

BERNARDO NICOLETTI

AGILE PROCUREMENT

Volume II: Designing and
Implementing a Digital Transformation



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Implementing a Digital
Transformation

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Abbreviations

A2A	Application to Application
AGV	Automated Guided Vehicle
AILOG	Associazione Italiana di Logistica
AMA	American Marketing Association
API	Application Programming Interface(s)
AR	Request for Acquisition
ASP	Application Service Provider
B2B	Business to Business
BAU	Business as Usual
BI	Business Intelligence
BMC	Business Model Canvas
BOL	Bill of Lading
BPaaS	Business Process as a Service
BPO	Business Process Outsourcing or Business Process Optimization
Capex	Capital Expenditure
CBS	Cost Breakdown Structure
CIM	Computer-Integrated Manufacturing
CPFR	Collaborative Planning, Forecasting, and Replenishment
CPG	Consumer Packaged Goods
CPM	Corporate Performance Management or Critical Path Method
CPO	Chief Procurement Officer
CPS	Cyber-Physical System
CRM	Customer Relationship Management

viii **Abbreviations**

CRS	Computer Reservation System
DDLC	Document Development Life Cycle
DMADV	Define, Measure, Analyze, Design, Verify
DMAIC	Define, Measure, Analyze, Improve, Control
DR	Disaster Recovery
DRP	Distribution Requirements Planning
DSO	Days Sales Outstanding
ECM	Enterprise Content Management
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
EU	European Union
EVI	Early Vendor Involvement
FTE	Full-Time Equivalent
GL	General Ledger
GPS	Global Positioning System
GSDM	Government Service Design Manual
HR	Human Resources
IaaS	Infrastructure as a Service
ICT	Information and Communication Technology
II-RFID	Intelligent Integrated RFID
IoS	Internet of Services
IoT	Internet of Things
IP	Internet Protocol
ISO	International Standard Organization
JIC	Joint Integrating Concept
KPI	Key Performance (or Process) Indicators
KPO	Knowledge Process Outsourcing
KRI	Key Risk Indicator
KYC	Know Your Customer
LAN	Local Area Network
MaaS	Mobility as a Service
MES	Manufacturing Execution System
MMS	Managed Mobility Services
MMSP	Managed Mobility Services Provider
MRO	Maintenance, Repair, Operations (Material)
MRP	Manufacturing and Material Requirement Planning
MSA	Master Service Agreement
MTS	Make to Stock
MWM	Mobile Workforce Management

NIST	National Institute of Standards and Technology
OBS	Organization Breakdown Structure
OEM	Original Equipment Manufacturer
Opex	Operating Expenditures
OPG	Order Processing Guideline
OTP	One Time Password
P2P	Procure to Pay
PA	Public Administration
PaaS	Platform as a Service
PC	Personal Computer
PO	Purchase Order
POS	Point of Sale
R&D	Research and Development
R2P	Requisition to Pay
RACI	Responsibility-Accounting-Control-Information
RE	Real Estate
RFB	Request for Bid
RFI	Request for Information
RFID	Radio-Frequency Identification
RFP	Request for Proposal
RFQ	Request for Quotation
RFX	Any type of Request for Procurement
ROA	Return on Assets
ROI	Return on Investment
RTLS	Real Time Locating System
S&O	Strategy and Operations
S&OP	Sales and Operations Planning
S2P	Source to Pay
SaaS	Software as a Service
SCF	Supply Chain Finance
SCM	Supply Chain Management
SG&A	Sales, General, and Administration
SLA	Service Level Agreement
SME	Small and Medium Enterprise
SOA	Service Oriented Architecture
SRM	Supplier Relationships Management
STP	Straight-Through Processing
SWOT	Strengths, Weaknesses, Opportunities, Threats
TCM	Total Cost Management

x Abbreviations

TCO	Total Cost of Ownership
TP	Transaction Processing
TPM	Total Productive Maintenance
UCC	Unified Collaboration and Communication
UK	United Kingdom
US or USA	United States of America
VA/NVA	Value Added/Not Added Value
VMI	Vendor-Managed Inventory
VoC	Voice of the Customer
WAN	Wide Area Network
WBS	Work Breakdown Structure
WMS	Warehouse Management System
XML	Extended Messaging Language

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1

Introduction to Agile Procurement Systems

Organizations need to grow, even in the face of market volatility, the need to reduce costs and delivery times, and the difficulty of forecasting in the modern world. As the economy becomes more competitive, organizations intensify their external activities. Better procurement enables them to substantially improve their margins as a result of the increased components of services and goods sourced externally at competitive ratio value/ prices.

The increasing complexity of the business environment requires significant intervention in the management of processes and information within each organization and in inter-organization relationships. The main stimulus for change comes from the need for process improvement and the opportunities offered by information and communication technology (ICT) in terms of characteristics and potential benefits—the digital transformation. These changes have a major impact on the management of the organization's value network and hence on its main processes and systems.¹

In the management of the value network of the organization, the procurement process can be defined as the process of procuring goods, raw materials, services, infrastructure, and maintenance in exchange for financial considerations. Due to the trend of concentrating on the core

business, relationships with vendors are increasingly important. Organizations have begun to review their procurement strategies. In the past, procurement was seen as a service to the other functions; now, however, it plays an increasingly central role in successful organizations thanks to innovations in the value network. Consequently, its impact on an organization's operations and creation of margins is significant. The expansion of outsourcing and globalization leads to an increase in the amount of supplies and stocks of work-in-process. Quality is increasingly critical, and delivery lead-time is fundamental to the competitiveness of the organization. Managers have to adopt new models that emphasize the procurement value network as a strategic key to success rather than simply a support organization.

In the modern, volatile world, flexibility is essential to the survival and success of an organization. This flexibility requires an agile enterprise. Organization agility is the "ability of a business system to rapidly respond to change² by adapting its initial stable configuration". Adapting fast goods and services to meet customer demands, adjusting rapidly to changes in a business environment, and taking quick advantage of new solutions and resources can achieve organization agility.³

Procurement is an essential function of any enterprise (it can represent up to 80 % of an organization's costs). Therefore, it is fundamental to enterprise agility.

This book argues that in order for an organization to attain agility, it must itself act according to an agile business model. The second volume of this two-volume work analyzes in detail the components of the business model more directly related to improvements in processes. This volume analyzes in detail the basic components of the procurement business model that are most affected by technological innovations.

In terms of tools to be used to attain agility, this book underlines the importance of a digital transformation. This can be achieved with a Lean Six Sigma approach,⁴ in combination with smart digitization.⁵

The principles of agility, seen as a combination of lean processes and automation, can enable organizations to meet increasing challenges, provide needed flexibility, and make their strategies successful in the short, medium, and long term.

This book discusses an approach referred to as agile procurement that contributes to improved value creation in procurement processes. The current digital transformation affects not only production (Smart Manufacturing/Factory) and logistics (Logistics 4.0), but equally all other functional areas of an organization, especially procurement. The goal is to make procurement processes leaner and at the same time to take into account the opportunities provided by process automation. Often one of the main problems is the excessive separation between the improvement of processes and digitization, or between the organization and the information and communication systems. This challenge is even more evident if one considers organizations of services, where digitization increasingly manages the processes.

This book discusses in detail the application of agile procurement for optimizing processes as well as digitizing them, in order to reduce waste and defects and improve cycle time. In so doing, it uses a business model applied to the procurement function. The vision is that procurement is indeed a series of processes that should act as a business.

Agile procurement is a method and a set of tools. It is also, and above all, a culture aimed at an organization's effectiveness, efficiency, economy, and ethics. It requires a change of paradigm. Agile procurement undoubtedly represents an important opportunity, especially considering there is already in the procurement organization a basic culture already oriented to the effectiveness, efficiency, economy, and ethics.

The agile procurement opportunity is especially important in this time of financial and economic crisis. In moments of crisis, any initiative to improve the value of business products for the customer, reduce waste, and especially become more flexible is a high priority.

Agile procurement can be of great help in improving sourcing, purchasing, logistics, and, in general, the end-to-end value network. In the past, organizations aimed to produce the best product in order to win the competition. Today, they must implement all necessary measures to avoid waste, add value for customers, and become more flexible. This is what the agile procurement approach aims to achieve. This approach requires adopting the perspective of the customer and endeavoring to increase the value of products, services, organizations, and business models for the

benefit of the customer. The value added for the organization is a derived result.

The agile procurement culture must permeate all areas of the organization to achieve flexibility and, above all, ensure the survival and growth of the organization. This book examines all these areas of improvement in procurement systems in combination with process improvements and suggests the best practices with which to tackle them.

This book takes into account the existing challenges in terms of digital transformation. The final sections of the book look to the future and underline a number of interesting emerging trends.

While the book presents a series of models, it substantiates them with many real-life examples of their successful implementation. Good practice should be the basis of any theory.⁶

Notes

1. This book does not use the terms “supply chain” or “value chain.” The term used is “value network,” which underlines the importance of taking into account the value provided by the organization to the customers and the more and more non-sequential nature of processes in the organizations.
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2

Customers in Agile Procurement

Introduction

In most organizations, the time when procurement was considered a mere additive result of the buying process and inbound logistics is long gone. Today sourcing, supply chain management, and value network logics dominate the procurement culture.¹

Depending on the industry or the organization strategy, procurement, once considered a back-office function, now has a different mandate: to pursue an efficiency-driven business model. Often this results in a disruptive imbalance, either toward procurement needs or, to adjust to business needs, ending up with off-contract, maverick spending.

Improving revenue by increasing volume or adjusting prices is in many cases not possible, or at least very challenging. Many organizations find significant opportunities for cost savings in procurement. In addition, as shown in Table 2.1,² the bottom-line impact of a 5 % reduction in external spend is effectively greater than a 5 % increase in revenue—a result not often brought to the attention of decision makers.

Agile procurement is the best approach. Its application should start with the customer, whose centrality is becoming more and more evident.

Table 2.1 Effects in the margin of decreasing external spend or increasing revenue

Income statement (euro M)		Decreasing external spend by 5% (euro M)	Increasing revenue by 5% (euro M)
Revenue	€ 1000.00	€ 1000.00	€ 1050.00
Cost of revenue	€ 700.00	€ 677.00	€ 735.00
Gross margin	€ 0.30	€ 0.32	€ 0.30
Selling, general and administrative	€ 200.00	€ 178.00	€ 210.00
Operating margin	€ 0.10	€ 0.15	€ 0.10
Operating income	€ 100.00	€ 145.00	€ 105.00
Taxes at 38 %	€ 38.00	€ 55.00	€ 40.00
Net income	€ 62.00	€ 90.00	€ 65.00
Change in net income		€ 28.00	€ 3.00
Change in net income (%)		45 %	5 %

Procurement needs to consider two types of customers: the internal customer, which needs the support of procurement, and the external customer, which is the final recipient of the products and services of the organization.

Customer Segments

One of the customer segments served by an organization’s procurement is “internal customers,” as procurement’s main objective is to satisfy the business needs of the departments that make up the organization, while achieving corporate goals such as efficiency and reductions in spending.

On the other hand, as also pointed out in the very definition of agility, while addressing the needs of the direct customer of a process, it is essential to keep in mind the end customer. Therefore, procurement must take into account both internal and end customers.

The aim of the agile procurement function must be to foresee potential changes in the end customer segment by closely observing the structure of the customer base in the sector. This allows for a better understanding of the future needs of end customers. This key information represents a leading indicator also of internal customer needs, as well as enabling a better understanding of the true value of the business.

With reference to internal customers, depending on the focus of the procurement function, the main internal customer may be either at the corporate level, where strategies and key performance (or process) indicators (KPIs) are defined, or at the level of the different departments that request acquisitions to satisfy business needs.

The objectives of these two customer segments overlap, as the ultimate aim for both is the satisfaction of the end customer and the health and sustainability of the business over time.

The aim in these terms for an agile procurement organization is to promote an enhanced end customer focus, both in delivering the final products/services and in providing inputs to the procurement process.

Innovation

Innovation is essential in a world of rapid and turbulent change. In procurement, innovation may be linked to changes in the environment and in the products, processes, organization, and business models. The most relevant question that the organization must address regarding innovation is how to define clearly the services to be provided through procurement to the organization in such a way as to satisfy the end customer (Table 2.2). There is no limit to the types and variety of services that can be offered through product innovation in procurement. The possibility of introducing these innovations takes for granted that there is a need for them in the organization and/or the market, depending on the type of services.

In today's volatile markets, it is very difficult to forecast in an accurate way. Organizations expect the delivery of raw materials, components, and services on time, every time, to meet the demands of their customers and not necessarily as initially scheduled. In the face of these demands, sometimes management buys more than necessary, thus creating excess inventory and often waste.

On the other hand, the procurement function cannot afford long periods of time to acquire supplies and services. If a vendor is not always able to supply on time, it is necessary to evaluate their replacement.

Table 2.2 Customer problems faced by operators’ logistics (from a survey of OTM SIG)

Problem	% in the survey
Lack of integration among internal systems	53
Inability to supply sufficient visibility on orders, shipments, and stocks	52
Inability to invoice correctly for the supplied services	31
Time requested to introduce a new vendor	22
Inability to quickly provide quotations for special services	21
Inability to accept electronic orders	18

Management decisions on incorrect procurement can weigh heavily on the return on assets (ROA). This parameter is increasingly important from a financial standpoint.

The procurement function should not simply find the right materials and services at the best price. The procurement function must manage the flow of information, components, and services throughout the supply chain in an effective, efficient, economical, and ethical way. The objectives are to:

- Prevent lack of material or components. The deliveries must be flexible in order to meet the needs of a changing organization. In addition to the sheer cost of disrupting production, the lack of critical supplies can produce reputational effects, damaging customer relationships and weakening the position of the organization on the market.
- Reduce costs and investment. For example, the inventory turnover of ten or more must be the rule, not the exception.
- Reduce delivery times. Using appropriate strategies, the solutions of agile procurement must provide a more responsive value network.
- Help logistics vendors to overcome the problems that their customers face delivering just in time.

All this implies a substantial improvement in the management processes of the procurement function.

Elica

Elica is a leading organization in the field of hoods and other components for the kitchen.³ In an effort to streamline its organization, it reached an agreement with its vendors for inventory management that covers 95 % of its supplies of stainless steel. This supply market is concentrated, and Elica's bargaining power is low. The agreement reached with the vendors is relative to a consignment stock. In other words, the vendor maintains a supply of its property in the warehouses of the customer. The latter is obliged to buy the materials within a specified period. The benefits are considerable for Elica, as it has drastically reduced the investment in stocks by about 30 %. In addition, Elica can do quality checks on the material before buying it and then greatly anticipate any corrective actions.

The benefits for the vendor include the possibility of better transport planning, consolidating deliveries with those of other customers. The vendor has gained greater customer loyalty with the lock-in effect of stocks at the customer's site.

Changes in Procurement

The traditional procurement process has undergone several dramatic changes in recent decades, in a series of waves, to adjust to new market conditions, increased variability, soaring complexity, increasing competition in every market sector, and slumping margins in most of them.

Procurement, even more than other functions, can contribute significantly to relieving pressure on an organization's margins. In the process of doing so, it can gain increasing relevance as a crucial source of competitive advantage and become one of the main grounds of improvement in the value network.

The phenomenon of profit erosion occurs when, in a transaction, the margin acquired is less than the expected margin. This can occur due to either a less-than-expected revenue or a higher-than-expected cost burden incurred.

Average-performing organizations strive to achieve operational efficiency or aim to deliver effective results.⁴ Top performers (the so-called leading organizations), on the other hand, perform at high levels in both areas. Note that leading organizations pursued +70 % average savings

and operating income increases compared with all the organizations surveyed.

ASUG/SAP found four common best practices adopted by the organizations that led in effectiveness and efficiency of procurement:⁵

- Align the sourcing and procurement organizational model to meet business needs. This can be done by setting an organizational model for procurement based on “key processes” or, by contrast, “key spend categories” in order to better address the needs of the business. An alternative is to decentralize spend power in small amounts to user departments instead of retaining it centrally in the procurement function.
- Manage spend and vendors strategically. This can be achieved by differentiating the strategy adopted in dealing with spend categories and vendors. In order to do so, leading organizations participating in the study implemented revised processes that increased dramatically the amount of spend put under management.
- Focus on employees. This can be achieved by providing formal training and education, including on negotiations, to procurement professionals in the organization to build strategically the expertise needed to support the organization’s needs.
- Implement cutting-edge solutions. This can be achieved by making consistent use of the most recent applications and the use of a world-wide unique system that allows and fosters collaboration between vendors.
- Early involvement of the procurement function in the product development cycle. This practice allows for a better understanding of procurement requirements and early involvement of vendors in collaborative development. In this way, it is possible to effectively contribute to the value proposition differentiation while achieving efficiency in the cost of development and of procurement.

All these actions allow leading organizations to be agile in maintaining low levels of staffing in procurement while achieving top results in terms of annual savings.

According to ASUG/SAP's survey findings, 98 % of participants thought that, in a three-year period, procurement would have become a strategic partner to the organization, while 68 % thought that at the time of the survey, procurement was considered a back-office support function.⁶

After the start of the economic crisis, it became clear that improvements in margins through cost reduction necessarily had to be addressed in a scenario of unprecedented uncertainty. One of the main reasons some organizations managed to survive a crisis of such duration was their capacity to deploy procurement agility in their business. This implies reacting to change by planning, managing exceptions and business as usual (BAU) in the same way, and delivering operational excellence for their customers.

In this model, as also argued by Borhanazad and Tran (2012),⁷ procurement agility is only achievable by pursuing it from two angles:

- First, the firm proactively sets its own vendor structure to make it capable of absorbing on-the-run adjustments as well as to make its own processes fit for uncertainty.
- At the same time, the firm assures that vendors have the capacity and ability to deliver in a flexible way in terms of volumes, delivery, and specifications.

Both these conditions need to be satisfied at all times, not only when actually needed, but also in the expectation of unforeseeable events.

The current trend is toward tightening the relationships between procurement and the organization as a whole, in order to foster the conditions for flexibility and responsiveness.

This book focuses mainly on the first of these two perspectives, looking into procurement processes digitization as well as an operating model to define principles, priorities, and metrics for developing an agile procurement function, using also the opportunities for digitization. The Chap. 5 underlines what to do to ensure the second aspect.

Changes in Sourcing Processes

Sourcing is a particularly important phase of procurement activity. The traditional sourcing process was, to some extent, far from what now falls under the “process” label. At the very beginning, it was the mere activity of finding, engaging, and interacting with vendors.

Traditional sourcing was characterized by a very low degree of standardization, leading to:

- maverick procedures;
- little competition between vendors;
- lack of transparency and traceability;
- loss of data;
- inconsistency and fragmentation;
- low agility;
- low scalability;
- long cycle time due to analogical circulation back and forth of information and inputs.

On the bright side, it is clear that face-to-face negotiation has its share of benefits. This is true in particular with reference to the possibility of understanding each other’s needs, discussing constraints, and building solutions and relationships leading in some cases to win–win situations.

The traditional sourcing process needs to undergo continuous and steady improvement. The organization, with the objective of improving its margins and pursuing profit opportunities, needs to invest in defining increasingly efficient and effective processes. This can allow for both reductions in cost and the development of revenues by better supporting the organization as a whole.

Profit development is not the only driver of change in sourcing. Other drivers include:

- increased customer demands, leading to products that are more complex;
- the market requiring products with shorter life cycles;

- the need for smarter and quicker product development to accommodate new paces;
- the search for opportunities with solutions that offer quicker, scalable, more standardized ways of working and communicating;
- risk management that is more and more crucial.

The sourcing paradigm of the previous century has shifted from plant/office supply to global supply, resulting in a completely different scale and complexity.

Reverse auctions were popular in the last century.⁸ In a reverse auction, the sellers compete to obtain business from the buyer and prices typically decrease as the sellers underbid each other. Reverse auctions are supported by digital platforms (such as frictionless auctions), which allow parallel negotiation and automatic sourcing processes by using a score-based system. The system allows vendors to bid on predetermined lots of goods in order to secure their ability to supply them. They offer a price and a time for delivery characteristics, but they are also automatically evaluated for reputation and other subtle values in the offering.

Reverse auctioning is very efficient and has proved to be effective in decision-making. On the other hand, it often leads to the misallocation of resources or loss of opportunities connected with side requirements of both the buyer and vendor.

The evolution of sourcing required finding a balance between the expressive language of human negotiation and the efficiency of computer-based sourcing processes.

P&G

Procter & Gamble Co. (P&G) is an American consumer goods corporation headquartered in Cincinnati, Ohio, USA.⁹ It specialized mainly in a wide range of cleaning agents, personal care, and hygiene products.

P&G has consistently been at the forefront of supply chain excellence, being ranked as one of the top five best-managed supply chains in the world and winning numerous best practice awards.

P&G uses software that allows vendors to propose their offerings creatively. This application also allows P&G to receive parallel bids from its entire vendor network and to process the information by using an algorithm to assess proposals against the organization needs. P&G effectively earned 9.6 % in savings thanks to the extensive use of such software.

The most expressive relation between the involved parties allowed sourcing to go beyond the transactional frame of mind and move toward a more knowledge-based sourcing, in which side effects of the sourcing process as well as its consequences would become crucial.

This shift toward a new, more professional and technological approach to sourcing requires specific profiles for sourcing professionals. P&G took this requirement into account and made the necessary organizational and human resources (HR) adjustments.

