. It's been right under my nose for many years and I'm convinced many of you will share the same experience after reading the book.

My inspiration for this book comes from working with highly respected colleagues and surviving dozens of presentations, publications and documents about IT infrastructures which all more or less talk about highly standardized shared IT services. The move away from compartmentalized IT solutions into standardized shared layers is growing stronger every day and many times a

metaphor is used or an analogy drawn with a factory and a manufacturing style of producing IT services.

> *"We have moved deliberately to a factory metaphor. We have stopped focusing just on what data centers store and are asking ourselves, 'What do they output?'"*[1]
> Brad Ellison - Manager, Global Data Centers - Intel® Corporation

This concept is typically received very well since almost all of us can somehow relate to factories and manufacturing. Amazingly enough, it frequently stops right there, by just mentioning the concept. That's a pity because the analogy with a factory appeals to so many people and can therefore help to establish what an analogy is for: play a significant role in explanation, communication, problem solving, creativity and decision making.

So let's take a closer look at the world of manufacturing, factories and supply chains and learn from the enormous amount of experience built up during several millennia. When you are able to grasp and communicate your IT environment in simple words using the language of factories and manufacturing, you may find so many fabulous opportunities for improvements that it might make your head spin.

I have learned a lot from the world of manufacturing and factories, which has made my life easier. I hope this book will make your life easier as well; I encourage you to experience the full potential of the analogy and, with whatever decision you need to make, unleash your knowledge about factories and supply chains. Welcome to the world where IT Infrastructure meets Manufacturing.

Notes

1. **Corporate Executive Board.** Hardwiring "Green" into Infrastructure and Data Center Investments - Defining and Implementing Meaningful Energy Efficiency Metrics. [Online] May 2008. http://www.executiveboard.com. Report number DCEC1A76HCB.

Acknowledgements

Writing a book for professionals cannot be done in isolation. It takes many others to learn from, provide inspiration, test ideas with, support and motivate you, keep you sane and stay away from jabberwocky.

From the vast number of friends, colleagues and supporters who, sometimes unaware, helped me to create this book, I would especially like to acknowledge:

Caspar Hunsche from the Supply Chain Council for his support and endorsement, together with anyone who ever contributed to the SCOR® model.

Chris Coggrave, Andreas Arts, Frank Kroon and André van der Meer for their friendship, support, collegiality, frankness and inspiration. They put their many years of experience in IT environments, gained at numerous international large and complex engagements in all types of industries, in reviewing this book. I am much obliged to them.

Foreword

When Hans first asked me to read his book *The IT Factory* I thought: "This has been done before." Organizations have adapted versions of SCOR® to describe and improve IT delivery processes. SCOR® allows companies with traditional supply chains to assess, analyze and improve supply chain performance using a repeatable and reliable method. SCOR® is built on the experiences from many companies running straightforward to complex supply chains. The processes of IT services deliver goods and services the same way supply chains do, with similar probability for complexity. The primary distinction is that the language used to describe these processes and their performance is different. Or is it?

Managing a supply chain involves developing a supply chain strategy that supports the business strategy, linking supply chain performance to supply chain configuration, managing process performance and aligning supply chain resources to enable processes and performance. Successful cloud computing implementations require equally well-defined IT supply chains to meet customer service requirements and optimal cost structures. Hans discusses the different IT services and how proven supply chain concepts can be applied to the world of IT.

Trends that apply to supply chain management apply equally to the IT services industry. In 2007 SCOR® introduced a set of foundational metrics to measure the environmental footprint of a supply chain (GreenSCOR). These metrics can be directly applied to the use of data centers and other IT services. GreenSCOR best practices can serve as ideas to improve energy consumption in the IT factory. Similarly, experiences from the IT factory may in return be applied to traditional supply chains in the future.

What makes this book different is that Hans describes the comparison between traditional supply chains and IT services supply chains in detail. In this book he extrapolates supply chain plants into the IT world: IT factories. He looks beyond the processes into metrics, thus introducing the ability to assess performance and root causes, analyze problems and reconfigure the IT supply chain or IT factory. These steps are simplified using a standard to describe the performance and processes.

Through this book the proven methods to assess, analyze and improve performance developed in the supply chain industry are now available in the relatively young IT Services industry.