A collaborative vendor networking approach is the current trend. The objective is to have integrated procurement within a collaborative value network model. This is enacted in some cases at a level in which vendors are physically based in the plants.¹⁰ Procurement in manufacturing has developed complex structures of integrated procurement. In these structures, the degree of integration throughout the value network has led to shared investments with relevant vendors in research as well as in physical plants and warehouses.

Two trends currently coexist in procurement:

- fostering high rapidity and automated negotiation, adjusted for an effective exchange of information and driven by a win–win motive;
- establishing solid, long-lasting, value-adding relationships.

It is crucial to differentiate the approach to be taken for each spend category and item.

In a survey by Ardent Partners Ltd., five trends emerged in the way chief procurement officers (CPOs) aim to go even further:¹¹

- source more (52.5 % of respondents)
- improve processes and policies (30.5 %)
- employ cash management strategies (28.8 %)

- optimize current processes (28.8 %)
- invest in technology solutions (23.7%).

Innovation in Procurement Processes

Recent decades have seen continuous progress toward more efficient and effective means of procurement. These developments have kept spend under control, facilitated alignment between requirements and features supplied, and improved the use of economies of scale/scope on the buyer's side as well as on the vendor's.

This has been possible over time thanks to breakthrough innovations, as described in the following sections.

The Skills Funding Agency (SFA)

The SFA disburses UK Government and EU funds for apprenticeships, further education and career learning.¹² Acuity is a leading Procurement and Business Case activity for the Funding and Contracting Transformation (FCT) program, a critical agile transformation.

FCT is replacing core mission ICT systems to manage contracting with learning providers and the flow of funds based on learning provision. It is a £20 million program delivering change in accordance with the Government Service Design Manual (GSDM), using agile methods to develop, test, and roll out systems and business change. Thanks to joint work with consultants the SFA has delivered:

- successful cloud-based procurement for the agile development team with specialist customer relationship management (CRM) skills;
- successful digital services model procurement for agile development and test team;
- requirements gathering to follow user journeys, and write features and user stories alongside architecture designs and skills specifications;
- project management of procurement exercises, working closely with colleagues in the Government Digital Service (GDS), Crown Commercial Service (CCS), and consultants;
- briefing of bidders for procurement competitions;
- running of evaluation, moderation, and vendor selection.

Modes of Innovation

This section follows a classic analysis of innovation to frame and show the innovations that have supported major changes in procurement. From a classification point of view, innovations can be in:

- products (or services);
- process;
- organization;
- business model.

All these types of innovation are important. There are innovations that can encompass the full list. The remainder of this chapter analyzes them in detail:

- A product or service innovation is an innovation in the output of the procurement process.
- A process innovation is an innovation in the way procurement processes are developed, especially in relationships with internal or end customers.
- An organizational innovation means a change in the structure of procurement and the way that it interacts with the rest of the business.
- A business model innovation creates the basis for alliances or partnerships between different institutions or a different way to interact with the customer.

Product Innovation

The main output of the procurement function is supply contracts or orders. The very nature of these outputs has changed over time. Spot contracts do not allow for the flexibility needed in terms of volume as well as the characteristics of the items/services supplied. Spot contracts, for well-structured organizations, tend to be of very limited use (Fig. 2.1).

1	INTERPRETATION
3	TERM OF FRAMEWORK AGREEMENT
4	SCOPE OF FRAMEWORK AGREEMENT
4	PROVIDER'S APPOINTMENT
5	NON-EXCLUSIVITY
6	AWARD PROCEDURES
7	CORRUPT GIFTS AND PAYMENTS OF COMMISSION
8	CALL-OFF CONTRACT PERFORMANCE
9	PRICES FOR SERVICES
10	STATUTORY REQUIREMENTS
11	NON-DISCRIMINATION
12	PROVISION OF MANAGEMENT INFORMATION
13	RECORDS AND AUDIT ACCESS
14	CONFIDENTIALITY
15	DATA PROTECTION
16	FREEDOM OF INFORMATION
17	PUBLICITY
19	CONSEQUENCES OF TERMINATION AND EXPIRY
21	INSURANCE
29	TRANSFER AND SUB-CONTRACTING
31	RIGHTS OF THIRD PARTIES
35	ENTIRE AGREEMENT
36	NOTICES
38	DISPUTE RESOLUTION
39	LAW AND JURISDICTION
	SCHEDULE 1 – GOODS, SERVICES AND LOTS
	SCHEDULE 2 – AWARD CRITERIA
	SCHEDULE 3 – PRICING MATRICES
	SCHEDULE 4 – ORDER FORM
	SCHEDULE 5 – CALL-OFF TERMS AND CONDITIONS

Fig. 2.1 Table of contents of a contract

The trend is to replace them with detailed model contracts for the supply of items/services. Model agreements encompass a very wide range of contractual agreements.¹³ They all aim to achieve the following goals:

- stability in supply;
- reduced number of tenders;
- flexibility in characteristics/volumes;
- solid contractual background to vendor–buyer relationships;
- spend under management;
- optimal supply decisions by employees within an approved model.

Model agreements are a very useful tool that provides large benefits to the buyer's side. Nonetheless, the complexity of the contractual provisions to be drafted is such that the organization needs contributions from procurement professionals, legal advice, and insights from users (of the items/services) regarding the supplies. In addition, on the vendor's side, when the tender has been won and the model agreement awarded, a sort of "winner's curse" occurs.¹⁴ This is because the flexibility earned on the buyer's side is a way to shift uncertainty and risk over to the vendor's side, which may be not capable of handling it. There are many different structures for model agreements. A simple table of contents of these agreements is shown in Table 2.3.

Another "product" of the procurement activity is outsourcing. This allows organizations around the world to focus on their core activities and delegate non-core activities to third parties, at the same time providing interesting opportunities for savings, but especially providing flexibility. In particular, outsourcing can be differentiated according to the share of the activity carried out externally, as well as the degree of integration between the two parties and the way risk is shifted between the two. The "-as-a-service" frame of mind has very interesting flexibility and scalability benefits. These services can be bought as "turn-key," allowing the buyer to eliminate uncertainty around costs while contractually defining quality standards.

Outsourcing is a sustainable business model for two reasons: it allows procurement organizations to reap relevant savings and focus on core activities, while on the vendor's side it provides a reduction in costs thanks to specialization and scale economies.

Outsourcing is an activity that fully engages procurement in finding suitable partners, defining selection criteria, choosing one, defining the Service Level Agreement (SLA), monitoring, and so on.

Technology and, in particular, cloud solutions impact on outsourcing by making it convenient and allowing it to be integrated into an organization's systems. ICT outsourcing has grown significantly. In this category of spending, a certain number of organizations did not simply exploit scale economies. Instead, they outsourced to many vendors,

Table 2.3 A simple table of contents of a framework agreement

Prelim	Parties and Date
Prelim	Whereas
Prelim	Definitions
Clause 1	Framework
Clause 2	Scope
Clause 3	Vendor's Appointment
Clause 4	Non-Exclusivity
Clause 5	Negotiations and Award Procedures
Clause 6	Commissions
Clause 7	Liability
Clause 8	Call-Off Contract Performance
Clause 9	Prices
Clause 10	Payments
Clause 11	Term and Termination
Clause 12	Responsibilities of the Parties
	Vendor's Responsibilities
	Buyer's Responsibilities
Clause 13	General
	Statutory Requirements
	Non-Discrimination
	Provision of Management Information
	Records and Audit Access
	Confidentiality
	Data Protection
	Freedom of Information
	Publicity
	Consequences of Termination and Expiry
	Insurance
	Transfer and Sub-Contracting
	Rights of Third Parties
	Entire Agreement
	Notices
Clause 14	Dispute Resolution
Clause 15	Governing Law
Schedule 1	Goods and Services Included and Lots
Schedule 2	Award Criteria
Schedule 3	Pricing Matrices
Schedule 4	Order Form
Schedule 5	Call-Off Terms and Conditions

developing diversified portfolios in order to benefit from the competitive advantage of each of their vendors.¹⁵

Process Innovation

The major process innovation carried out in procurement has been due mainly to the revolution started by new solutions, which is still very much alive. In particular, the most important change over the years has been to bring under management as much of the organization's spend as possible. The extent to which this is possible has changed dramatically thanks to ICT analytics, automated processes, e-market platforms, and the gathering and analyzing of information of an unprecedented magnitude.

The production of information has greatly improved the capacity of the procurement function to strategically manage spend. The transfer of information between vendors and buyers has greatly aided the communication and integration between the two parties, allowing process improvement and synergies. In particular, some relevant developments include:

- The trend in purchase requisitioning has been to automate and integrate, with a single point of contact, the procurement function for the whole organization, eliminating redundancies in terms of actions needed and people involved, enhancing the capacity of procurement to manage spend, standardizing the means of requisitioning (platform vs. email, notes, calls), and eliminating maverick purchases. This has happened in particular in public procurement.¹⁶
- Contract management has become very challenging, specifically the need to monitor and keep track of the status of contracts. A dedicated tool can provide relief and summarize the information in such a way that supports actions when needed. A contract management tool can also be very impactful in supporting the shift toward model agreements, which allow a certain autonomy throughout the process but still require an approval workflow.
- In tendering, a greater number of competing vendors ensures a more complete investigation of opportunities. At the same time, it generates

more workload for procurement. Dedicated comparison algorithms, fine-tuned for the organization, have been adopted to overcome this obstacle and provide the analysis needed to support decision-making.

Organizational Innovation

A very important factor to take into account in organizations is that there has been a trend toward keeping in house only those procurement activities perceived as critical for the organization and its value network while riding the wave of outsourcing even with reference to procurement processes.

Deloitte points out in its 2014 Global Outsourcing Survey that the adoption of procurement outsourcing has been relatively slow.¹⁷ The outsourced activities found in this survey were relative to:

- invoicing (27 % of respondents)
- spend analysis and benchmarking (26 %)
- requisition creation (26 %)
- vendors assessment (24 %)
- strategic portfolio management (21 %).

The adoption is mainly in transactional services, but increasingly present in strategic analysis and benchmarking. For these activities, specialized agencies can provide a complete scenario and in-depth analysis.

In the procurement area, there are opportunities associated with, for example, the outsourcing of services, Business Process Outsourcing (BPO), and more recently the outsourcing of processes for knowledge management (Knowledge Process Outsourcing—KPO). The organization's own research and development (R&D) departments focus increasingly on their core competences and outsource less critical parts of the innovation processes. This results in an increased complexity of technologies and a lack of expertise in some areas. Furthermore, it is necessary to ensure competitiveness in the market and access to new technologies, and to consider the outsourcing as a growth driver for the organization. In the meantime, the market offers a large number of

specialized tech organizations, which ensures the ability to purchase every needed solution.

Business Model Innovation

The way in which procurement creates value for an organization has changed over time. One example is open innovation.¹⁸ This term refers to the use of both inflows and outflows of knowledge to improve internal innovation and to expand markets for the external exploitation of innovation.¹⁹ In this case, the early involvement of procurement in the R&D cycle allows for better product design and creates value while keeping the cost drivers in evidence. This has a major impact on those industries in which the product involves complex engineering and therefore the portfolio of sourced semi-finished parts is relevant. In these organizations, the procurement functions have had to step out of their comfort zone, that of spend savings, to contribute directly in an essential phase of the value network.

Interaction between organizations of the same type has become frequent in terms of centralized cooperational buying.²⁰ This development has occurred especially among groups, in which the headquarters organization brings together the needs of all the subsidiaries and negotiates contracts applicable to each organization in the group. In this way, it can very frequently obtain better conditions than the ones obtainable locally.

The business model innovation has been very much related to the degree of centralization or decentralization of the procurement processes and analysis and the proportion of activities outsourced vs. the portion carried out in house.

The 2014 KPMG Survey took a close look at how organizations have shifted in the way they interact with the environment in order to capture value.²¹ The KPMG method identifies several stages in the pattern usually observed in the life cycle of organizations to date:

- In the first stage, spend is decentralized because of the lack of a centralized process/structure for procurement.

- Once the necessary infrastructure organizations have been developed, very often there is a rush into centralized spend. Given the normal structure of the organizations population, the majority of them fall into this stage.
- Usually, after a stage in which spend becomes too centralized, organizations fall back toward a milder, center-led spend. This is a final stage reached after a phase of decentralization, in which 43 % of mature organizations are included.

Organizations do change their operating models gradually, introducing projects that support the target business model.

KPMG identified the following top five projects launched by organizations, mostly related to vendor relationships and requisition to pay (R2P):

1. supplier relationships management (SRM) and vendor collaboration;
2. requisition to pay (R2P) enhancement/introduction and upgrade of e-procurement;
3. category management;
4. category-specific projects;
5. globalization of procurement operations and staff.

TNT Express

TNT Express is an international [courier](#) delivery services company with headquarters in [Hoofddorp](#), Netherlands.²² The firm has fully owned operations in 61 countries. It delivers documents, parcels, and pieces of freight to over 200 countries. TNT Corporation sales in 2015 were \$50+ billion.²³

With logistics at the heart of the agile supply chain, selecting a partner is crucial. TNT Express aims to help customers around the globe to achieve greater flexibility, visibility, and end-to-end control at optimum cost.

To reach these targets with agile procurement, TNT uses a holistic approach based on:

- planning and design: value network planning, design, and consultation for maximum network efficiency;
- international distribution: managing the flow of goods from low-cost production locations across Europe and worldwide;
- in-country distribution: low-cost, flexible nationwide network;
- inventory management: integrated solutions for end-to-end visibility and stock control;

- inbound to manufacturing: delivery direct to the shop floor to maximize production output;
- service logistics: storage, delivery, and returns of replacement parts;
- in-night solutions: stock delivery straight into store at night for the start of the next working day;
- warehousing and order fulfillment: improved stock accuracy and increased speed;
- returns management: collection, consolidation, and redistribution of products.

Auchan

Auchan is a large multinational retailer. Its solution, Flash'N pay, revolutionizes the shopping experience.²⁴ Flash'N pay is an interesting solution that incorporates almost all the dimensions of shopping: payment, loyalty, dematerialization and historization of the checkout receipt, reduction coupons, shopping list, and wish list.

Flash'N pay is a generalized solution independent of mobile carriers and financial institutions. The Flash'N pay solution was a response to the blockage affecting the rollout of mobile payment in France. All consumers, whatever their purchasing channel, telephone operator or financial institution, can use Flash'N pay. It incorporates all payment and loyalty cards issued by all retail chains. This solution, which has enabled the rapid rollout of mobile payment in a number of countries where Auchan has introduced the product, has been welcomed and supported by retailers.

Flash'N pay is an application devised by retailers for their customers that is adapted to the needs of customers in their shopping experience. Already operational in stores and simply and rapidly deployed, through Flash'N pay the retailer enters into a direct relationship with customers to propose to them personalized offers throughout their shopping experience and thus develops close contact with them.

Apart from simple payments, Flash'N pay incorporates all the dimensions of shopping before, during, and after the act of purchasing. It includes payment, loyalty, dematerialization and historization of the checkout receipt, reduction coupons, shopping list, wish list, advice on products, shopping tips, social shopping, budget management, and other functionality. In this way, Flash'N pay enables customers to improve their purchasing power by optimizing the use of their loyalty programs and similar initiatives, to access personalized shopping tips, and to develop an innovative shopping experience.

Conclusions

Changes in procurement have been largely triggered by changes in customer demand, a greater maturity of procurement functions, and a challenging environment.

In order to deliver efficiency in procurement, organizations have embarked on several projects for innovation. This has implied managing correctly as much spend as possible and leveraging new solutions and digital platforms. Organizations have also changed the way they interact with vendors, both in terms of the level at which organizations integrate with vendors and in terms of the tools through which the interaction is undertaken.

Platforms for e-auctioning, which support well-defined specifications and requirements, have brought a new level of optimization in the structure of supply. New contracting policies allow for flexibility in volumes, requirements, and timing that is fully leveraged by leading organizations.

All this has been undertaken by leading organizations without a large procurement structure. Resources that procurement can count on remain generally same as in the past, while innovation has become much more important to support the digitization of processes and to ensure full compliance between buyer and vendor organizations.

The trend now observed is a convergence toward a center-led spend, largely enabled by e-procurement. This aims to leverage the benefits in terms of flexibility of decentralized procurement, while grasping the opportunity for centrally negotiated deals and coordination.

Digital transformation is real and has progressed beyond the hype phase. It must be carefully managed. Some key learnings are important for the digital transformation journey:²⁵

- Seize the opportunity for innovation, but plan for quick adoption to gain the maximum market advantage. Take into account that in order to make sense, digitization must be based on simplification.

- Embrace digital business models and leverage unique project opportunities to bring innovation to fruition and become a change agent and leader.
- Plan for value. Digital transformation requires tangible results. Make a solid business case for innovation and define tangible economic benefits. These must be communicated by using storytelling to simplify the narrative and deliver the right story.

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3

Systems in Agile Procurement

Introduction

The implementation of agile procurement—that is, a lean and digitized approach to procurement—requires adequate information and communication solutions. This chapter analyzes ICT support for procurement, beginning with a description of the meaning of:¹

- enterprise resource planning (ERP)
- e-procurement.

It focuses attention on the latter for its potential to support agile procurement.

ERP

The application of ICT in business organizations began in the 1970s, when the demand for production materials was structured using a simple electronic system (known as “manufacturing and material requirement

planning” or MRP).² Its use was limited to connecting internal departments such as production, material management, and/or procurement.³ The functionality of these systems was restricted. The next stage of ICT use in procurement was the implementation of a stronger intra-organization integration of ICT systems, also known as ERP systems. ERP systems aim to provide a common basis for all major business functions across an organization, extending from sales to finance, from procurement to production (and other functions).⁴ The functionality is still focused mainly on administration and support of operational tasks.

Many organizations use ERP. These systems provide integrated support to different functions of the organization, such as planning, sales, purchasing, logistics, product manufacturing, marketing, and other functions. Subject to regulatory and contractual rules, an ERP creates strategic value in operational and administrative cost savings, ensuring a rapid return on investment. With an ERP, the organization is equipped with automated, efficient, and effective tools that obtain good results. ERP helps in the so-called active and passive cycles. In particular, the latter is also referred to as the procure-to-pay process for products and services, when it is considered end-to-end. The ERP covers activities in this process such as:

- purchasing;
- contract management;
- vendor management;
- invoicing;
- simple expenditure analysis.

The manner of operation of an ERP allows for:

- defining sourcing strategies based on the specific needs of the organization;
- providing operational support and administration;
- doing advanced analysis to plan investments, taking into account predictive and emerging trends in the market and the organization’s demand.

ERP allows small and medium-sized organizations to improve order management, cut costs, and seize new opportunities.

e-Procurement

The ERPs support procurement from an operational and administrative point of view. However, they are not sufficient to optimize functions. Specialized procurement systems are required to allow organizations to use specific methods and tools related to agile procurement. In recent years, software that can make procurement processes more efficient, effective, and economical has become available and increasingly supportive. The ability to interface the ERP software is important to ensure an integrated system. Even more important is the use of the Internet to extend remote access to applications and reduce the costs in building a value network integrated and extended outside the organization.

The process of procurement is of fundamental importance to any organization, as success, customer satisfaction, and good cost management all depend on it. Management of the value network and of processes for the customer are the most important goals. The organization needs to understand that managing an excellent value network and the sales process leads to an increase in margins. Support for this approach is referred to as e-procurement.

E-procurement means, literally, electronic procurement. The term e-commerce (electronic commerce) defines trade in goods and services between organizations or between organizations and customers. The term e-procurement refers to a similar concept from the perspective of the buyer. It supports the organization that needs to select, buy, and manage goods or services. The environment of reference is that of business-to-business (B2B).

While the step from MRP to ERP is rather evolutionary, the next development stage—e-procurement—is revolutionary. Flanked by trends such as e-business, the Internet, and supply chain management, technology use has increased over time.^{5,6} It allows for relatively easy integration of the organization with its vendors.⁷

The term e-procurement is not clearly defined. Some authors see it only as the support solution for operational procurement, with distinct e-sourcing for the tactical or strategic procurement tasks.^{8,9} The other, more comprehensive view of e-procurement is as a general term for the use of ICT in procurement. Concretely, the concept is defined as the use of Internet solutions for facilitating procurement processes, such as ordering,

as well as sourcing tasks, for instance web-based vendor search or e-auctions.¹⁰ From a technological perspective, e-procurement systems facilitate tasks that previously required heavy manual work,¹¹ for instance the connection of vendors with the ordering organization by means of electronic data interchange (EDI) systems. Many studies show that e-procurement in general has been broadly adopted in organizations, often in specific processes such as procure-to-pay operations.^{12,13,14}

E-procurement applications also include a number of very different functions.

In e-procurement, the focus moves along the value network. It starts downstream. It continues along the links in the network. It finally arrives upstream in contact with the supplier network. E-procurement potentially allows the organization to manage the entire process of procurement online (Fig. 3.1). This tool allows the organization to:

- reduce the cost and time of the procurement process;
- improve inventory management and inventory; and consequently
- markedly improve the management of all business processes.