Caspar Hunsche

Director of Operations, Research Director

Introduction

Introducing the IT Factory

Long ago, before we grew up and started on our first job, we asked questions about how things were made and drove our parents mad. We wanted to know where LEGO® came from, how machinery works, or even how a car worked. Our parents would answer the best they could and tell us about the factory that created LEGO building blocks out of lumps of plastic. Our teacher taught us about ore, raw materials and transportation. Later on probably, we even learned about demand and supply, assembly lines and supply chains. From a distance, it all looks, deceptively so, quite simple. We listened, accepted the explanation, and thought no more about it; the notion of a factory was put firmly in our minds. The older we got, the more we learned about factories, their supply chains and manufacturing processes; we might even have worked in or for a factory at some time or other. Then we started working in IT and somehow clean forgot all about the world of factories. This seems odd because if you take a good look at it, there are many similarities between factories and IT infrastructures. Why not put our latent knowledge and ideas of factories to good use for the way we structure and organize IT infrastructure services? Voila, **"The IT Factory"**.

Audience for this book

This book is written for business managers, IT architects, business consultants, strategists and key decision makers in the IT, or anyone else who is interested in understanding what it takes to create services from IT infrastructures in a factory style. The aim of this book is to unleash and exploit your latent knowledge about factories, manufacturing and supply chains and put it to good use in the world of IT.

The goal of the book is to improve your general understanding of IT infrastructure services, how these are constructed using supply chain models, how to talk about these services with non IT specialists and how to objectively measure the success of the services. You will be introduced to, and hopefully inspired by, the world of supply chains using the de facto industry standard reference model SCOR®. The generic processes for supply chains, which are part of this reference model, will be covered as well as their powerful metrics. All of this is in the context of IT infrastructure services.

After reading this book, you will have a new or improved point of view about IT infrastructure services. You can use this point of view for both diagnosing and optimizing your current IT environments, or to explore opportunities for the introduction of concepts such as IT shared services and cloud computing, whether as a services provider, consumer or as both.

Besides covering essential knowledge about services and supply chains in general, this book provides a step-by-step approach to get started with your own IT Factory. The approach used is based on a blend of mainstream industry IT Enterprise Architecture frameworks and the tested Supply Chain Excellence Method as described by Bolstorff and Rosenbaum in their book "Supply Chain Excellence"[1] and propagated by the Supply Chain Council (SCC)[2]. The industry IT architecture frameworks in general start with looking at the drivers and goals for doing any type of work and then go into the business and functional point of views, eventually followed by technology and implementation views.

In this book, setting up shop in Part II starts with this flow but stops at the point when it comes to specific technologies. The technology part should be done when an IT Factory is determined as viable with the technologies that are currently available. After the drivers and goals are covered, the focus is shifted to the supply chain excellence method. This method is used to figure out what the existing or future supply chains are, and then continues with defining metrics from a strategic or business point of view.

Organization of the book

This book is organized in two parts. Part I covers everything you need to know about the analogy with a factory, current issues, services and values, supply chains and processes and finally the IT Supply Chain Reference Model. This is a quick rundown of the chapters in Part I: Principles:

- Chapter 1, The IT Factory: addressing the challenges of the IT department
- Chapter 2, The main features of an IT Factory
- Chapter 3, The IT Supply Chain Reference Model: This chapter is fundamental for setting up supply chains for IT infrastructure services. It introduces the IT Supply Chain Reference Model, which covers eight blocks with demand-supply relationships. For each block, there is a detailed

explanation of the main components, its customers, suppliers, products or services and processes.

In Part II of this book (Practice), you can read all about the business and supply chain strategies for setting up your own IT Factory. The supply chain metrics are explained including why these metrics are pivotal for the arrangement of your IT supply chains. This Part also describes how to measure and prove your success, and also how to identify areas for improvements, including areas such as quality and financial considerations.

- Chapter 4, Set Up Shop: Setting the scene for setting up an IT Factory. Where to begin and what are the next steps?

- Chapter 5, Business Drivers and Business Strategy

- Chapter 6, IT Supply Chain Strategy – Part I: We know the customers and have an idea what services to produce but what is the strategy for the IT supply chains of these services?

- Chapter 7, IT Supply Chain Metrics: One of the jewels of the SCOR model, the metrics. These are the key performance indicators for your IT Factory. The metrics include customer facing metrics as well as metrics for your financial performance.

- Chapter 8, IT Supply Chain Strategy – Part II: Picking up the strategy from Chapter 6, after the intermezzo of the metrics.

- Chapter 9, Configuring the IT Supply Chain: All the information is here to start configuring the processes for an IT supply chain to meet the chosen objectives.

- Chapter 10, Next Steps: Lots of important information is covered up to this point and there is still plenty to do.

- Appendix A, Examples of IT Supply Chain configuration: Some examples of different IT supply chain configurations are provided, including examples about IT supply chains using multiple geographically dispersed locations, incorporating Clouds and an example using converged technologies.

IT infrastructure services

'IT infrastructure services' is quite a generic term and is interpreted in many ways. When doing some desk research on what these services are all about, you will find many different service offerings, definitions and descriptions. And after a while, you will find that there is no single version of a definition that is endorsed industry-wide and accepted. This book is neutral about all existing definitions of the term "IT infrastructure services", it will not introduce a new definition and you will not be menaced with many other definitions or academic discussions. Those are not appropriate in a factory environment.

However, for the sake of setting the scene and drawing a broad outline of the world of IT infrastructure services, think of the type of services that you could buy or sell from a catalog in the open market. Think of services such as:

- Provision of data center space if you need space for your IT equipment;
- Wide Area Networking connectivity to connect to another remote data center or an office;
- A managed or unmanaged simple Operating System for some quick development or testing activities;
- An Oracle® Web Service or an Apache® HTTP Server for running web sites or web shops.
- A Java™ Application Server for developing or running applications;
- An Oracle® or Microsoft® data base instance when data needs to be managed.

All of these examples, and many more you can think of, can be (but need not be) categorized or labeled as IT infrastructure services. The scope of these services is quite wide, ranging from the domain of data centers, up to services for running applications and everything in between. This is the primary scope of this book; however, you can there is nothing stopping you from using the supply chain concepts in an extended scope where information and business processes are included. The last chapter in Part I of this book shows you how this works.

Frameworks

Many industry best practices and frameworks will be combined but as mentioned before, you will not be tormented with all the definitions or details. The details are something you need to work out when you start implementing

your IT Factory. However, there will be frequent references to industry standards and it is useful to know a little bit about two of them before starting on Chapter 1: SCOR® and ITIL®. More in-depth information about these standards can be found on the websites of the governing organizations but a word of caution here. The combined number of pages to communicate just these two standards exceeds 2200 pages! No need to say that this contributes to the point in the Preface of too much gobbledygook.

SCOR® – Supply Chain Operations Reference

SCOR® is a process reference model[3] from the world of Supply Chain Management and has, at first sight, not much to do with the world of IT. You might not even have seen much of this model before but once you take a closer look, you'll find an enormous amount of valuable information and know-how and what is more, the SCOR model plays a pivotal role in the IT Factory.

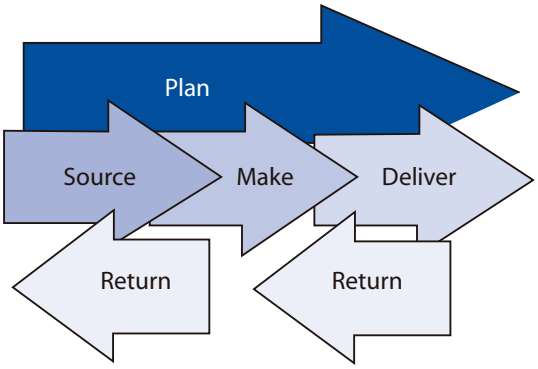

Figure 0.1 The SCOR® model is organized around five major types of processes

The SCOR model is governed by the Supply Chain Council (SCC). This is an independent, not-for-profit global trade organization consisting of many practitioners, with hundreds of corporate members worldwide from a wide range of industries who are operating the biggest and most complex supply chains you can imagine. This makes SCOR a model that can be applied to virtually any supply chain, including the supply chain of the IT Factory.

Supply Chain topics such as planning, manufacturing, order management including invoicing, logistics and all customer and market interactions are covered by the SCOR model and are in line with Michael Porter's renowned framework for the Value Chain[4]. The SCOR model is organized around five major types of processes: Plan, Source, Make, Deliver and Return as can be seen in Figure 0.1 from the Supply Chain Council. These process types

are worked out in categories, described up to the level of process elements and enriched with a vast repository of powerful metrics, best practices and technologies.

The SCOR model has evolved over the years into a very comprehensive framework. In version 9 the integration with GreenSCOR has been introduced, which adds process elements and metrics for environmental management. This is good news since Green IT is a 'must' on the agenda of every business these days, and GreenSCOR can help with awareness of and accounting for the environment by adding environmental metrics and processes.

One final argument why SCOR is *the* model to use for any supply chain is visible in the SCORindex[5]. SCORindex contains a chart where the value of an aggregate 70 company SCC members is tracked since 2003 and is compared to the performance of the Dow Jones and Standard and Poor's (S&P) indices. The SCORindex consistently outperforms the Dow Jones and S&P.

ITIL® – Information Technology Infrastructure Library

Most of us in IT know at least about the existence of ITIL®[6] (Information Technology Infrastructure Library). It is an industry best practice approach for IT Service Management and provides guidance with frameworks. Version 3 of ITIL covers the lifecycle of services and is much more aligned towards the customers of services than Version 2. ITIL V3 consists of five core books of which the interrelationships can be seen in Figure 0.2.