E-procurement is necessary both for large organizations, because it makes management of the entire process of buying and growing a network

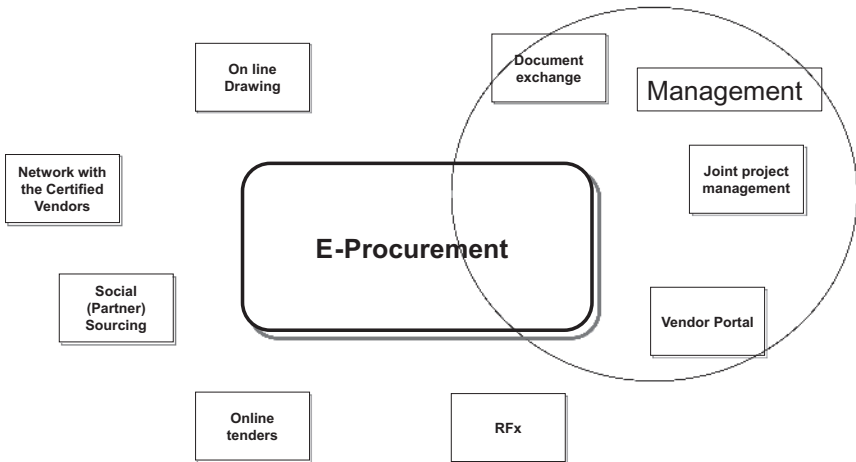


Fig. 3.1 The cycle of e-procurement

of supply easier and more effective, and for smaller organizations, where there is a great need for agility.

e-Procurement Components

E-procurement in a broad sense, as a set of inter-customer-vendor processes supported by digital technologies, is complex and composite. It is useful to introduce a classification scheme based on the following criteria:¹⁵

- application areas involved;
- process support;
- enabling technologies.

Regarding the first element, the process of e-procurement can be divided into two main areas (Fig. 3.2):

- e-sourcing: This is the component where the organization defines the specific technical and economical product to the time the order is issued. This is the basis for sending the request for procurement (RFX) to the vendor, collecting published offers, and selecting the best proposal(s). The chosen vendor must engage in contractual terms with

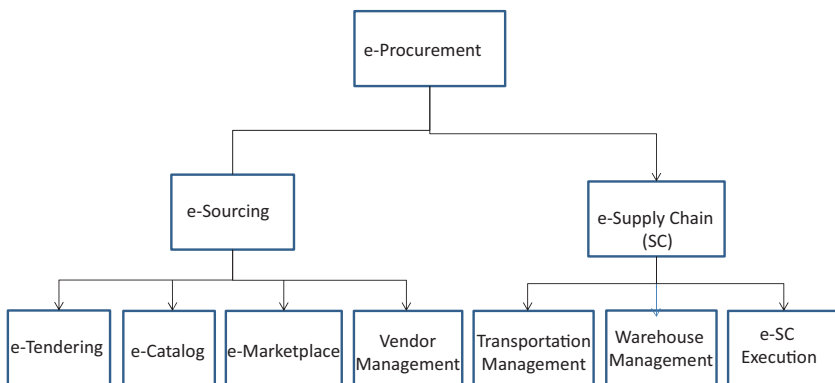


Fig. 3.2 The components of e-procurement

the organization. E-sourcing provides support to the entire procure to pay (P2P) process, including:

- streamlines and automates the entire process, from the acquisition request to payment to the vendor;
 - processes the documents (such as functional specifications, technical specifications, invoices, supporting documentation, and so forth) in electronic format to avoid duplication and payments at an incorrect time;
 - facilitates vendors to generate electronic invoices and manage online catalogs.
- e-supply chain management: this component supports the operations of the supply chain and the use of operational assessments.

Each of these major areas can be decomposed into several specific areas. E-sourcing, for example, can be broken down into:

- the process of purchasing products or services or only limited quantities and specific items (e-tendering): these include all activities ranging from the search for new vendors, their qualification and certification, and the negotiation phase (based on tools such as the request for proposal/quotation and online auction);
- repetitive purchasing processes (e-catalog): this component refers to a web-based catalog. It is relative to a product or a service that has already been defined, for which a model agreement has been reached or all the specifications and prices of the supply are clearly defined. E-catalog refers to processes that are not derived directly from the normal planning tools of production;
- sourcing processes on the market (e-marketplace);
- vendor management and contracts (vendor management).
- The e-supply chain management can be broken down into:
- transportation management: this component supports activities after the issuance of the order. The vendor ships the product. This is controlled during acceptance;
- warehouse management system: this component supports activities connected with the storing of materials, components, or finished products;

- operational processes (e-supply chain execution): this component relates to the cycle of order–delivery–invoicing and the processes of pre-sale and post-sale. It has the objective of automating and integrating the interfaces between the various players in the logistics chain. It also includes the management of the logistics and of the administrative records.

e-Procurement Support of Processes

From the point of view of support for processes, it is useful to distinguish the following possibilities for e-procurement:

- limited coverage of the order cycle: this solution supports only the exchange of some basic documents of the order–delivery–invoicing cycle, typically orders and invoices;
- expanded coverage of the order cycle: this solution supports the electronic exchange of most cycle documents: orders, order confirmations, shipping notices, shipping documents, invoices, and payment notices;
- complete coverage of the order cycle: in addition to extensive coverage of the exchange of transactional data (as the previous solution), this solution includes the automatic alignment of personal data relative to the product data, the conditions of sale, and the price lists;
- coverage extended to other business processes: this solution supports some operational processes complementary to the order cycle, associated with the phases previous to the issuance of the order (pre-sale, from the point of view of the vendor) or following the closing of the order cycle (after market).

With regard to the third element of the classification presented, enabling solutions for the complete coverage of the order cycle, this can be divided into three main categories in terms of the media used:

- EDI or other proprietary technologies, that is, the exchange of data, formatted in a standard way, between the information systems of two or more trading partners, with minimal manual intervention;

- EDI over the Internet, namely the expansion of EDI networks, through hybrid Internet–EDI systems, to trading partners with a lower critical mass in terms of trading volume that is not sufficient to justify the traditional relations based only on EDI;
- pure Internet, for example using electronic messages or even simply mail suitably standardized to automatically feed the computer systems. This is also referred to as the Internet of Data (IoD).¹⁶

Looking more specifically, from the point of view of the possibility of integration, one can distinguish between the following possibilities:

- traditional EDI: in this case, the integration of the vendor–customer interface is achieved through the exchange of electronic transactional documents—orders, order confirmations, delivery notes, and invoices—structured according to a standard format;
- proprietary solutions: in this case, the integration is carried out through exchange of electronic documents in proprietary formats or by sharing an application. This is a solution typically promoted by a large organization to its supply chain partners;
- application-to-application (A2A) based on the Internet: in this case, the integration is direct between computer applications. This is enabled by a suite of products (Internet-EDI, web-EDI or XML-based A2A);
- solutions consortium: in this case, the architecture and technologies for integration, usually a type of A2A, are provided by a specialist district level. Business operations and standards are shared at the district/supply chain level;
- extranet sellers centric: in this case, the interaction takes place in the operating processes of the vendor on the extranet that is available on the sales catalog, the information to support the pre-sales, and/or a possible tool to support the creation and configuration of the order. In this way, it is possible to manage the main steps in the process (issuance of the order, order tracking, and so forth) according to workflows pre-defined by the vendor;
- extranet buyer centric: in this case, the customer extranet is the site for interaction on operational processes, giving visibility to vendors' purchase orders. The vendors need to enter the main documents of the

order–delivery–invoicing cycle (order tracking, delivery notes, invoices, and so forth) in the format requested by the buyer organization through the buyer extranet. This is an innovative approach developed in areas with a number of buyers and high fragmentation of vendors. The benefits in terms of time and costs for the evaluation of a very broad offer may be relevant, as it is possible to ensure compliance with the procurement policies of the procurement organization. In this way, the organization can improve the efficiency and speed of the process of procurement. At the same time, it maintains a centralized control function and audit.

The main barriers to the adoption of systems of this type are:

- the difficulties of integration with existing information systems and with back office processes;
- the current lack of a software standard for this type of purchase;
- other administrative/legal aspects.

DHL

DHL Freight is one of the leading providers of road freight services in Europe.

DHL has implemented the Agheera system to increase supply chain visibility and agility. The system is especially tailored to the tracking of non-powered assets and is designed to run on solar energy for more than seven years. The solution, an autonomously power-supplied device with embedded cellular and GPS connectivity, stands out due to its durability, robustness, and mature quality. This integrated management system can operate a platform of supply chain organizations.¹⁷ This platform has been connected to a plurality of data systems of the value network organization.

e-Sourcing

E-sourcing includes all activities ranging from the search for new vendors (scouting), to their qualification and certification, to the negotiation phase (based on tools such as RFP systems/quotation and auction) (Table 3.1). The purchase phase is the most important and also the most difficult, because it is necessary to search for information on vendors,

products, and technologies. An important condition for a good search is that potentially interesting vendors are accessible online. The networks of online vendors are growing exponentially, as are services that support such networks.

The e-sourcing systems adopted by many organizations have allowed large savings in terms of lower purchase prices and most of all in terms of rationalization of the procurement process.¹⁸

Table 3.1 e-Sourcing components

Analysis needs	Scouting vendors	Qualification of vendors	RFX	Online auction
Analysis and classification of expenditure	Vendors market analysis	Evaluation of vendors	Consultancy on the drafting of specifications	Vendor training
Identification of opportunities for improvement	Selection of potential vendors	Certification of vendors	Request for quotation (RFQ)	Online auction
Identification of the best negotiation strategies	Request for information (RFI)		RFQ responses evaluation	Attendance monitoring
	Update list of vendors		Request for proposal (RFP)	Help desk during the event
			RFP technical responses evaluation	Support in selecting the winner
			RFP commercial responses evaluation	Notification to vendors
				Reporting on results
				Feedback from the event providers
				Support the drafting of the contract

Tools of e-Sourcing

The means by which an organization can make purchases of goods and services online are:

- online auctions;
- national or regional conventions or electronic catalogs;
- marketplace or electronic market;
- vendor management.

Each has its own characteristics and its own sphere of operation. Each of these tools is conceptually thought out, and in part regulated by law with respect to different types of purchase. They are relative to:

- the characteristics of the purchased goods;
- the frequency and volume of purchase;
- the amount limits.

The use of e-sourcing involves the use of several trading tools depending on:

- the needs of the customer organization;
- the environment of action;
- the characteristics of the property in question;
- the availability of vendors.

Ceccato S.p.A.

Ceccato S.p.A. (Ceccato) is a company based in Vicenza, Italy.¹⁹ It is a manufacturer of equipment for the cleaning of transport vehicles. It has reorganized its business processes based on the principles of lean thinking. The objective is to be more responsive to the trends of a market characterized by sharp fluctuations in demand and therefore also by strong seasonality. Ceccato needs to reduce delivery times and be able to customize its systems easily and quickly. A review of the management of production led to results such as halving installation times. The result has been an improved time to

market and especially the possibility to use resources for the monitoring, and if necessary the recall, of materials upstream of the production activities. In addition to a number of lean tools, the organization sought to create better integration within the organization and with external partners. Ceccato has also implemented other actions such as the reduction of delivery times (reducing times for resupply from one month to two weeks), having the highest rate of on-time delivery and a high quality of supply, and maintaining adequate stocks with reduced risk. The approach is based on a relationship with the vendors characterized by speed, accuracy, and regular exchange of communications from the vendors to be included in the management system and MRP. In this way, it is possible to create consistent forecasts.

The pilot phase of the project involved four Ceccato buyers and ten vendors. The ICT interface with the vendors is used for the management of purchase orders and for delivery forecasts. Over time, around 60 vendors have been integrated. These are strategic vendors providing 80 % of the incoming material. It has been beneficial in that it has been possible to create a timetable of deliveries, and the speed of communication has reduced problems related to order confirmations. Within seven working days the order is placed, confirmed, and processed. In this way, it has been possible to obtain a reduction of working capital and inventories.

e-Tendering

E-tendering is the set of activities involving the use of different tools and sourcing in various stages of negotiation. It starts with the identification phase of the specifications and market understanding. It is then possible to move on to the various requests to vendors (often referred to as RFX) and competition between the best vendors, selected based on the results of the previous stage, through an online auction. Several buyers currently use these tools to get an array of many vendors from a round of RFX, providing excellent and fast selection for the final award.

The e-tendering systems depend on requests to vendors (RFX) (Fig. 3.3). They support the management of all activities of asynchronous interaction between buyer and vendor.

In terms of the acquiring organization, requests to vendors can be of various types.

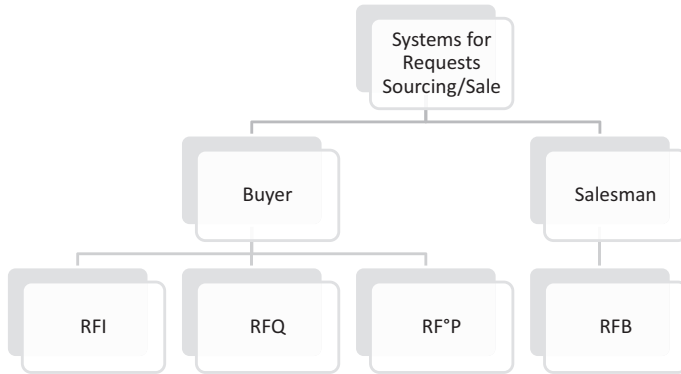


Fig. 3.3 Requests to vendors

- RFI, or request for information, may be the first step of the buying process, in which the buyer sends an RFI to a select set of vendors. An RFI is used when the organization needs more information about possible supply. It is necessary to select a group of potential vendors or, better yet, to specify the request based on the availability of the market. RFIs are employed especially when the organization does not know the network of vendors, so it is relatively uncommon.
- RFP, or request for proposal, is generally used to get more detailed information about the technical and economic specifications if they are not sufficiently clear in the response to the RFI.
- RFQ, or request for quotation, is the next step with respect to the RFI. The buyer selects vendors to be invited into the negotiation and sends them an RFQ with the details required to quote prices and possibly other terms and conditions, asking them to publish a binding offer. The offer must take place, in general, by the date set by the vendor or, sometimes, by a date determined by the needs of both sides. This step is the most common, used also when it is unnecessary to send the RFI and RFP since the performance of the supply is already known. Often, for reasons of speed and accuracy, the (electronic) document is the same in both requests. It is only completed in successive stages, for which the format of the RFI is the same as the RFP, with additional information. The same applies to the RFQ that is finally returned to the buyer completed in all its entries.

- RFB, or request for bid, is a request from the seller's side to the buying organization. It is one tool used by a potential seller to generate the electronic tenders in which potential buyers formulate their offers for the purchase of a product/service.

In the case of public administration (PA), there is a need to comply with government regulations. This aspect introduces some peculiar elements, such as:

- logging of the receipt of tenders (with relative time stamp);
- management of the process of opening the bid envelopes (on paper or electronic);
- digital signing of the documents included in the offer.²⁰

Telematics or Online Tenders

Sourcing with an agreement is suitable for standard products, which are normally purchased in large quantities. At times when these characteristics are not readily available in the market and the organization has, on the contrary, a need to purchase goods or services with particular characteristics (for instance, scientific equipment) in large amounts but also in small quantities, the most suitable tool is an online tender.

Online tenders are tools for the selection of vendors based on electronic trading systems. In the case of PA, the process of online tenders is determined by government regulations. In the case of private organizations, the procedures are similar but more elastic and with fewer pre-dates defined in general.

The process in PA is normally the following:

- A notice of certification is published at least 60 days before the start of the subsequent actions. Vendors apply for certification to the tender with reference to the category of interest. The organization decides on the applications for authorization within 15 days of receipt of the request. The certification lasts no more than 24 months. The content of the notice of authorization is governed by the sourcing regulation of

the specific administration. This procedure enables the access to tenders once they are published. By resorting to the terminology of the traditional procedures, it can be said that by placing them in a register of qualified vendors the organization has the ability to pre-qualify vendors. This normally does not apply in respect to a single tender, but to all the tenders that the specific PA launches during the validity of the authorization for the product category for which the vendors have applied and obtained a certification to participate.

- A notice is published at least 30 days before the deadline for the start of operations relating to the procedure of supply of any goods or services specified in the notice of qualification. The conditions required by the RFP are identical to those provided by the notice of qualification.
- The invitation to the authorized persons must be made at least ten days before the date set for the start of tendering, through e-mail or other communication tools indicated in the notice of qualification. The invitation shows the ways to participate in the procedure, and the day and time in which the start of operations is fixed.
- Once the operations of the tender have begun, each vendor sends its offer (or economic feasibility report, according to the award criteria identified by the organization) via computer and has the ability to improve it until the expiry of the term of the procedure. The offers are displayed by the organization responsible for the procedure and evaluated in real time using automatic or semi-automatic mechanisms, previously defined.
- The tender is awarded to the vendor who has submitted the best offer at the time of the close of business of the tender, based on the notice issued.

Online Auctions

Online auctions, or competition telematics, are vendor selection procedures based on electronic trading systems. They are applicable to the acquisition of goods and services that can be evaluated in an objective manner based on technical/economic, qualitative, and quantitative criteria.

The difference is that the tender is done by a confidential written application. An auction is conducted in the public domain, with offers from registered buyers deciding the result or otherwise.

Online auctions, unlike telematics tenders, support synchronous interaction, therefore in real time, with several vendors.

Online auctions allow buyers to obtain a supply at the lowest possible cost (or other characteristics defined in the contract). In this case, they bring in more competition. The vendors try to win the supply by lowering the price until the end of the period set for online trading.

There are different kinds of auctions, including:

- masked auction: this removes entirely the visibility of the dynamics of the vendors, so vendors tend to offer the lowest price respecting the time constraints;
- secret auction: in this case the vendors do not know who else is offering and who is winning;
- post-event auction: this provides for the possibility of reducing the price further by using other types of tools after the close of the auction;
- multiparametric auction: this type of auction adopts a system of weighting. The buyer reserves the right to assign bonus or penalty points to the various vendors invited. These weights are assigned based on the quality of the supplies offered, for example, after a preliminary RFQ based on the level of service and/or knowledge of the vendor. This is perhaps the best mechanism to award a tender and to achieve satisfactory products. This approach overcomes some of the limitations associated with auctions. An award based only on price tends not to weight other relevant factors, such as the quality of the supply.

There are different auction structures as well:

- A direct auction involves upward price movement. This is typical of Business to Consumer (B2C) markets (for instance, in the case of e-Bay), where the winner makes the highest bid within a specified period of time.
- A reverse auction involves downward price movement. This is more common in B2B markets, where the offer comes from a vendor who cannot offer a higher price than that of the base established by the buyer.

Auctions can also differ in the manner in which the offer is presented:

- The offer can be open, in which case the negotiation process occurs in real time, bidding after bidding.
- The offer can be closed or secret, in which case the negotiation process takes place with a sealed envelope (possibly virtual) and can be repeated many times (in the case of the RFQ, it does not involve interaction in real time) according to the following valuation parameters:
 - price: wins the auction on the basis of the price;
 - price set by the vendor or customer, beyond which (live auction)/ under which (reverse auction) auction is considered valid, and wins;
 - multi attribute: wins the auction in accordance with a grid obtained by weighing the price with other parameters of the supply, according to a reserve price. This is useful in supply of very complex products or services that need to intersect numerous constraints, and where it is necessary to compare and choose from a lot of information to make the best decision. This tool allows the organization to:

take into account a large amount of information;
 manage the search following customized workflows;
 track the data and do what-if analysis (define a path for improvement arising from the analysis of the current state);
 apply optimization and decision support techniques.

Auctions can also differ based on the mechanism of trading:

- English upward: it is expected that each participant raises with a bid better than the current offer within a certain time frame (+ hammer time);
- Dutch: this is used to sell more units of the same product: the competition among the participants is based on both the price and the amount that the organization wants to buy;

- Japanese: the price changes for successive increases/decreases with subsequent self-exclusion of the vendors until the last one remains in the bid.

Auctions can also be classified by the method of grouping:

- combinatorics: different lots of different products with the opportunity to make an offer for several lots at the same time;
- Yankee: different lots of the same product;
- simple: single award.

Auctions are also distinguished by the method of award:²¹

- mode: automatic or non-automatic (subsequent negotiation);
- price: first price or second-best price (Vikrey auction).

Auctions use sealed envelopes as a tool to allow the organization to manage vendor offerings in two distinct phases:

- the technical selection collects the supply specifications;
- the commercial bid is dedicated to the price and is limited to the vendors that have responded with a satisfactory technical bid.

The second auction can also be made online. The final evaluation weighs the different ratings (technical/commercial).

Gesac S.p.A.

Gesac S.p.A. (Gesac) is the management organization of the airport of Naples.²² It implemented a portal to manage online tenders, online purchases, and vendor registration. The portal allows the organization to put online all the supply (direct, by invitation, to public evidence, below and above threshold) through specific trading functions, all in accordance with the provisions of the regulations governing public purchases in the so-called "special sectors."

The choice to innovate procurement processes in Gesac is part of a wider program of optimization of the main internal processes, also aimed at improving the level of service to passengers.

In the specific case of supply, Gesac was looking for a solution that would enable both greater competitiveness and cost rationalization. The solution should allow Gesac to interact more easily with vendors and enable them to access bids through a more streamlined and transparent process in terms of real equal opportunities, all scrupulously respecting the provisions of the Public Contracts Code, which regulates most of Gesac's purchases as a public organization.

The extensive use of digital solutions has brought significant benefits. It has gained in efficiency of the processes, with a reduction of so-called "crossing times." Some greater benefits were seen for tenders for invitation and below the thresholds, estimated at 50 % compared to conventional tenders. The portal provided the possibility to invite many vendors to the tenders. The ability to easily compare their offerings allowed Gesac, in many cases, to improve the quality/price ratio of its purchases. These savings along with those of the processes brought in several cases savings in the order of 25 %.

Range of Products and Services Suitable to Online Transactions

It is interesting to analyze the frequency with which the purchase of different types of products is done online. The tools of e-sourcing were born mainly to reduce the transaction costs related to the processes of purchasing indirect goods. They are useful for that class of goods necessary for the growth of the organization but not critical and demanding in terms of evaluation, analysis, and thorough selection of vendors. Today online transactions are used for many classes of products, with a higher strategic weight.

Especially in large organizations, it is confirmed that if the event is analyzed and evaluated in the right way and tools of e-sourcing appropriate to the case under analysis are chosen, the results are definitely positive regardless of the type of goods to be purchased and the type of market being dealt with.

From the point of view of the turnover of purchases, simpler products that are not critical to the organization affect less than 30 %. In terms of turnover, they are followed by direct products and then by services and capital asset.²³

Depending on the complexity of the product in question, the use of appropriate e-sourcing solutions implies the presence of a strong expertise in the organization. It is necessary to:

- draw up the contract in the best way;
- select the right vendors;
- choose the right tools;
- assign the parameters in the proper way.

e-Catalog

Definition of e-Catalog

Another tool of e-procurement is to optimize the purchasing process via an electronic catalog or e-catalog, also called sometimes the conventions. These are model agreements signed by the organization or by some public authority to whom the role of purchasing has been delegated in the case of PA. These contracts are executed following a traditional or electronic tender procedure. Such a purchasing tool provides the organization with goods or services identified by analyzing the needs of the organization. It offers vendors the opportunity to meet demand while ensuring respect for the principles of competition and transparency. The conventions are engaged in a “commitment system,” as indicated in Fig. 3.4.

The e-catalog is a catalog of products offered by the organization that can be consulted online by the staff.²⁴ It is essential to integrate the catalogs of a number of selected vendors in the corporate intranet, so that employees can place their orders directly. The entire process can take place under the constant supervision of the organization’s ERP system.

In recent years, the total number of transacted managed platforms of e-catalog have increased by 100 %.²⁵ This growth is mainly due to the increase in transaction volumes by a few large organizations (in Italy: Telecom Italy, Unicredit, Vodafone, and so on) rather than to an expansion of this tool to many organizations.

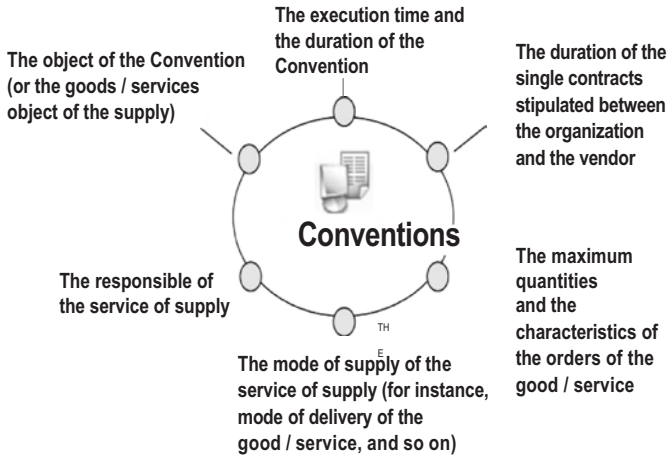


Fig. 3.4 System of commitments in the conventions

Models of e-Catalog

In many organizations, the use of e-catalog is increasing. There are essentially two groups of variables driving this expansion:

- variables of an organizational nature, such as a commitment by the board and the institution procurement to clarity of objectives and attention to change management;
- variables related to the model of the e-catalog, developed according to a specific technology platform and according to the types and modes of items loaded.

The most successful cases are when both of these groups of variables are managed properly within the organization. In other words, the success of this tool depends on the support of the executives and the awareness of the institution procurement management of the need for change in the process toward more self-service.²⁶ The correct loading and timely management of the catalog of products needed by the organization is very important.

The e-catalog can be managed and updated by:

- buyers;
- vendors;
- markets (that is, by third parties) that offer various search tools and selection as well as a higher level of security.

With reference to the variables defined earlier, the organization can identify different technological solutions (connected with the trilogy: make, buy, or partner):

- completely inside: all catalogs are loaded on a platform inside the organization (Suite, Extended ERP (EERP),²⁷ ad hoc). An important aspect is that the management modules of the e-catalog come from vendors of systems already present in the organization. This allows the organization to easily integrate the back office with the e-catalog;
- internal punch-out: this solution is a variant of the previous one. In this case, it is possible to access the catalog of the vendor via extranet. This solution presents significant benefits since it is possible to use an efficient service without the need to invest inside the organization for the catalog system and its update (for instance, frequently updating the current availability of the products or services). There are some disadvantages related to the loss of control of the contents of the catalog and the need to become flexible and adapt to interact with a multiplicity of different interfaces from different vendors;
- based on external service vendors and e-catalog: in this case, the products are loaded in catalogs belonging to an external technological platform managed by a specialized operator. This is very similar to rental management. Sometimes the external operator is also responsible for managing the content of the catalogs, even if the administrative, accounting, and logistics remain the responsibility of the organization;
- external based on an outsourcer processing the e-catalog: in this case, the catalogs are managed entirely by a specialized external operator dependent only on the organization that buys. The operator is responsible for the management of the technological platform, the loading of

the data, the monitoring of the products in the catalog, the accounting cycle administration, and the logistics. This type of solution is expanding because it implies a reduction in management complexity, especially in the logistics of deliveries. It also reduces the costs for management of these processes. It can take advantage of highly specialized expertise and reduced costs/investments. Its drawbacks are the need to choose the right vendor and the risk for the vendor of losing contact with the end customer. It is widely used for travel and insurance, since it also makes it possible to compare prices and fees;

- external-based catalogs and marketplace: the catalogs, in this situation, are provided by the service vendor, or are uploaded to a marketplace where the vendor is registered. Typically the catalogs are managed directly by a specific vendor. In the other cases, they are of a more general, but less flexible type;
- mini catalogs that refer to products/indirect services for the office: these cover typical office supplies. Generally, the catalogs are very lean and flexible. They can include thousands of articles available from a limited number of vendors;
- selective catalogs of products for maintenance, repair, and operations supplies (MRO): This type of catalog includes products/indirect services for the office and all the products necessary for the repair and maintenance of facilities. These catalogs usually include thousands of articles. For this reason there might be some difficulty in adapting to online purchasing processes;
- maxi catalogs: this type of catalog includes an extensive portfolio of products for maintenance or technical assistance, capital goods, and ICT goods and services. These catalogs usually include hundreds of thousands of items;
- catalogs of direct goods: these are relative to products whose procurement process is triggered by specific needs (the purchase in this case is not defined by production planning, or by reaching the reorder level based on available stocks, but the purchase is for instance “pulled” by the customer).

In addition to the definition of the different models of the e-catalog, it is also useful to classify the types of catalogs according to two

variables: the specific sourcing category and the size of the catalog. A useful element for the entire sourcing process is certainly the presence of online B2B platforms that help guide the organization. They support the comparison of a wide range of information, together with the possibility of effectively scouting through the portals that host the online catalogs.

This tool should ensure better management of all information, making it possible to search and perform analysis at different levels of grouping and according to different functions (by category or keyword). It often provides a good integration with the management system of the customer and a low cost of updating.

Monitoring of e-Catalogs

The monitoring of supply consists of an integrated system for detecting the service levels provided by the vendors that have conventions with the organization.

The objectives of monitoring are to:

- verify compliance with the levels of service and contractual obligations stipulated in the convention through a constant check on the services provided by the vendors;
- promote improvement actions in the definition of subsequent agreements, making changes as necessary to the structure of specifications.

The tools for detecting the service levels provided include:

- an audit sampling by the procurement aimed at monitoring compliance with the service levels in the contracts, ensuring uniformity and objectivity of the evaluation;
- interviews/questionnaires and telephone surveys of requestors to measure satisfaction as perceived by the applicants;
- systematic collection and structuring of complaints addressed to the vendors.

Sandvik

Sandvik, the Swedish mining giant, aimed to simplify its supply chain.²⁸ One of the tools it has used to improve the agility of its procurement organization is a single portal for purchase orders. The need for such a system became evident after the 2008 crisis forced every organization to reduce waste. The global organization signed a host of agreements in different parts of the world. This created a fragmentation of information and areas of poor performance.

The Swedish management decided to take action in search of a solution. It chose an e-procurement system, internally called VendorConnect, involving 750 vendors in 22 countries. The system includes 13 different ERP systems used within the group.

Thanks to this system, the mining giant has better information management, saves time, and has a more complete view of its relationships with vendors. The indicators of performance of vendors are shared among the group organizations and updated continuously.

e-Marketplace

The e-marketplace is a tool that allows for rapid matching of demand and supply. Purchase can be made very quickly. It is by nature particularly suitable for frequent purchases of low value.

There is no full convergence in the literature and among professionals in defining an e-marketplace.²⁹ Some observers attach limited significance to the concept of the e-marketplace, referring only to those intermediaries designed to manage online processes of sale between businesses. Others consider any intermediary B2B as an e-marketplace. It is designed to support any form of commercial value network, even if not strictly transactional.

This book suggests using the definition of the electronic market only for purchases below the threshold that requires an EU tender. An e-marketplace can be defined as an online service to the benefit of buyers and sellers, offered by a neutral and independent market service provider for a fee.³⁰

Use of an e-marketplace must be regulated by a procedure. The required elements include:

- communication with vendors seeking access to the e-marketplace, including the requirements they must meet to obtain a license;
- description of the characteristics of the products/services, grouped by categories, that are intended to be offered in the e-marketplace;
- provision of all information regarding the operations of the electronic market, in both technical and administrative terms;
- automatic evaluation of offers, including a ranking based on the criteria chosen by the ordering organization among the options proposed by the computer application.

These services are used in three different situations:³¹

- Some informational e-marketplaces make RFP/RFQ tools available to customers to allow them a first level of interaction. Generally, the next interaction with the customer occurs offline.
- Other e-marketplaces adopt this mechanism as the only means of transaction through which to order online.
- Finally, there are e-marketplaces that use the purchase requisition as a complementary tool to the online catalog. This catalog allows buyers to enter into direct contact with the sellers. The use of RFX by the buyer may be an alternative means of negotiation to online auctions, in case the organization wants to conduct negotiations simulating a negotiation in a sealed envelope with a number of RFPs or RFQs.

Amazon.com

[Amazon.com](https://www.amazon.com), also called Amazon, is an American electronic commerce and cloud computing company founded in 1994 by Jeff Bezos.³² It is based in Seattle, Washington but maintains offices and warehouses around the world. It is the largest Internet-based retailer in the world by total sales and market capitalization.³³

[Amazon.com](https://www.amazon.com) customers have access to over 250,000 products, from vendors mainly in categories such as books, electronics, and software.

Thanks to e-marketplace, customers can access an even wider selection of products and vendors, always with ease of use and different payment system options. Amazon also guarantees all purchases from vendors, making buying on Amazon easy and secure.

About a third of all items purchased on Amazon sites are sold by more than two million active sellers on Amazon Marketplace.

Amazon strives to be the global organization closest to the customer and aims to offer its customers the lowest possible prices. Amazon and its affiliates operate many websites specialized for individual countries.

Supplementary Tools for Negotiation

E-sourcing not only provides for the use of online trading. The latter should be considered in parallel with other tools and relevant solutions to support the processes of sourcing, such as:

- tools to scout for prequalification online (which sometimes, in the most simple and less critical cases, coincides with the qualification itself);
- tools for negotiating with vendors (Fig. 3.5);
- contract management tools needed to support the buyer in the definition of a contract. These tools simplify the creation and management of the contract. An archive of contracts provides visibility of important contract data, enables monitoring of the use of the contract, guarantees compliance with the contract terms, and allows for active management of associated risks, longer-term and/or automatic renewed contracts. Advanced features that can help the organization in purchases include:
 - acceleration of the negotiation of contracts, authoring, and approval processes;
 - minimization of legal exposure, risks, and benefits of the sourcing—by standardizing the content of the contracts and the controls of their different versions (so-called versioning);
- tools for data analysis and reporting, which are important in making conscious choices and to support the decision-making process of sourcing managers;

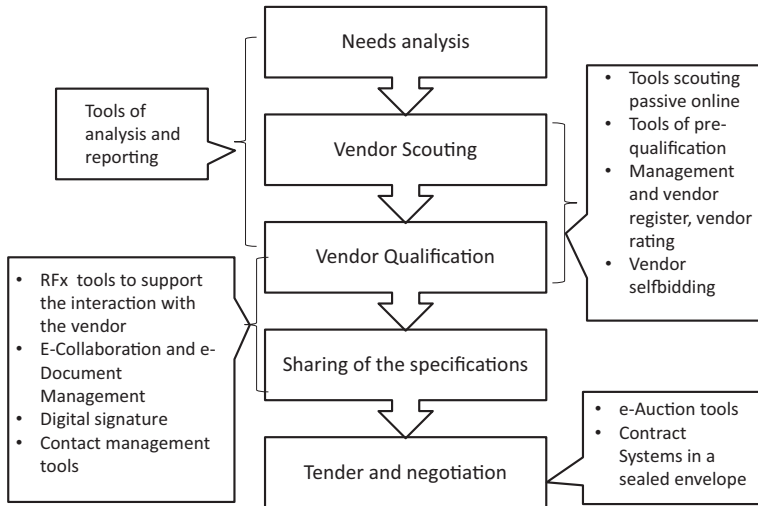


Fig. 3.5 Negotiation tools

- tools for managing vendors. These should permit deep visibility of information on vendors and their performance. They manage a mix of objective and subjective factors of performance data of the vendors, and measure different types of vendors, products, and services with a single management system for the performance of vendors. This tool is used to track the operations of vendors (mainly in the case of services), verify their compliance with the order or contract, and improve collaboration with vendors;
- tools for managing savings in support of management control. These are tools that record and monitor the parameters of efficiency of the procurement function with respect to the objectives of the organization. They are also important to disseminate the results of the work of the procurement function. They provide:
 - mechanisms for the validation of the initiatives of agile procurement;
 - liaison of the savings with the procurement strategies;
 - characterization of the types of savings, and work with the administration to provide support for the assignment or reinvestment of savings.

These tools provide crucial support to the procurement management. They are useful not only to support the optimization of purchase prices, which is allowed by the e-sourcing, but also to:

- gain and consolidate experience in the management of a well-structured procurement process;
- use a multiplicity of improved tools to support specific aspects of procurement.

Anas S.p.A.

Anas S.p.A. (Anas) manages and operates the Italian national road and motorway network.³⁴ The entire cycle of procurement is handled online, in an integrated mode supported by ERP systems. The benefits are reduced costs and a more efficient collection and sharing of information on purchases, often "scattered" across various business sectors.

The assessment of vendors (vendor rating) is an important part of the Anas procurement process. Thanks to ICT, this activity is now structured and transparent, providing support for the organization representatives involved (internal customers) in relation to the specific performance required. It is possible to know in detail what and how the organization is spending. The discovery of potential deviations of expenditures from the estimated budget occurs almost immediately thanks to the spending visibility system.

e-Supply Chain

The e-supply chain is the digitized supply chain, or in the terminology used in this book the digitized value network. It is the set of processes involving an organization and its main partners in the value network. It should be managed in an integrated manner using new solutions. The organization can benefit from correct process planning for the entire supply chain.

To understand in detail the features of an e-supply chain, the organization can adopt an analysis model based on two variables:

- the macro scope in terms of the processes involved in new solutions, such as in transportation management, warehouse management systems, manufacturing execution systems, and e-supply chain execution;

- technology choices: organizations may adopt integration technologies, such as A2A as in the traditional EDI, or integration technologies based on the Web or extended messaging language (XML) protocols, using for example service oriented architecture (SOA) protocols and web services.

e-Supply Chain Execution

This e-supply chain process is divided into a series of macro phases (Fig. 3.6):³⁵

- pre-sales support;
- issuance of the order;
- logistics;
- administration and accounting cycle;
- after-sales support.

According to the stages considered, the e-supply chain execution involves the use of specific tools.

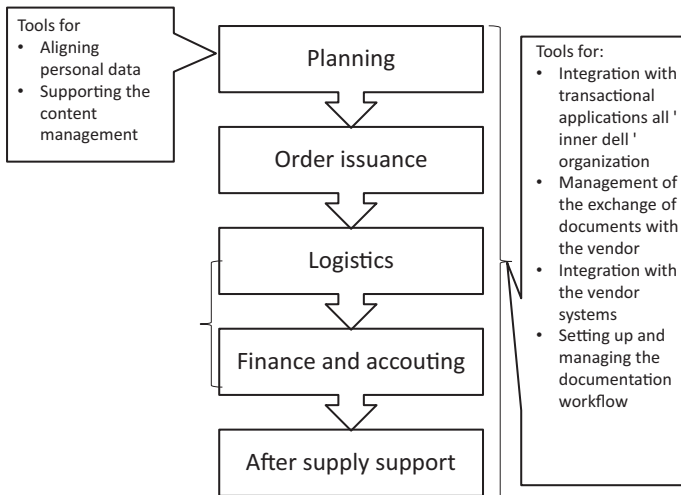


Fig. 3.6 e-Supply chain execution

Warehouse Management System

Inventory management involves the receipt, storage, and handling of goods, including goods in process and finished products, up to delivery to intermediate or final storage or to an end user. In a model covering many levels of distribution, there may be multiple levels of warehouses:

- a central warehouse;
- regional warehouses;
- pretail stores (served by regional warehouses)
- consignment stores (at the customer location).

The design of the warehouse and the design of its internal processes (for example, the manner to carry out the picking) is also part of the management of the warehouse.

The objective of a warehouse management system (WMS) is to provide a set of computerized procedures in order to optimize costs and time of storing and picking.³⁶ This includes:

- reception in a facility;
- modeling and management of the logical representation of storage facilities and equipment (such as shelving and so forth);
- enablement of a seamless connection for order processing (active and passive) and logistics management, in order to receive, pick, pack, and ship products out of the facility.

A WMS is a key part of the value network of the organization. It aims primarily to control the storage and internal movements of materials and process the associated transactions, including shipping, receiving, storage, and collection. The system also directs and optimizes stock repositioning based on real-time information about the status of the bin utilization. A WMS monitors the status of the products through the warehouse and the physical infrastructure inventory, tracking systems, and communication between working stations of the product.

WMSs often use automatic identification and data collection solutions such as barcode scanners, mobile computers, wireless local area networks (LANs), and increasingly radio frequency identification (RFID). In this way, it is possible to monitor efficiently the flow of products. Once the data have been collected, there is a batch or real-time synchronization with a central database. The database can then provide useful reports about the status of goods in stock.

WMSs can be stand-alone, or they can be modules of an ERP system or of a supply chain execution suite. Depending on the size and sophistication of the organization, the system can be as simple as a handwritten list that is updated when necessary, spreadsheets using software such as Microsoft Excel or Access, or purpose-built software. In its simplest form, the WMS can keep track of the data produced during the production process and act as interpreter and message buffer between the existing ERP and WMS.

Robert Bosch GmbH

Robert Bosch GmbH or Bosch is a German multinational engineering and electronics company headquartered in Gerlingen, near Stuttgart, Germany.³⁷ It is one of the world's largest vendors of automotive components.

Bosch has introduced virtual tracking in order to share information on the production, distribution, and trading partners of the organization. It uses RFID tags to automate the data management of incoming goods and optimize its stock,³⁸ enabling flexible review of the production and procurement planning in response to changes in supply, transportation environment, and demand fluctuations. If several organizations use this system, it can share the data in real time and reduce the differences between organizations and industries.

Vendor Management and Contracts

As for vendor management, pre- and post-acquisition, e-procurement can provide interesting tools, such as:

- vendors register: the goal of a vendors register is to enable the sharing and capitalization of information on current or potential ven-

dors for an organization or group of organizations. It makes it possible to collect information directly from the vendors to facilitate the processes of classification, pre-qualification, and qualification. The register allows buyers to monitor financial management (quality and pricing of products, financial stability, production capacity, and so on).

- contract management tools: the contract management software is based on the typical needs of the procurement processes. For instance, it can keep track of the whole evolution of a commercial negotiation: the vendors that participated in the tender process, how the procurement process was handled, under what conditions, at what prices, and how the contract was executed.

These tools can provide significant support to a relatively uncommon organizational figure—the vendor manager. The duties of a vendor manager include:

- primary duty: provide support in the management of vendors.
- general duties
 - manage a certain number of vendors, supporting the department either in the solutions delivery or in the service delivery;
 - work together with the rest of the organization management in charge of the projects, services, and initiatives supported by the vendor to optimize support of the vendor;
 - support sourcing and legal in the definition of the commercial relationships and the terms and conditions of the contract with the vendor(s);
 - define a service level agreement with the vendor;
 - work to define and improve the dashboards and reports to monitor the activity of the vendor;
 - monitor the respect of contractual relationships and follow the level of service actually delivered by the vendor;
 - define and monitor the actions by the vendor and the organization in case there are substantial deviations in the level of service offered;

- manage the change control process;
- organize and attend periodic meetings with the vendor management;
- monitor respect of the security requirements by the vendor;
- organize the lessons learnt session at the end (or periodically in case of continuing service) of the relationship with the vendor.