- Service Strategy. Descriptions of strategies, demand management and business service management are on the same turf as the Plan processes of SCOR.
- Service Design is about the development and design of services. This is not really covered by SCOR itself but in an affiliated model DCOR™ (Design Chain Operations Reference).
- Service Transition forms the bridge between the development of services and putting these into operation.
- Service Operation contains information about the continuous delivery of services.
- Continual Service Improvement mainly deals with the quality aspects across Strategy, Design, Transition and Operation.

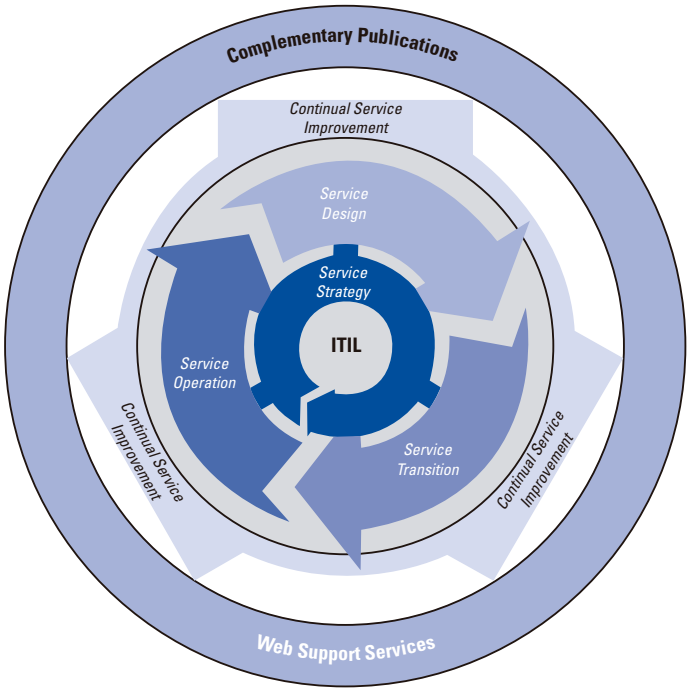

Figure 0.2 The ITIL Core

The summaries above do not fully do justice to ITIL but should be sufficient as base information for reading this book. For all the details, see the Notes section where you will find more information.

Notes

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PART I: PRINCIPLES

1 The IT Factory: addressing the challenges of the IT department

1.1 Service trends in the IT industry

Supply Chain Management of IT Infrastructure Services using the SCOR model is the subtitle of this book and it is about using the analogy of factories and manufacturing for creating IT infrastructure services. A broad outline of IT infrastructure services, with some examples, has been covered briefly in the Introduction and you will frequently come across such services as part of a trend in the IT industry:

Adaptive Infrastructures, Utility Computing Infrastructures, Platforms as a Service, Service Oriented Infrastructures, Cloud Computing Infrastructures, Infrastructures as a Service, Real-Time Infrastructures, On-Demand Computing, Grid Computing…

There are many more examples of such trends that can be found in the industry, some already outdated, some new or still to be invented. Looking from a distance at these trends, they all share some key characteristics. They deal with delivering services in an efficient, automated way, are easily able to adapt to changes in demand and sound very appealing to anyone who wants to develop new business services quickly. These infrastructures are typically shared between multiple tenants and can, in a manufacturing style, produce large quantities of standardized services on a pay-as-you-go basis. The most notable difference between all the trends is in the area of the scope or boundary of the services. Some are limited to just providing compute capacity or hardware, others include operating systems and some go into the domain of middleware, applications or databases.

Putting these infrastructures in place is far from easy but fortunately there are real-life implementations that hit the mark – and they almost all appear to work as a factory would.

1.2 Managing expectations

When one of the phrases mentioned above is coined as an ambition for a new infrastructure to be developed, the expectations that come with it are typically pretty high. The new infrastructure is supposed to be flexible, provided at low cost, adaptive, automated, able to scale seamlessly, reliable, adaptable to business changes and demand, elastic, virtual, fast and easily ordered, predictable, enabling business growth, agile, standardized, secure, highly available and efficient but most of all KISS (Keep It Simple, Stupid). Does this sound familiar? And this is definitely not the complete list you can encounter. But how on earth can anyone live up to all of these expectations? And where do you start to realize some or all of these? How do you try to explain what you intend to do to your CEO, CIO and/or the IT Executives in simple understandable terms that anyone can understand?