Diffusion and Frequency of the Processes of e-Procurement

Two factors are important to assess the level of e-procurement in the organization:

- the diffusion and capillarity of the use of the tools;
- the frequency with which the organizations use e-procurement to manage transactions.

Widespread use is dependent on the number of users of such solutions. Frequency is dependent on the number of transactions.

An important aspect to evaluate is not only the capillarity and frequency of use but also the type of assets managed. The types can be very different (from a professional and organizational point of view). This value can range from a few tenders of great value managed by a single user, to many online transactions by multiple users.

Benefits and Barriers of an e-Procurement Application

E-procurement brings several benefits to an organization, including:³⁹

- management and governance of the procurement processes according to agreed methods and their optimization (with real-time tracking of

all activities undertaken by any applicant, buyer, receiver, payer, or vendor);

- addressing basic principles of selection of vendors and their management (with real-time accessibility of all procurement activities conducted by any applicant, buyer, receiver, payer, or vendor);
- availability of additional tools to ensure the best conditions of procurement (an Aberdeen study found that enterprises displayed a 35 % improvement in spend under management, with a 41 % reduction in maverick spend. Enterprises also reduced their requisition-to-order cost by 48 %, and cut transaction cycle time in half.⁴⁰);
- reduction of time spent managing, negotiating, and having vendor relationships (with savings on negotiation times up to 70 % and on the administrative management of negotiations up to 50 %).⁴¹

In a more analytical sense, the general benefits include:

- cost savings
- greater efficiency of the organization in the process of procurement, with:
 - process simplification;
 - reduced time of completion of the tenders;
 - greater transparency of procurement processes;
 - increased competition between vendors;
 - interaction and collaboration with vendors;
- modernization of the administration, due to:
 - widespread use of ICT tools;
 - rationalization and upgrading of resources;
 - programming, control, and monitoring needs.

Figure 3.7 shows how e-procurement can simplify the processes of bidding for PA.⁴²

A separate examination of the benefits of e-sourcing and e-supply chain management follows.

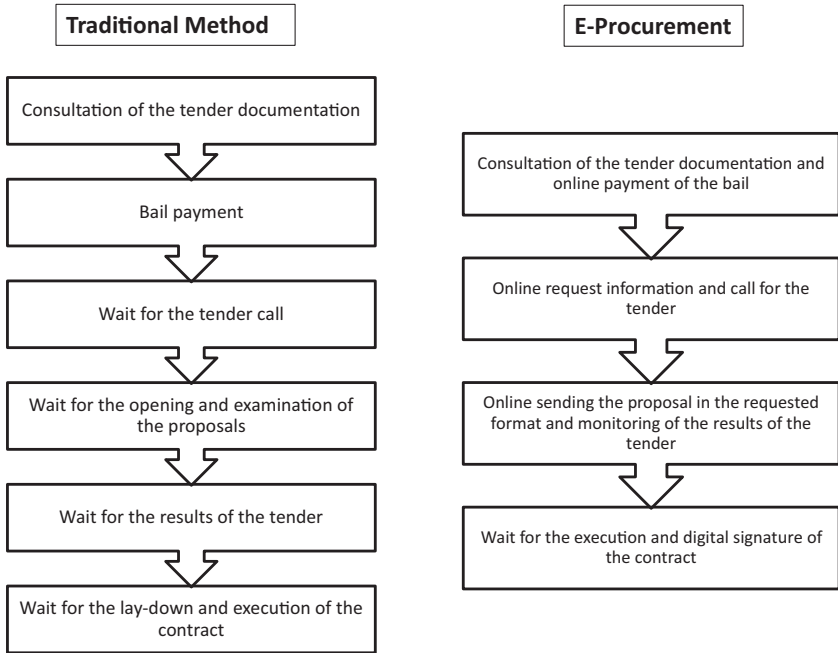


Fig. 3.7 e-Procurement in PA

Benefits and Criticality of e-Sourcing

The adoption of e-sourcing tools brings several benefits, especially for buyers, hence the growing adoption of these tools.

The main benefits include:

- reduction in purchasing costs;
- increasing level of efficiency extended to all processes;
- possibility of consolidating vendors to a selected and reliable core;
- ability to aggregate demand.

The reduction in sourcing costs is due to the possibility of receiving a larger number of tenders than in the past. Some studies show an average reduction in purchase price of 17 % over the previous situation.⁴³

In the past, the buyer had more power than the vendor when the products were simple and without many specific characteristics. In such cases,

there was an opportunity to choose from a large number of vendors to place in competition. In the case of special, or more complex, products, however, the power of the buyer was supplanted by the strength and exclusivity of the vendor. In this situation, the opportunity to buy at competitive prices was very limited.

The tools of e-sourcing RFX and auctions allow the organization to change these conditions. They support the definition in advance of the technical and economic specifications. Based on this information, a buyer decides who gets the tender.

The benefits are substantial. The time required for defining correctly and in advance the various specifications are more than compensated for by the speed of selection and choice among the proposals received.

The efficiency of a process of e-sourcing increases with the frequency and the number of transactions to manage online. This is because if the number of transactions grows, the costs related to market analysis, documentation, selection of vendors, and resources for the negotiation are distributed over a larger number of events. In this way, the transaction cost of each event goes down, making these solutions affordable.

The success of such a choice is based on a careful definition of the guidelines to follow:

1. analysis of the portfolios and identification of the products to be acquired by e-sourcing;
2. definition of correct and clear technical specifications and economic information before the use of RFX and online auctions;
3. appropriate choice of the number and type of vendors to invite to the tenders: finding several competing vendors (usually four or five) allows the organization to purchase at a competitive price. The organization needs to choose homogeneous vendors from the point of view of supply. The final choice should be conditioned solely by the price and not by technical and economic parameters or the level of service and quality indicators. If this is not the case, it is appropriate to use multiparametric auctions, in which deals with different characteristics can be compared;
4. the final phase, which is very important: choice of vendor to receive the award.

Benefits and Criticality of e-Supply Chain Management

An e-supply chain execution can:

- reduce operating costs of all activities at the interface between the customer and the vendor;
- improve the level of service to customers through reduced lead times and greater accuracy in process management.

The critical issues of e-supply chain management include:

- investment in the solution;
- the need to reach a certain critical mass to ensure that the investment is convenient;
- the need to manage a level of integration between the Internet-based solutions and the solutions internal to the organization;
- a successful change management, both within the organization and with regard to the various stakeholders.

Architecture of an e-Procurement Solution

In recent years, there has been a significant increase in the use of e-procurement platforms and a doubling of transactions executed online. This increase is due to relatively few organizations, although their growth bodes well for the near future.

This chapter highlights the decisive weight of the qualitative as well as quantitative approaches in the organizations as they progress towards maturity, improving the quality in the management of the procurement.

The main factors of evaluation at the level of a specific organization include:

- the type of e-procurement tools used and the ways of using them;

- the range of products and services traded online (direct goods, indirect, services, and so forth);
- the degree of use and the capillary level in the buyer's use of the tools of e-sourcing;
- the type of complementary support to be used in the negotiations.

The results of these initiatives are very satisfactory in terms of price reduction compared to auctions. In cases where the purchases were conducted in a pool, it was possible to rationalize the resources used. This latter type of purchase, due to its innovative characteristics, requires a strong commitment and highlights, in some cases, the need to modify or refine some mechanisms.

In the case of PA, the laws that centralize procurement can lead these institutions to further support the use of e-procurement.

Agile procurement raises the level of service (defined as compliance with quality standards and reduction of the time to market) through:

- definition of customer satisfaction as a measure of value;
- tools for the elimination or reduction of waste to ensure improvements in quality and lead times of the process;
- measurable and repeatable processes, enablers for the standardization and control;
- motivation and enhancement of professionalism thanks to an agile culture that puts the person at the center of the path of improvement.⁴⁴

This chapter outlines some future developments. It is important to consider the overall architecture of the information systems that can be synthesized, as in Fig. 3.8.⁴⁵

This approach is useful, as shown by its application in many organizations. However, many attempts to use this approach do not give due importance to the processes, the platforms, and especially to the people who have to use them. The author has noted in the course of consulting activities that often, despite the availability of many tools within an organization, in many cases they are not used.

The introduction of agile procurement requires a cultural change. The transfer of the benefits to the staff who use the tools is crucial for success to be guaranteed.

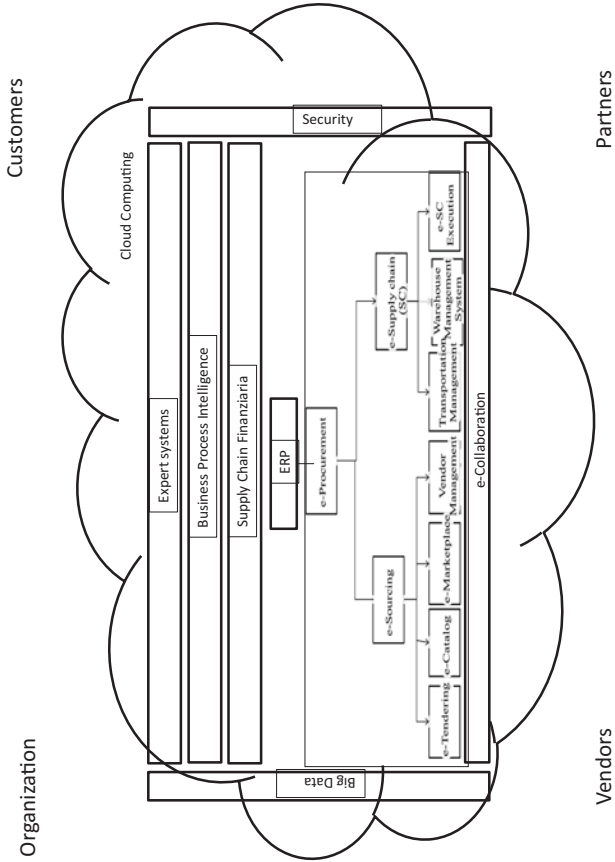


Fig. 3.8 e-Procurement architecture

There is no doubt that responsibility for this backwardness lies also with a certain number of managers, for example some ICT professionals. Many of these managers are focused on “technology” in the acronym ICT. In fact, they should focus on the true meaning of the “I” in ICT: innovation. The computer has to play this role in the organization, firstly because in times of crisis, organizations need to innovate, and also because if ICT has a central location in the organization, it can take action to improve the processes end-to-end. Finally, ICT is closely connected with innovative technologies. The ICT professionals should sell to the organizations these solutions, review the processes, and train people in their knowledge and use.

The future of agile procurement is very much connected with the development of lean and digitized solutions. Mobile devices can help a lot, as well as support infrastructure, as in the case of the communication and cloud computing infrastructure.

These two dimensions are closely related, as the technologies have undeniable synergies. They are designed and developed with built-in support for each other. The result is a potentially more agile way of working, which needs to be supported by a review of an organization’s processes in order to optimize the procurement.

At the same time, the new solutions create a great deal of data. This has fostered the development of methods capable of tackling the complexity of raw data in order to create structured and useful information supporting the discovery of key insights for decision-making.

The agile potential for big data analytics is considerable. It allows for additional reliability in forecasting and decision-making.

Implementation of e-Procurement

There are three management methods for implementing e-procurement:⁴⁶

- internal solution: in this case, the enterprise develops and manages internally the digital platform, or uses the platform of the group to which it belongs (in-sourcing);

- external solution: this can be divided into external solution through an application service provider (ASP), and external solution through an outsourcer.
 - external solution through ASP: the technological platform is personalized and is made available by an enterprise against the payment of a fee. The provider manages technical and information support services as well as aggregation services of the various buyers and sellers, reporting on the various values declared during negotiation, and printing of final reports.
 - external solution through outsourcer: in this case, specialized vendors manage on behalf of their customer enterprises the entire e-procurement process, that is, all the activities involving the search for new vendors, their certification and qualification, all the way to the real negotiation phase. The objective of this strategic choice is to improve the efficiency of the entire procurement process, even though, on the other hand, it reduces the control of the outsourcee.
 - hybrid solutions: in this case, part of the processing is done internally and part is done externally to the organization. For example, the e-sourcing part is done through external providers, since the interactions with the external vendors is facilitated. The e-supply chain and the administration is done internally in close interaction with the other applications of the organization. This approach is also used by organizations that want to maintain a certain degree of control internally but do not have the economic and/or technical capabilities to provide these services internally.

Conclusions

Recent decades have seen the spectacular development of automation in the management of structured information, including:

- 1960 The introduction of computers in organizations
- 1970 The development of large computers (mainframes)

- 1980 The development of the personal computer
- 1990 The development of client–server systems and the diffusion of ERPs
- 2000 The development of networks (and in particular the Internet)
- 2010 The development of smartphones/tablets
- 2020 The development of user-friendly interfaces and the diffusion of cloud computing.

This chapter underlines some important points to take into account in systems development and its delivery.⁴⁷

It is important to resolve conflicts between manufacturing effectiveness, efficiency, economics, and ethics. In this respect, sales and operations planning can help. The inventory levels decrease in proportion to the inventory turns. The higher the speed through the value network, the higher the inventory turns and the less capital is tied up in inventory. At the same time, the faster the raw materials move through the value network, the less obsolescence there is and the less expired materials.

Organizations should master the demand forecasting process in order to decrease inventory and increase levels of customer service at the same time. It is also important that the demand-forecasting tool allows for exporting the forecasts to various common office applications and emailing them to key people throughout the enterprise. In order to increase accuracy, it is necessary to be able to easily monitor and take action based on forecast errors, so it is important to use robust error management functionality.

To increase agility, it is interesting to extend systems to vendors in order to avoid disconnects between internal scheduling processes and those of external critical vendors and partners.

It is important to use digital solutions that can delay the commitment to manufacturing until a demand is visible, known, or certain. Regardless of how many sites the organization operates at, the systems should provide for operations at multiple sites, since it is good practice to include the sites of the most important vendors, partners, and potentially customers with consignment stocks. Cloud computing is an excellent support for this approach.

No digitization solution, all by itself, delivers agile and lean value network benefits. However, as the organization goes along its agile journey, it is important that the digitization solutions support and streamline the agile and lean efforts instead of creating barriers to the adoption of agile and lean value network best practices.

Regardless of the operations mode of the organization, it is important to make sure that the organization application supports multiple modes, including manufacturing to order (MTO), engineer to order (ETO), configure to order (CTO), and others.

An enterprise application should offer tools that allow production to become pull-based, facilitating processes like kanban.

Big data analysis is key. It brings efficiencies, for instance to organizations that, in different parts of the organization, have multiple part numbers for the same item. It is hard to create enterprise-wide visibility and integration through the value network when there are duplicate data and records for the same part. The better the demand-forecasting tool, the more agile and leaner the organization value network is. The better the organization knows what the customers require, the more agile and leaner the value network is. It is important to ensure that demand-planning functionality allows multiple users to simultaneously review and give input on the demand plans. In this way, it is possible to support shortening review cycles and increasing accuracy.

An integrated solution for quality management should support the effort to do things right the first time.

Notes

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4

Channels in Agile Procurement

Introduction

This chapter deals with the channels used by procurement to interact with its internal customers and third parties, such as vendors, partners, retailers, and similar. They can be connected either with actual procurement processes or with reporting processes. Agile organizations foster transversal and informal communication in order to identify issues or to forecast them through direct interactions.

The phases through which the procurement organization can interact with its direct customer are the traditional ones:

- create awareness of the business need;
- assist in evaluating possible solutions;
- offer/link to the most suitable resource in order to fulfill the need;
- facilitate the acquisition of the resources/services;
- provide after-sales support.

The phases through which the procurement organization can interact with third parties are several.

The support function of procurement may not be restricted to the ordinary reactive interaction starting with an acquisition request and ending with a transaction with a vendor. Agility is very much achieved in the phases that come before and after the actual transaction. In order to support customer departments in an effective way, it might be necessary to meet with the relevant people during the process of closing and issuing an order or a contract. This approach is called scrumming in terms of agile management.

The aim in this chapter is to create an awareness of the benefits of agility through the support phases of the interaction. In doing so, it is possible to foster collaboration beyond the usual cost savings dynamics.

This chapter concentrates on the new agile channels for communicating between procurement and its internal customers and third parties, with particular reference to the following trends and their impact on procurement:

- mobility;
- cloud computing.

The trend is towards the so-called omnichannel.¹ This means that (internal) customers and third parties might use different channels to interact with the procurement. They might start the interaction with one channel and move to other channels, and they expect seamless integration among the different channels.

Mobility

Mobility and Procurement

The connection between mobility and procurement can be interpreted in different ways, all of which appear interesting.

One approach relates to mobility products. In this case, mobility and procurement are very tightly combined with logistics and, of course, with value network management. In the case of logistics, there are different forms of services, often referred to as 1LP, 2LP, 3LP, and so on. The sector

is changing rapidly. It is important that procurement seizes the opportunities provided by these new organizations, as they may facilitate a more agile business.

Another approach relates to the mobility of the personnel of the organization. Procurement acquires and manages staff mobility services. Even here there may be different meanings in the sense of temporary mobility (so-called missions) or a mean of mobility/long-term understood as a transfer of personnel. With globalization, both meanings have an increasing economic value on which the procurement can and must act.

Mobility can also be connected with acquisition of the means or mobility services. Here, too, the analysis would also widen considerably to include recent developments such as those associated with the shared economy, for example Airbnb, Uber, and the like.²

The most interesting meaning of mobility in connection with procurement is in reference to telephone mobility. Procurement is interested in mobility in different ways, depending on whether one considers mobility as a support to the procurement function or, instead, to purchasing the product category of mobile telephony.

In the first meaning, there are several mobile uses in procurement, especially in connection with the management and improvement of the times of the authorization workflow of purchases and the receipt of goods or services purchased. The use of mobility in this regard is likely to rise as is the growing importance of mobile devices in all sectors and thus also in procurement.

The purchase of mobility, understood as a cell phone, is a field of increasing importance, as despite the relative reduction of vendors at this time, competition among operators remains intense due to a product essentially of commodity type, and thanks to rising volumes and the possible effects of scale.

One sector in which little attention is dedicated to mobile phones is that of the management of mobile devices. New services and products are spreading. Some of the abbreviations for these products include:

- An MMSP (managed mobility services provider) facilitates the task of organizations' ICT departments to tackle the complexity of managing multiple platforms for mobile devices. Managed mobility services

(MMS) enables communication with employees who work outside the office and allows them to interact with the resources that have traditionally been available only to users of workstations within the organization, such as databases, business and other email content, and business applications. To do this, an MMSP delivers the content of these applications in a suitable mode to be accessed by specialized mobile devices.

- The MWM (mobile workforce management) is somewhat similar, and the two expressions are sometimes used interchangeably. However, the MMS is focused on the mobile connection of workers outside the office to business applications such as servers, databases, management, and other employees and vendors. The MWM generally provides devices, software, and services. The focus is more on field workers, such as employees of utility organizations (gas, water, electricity, telephones, and the like). Some applications in this area are particularly relevant, for example for workers carrying out maintenance for utility organizations. In this case, the mobile devices help to pinpoint the location in which to perform the services, and the network that provides the services themselves. With augmented reality devices, it is possible through the appropriate viewers to provide workers with simultaneous access also to maintenance and installation manuals, helping them to accomplish their tasks.
- Finally, there are solutions for mobile device management (MDM). This is similar to the terms already defined and sometimes confused with them. MDM is the administration support and management of mobile devices. It provides distribution support, security, control, integration, and management of mobile devices, such as smartphones, tablets, and portable computers, at any location where the organization needs to operate. MDM is a component of the MMS.

There is also an insurance link with mobility. This can be of different types, depending on whether it refers to property and casualty or life. Recently cyber security has gained in importance. Even this last item requires specific insurance in addition to adopting emergency systems to support business continuity (BC) and disaster recovery (DR).

In short, mobility is an interesting category of procurement that allows organizations to add value to its internal and external procurement customers.

Mobile Computing

It is useful to go into more detail on mobile computing in support of agile procurement. The expression that fits this activity is the “consumerization of ICT.” It is the spread of a solution first to consumers and then to businesses organizations.

Mobile computing is defined as a computing environment with physical mobility.³ Mobile computing has become the main mode of working in many professional environments. This is primarily the result of greater availability of mobile terminals and the dramatic acceleration in the availability of network infrastructure and software. This is now confidently driving mobile computing towards mainstream usage in traditional office set-ups.

More specifically, mobile computing is the group of tools and techniques that support an organization’s employees in reducing the gap in accessing people, resources, and information while away from his/her workplace.

This has changed over time, in part because the resources and information to be accessed have changed dramatically, both in quantity and complexity. The changes have been supported by new applications, which have increased over time. Organizations invest in mobile computing in an effort to empower collaboration and make full use of the third-party applications they purchase or develop.

The kinds of access organizations need to provide to their employees largely depend on their job description and on the organization’s processes. The support required in an organization in which collective efforts are carried out (for instance, consulting) may relate to access to people or shared information. With reference also to organizations with processes that entail the use of a platform, an authorization may need to be submitted via app (for instance, the authorization of an order) in order to carry on with a process. Similarly, any work activity always generates

information. With the aid of mobile computing, that information can be transferred in real time to feed into processes (for example in logistics).

The increase in the potential of mobile devices has been coupled in recent years with a steady decline in the cost of the solutions involved. This has facilitated their pervasive diffusion into nearly all areas of work.

The recent trend is mostly concerned with mobile applications and in general with the concept of enterprise apps,⁴ which are changing the way software is produced and used. Mobile enterprise apps are those “ICT applications that organizations adopt to restructure interactions among groups of employees or with business partners” with the aid of mobile devices and the use of wireless networks (Mcafee, 2006). The short-term approach is to rethink business interactions according to a mobile perspective. Fifty million US employees are estimated to be mobile, working away from the office at least 20 % of the time.⁵ With European figures going up and aligning with US levels, organizations are being forced to generate a productivity continuum.

Many ERP developers are offering their own mobile ERPs: “In the simplest approach, mobile ERP is about having access to a software that allows a mobile device (portable computer, smartphone, Tablet, PDA) to be connected to the ERP system of an organization through a mobile net of communications and transmission of data.”⁶ Mobile ERP is no longer simply a means of accessing the organization’s ERP. It guides a change in the interaction paradigm.⁷ It represents a new enterprise solution *per se*, which many organizations are eager to adopt.

Some Data

Information about the mobile workforce is not easy to gather. The Forrester’s 2013 Mobile Workforce Adoption Trends reports that the share of mobile “information workers,” those who use three or more devices and work in multiple locations with the aid of multiple apps, rose in a one-year period from 23 % to 29 % of the global workforce.⁸

The information shown is the result of a survey of over 9776 of those defined by Forrester Research as “information workers.” The most relevant mobility devices here are laptop PCs and smartphones (and

increasingly the latter), which are the means to which organizations are most comfortable shifting when mobility needs are addressed. Tablets are also increasingly supported by the development of dedicated or compatible applications.

Forrester Research identified the most common work locations for the mobile workforce.

The survey also offers an opportunity to address the very obvious side effect of access to job-related information anytime, anywhere, through any channel: the increasingly fading divide between work and private life. The ability to access work material anywhere often extends the mobile workforce's work hours. This brings a range of organizational problems that the organization needs to monitor and manage.

Organizations benefit greatly from their employees' borderless access to corporate information assets. However, this also brings a major corporate risk. Multiple devices have connections to the corporate network. Covering thousands of devices connected through many different network connections is a challenge. According to Gartner, organizations are investing as much as \$81.6 billion worldwide on information security in 2016.⁹ This figure is up by 7.9 % on data from 2015. Concern around security is also affecting the offers of software. Gartner says that 30 % of infrastructure protection products are embedded in the suite.

Mobile computing solutions are also affecting the way software is delivered. Use on the go of mobile devices demands more user-friendly interfaces. This has driven enterprise software development and created precise development paradigms and models.

Mobility for Agile Procurement

The launch of agile procurement needs a comprehensive, real-time, structured stream of information fed to the organization in order to proactively create value. The workforce must have the opportunity to access the updated information on the organization at any time.

Procurement has undergone a massive shift towards the use of ICT:

- in sourcing, with competitive bidding optimization, vendor rating systems, global and agile reach;

- in logistics, with the integration of information streams from the supply chain towards the network of vendors, enabling greater coordination and an unprecedented level of collaboration;
- in administration; as the procurement process demands greater monitoring and transparency, heavy processes from an administrative standpoint have often reduced effectiveness. The contribution of ICT has brought administrative efficiency and overall outcome effectiveness, and at the same time improved the economics. In addition, the visibility possible with ICT makes it possible and simpler to ensure ethics in procurement.

Overall, mobility has the effect of reducing the proxy-delegation phenomenon, in which a manager away from his/her desktop delegates interaction with the system to an onsite employee.¹⁰

The mobility trend brings major benefits, improving even further the digitization effect. Mobility, similar to digitization, requires the end-to-end re-engineering of processes and interactions. Furthermore, the benefits brought by mobility depend on the initial conditions of the organizations at the start of the transformation process. Methods such as Lean and Digitize proved to have a strong positive effect on the digitization of lean, streamlined processes, making them much more agile.¹¹

Therefore, it is to be expected that the impact of mobility on those organizations that have undergone a Lean/Lean Six Sigma review of their processes will be greater than it will be on those that have just dropped mobile devices on their processes.

Mobility for Sourcing

Mobile sourcing is concerned with the availability of information on vendors that are relevant for a specific sourcing need and the tracking of the results delivered by the organization.

The advantage of mobility over other ways of working is that the effortless interaction with systems allows the organization to improve productivity. It allows for better reporting and complete information because procurement professionals can have fast access to accurate information that they can read and modify.

Information accuracy is key for agile procurement, since it is the basis for a reliable spend analysis. An accurate and accessible database of vendors improves the negotiation capabilities of the organization. In an agile perspective, it allows for better selection of vendors as long-term business partners.

Sourcing information is key to an agile organization. Gebauer points out that the overall effect of mobility is increased awareness due to automated information flows provided to a specific buyer (notifications).¹² The high level of awareness and transparency developed in sourcing is one of the pillars of risk management, which is another basis for agile procurement.

Mobility for Logistics

Mobile devices are very important for logistics. In the case of transportation, they can help in detecting the location of a vehicle or communicating with drivers. In the case of a warehouse, mobile devices can be used for picking, to decide the arrangement of items on the shelves, for receiving, or for shipments.

Mobile devices can be used very efficiently in inspections because they make it possible to work close to the materials or components that the organization wants to inspect or verify in terms of quantity and/or quality.

Logistics arguably benefits directly from an accessible system. The information produced and transferred is in many cases essential for the smooth functioning of the procurement value network. It may represent a concrete share of the value perceived by the end customer.

Integration with technologies such as RFID and automated warehousing has completely changed the logistics paradigm.

As far as agility is concerned, streamlined and lean processes designed to produce structured information flows have brought additional power to the Just in Time paradigm. They allow for the implementation of e-kanban systems in every situation, reducing the infrastructure required. Logistics can then be synchronized in real time with the resource planning functions to adjust to minute-by-minute requests. This needs to be

developed in an extended value network logic that defines a minimum standard level of service for the business partners.

There are sound basis for a larger utilization of mobile solutions especially in logistics. There is an increase in the availability of dedicated mobile hardware/software solutions and more complex solutions in the pipeline. Web/app-native logistics management is very interesting and increasingly used.

The information attained through mobility-enhanced logistics should be exploited in a risk management perspective, concerning the operational risk. It should be coupled with the information gathered by the organization to support the overall risk management strategy.

Mobility has been used for logistics in several ways:

- Mobility has been used to survey the status directly near the shelf of the warehouse, without the need to manually count and report on central applications. At the same time, it is possible to proceed with the acquisition request on the spot where the operator is rather than in the back office. In the case of people on the move, such as doctors in a hospital, the ability to request the repurchase of a medicine directly from the hospital is particularly important.
- Mobile devices can also be used to send or accept orders. The benefit is constituted by the fact that the staff working on these tasks need not necessarily be at their workplace, but may be in the field. This means being able to be closer to the seller (or to the buyer) or even closer to those in need of the content of the order. A survey in Germany found that only 39 % of office workers sit at their desk for the entire working day, while 38 % spend more than half of their time outside the office walls. They would appreciate the benefits of using mobile devices for procurement.
- Expenditure analysis can also be done on the move. For example, there are applications that can be accessed not only from a PC but also from a smartphone or a tablet. Operators can make decisions not necessarily in their workplace, but in a meeting or on the move, and in any case based on data rather than feelings.

Auchan

An example of an application in mobility is that used by the Auchan group of supermarket chains.¹³ Auchan has introduced handheld computers in its 35 hypermarkets. Three operations (drawing up “products to be restocked” lists, inputting orders, and sending deposits) are carried out by the foreman with a single gesture: just pointing the reader at the product identification code on the shelf. This has led to marked improvement in the flow order/delivery, reducing working times and eliminating the possibility of error.

Operators have responded well to the introduction of this new solution. They especially appreciate the manual aspects, that is, the ergonomics, visibility, and weight of the handheld, making it a suitable tool for many hours of continuous work. The application also provides support for periodic inventory.

Mobility for Administration

The major improvements in administration have been possible thanks to the digitization of paperwork and the related redesign of processes. Lean and streamlined administration processes are essential to any agile environment. An agile organization needs both transparency/accountability, flexibility, and fast response. The contribution of mobile technologies is to transform administration into a tool that supports processes rather than the hassle with which it is often identified. For instance, with reference to authorization processes, mobility enables a swift response anytime and anywhere. It allows organizations to avoid delays related to a manager being away from his/her workplace or a generalized delegation of authorization. Thanks to mobility, it is possible for a mobile workforce to interact and start the administrative process connected with their work according to their work needs.

Mobile devices can also assist in making administrative processes agile. The most important application is to inventory, in which the detection of the level of a stock is not done manually and typed on a workstation. It is carried out directly in the warehouse or in the places of transit, providing a whole series of advantages.

Development of Mobility

The development of solutions to support mobility has grown in recent years, both in the consumer and in the business world. A survey carried out by cio.com found that 35 % of those polled said they plan to increase spending on mobile systems next year.¹⁴ Nearly 10 % said they are beta-testing mobile apps, while 21 % of those with hiring plans said they hope to add people with mobile application and device management skills.

Many chief information officers (CIOs) recognize the importance of this solution for changing the landscape of applications. Table 4.1 presents some interesting data on mobility applications.

It is interesting to note that this survey shows its use in procurement has not been significant so far. The exception is in management of the value network. This situation is changing, however.

Table 4.2 shows the priorities of managers to create a more effective and efficient workplace.

Benefits and Limitations of Mobility

Mobility has several benefits and limitations.

- Benefits:
 - It is possible to work in any place and at any time.
 - It is possible to be agile, lean and thus avoid unnecessary movements of people or transport of materials.

Table 4.1 Mobility applications already in use

Application	Organizations that use it (%)
e-mail	85
Instant messaging	45
Value network management	25
Data analysis	25
Sales force automation	20
Location-based applications	18
Automation technical support	15
Vertical applications	10

Ovum, Large Enterprise Survey, Corporate Mobility, June 2011

Table 4.2 Priority application landscape

Initiatives in the coming 12 months	% of executives who are considering them
Invest to expand network security solutions	65
Deploy or expand collaboration solutions	47
Support multiple mobile applications to users outside the office	46
Migrate more voice traffic to Voice over Internet Protocol (VoIP)	45
Support more mobile devices or smartphones	44
Implement or expand wide area network (WAN) acceleration	40
Implement or expand unified collaboration and communications (UCC)	37
Implement or expand video conferencing over IP	37
Provide support to mobile applications for staff in offices	33
Implement or expand Ethernet services	26
Implement or expand the use of third parties for services on-demand to support solutions	25
Implement or expand the use of services operated by third parties	21

Forrester Research Inc. (2010), *Managing Mobile Complexity*, Forrester Report, Oct.

- It is easy to work with others, not being tied to a fixed location or at least being able to connect in any location.
- Limitations:
 - One of the disadvantages is the availability of equipment. Their value (functions/costs) tends to be higher than that of a desktop.
 - The use of a mobile device requires the availability of a network with high performance and reliability. There is also the problem of the availability of the network in certain locations.
 - It is necessary to be very careful to improve security. This is manifested in two ways:
 - Unencrypted transmission of data or even documents allows for the theft of information that may be relevant to the business.
 - Possible loss of mobile devices. It is much easier to lose a smartphone, especially due to their increasing power and lightness, and is as damaging as the loss of a PC.

- Mobility tends to blur the line between leisure and business, allowing people to work anywhere, anytime.
- Mobility requires a new type of management, where the manager often does not have a direct view of employees. While they can be followed through computer applications (when the law allows it), this is not as effective as physical contact.

Unified Communication and Collaboration Solutions

New solutions are becoming more and more available in mobility. Think of all the devices geared especially to the consumer introduced by Apple (the various i-XXX). In the business world, the most interesting example of a mobility solution is the so-called unified communication and collaboration (UCC). These are value-added services for integrated communication and online collaboration. The benefits seem high and this solution is expanding fast.

The devices most often used in business to support mobility can be classified as follows:

- Smartphone: a smartphone is a portable device that combines phone functionality with the management of personal information. The most interesting feature of a smartphone is the ability to install additional applications (so-called apps) that add new features. These programs may be developed by the manufacturer of the smartphone, by the user, or by third parties.
- Portable PC or laptop: this is a traditional PC in a portable version.
- Tablet: this is a particular type of portable PC, characterized by the possibility of being used with a pen or a touch screen.

Some Numbers

The number of smartphones in use exceeds the number of laptops. Similarly, the number of smartphones is growing rapidly and will exceed the number of PCs in the coming years.

Cloud Computing

Model of Cloud Computing

One of the most interesting developments in computing consists of the so-called cloud computing (or simply cloud). The National Institute of Standards and Technology (NIST) defines cloud computing as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (for instance, networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.¹⁵ This cloud model is composed of five essential characteristics, three service models, and four deployment models.

In this matter, many cloud solutions offer a structured approach to security with encrypted transmission and limited local storage of information. This along with many other benefits makes cloud a very interesting opportunity for business, especially in connection with mobile solutions.

A more complete definition is the following:¹⁶ cloud computing is a set of technologies that allow the support customers storing, processing, and/or maintaining data using distributed hardware and software in a virtualized network. The payment for services is based on consumption, as with the provision of other services such as electricity, gas, and so forth. This form of outsourcing in the use of computer resources is spreading among small and medium-sized organizations.

Ferretti Yachts

Ferretti Yachts, which produces and sells luxury yachts, is one example among many.¹⁷ In order to lower the cost of managing the administration and accountancy, Ferretti Yachts adopted a cloud computing solution. With the cloud, Ferretti uses two applications: it accesses a remote installation of SAP for administration and finance, and it distributes its own sales application for iPad to its dealers around the world.

Imperia & Monferrina

Imperia, established in Italy in 1932, sells pasta machines and other small kitchen appliances in 77 countries around the world.¹⁸ Imperia merged with Italian pasta machine maker Monferrina in 2010 to form Imperia & Monferrina, producing a range of products from the small home-use pasta machine to industrial pasta makers, capable of producing 600 kilograms of pasta per hour.

When Imperia & Monferrina merged operations, the company needed to set up a new infrastructure quickly to help bring the two companies together. The information technology (IT) team had to create a flexible new ERP system that would unify the internal and external management information across the newly formed entity. Additionally, requirements dictated that the solution be reliable and efficient, and that it could be set up quickly and cost effectively—all in less than six months.

Imperia & Monferrina turned to a cloud computing-based ERP. It did not take long for the company to see a dramatic decrease in ICT costs. The company was able to reduce capital expenses by 50 % and operating expenses by 15 %.¹⁹ The company also saw improvements in time to market and availability.

The NIST identifies five different elements of the cloud computing model:²⁰

- On-demand self-service: this characteristic refers to the autonomy of the user in requesting additional services.
- Broad network access: the aim is to allow access to cloud resources by different customers and/or devices, effectively creating a continuum in accessibility.
- Resource pooling: the key advantage for the vendor is the capacity to dynamically assign resources to various customers depending on their demands, optimizing the use of assets, without affecting in any significant way the customer experience. The customer normally does not have knowledge of where and how the service is processed.
- Rapid elasticity: the customer effectively has the feeling of being served by an infinite-capacity system, while in reality this is achieved by scaling inward and outward the service provided to each customer, reassigning spare capacity at high speed.

- Measured service: the entire system is possible thanks to an accurate measurement of the resources employed. It is no surprise that the level of transparency on the vendor side is reflected in accurate real-time reporting on the customer side.

The elements listed above describe the essential characteristics of a cloud service. There is a degree of freedom in fine tuning these characteristics, and therefore various types of cloud service exist.

Computing Models

The NIST identifies three service models:

- SaaS, or software as a service: most of the vendor's resources are offered to the customer in a service package in the service model. The vendor is the owner of the infrastructure and the owner or licensor of the software employed. The customer interacts with it only through a program interface without seeing what lies behind it. The customer service provided is complete, from hardware to software. The vendor is responsible for the maintenance and troubleshooting of any issue.
- PaaS, or platform as a service: this service model entails less resource involvement on the part of the vendor. The vendor offers the infrastructure and the software environment to run the applications. The service does not include a specific application, which needs to be uploaded and run by the customer. The level of customer service is less and limited to the vendor offering.
- IaaS, or infrastructure as a service: the customer has more control over the operations in this form. The cloud vendor offers the bare-bones infrastructure and manages the resources through its cloud network, but the customer can tweak the operating system, storage, applications, and other configurations.

Some manufacturers have introduced mobility as a service (MaaS), similar to what is referred to as SaaS. This applies to the services of mobility. In this case, the use of the cloud seems particularly appropriate since the cloud allows for breaking away from a fixed position.

With reference to the deployment of the service, it is possible to make differentiate between:

- Private cloud: use of the cloud is restricted and a single organization can access it and make use of the infrastructure. The very ownership and management could be in the hands either of a third party or of the business.
- Community cloud: use of the infrastructure is shared by multiple organizations belonging to the same cluster, be it a consortium or some kind of association.
- Public cloud: the infrastructure is multitenant, open to any organization to use. The ownership may be a business institution or the government. The infrastructure is located in the premises of the cloud vendor.
- Hybrid cloud: this is deployed as a combination of the previous modes, in the sense that there is a portability option between them that enables data and application migration.

Business to Business (B2B) Cloud

An interesting variation in the distribution models of cloud computing is the so-called B2B cloud. This solution helps to address the very important aspect of cooperation and integration among organizations.

Cloud solutions can be leveraged both within an organization and between organizations. Organizations that have an advanced approach to cloud computing tend to maximize their benefits through hybrid solutions. This allows them to use this solution effectively as a means of integrating information within the organization, and as a means of interacting effectively, efficiently, and in total transparency with their business partners.

In particular, procurement organizations often have a shared information environment with their principal vendors on the cloud in which they exchange information and interact, using a B2B cloud for vendor integration and collaboration.

The B2B paradigm is the application of the cloud solution to create value for the business that can leverage that advantage to create end-customer value. Customer demands in a B2B cloud solution differ dramatically from those in a B2C.²¹

Cloud computing makes available opportunities such as:

- linking systems of different organizations in real time;
- easy elimination of conventional access boundaries;
- shared and transparent functions.

Organizations can use these opportunities to implement best B2B connections. This solution is interesting when:

- there is a need for frequent exchanges of information between the various organizations;
- organizations wishing to work together are geographically distant;
- standard formats are available for the connection of different solutions.

In this situation, it is possible to implement a partnership B2B outsourcing and management of a community for trading. This is a typical situation present in procurement. It can greatly facilitate the collaboration process due to the possibility of communication via computer. Even more important, organizations can improve their connections with their partners, including customers, dealers, vendors, research centers, and universities.

The best solution might be, at least initially, a hybrid B2B. This would allow the organization to connect directly with their most important and demanding partners. At the same time, the organization may use a cloud B2B to connect with its remaining partners. The cloud also makes it easy to build a social network to improve collaboration between partners.²²

Benefits and Limitations of Cloud Computing

Cloud computing offers a number of benefits in support of agile procurement, including:

- little or no investment;
- reduction of costs related only to consumption;
- flexibility;
- quick installation and start-up.

Cloud computing presents also problems, for example:

- privacy and security:
 - Who can access the data in the cloud?
 - Is there trust in the cloud vendor?
 - What are the guarantees of recovery, tracking, and data integrity?
- political and legal:
 - Who owns the data?
 - Who can use personal information?
 - Where is the data?
- need to design scalable applications from the start;
- communication latency:
 - dependence on the network;
 - variable response times for the online applications depending on the availability of connections and network.
- risks of excessive dependence on vendors, especially in the event of termination of the contract (vendor lock-in).

Cloud computing is not just a technology, but also a model to link anyone to anyone wherever he/she is located, anytime, and with any device. This creates a new paradigm called the shared economy. At the same time, cloud computing is a perfect base for global procurement, since it releases the buyer from a specific location and can potentially consider the market of vendors around the world.

The major benefits of cloud computing are the agility it provides in terms of use of computing resources. At the same time, it allows for coping with the still high innovation in ICT solutions. This innovation constitutes a risk for investments, for the dynamic nature of the workload, and for the need for a secure and stable system. Cloud computing has evolved rapidly in each of these fields and has done so in a very cost-efficient way, effectively allowing organizations to reduce their efforts in ICT and focus on their core business.

In particular, with reference to the investment risk connected to the purchase of ICT infrastructure, a cloud solution shifts the risk completely toward the vendor side of the deal, since the buyer is not involved at all in the management of the infrastructure. Different service models offer different involvement of the purchaser in the ICT in order to make customization possible. In this way, organizations can have ICT their way while greatly reducing ICT infrastructure costs in terms of immobilization of capital and investment risk.

Another important aspect from an agility point of view is the scalability and flexibility allowed in the cloud model. The buyer benefits from the concept of cloud by paying a usage fee, with seemingly no upper limit to the resources at its disposal. The scalability in connection very much impacts the capacity at which the business can contract and expand its operations without having to take into consideration the cost of investment or dismiss infrastructure if not in use. Scalability comes with a cost, but so far, the benefits connected with the flexibility and efficiency with which cloud vendors run their operations seem to balance out the costs.

Security is indeed a big issue in cloud computing, arguably the most shared concern around buyers. It is necessary to separate the perceived risks from actual ones. It is common to consider a situation in which the physical location of the information is within reach of the owner as less risky. Many cloud vendors provide a level of security that cannot be achieved by organizations unless they invest large amounts of money. The correct qualification of potential cloud vendors should include an assessment of the security level guaranteed, the location and jurisdiction of the vendor premises, and the security measures in the means of access to the cloud from remote devices.