Without being crystal clear about these types of high expectations, you will end up with a lack of mutual understanding and potentially create unrealistic expectations. Many organizations have already been here before. A global survey from the Economist Intelligence Unit[1] showed that 33 percent of the respondents (CEOs, board members and IT executives) considered "Lack of understanding from senior management of how IT should support business objectives" as the number one chief obstacle to the ability to align IT infrastructures with business objectives. Although this survey is from 2006, there is no evidence that things have got any better; sometimes there is even a growing impression that the degree of alignment and mutual understandings is worse than before. This is not an encouraging prospect to start your endeavor with.

Alleviating some of the misunderstandings, reducing disappointments and getting to realistic starting points and expectations is the 'sweet spot' where the analogy with factories and manufacturing kicks in. As discussed in the Introduction, whether you or your contacts are from the IT or business side of the house, we all share some knowledge about factories and manufacturing. And it is this common ground which is an excellent starting point for using a universal vocabulary, fundamental for better understanding and setting realistic expectations.

1.3 A vocabulary for the IT Factory

Let's start by seeing if some of the vocabulary of traditional factories, which we all learned early on in our school days, can be easily applied and makes sense in an IT environment. The following table contains some ad hoc translations from traditional IT terminologies into a vocabulary that can be used inside the IT Factory.

Table 1.1 Traditional IT terminology versus IT Factory terminology

	Traditional IT	IT Factory
Production Facility	Data Center	Factory Building
Production Area	Raised Floor or White Space	Shop Floor
Suppliers	Deliver hardware, software and services.	Deliver raw materials or semi-manufactured products.
Stock items	Spare capacity in a resource pool	Stock items on the shelf in the warehouse
Product changes	Upgrades, updates, patches, fixes, …	Maintenance, Repair and Overhaul (MRO).
Tailor-made production method	One-off departmentalized IT Project	Job Production
Ready-to-wear production method	Shared Services	Batch or Mass Production
Automation	Data Center Automation	Robots
Automation department	IT for IT	IT department of the factory
Operations Center	Network Operations Center (NOC)	Control Room
Leaders	Team leads	Foremen
Workers	System Operators	Shop Floor Operators
Build approach	Waterfall model	Engineer-To-Order (ETO), Make-To-Order (MTO) or Make-to-Stock (MTS)
Provisioning process	?	Configure To Order (CTO)

Just to be clear, I am not advocating that you permanently change your vocabulary of IT. That would be ridiculous. This approach is positioned as an aid to help communicate with parties who are not IT literate.

With a little bit of imagination, it is quite easy to make this a very long list and of course there are some differences as well. After all, the factory is an analogy and is thereby, by definition, not identical to the world of IT infrastructure services. Another characteristic of any analogy, including this one, is that if you push it far enough, it will certainly break down and starts to become

counterproductive; that's why it remains an analogy. But let's stay focused on the similarities and the main positive contributions of this analogy in the areas of communication, problem solving, creativity and decision-making.

1.4 Strategic metrics for the IT Factory

Before investigating more background information, here are two more examples of how the vocabulary from the world of factories and manufacturing can be used for the IT Factory and for manufacturing IT infrastructure services. These examples are in the area of strategic[1] SCOR model metrics for the processes of the IT Factory. These strategic metrics can be used as Key Performance Indicators (KPIs), set expectations for your customers and lead the organization of supply chains.

One of the top-level strategic metrics in the SCOR model is "**Perfect-Order-Fulfillment**"[2]. This is the percentage of all the orders where the whole order fulfillment went perfectly. The orders have been delivered as expected and the customers received and accepted their orders within the promised timeframe, at the right place, in the right quantity, undamaged, working as specified, fully documented etcetera. Think about this metric when you order a couple of books from an online bookstore. When you agree to the price and the date of delivery for the books and you push the final buy-button, you expect to get all the books on that date, at the location of delivery you specified, undamaged and with the correct invoice. If all of that is ok and up to the expectation set at the time of ordering, than that delivery is counted as a perfect order. As a customer, you prefer or expect this to be the case for every order (100 percent) you place. However realistically, you also understand that this is difficult and expensive to realize for every single order for every single customer. There is always something that can, and therefore will, go wrong sometime, somewhere, somehow.

Setting this metric to 100 percent of the orders is a bit unrealistic for IT infrastructure services (or for any other service for that matter) but if, let's say 95 percent of all the IT infrastructure service orders would have been perfectly fulfilled, that would be quite an accomplishment compared to today's best practices (more on today's achievements for this metric later). Perfect-Order-

1 Next to these strategic metrics, there are many diagnostic metrics in the SCOR model as well
2 Another broadly known logistical metric in this area is "On Time In Full" or OTIF