Another very common concern is the stability and reliability of the structure. Common SLAs do provide for the uptime of the cloud. This means, for instance, that the customer is entitled to have access 99.9 % of the time during a year. If the level of service does not meet expectations, the vendor is charged a penalty. Regarding the reliability of the infrastructure, for key information, the vendor often offers a redundant

system that stores the information a second time in case of failure of the primary infrastructure.

A literature review identifies six areas of perceived risk:²³

• confidentiality	• performance
• integrity	• accountability
• availability	• maintainability

The paper finds that these ICT risks are among the major factors in the decision of a business to adopt cloud computing.

In the current state of the solution, the flexibility and efficiency of a cloud solution seem to overcome concerns about the adoption of this type of service, if a correct vendor qualification and selection is run.

Organizations that want to become agile enterprises should carefully evaluate whether they can afford not to adopt a cloud computing solution. They would not get the undeniable benefits that come with it and the concrete possibility of further improvement in the solutions available with reference to advanced analytics, such as big data analytics capabilities that are very much needed when modeling complex environment forecasts.

Efficient and reliable forecasting is a key component of agile management, and cloud computing is a tool that may significantly aid in this effort.

Business Case for Cloud Computing

This section considers a cloud computing economic model using the Total Cost Management (TCM)²⁴ model.

In deciding whether hosting a service in the cloud makes sense over the long term, it should be noted that the cloud computing model not only potentially reduces costs but also offers elasticity and helps transfer risk to vendors.

Although hardware resource costs continue to decline, they do so at variable rates. For example, computing and storage costs are falling faster than WAN costs. Cloud computing can track these changes—and potentially pass them through to the customer—more effectively than is pos-

sible with an in-house data center, resulting in a closer match of expenditure to actual resource usage.

In making the decision whether to move an existing service to the cloud, one must additionally examine the expected average and peak resource utilization—this is true especially if the application may have highly variable spikes in resource demand—as well as the practical limits on real-world utilization of purchased equipment, and various operational costs that vary depending on the type of cloud environment under consideration.

The main benefits of cloud computing with regard to information systems are scalability and flexibility, access to information resources in any place, continuity, and the professionalism of being able to share use of the vendor's resources with other customers (resource pooling).

From an ecological point of view, finally, the commitment of the major vendors to drastically reducing the environmental impact of data centers, including using alternative energy, is not negligible.

The main benefits derived from the introduction of procurement on the cloud are in flexibility, quality, and efficiency. Some of the benefits for the customer are costs reduction, widening of the available vendors and better relationships with them, improvement in the internal organization, and control of the quality of the supply.

Whereas the previous section tried to quantify the economic value of specific cloud computing benefits such as elasticity, this section tackles an equally important but wider question: Is it more economical to move an existing data center-hosted service to the cloud, or to keep it in a data center?

With the above caveats in mind, here is a simple example of deciding whether to move a service to the cloud.

The costs associated with an internal data center (in the case of SaaS) include:

- architecture costs;
- procurement (sourcing, transportation, and installation) of hardware (servers, storage);
- procurement of application and platform license and maintenance;

- customization and configuration;
- costs of communication with vendors;
- operational costs;
- site for disaster recovery;
- costs replication between data centers for the business continuity plan;
- upgrades and patches;
- support to the end user;
- data center support and maintenance;
- power, cooling, and space;
- costs of the network (LAN, WAN).
- physical and logical security and the availability of skilled resources to manage them.

The costs associated with processing in the cloud include:

- integration with applications that remain in house;
- customization and configuration;
- support to the end user;
- costs of the network (usually the Internet);
- need to pay for the resources that are consumed, or “pay per use”;
- vendor management;
- disposition of the existing resources (people, hardware, software, and so on).

The total cost reduction tends to be around 20–30 %.

On top of the previously mentioned costs, there are the migration costs. A related issue is the software complexity and costs of (partially or fully) migrating data from a legacy enterprise application into the cloud. While migration is a one-time task, the amount of effort required can be significant and it needs to be considered as a factor in deciding to use cloud computing. This task is already creating business opportunities for organizations that provide data integration across public and private cloud computing.

Conclusions

This chapter examines the channels that can be used by procurement to communicate and collaborate with internal customers, vendors, partners, and so on.

This chapter focuses on the innovative channel, such as mobile and cloud computing. It is important to stress that the communication must be fully integrated into an omnichannel approach.²⁵ This means there is a need to ensure that the users of these types of channel can move seamlessly from one channel to another.

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5

Partnerships in Agile Procurement

Introduction

Agile procurement requires a collaborative relationship between requesting departments, the procurement function, and the vendor, clearly defining the scope of the procurement activities. Procurement should advocate and support agility within the organization. The aim should be a co-creation/dedicated personal assistance means of working.

In fact, many markets contain examples of procurement collaboration. For instance, in Italy, ABC is a consortium of Italian financial institutions that works as a sourcing service center,¹ collating the interests of a number of financial institutions in order to increase transactional efficiency in commodities sourcing and procurement. This enables a number of benefits. It effectively reduces the workload on internal procurement departments, reducing risks and investments, allowing collaboration and outsourcing of some non-core activities, and providing economy of scale. That is, for collaboration among competitors, quite a leap towards agility. This is mainly possible because the competition is perceived as not being focused on sourcing, negotiation, and acquisition of products or services. Other factors affect competition, for instance, key resources or the acquisition of talents.

The key partnerships to be developed are mainly with non-competitors. Agile procurement should aim to consolidate the number of key vendor-partners that provide non-commodity assets and services, pushing the relationship forward in order to reduce risk and reaching complete collaboration in order to align purposes with the vendor, which is then trusted to carry out the non-core activities.

Documentation plays a vital role in the relationship between the procurement function and partners. Buyers and vendors create a variety of forms of documentation. Procurement documentation refers to all the content of the various media that are used to describe the products, services, and supply in order to manage information for the procurement. This can take place in the form of both structured data and unstructured data, such as documents, drawings, graphics, and more. At the same time, it can also include voice, video, and other forms of information.

A study by International Data Corporation (IDC) emphasizes that improving the management of documents that support processes, traditionally seen as a means to reduce costs, can even lead to a significant increase in sales.² According to the results of the IDC survey, customers tend to leave vendors whose documentation processes are inefficient: 68 % of respondents said they would prefer not to maintain business relationships with organizations whose document management is inefficient, and 60 % would change trading partners. A further 68 % advise colleagues in other organizations not to do business with these organizations. Better management of processes by vendors leads to a potential increase in sales. Over 83 % of respondents think that the optimization of business processes based on documents could increase revenues by an average of 10.1 %.

An IDC research shows from International Data Corporation (IDC) shows that, contrary to what one might think, the automation of workflows does not always result in greater efficiency. The study states that “many digitized processes are still inefficient. This dispels the myth that to streamline processes is sufficient to eliminate the paper.”³ Many processes (30–40 %) are still based on paper documents or integrated workflows, partially on paper and partially digitized. To achieve real benefits, it is necessary to analyze in depth the organizational processes in order to understand where and how to intervene.

Agile procurement can provide significant support to document management throughout its life cycle: from the time of its drafting, to its packaging, distribution, update, and storage.⁴ Agile procurement through ICT allows for greater unified management of all the possible contents of the documentation. In this respect, it is possible to talk about enterprise content management (ECM). Very often, this term refers to the containers and not the integrated process management and procurement documentation. One of the difficulties lies in the fact that often the contents of the procurement documentation are likely to contain unstructured information. Traditionally, ICT applications have been very effective in managing structured data, but less has been done so far with regard to unstructured data or information or, more generally, any type of content, be it on paper or in video, or in voice.

It has been estimated that unstructured information, for example in procurement documentation, represents 70–80 % of all information within an organization.⁵ There are several reasons for this situation. Documentation in procurement includes specifications, orders, invoices, drawings, pictures, and so forth. Moreover, historically there were no structured data because there was a need to structure them, as there was no automated tool to manage them. People tend to use unstructured data because they are accustomed to doing so and they manage them well. In general, the production of unstructured information tends to be easier than the production of structured information, but, of course, it is less precise. The latter requires much more effort, for example in terms of compliance with standards or formats or conventions.

This chapter presents a generalized model for the description of processes for the management of procurement documentation. In the approach of agile procurement, the model is applicable to both the structured and unstructured data. Therefore, it includes the management of documents, emails, drawings, voice, video, and so forth.

The model allows for the evaluation of tools for managing the procurement documentation used in an organization. In addition, the model shows the processes associated with document management in procurement and then allows the organization to focus on their improvement in support of agile procurement.

The model is referred to as that of the Ten plus One (10 + 1) S, because the main processes related to the management of procurement documentation can be classified mnemonically in ten words that start with the letter S. Another word, which always begins with an S, summarizes the previous ten.

Procurement processes can be analyzed from different points of view, including:

- the functions that add value for customers, whether internal or external to the organization;
- the important features in the carrying out of the processes, in particular those that are automated.

The model addresses both aspects. It then examines the relevant aspects in their ICT implementation, today and in the future. One should always remember that prior to automating and digitizing, it is crucial to streamline and improve processes.⁶

Document management is closely connected with the dematerialization that derives from different points of view, including regulatory requirements. It is useful to think of the initiatives related to:⁷

- invoicing—mandatory for many central and local PAs;
- electronic storage of legal documents, taxes, and labor laws;
- digital preservation/replacement.

Partnerships in Procurement

There are several possible forms of integration between the processes of the organization and its vendors. Those forms may include the organization's processes relative to product development, planning, procurement, and logistics (Fig. 5.1).⁸ The integration of these processes may take different forms according to the relative level of partnership. It may start with simple communication, move on to coordination, and eventually reach a complete form of collaboration and partnership.

Vendor	Integration		Organization
Planning and control of the vendor supply chain	Planning and control of the customer supply chain		
Vendor product development	Customer product development		
Sales planning of the vendor	Planning		
	Vendor Sale	Purchase	
		Supplies Forecast	Skills and materials management
Management and construction supply	Supplying		
Logistics of the vendor	Logistics of the customer		
		Inbound	Material management and warehousing
			Production management

Fig. 5.1 Vendor–customer integration processes

Partnering is a commitment for the long term between two or more organizations in order to reach specific procurement and business objectives.

The benefits include:

- quality improvement;
- greater efficiency;
- lower costs;
- more opportunity for innovation;
- continuous improvement of products and services.

Three components are important in a partnership:

- shared vision;
- trust;
- long-term commitment.

It is useful to analyze each one of them.

In terms of shared vision:

- Each of the organization's partners must understand the need to satisfy the end customer.

- There should be open and frank communication on the needs of both parties and a sharing of plans.
- The partners should understand the respective activities to arrive at fair decisions.
- These decisions must be formulated and implemented as one.

In terms of trust:

- The strength of a partnership is based on correctness and parity as the basis for joint work.
- Trust makes it possible for the resource knowledge of both partners to be in synchrony and for them to avoid a conflictual relationship.
- Frequent and open communication prevents misdirection and disputes, and strengthens the relationship.
- The parties can potentially share or integrate resources, education/training activities, systems, facilities, and/or warehouses.

In the case of long-term commitment:

- A vendor can only take risks when it has long-term commitments.
- A long-term commitment provides the environment necessary for both parties to work toward continuous improvement.
- Each party should contribute to the process based on its strengths and capabilities.
- The partnership creates dependence due to the long-term commitment. It is not a sign of weakness but of a strong relationship, which is necessary to achieve competitive advantage.

Barilla Group

The Barilla Group are pasta makers and bakers.⁹ The Barilla family has pursued this line of work for four generations, with the help of outstanding coworkers and partners. It is the only line of work The Barilla management is engaged in improving that line of work continuously.¹⁰

Barilla employs different strategies depending on the product to be acquired. For the most relevant and critical products, Barilla adopts integrated management of the entire supply chain with its vendors. In this way it shares information with these partners in the planning phase and has direct control of all stages. The company adopts mixed management models for other sources of supply.

The drivers of management of an integrated supply chain can be summarized as follows:

- impact on the organization, in other words the contribution of the product to the pursuit of competitive advantage by the organization;
- economic importance of the category of expenditure, in terms of purchase total expenditure;
- existence within Barilla of expertise, allowing the group to manage and support the industry in a precise and proactive way;
- risk level of the supply chain, or the possibility that events or problems will affect or even interrupt the continuity of supply.

Roughly 80–90 % of the expected annual purchase represents critical elements and it is thus managed according to the logic of integrated chains.

For the selection of partners among the vendors, it is useful to refer to the Kraljic matrix.¹¹ It is important to consider the following points:

- knowledge by the vendor of the management policy of the purchasing organization;
- stable and valid management system of the vendor;
- capacity to manage technological innovations;
- provision of quality on supply;
- capacity to satisfy the quantity requested by the organization's production;
- confidentiality of the information learned from the customer;
- ease of accessibility in terms of visibility and communication;
- correct implementation of the contractual provisions;
- system of quality and effective program of continuous improvement;
- track record of satisfaction of the customer of the vendor and credibility of its organization.

Documentation Management

The ability of organizations to manage critical document processes is important. The capability to manage large amounts of content is often very low despite the availability of solutions such as big data analytics. This term refers to the large volume of information flow within an organization. The scenario is gradually worsening over time, not only because of multiplication of the “sources” of information in the organization, through enhanced processes and multiple paths, but also because of a change in sensitivity. Business risk management rose to first place among the priorities of 65 % of those surveyed by Coleman Parkes Research, which drafted the “Ricoh Document Governance Index 2012.” The research consisted of 1075 interviews amongst C-level executives, Directors, and other employees within large (1000+ employees), medium (500–999 employees), and small (fewer than 500 employees) organisations, located in Belgium, France, Germany, Italy, The Netherlands, The Nordics (Sweden, Finland, Norway and Denmark), Spain, Switzerland, the UK and Ireland. The survey probed objectives regarding the management of business risk in relation to document processing.¹² This is a rate almost four times higher than that recorded in 2009. Organizations have indicated as important trends the management of vendors/partners of the organization and their approach to emerging markets. These two items affect and will affect corporate strategies, with increasing volumes of data to manage. Their increase creates difficulties for management but also opportunities to increase the effectiveness, efficiency, and economy of procurement. This is true in general. It applies especially to the world of procurement documentation, since it is growing in importance as the service sector is growing. In addition, the volume of documents, both paper-based and electronic, is increasing day by day. Statistics indicate that:¹³

- US offices print and photocopy 195 terabytes annually (trillions of bytes: the storage unit on computers).
- The world consumes 280 million tons of paper every year, much of it in organizations, and consumption is growing.
- Those who work in offices spend on average 40 % of their time searching for information.

- Each document is copied or reproduced on average 11 times.
- When a person leaves an organization, 70 % of its knowledge goes with him/her.

In addition, frequent changes to the rules internally and externally to the organization impose a substantial burden on the effective management of the information flow to the organization, to the outside, and within the organization.

In this context, the activity of managing the documentation in procurement is becoming increasingly important. This expression refers to the management of heterogeneous documents or existing products within an organization related to the processes of procurement. These documents may be of various sizes and have different functions. A document management system allows for storing, managing, and organizing large amounts of documentation in a rational and organized way.

The processes that support document management are changing. Unlike in the past, documents are increasingly distributed electronically, leaving those who receive them with the task of printing them if they want or need them for regulatory or internal reasons.

These phenomena have a considerable impact on organizations, opening up new horizons. As a result, the way of doing business must inevitably change.

The sharp decline in the number of paper documents has been accompanied by huge growth in the amount of information flow over the past decade in organizations, especially those that are highly regulated such as in the pharma sector.

It seems appropriate to consider the problem of analyzing what should be an integrated and complete management system to support the processes of documentation in procurement. This chapter applies a general model for document management (Fig. 5.2).¹⁴

Functionality

A document management system must meet the requirements, expressed or unexpressed, of the business users. The following paragraphs examine each of the components of the model in the specific case of the documentation supporting the procurement processes.

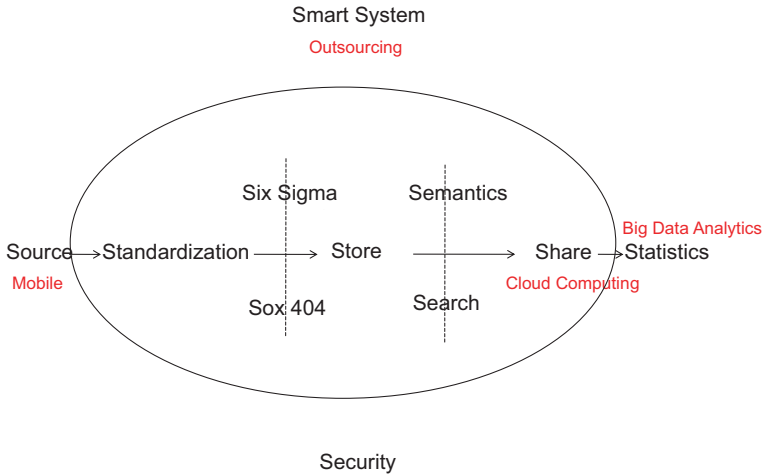


Fig. 5.2 Content management processes: the Ten + One S model

Source

The starting point for documentation management in procurement is a source, which can be of various forms, including:

- internal or external to the organization;
- partially reliable or secure;
- identified or unidentified.

The creation or placement of the document is the start of the process as shown in Fig. 5.2. This is one of the main problems that a documentation management system must successfully address, through the support of users in the creation of the content.

Another important function is “change management.” This function allows users to make changes not only to individual documents but also on the document workflows. It often happens that the constantly changing internal and external environment is not compatible with the current structure. As a result, organizations end up with processes that refer to old environments and do not take into account the recent changes introduced into the organization.

Given the nature of these processes, it is essential that updates (for example, the bill of materials of a product to buy) be done in advance of the request for acquisition. The solution needs to be able to store documents already in the planning or sourcing stages.

Examples of important documents in support of procurement include:

- minutes of meetings;
- technical and functional specifications;
- risk analysis;
- general reports;
- requests for acquisition;
- emails;
- orders;
- contracts;
- details of the changes;
- operational practices;
- transport documentation;
- invoices;
- drawings;
- pictures (for instance, after bad deliveries or anomalies);
- vendors' and shippers' addresses and contacts;

data access to help desk and support websites.

To help in compiling these documents, it is possible to set up standard formats. For example, for documenting contacts with vendors it is possible to prepare a template including:

- a cover:
- an automatic index that is self-complete with everything entered with the formatting style "title";
- a page banner with the name of the archive and its extension;
- a footer with the sheet number;
- a table that requires: date and time of the meeting, duration, and product line concerned and the names of the other people involved in the work or in the discussion;
- minutes of the meeting;

- actions to be taken;
- a number of paragraphs in the contract already in place;
- any aspects to be explored;
- conclusions;
- possibly keywords to simplify search of the document when needed.

Standardization

The first action to take on procurement documents is to standardize them as much as possible, in order to facilitate their classification and search. This can also be referred to as normalization. It is not always a simple process, since different vendors might supply many components and services with different types and styles of documentation.

A major obstacle to the standardization of digital content is the lack of a single standard used by everybody for each type of document. Consequently, a function “template build” must be made available to the user. A person compiling documents, even if accustomed to the use of computer solutions, must have an order to follow. Otherwise, he/she is likely to create content that is not easily found or consulted since it has not been drawn up in a unique format.

Therefore, a function that allows for standard indexing and archiving of documents, whether in digital or printed form, is very important.

Six Sigma

The Six Sigma approach, or rather Lean Six Sigma, is an important aspect of management of procurement documentation. It refers to management and improvement of the quality of the documentation content. Lean Six Sigma is a mix of quality improvement and reduction of variability as required by Six Sigma, and acceleration of the processes connected with Lean Thinking. They are synergized in order to both reduce the variability and defects of processes, and to improve the speed and value for the customer. This is critical, especially in services.

The Lean Six Sigma method identifies waste in the processes. In this way, it helps to eliminate it and thus improves agility by reducing cycle time and improving value. To do this, the Lean Six Sigma method requires that some questions are answered, including:

- Is this document essential?
- Is it complete in all its parts?
- How can the quality of the document be ensured?
- Is it essential to process and store the document?
- What are the essential processes?

By answering these questions and acting accordingly, the organization can automate the management of documentation with higher quality and in less time.

Storage

With the model of the Ten + One Se, all the procurement documentation should be managed in a unified way. Thanks to it being stored in a single and secure way, all the procurement documentation is accessible to all interested parties, in a fast and effective way.

Search

Another 'S' is the possibility of searching the document. It must be possible to search for text and documents. The search can be:

- throughout the entire content;
- through customized search keys or tags.

The search path of a document can vary. The immediate ones are based on searching by part numbers or vendors. In the second case, quick identification of supplies is made possible.

When the set of documents under management becomes large, a tree search is only useful to filter most of the results. It is necessary to complement this with systems that are more effective.

Google and other organizations, such as vendors of ERP packages, provide interesting solutions for searching for information in different structures (in Word, Excel, Acrobat, and so on). They work primarily as stand-alone or integrated tools (“appliance or engineered systems”) adaptable to many types of procurement documentation, whether structured or not. There are now commercial products that also allow one to search images, such as drawings.

The required functionality is to obtain a list of the search results displayed by relevance. If, on the one hand, this makes the search of “rare documents” more difficult, on the other hand, it minimizes the average time required to search for the majority of users. It is left to those who seek the “rare documents” to undertake the detailed work of tracking keywords. In this way, it would be possible to obtain the documents that are most useful rather than all the documents consulted by a few persons.

Always from the point of view of facilitating the search, there should be an automatic hinting system as the person types in what he/she is searching for. The system should also take into account minor errors in the wording of the content.

For text documents, it is possible to rely on the experience of search engines in reading the contents of the individual archives. For documents such as drawings or photographs, it is normally necessary to search for keywords in a list that is entered by the user at the time of loading the document into the system.

The search tool can be based on metadata. Examples of metadata include:

- type of product;
- date of upload;
- author;
- applicant;
- buyer;
- vendor;
- type of document;

- extension;
- language.

For full utilization of this feature, it is normally necessary to train users to identify search keywords that are useful.

The location of the document within the storage system and the life cycle of the document must be determined at all times.

Semantics

Semantics is important in the search of procurement documentation. Semantics is fundamental to access and recognize similar information stored with different wordings.

Sequence

Set-up options and control of the life cycle of the document must be available. The main functions of this macro group include:

- design workflow: this function supports the creation of the document development life cycle (DDLDC). Basically, it determines the stages through which a document evolves during its existence, including management of the profiles of persons with responsibility and control over the documents and how they can act on them;
- management workflow: this favors assessment and control of the workflow (for example deadlines). It manages the DDLDC, including the approval of documents, taking into account the organizational hierarchies and the respective responsibilities of members of the organization.

Sharing

One other important feature is sharing. Information must be shared in order to enhance cooperation, not only within the organization but also

in some cases outside the organization with vendors, customers, and distributors. This feature includes a whole set of functionality, such as screens, reports, text messages, calendar, email, and workspaces (virtual places to support teamwork). The documentation system should support e-collaboration, aimed at promoting access, sharing, and joint work throughout the life of the document, such as reminders of deadlines and changes to be made to the documents managed.

Statistics

The documentation system should support the production of dashboards and statistical documents, for example on how many structured and non-structured documents there are, how many times they are accessed, by whom, and so on. This is not only to produce statistics on the number or type of content but in general on what happens to the procurement document throughout its life cycle.

Equally important are the functions relative to reporting. The aim is to monitor simply and continuously both the technical and the functional aspects of the documentation and to promote information sharing among users.

The documentation system should target aspects such as system efficiency and ease of use. This is important to understand and improve the architecture of the system. There are other parameters as well, such as statistics on the number of documents loaded by each user, the number of links between documents, and who in the organization is rating the vendors. These statistics can help in understanding the use more or less active of the system.

The statistics on the performance of the system are very useful. To improve the system, it is important to evaluate, for example, the average time between the start of every search for a document and the actual opening of the document. The system should automatically detect these times. It should analyze the feedback offered by the user at the end of his/her research (to find out whether the user actually found the document for which he/she was searching). To improve the use of the system, reports should include:

- the number of documents produced, updated or consulted;
- the number and type of consultations;
- the number of links created between documents by the user and others in the system;
- the time spent by the user on the system.

The objective of such statistics is to understand what would be the appropriate time to improve the system and make it more useful. An access report by document type should be helpful in understanding the use that is made of the system. It could help to guide additional developments by revealing gaps, leading to the strengthening of the most commonly used functions. By means of such reports, it is also possible to keep the number of documents loaded without type attributes (or with the generic attribute “other”) under control and monitor over time the completeness of the metadata included with documents.

Security

Another ‘S’ relates to security concerns. It is critical to focus on the security of access to the content in a documentation system. The documents may be of a confidential nature and part of the organization’s intellectual property.

It is not easy to balance security with access. Statistics indicate that:¹⁵

- 67 % of Italian organizations surveyed said they fear a possible loss of information (the average in Europe is 50 %);
- 51 % admitted they had already suffered a loss of information at least once;
- 47 % also reported economic damage as a consequence, with values ranging from 10,000 to over 100,000 euros.

Close attention must be paid to several issues:

- The workflow and life cycle of documents must be followed, to enable compliance with the requirements applicable to a specific document

management process (for example, ISO, regulations, laws, and so on). The organization has to shape the processes of development, verification, validation, distribution, review, and archiving so that they meet the required standards. Access to documents and possible amendments to them must be checked across the entire flow and in the single operation. There might be multiple layers of security to protect content from unauthorized changes, verifying the identity of those seeking access and the method of access (username, password, and possibly hard or soft token).

- Access permissions, which allow authors and publishers, employees' revisions, and users the right to create, edit, or view the procurement documents according to their profiles must also be monitored. The organization must be able to specify access to documents and any options for amending them based on the policies of the organization.
- Access control is essential to ensure the protection of the content of procurement documentation. It is also necessary to identify, during the insertion of a document into the document management system, its integrity and content validation. This feature allows documents to be stored with certainty about their source and protect against potential risks. Digital signatures for accessing, changing, or authorizing documentation are becoming more and more common.
- Auditing of the procurement documentation is needed to record who did what on which document and to trace who has accessed which document, when, and the actions taken. Auditing requires that the organization is able to analyze a sample of the contents, looking for similar or identical information, as well as any unnecessary duplication of documentation, or breaches in the access of the documentation.

The protection of information stored on paper is relatively simple. For this reason, legal actions have been less common. However, the easy reproducibility of large amounts of electronic documentation in tiny spaces (pen drive or CD) makes their legal protection a vital aspect. The principles of confidentiality must be updated to take into account the different ways in which electronically stored information can be used.

From the legal point of view, the law protects only confidential information, making it necessary to indicate clearly what information is con-

fidential. Those with access to confidential information by consent of the owner of this information has a duty to use such information only for the purpose for which he/she has access permission. Any other use must be liable to prosecution.

The staff of an organization tend to have wide access to classified information. It is necessary to specify in contracts with employees that they can use such information only for the specific purposes for which they are authorized to access that information. They may not disclose it unless authorized. In some organizations, this commitment must be periodically confirmed (for example, once a year).

It is important to:

- physically protect information systems to avoid the need for legal action;
- insert into screens and reports a message that indicates the confidentiality of the information;
- check the ability to copy and/or modify the information;
- encrypt information.

The functions of input and output control of documents while editing are important. It is necessary to ensure that the document itself is compliant with the specifications laid down in the planning stage.

Safety is also important. It is relative to the compliance with the regulation and the policy of the organization. There are rules and laws that set the standards of physical safety required for all organizations. In the case of multinational organizations, these aspects have to be considered in all countries where they operate. Often organizations address this issue without an organic approach, responding tactically to individual regulatory requirements. It is important to structure an integrated approach to governance, compliance, and control.

The need to adapt to regulations has important organizational effects. In most cases, the activities required in these processes are the responsibility of the managers in charge of production. They are invested with new responsibilities for monitoring and assuring the quality of procurement documentation in terms of security.

Smart System

The Ten + One S model aims at designing, supporting, and verifying the processes for the management of procurement documentation and their value added to the organization. The last “S” indicates that the system must be smart, that is, clever and agile. An application that supports processes is smart when it implements a unified, consistent, and integrated strategy for the management of procurement documentation. It must be a repetitive method in order to identify all the requirements of the procurement documentation. Initially, it is important to create documentation that is consistent and can be adapted and reused. It should be managed in a well-defined archive. The content should be assembled to meet the needs of users effectively, efficiently, and economically. A strategy of this type can help reduce the total costs of operation (TOC) of creating, managing, and delivering procurement documentation.

The Department of Transportation of South Carolina

A best practice of the United States of America is to understand the benefits obtained from the efficient management of electronic information and documents, which can be obtained from a system for the electronic management of documents.¹⁶ This is what has been implemented at the Department of Transportation of South Carolina, resulting in a lower error rate, improved productivity, and a reduction in human intervention. The example of the Department of Transportation of South Carolina, although different in many ways from the reality in many countries, can be a useful textbook case to examine all the opportunities provided by technology in this field.

Tools in Support of Agile Procurement in Documentation Management

In light of the model presented, it is important to have tools that:

- are simple, effective, efficient, and economical;
- are able to interpret the needs of users and adapt to them;
- offer different operational modes to users and evolve over time to improve the preferred functionalities and modify or delete the ones not used.

Compliance with these three aspects should ensure that:

- the system is useful to users;
- the process is properly designed and able to aid users in managing and accessing content;
- content created does not remain buried in an archive but is a daily working tool;
- the system is self-sustaining. It should not only be durable but must be developed over time by increasing the functions offered and their quality.

The benefits of agile management of procurement documentation include:

- easy distribution and duplication;
- fast access times;
- easier search (especially with the semantics);
- documents stored in a structured way;
- availability for long periods of time (watching out for new versions);
- print or ease of sending specifications, parts, or components produced both inside and outside the organization;
- greater security;
- lower upgrade costs.

Features

Processes and systems for document management are very heterogeneous and are suitable for use in different areas and for different activities. It is possible to identify a set of relevant features of a procurement management application whose presence is important so that a procurement process can be considered useful and agile for the organization.

The features can be distinguished according to their relationship with:

- the user of the processes;
- the technical structure of the system.

The critical features, from the point of view of the primary user, can be classified according to the following categories:

- **Easiness:** the system must be easy to use, easy to learn, and its use should be ergonomic. Once it is installed, users must be able to access the system, possibly with little or no training or additional software. Users should need only a standard browser. This allows for a quick start, a drastic reduction in processing times due to the simplicity of the interface, and change management over time. Ease of use also includes ease of development of new features.
- **Extended operation:** operators must be able to access the system through internal and external networks or, whenever possible, the Internet.
- **Customization:** tools for managing workflows must be intuitive. They must be based on the personalization parameters that users can set and should not require complex computer actions.
- **Control:** users must always control the operations and receive alerts about deadlines, excessive waiting times, and task execution. This concept is linked to the life cycle of the document: the user must be promptly alerted, for example, about deadlines for making changes to a document before it can enter the next stage or be distributed. It should be able to communicate also via email or messages, and be operable on mobile phones.

The characteristics associated with the technical structure of the application should be as follows.

Document opening:

- **Integration:** this feature refers to the possibility that the processing of document management is integrated with standard tools and applications and is operable on different types of hardware. It should be feasible to import or export automatically files in pdf, doc, xls, and similar standard formats.
- **Interoperability:** the documentation system should be able to interface directly with other applications. The application must allow for the processing of a document in an integrated way with other applications outside the process itself and potentially outside the organization (for example, processes of vendors or customers).

Adaptability:

- Scalability: the process must be scalable and high-performing. The application must be distributable on multiple servers, supporting a large number of users simultaneously. In addition, the application must be able to handle millions of documents. The architecture, therefore, must be able to grow according to the number and needs of users and in such a way that performance is not affected by the size of the application itself and its tables.
- Import and export of documents: the system must allow for importing and exporting electronic documents according to criteria established by the user and his/her immediate display without requiring installation of the source document application. It is possible to distinguish between:
 - native formats, where imported documents are displayed using the format of their origination (doc, xls, pdf, html, and so on) and are accessed using the appropriate viewer program (Word, Excel, Acrobat, and so on);
 - custom sizes, where the application has its own language into which the imported documents are converted.

Modularity:

- Flexibility: many tools for the management of documentation have different modules that operate in an integrated way or separately from each other to meet the different needs of users. Potentially they must be able to meet the needs of organizations in:
 - making document management supporting activities for key processes (including organizations for which document management is not the core business);
 - controlling and distributing essential documents in a systematic way.
- Segmentation: this function must allow for separate document management based on the different functional segments into which the organization believes it is necessary to split the activities (for example, sales segment, accounting segment, warehouse segment, sourcing segment, and so on) and other sectors closely linked with the functional areas of the organization or its processes.

Standardization:

- Compliance with standards: the functions in the application must ensure that the process is able to work in a certified manner and respect the current standards without the need for revision.

Classification of the Applications of Documentation Management for Agile Procurement

It is interesting to classify documentation management tools in support of agile procurement based on two parameters:¹⁷

- document management;
- users.

Relative to document management, it is possible to identify two categories of products according to the core business of the organization:

- Support activities: this includes products used by organizations that use document management only in certain sectors and mainly as a support activity in relation to their fundamental tasks, for example to support accounting.
- Predominant activity in organizations: this refers to products used by organizations to control, manage, and distribute thousands of documents essential to their product in a systematic way (usually organizations active in the services or with strong design components).

Products can also be classified according to possible users, including:

- working groups, for example functional areas of an organization, consulting agencies, professional studies, teams, task groups, and so on;
- small/medium organizations;
- large organizations.

Integrated Approach to Documentation Processes

A study of joint process improvement and automation in the management of procurement documentation can bring significant benefits, for example the dematerialization of documents.¹⁸ An initiative in this direction must not be limited to the pure and simple electronic archiving of documents. It is necessary to tackle the problem in an integrated way by reviewing the processes in order to capture all the benefits of dematerialization.

Agile procurement can benefit a lot from this process.

The Hera Group

The Hera Group is one of Italy's largest local utilities and operates mainly in the environmental services (waste collection and treatment), energy services (distribution and sale of electricity and gas), and water services (waterworks, sewerage, and purification) sectors.¹⁹ The Group has over 8500 employees. They are all committed every day to meeting the different needs of more than 3.5 million citizens.²⁰

Process optimization, lower costs, and improvement of the services offered are the main achievements of the Hera Group thanks to the project of dematerialization of documents. The Hera Group decided to assign to a service vendor the task of completely digitizing its documentation (letters, reminders, contracts, budgets, records), issuing electronic invoices, storing and publishing documents in the portal, and forwarding them in a multi-channel mode to multiple recipients via email or certified mail. This project has allowed the multiutility group to:

- generalize dematerialization;
- achieve greater efficiency in searching documents;
- reduce storage space;
- enhance the services offered to customers through increased timeliness in sending documentation and in process management of invoicing.

The solution implemented by the Hera Group has enabled it to optimize costs and processes while safeguarding the environment—a goal perfectly in line with the corporate vision of the group. This project fully meets the strategic needs of Hera to continuously improve its services with innovative but safe solutions and to meet the expectations of its customers.

Procurement and Risk Management

As global procurement becomes mainstream, many organizations are considering partnering in low-cost countries, often without properly considering or mitigating the many potential risks that come hand in hand with global procurement.

Some years ago the price of hard disks on the market almost doubled. Many have wondered why. The reason was simple. A flood in Thailand adversely affected a huge hard-disk factory.²¹ This is a problem of globalization, which presents enormous opportunities but also significant risks. It is therefore interesting to analyze them, and here too we take an agile approach. There are many reasons why firms choose a strategy of global procurement. Lower production costs are perhaps the primary factor. There are many uncertainties and challenges in global procurement. The question is how to assess the risks of such choices as completely as possible and take action to mitigate them if necessary.

Taxonomy of Costs Connected with Global Procurement

Few models provide an overall assessment of the risks and costs of global procurement to guide managerial decision-making. A recent publication by Holweg et al. attempts to describe the risks and opportunities associated with it.²² It presents a reference model to show the differences among the different procurement strategies. It defines three basic types of costs in a procurement strategy:

- static;
- dynamic;
- hidden.

This section follows this approach and attempts to generalize it to assess the costs and risks inherent in global procurement scenarios.

Static Costs

Static costs are the most obvious factors. They include unit costs connected, for example, with logistics, such as transport and customs clearance, if any, insurance, and handling. A more detailed list includes:

- purchase price ex-factory;
- transportation costs per unit, assuming there are no unexpected delays or quality problems;
- customs and related taxes for shipments in export;
- insurance and transaction costs;
- costs of quality control and compliance with local environmental and safety standards that may be higher than those in the country of the vendor;
- search costs and agency fees to identify and interact with local vendors.

Dynamic Costs

The dynamic costs of acquisition are those not included in the static evaluation, driven by the fact that supply and demand can vary widely and are not always controlled by the buyer. They include:

- increase in the pipeline and the security of stocks, which are amplified by demand volatility and the variety of products. This risk is closely aligned with risk in the timing of delivery. The key question is whether the product will sell by the time the organization markets it. Competitors do not stand still, nor do customer tastes. The organization might miss a window of opportunity, or even worse, hit it and then have it slammed shut;
- the possible obsolescence of stocks due to logistics, with extended resupply times in case, for example, of quality problems;
- the cost of lost sales and stock-outs, with a supply chain that does not respond promptly to changes in demand;

- the possible need for expedited shipping, for example by air, to ensure speedy delivery.

In order to realize the anticipated savings from offshoring, it is necessary to fully understand and anticipate the total delivered costs (including overhead costs), and not to let potential savings slip away through execution lapses.

Hidden Costs

Hidden costs are not directly related to the operation of the supply chain, but rather to the impact on the broader economic context of the organization. They include:

- inflation of labor costs, particularly in countries that start out with very low-level wages (as happened, for example, in India, with its huge population);
- fluctuations in exchange rates; in addition to those financial risks that come from basic operations, global sourcing carries other financial risks that differ from domestic sourcing. These include currency fluctuations, cancellation/delay costs, and vendor solvency/continuity risks;
- lead times for investments or developments, which are often relatively long, meaning much can change from project inception to market introduction. Time is money in these situations;
- increase in transportation costs, for example due to rising oil prices, or possible delays due to several factors such as strikes or natural disasters;
- overheads associated with managing an international supply, including costs for staff travel, selection agencies in the local supply market, vendor management, and supply;
- risk of possible loss of intellectual property due to unstable vendors. This is a growing concern in some countries, as intellectual property in terms of design, engineering, materials, and other elements can easily

walk out the door—or organizations may even find their own offshore vendors suddenly competing with them with knock-off pricing of products;

- the need to manage cultural and language differences, with complications from the point of view of negotiations and relationships in general;
- risk of political instability and changes in economic or political systems;
- solutions that are not always up to date and reliable with a number of vendors. The basic question is, can the vendor really supply the product(s) consistently? The challenges range from scale-up problems to quality and service issues when deliveries of the components/goods begin;
- regulations that can change over time and be harder to meet than expected. This could lead to delays. This includes both technical regulations (building permits, ICT infrastructure integration) and trade regulations (duties, dumping, political embargoes). Offshoring can lead to quality problems that, if not well managed, can damage the organization's brands, in addition to extracting a huge financial penalty. Activists in labor and environmental areas can also cause damage to the brand. For example, it turns out that several leading retailers were linked to factory worker abuse in an emerging country.²³ Activists target the retailers, not the producers;
- other factors that impact supply/operational risk, including the degree of exclusivity to the organization, whether it is a sole-source/single-plant strategy, volume/vendor capacity commitments, rights of first refusal for extra capacity, inventory plans (start-up and ongoing), construction/start-up schedules, and logistics execution;
- unexpected events, especially with regard to organizations that are relatively new to global procurement, but to more experienced organizations as well. Elements such as input/ingredient/equipment lead times, lead times for the development of a solution, staffing, customer testing, capacity start-up, quality issues, and other factors can all affect the time equation.

A Model for Risks and Opportunities in Global Sourcing

The static and dynamic costs are undoubtedly of interest. It can also be very interesting to evaluate the hidden costs. Several key areas have a significant impact on dynamic costs and partly hidden costs and, therefore, largely on the total risk associated with the economic success of global sourcing decisions, including:

- time difference between the supply of domestic and international deliveries. Time is often a key strategic variable. This occurs in a system of production and logistics structured around “just in time” and the elimination of the store;
- business need for flexibility, uncertainty, and variability in demand of products;
- importance of service levels (or the cost of lost sales and obsolescence);
- logistics cost;
- objective quality and/or complexity of the product (in terms of technological sophistication or need to be produced according to customer specifications);
- stability of the country/region of the foreign vendor.

To compare all these factors, it is possible to develop a simplified decision model for a first assessment of the risk associated with the decisions of global procurement. It is necessary to rank each factor on a five-point Likert scale (where one indicates low importance/value/cost and five high importance/value/cost).

In this way, it is possible to compare different scenarios of supply and the risks associated with each of them. The result is a quantitative support for the decision rather than one based only on qualitative judgment.

From the perspective of lean thinking, any transport or storage should be seen as a possible waste. Before accepting them as necessary waste, they should be carefully evaluated. The problem is that some organizations ignore the hidden costs of global procurement.

Many global procurement initiatives produce fewer benefits than expected—or are not actually economically sustainable—because of hidden and dynamic costs that had not been budgeted in the original calculation. In reality, each instance must be examined. The model examined

can help. In other words, often the best solution is a mix of local and global sourcing.

Zara

Zara, the Spanish clothing producer and distributor, represents a relevant example of balanced procurement. Zara has moved from outsourcing to insourcing in order to shorten the supply chain wherever necessary to satisfy customers quickly.²⁴ Someone has said that Zara's deployment of Just-in-Time operations and use of technologically advanced logistics processes is the basis of its success.²⁵ It completely redesigned logistics. It has internalized some production and does not always trust vendors. For Zara, logistics is a highly competitive advantage process.²⁶

The advantages that Zara obtains from having a short supply chain for a certain number of purchases include:

- speed of response to new trends and cost containment;
- reduction of safety stocks;
- constant supply throughout the year from various internal and external vendors. Zara can vary fabrics and models, with shipments made to stores twice a week against competitors with much higher resupply times.

In the fashion market, outsourcing fits the rationalization of the production cycle, but insourcing provides the competitive advantage in terms of time (quick response) and style freshness.²⁷

The supply chain must be efficient, with features such as:

- agility;
- reduction in time to market;
- ability to change quickly according to new styles.

For these reasons, Zara has chosen to produce both internally and externally. It therefore maintains production capacity in Europe and Asia, despite the fact that offshore costs are significantly lower. In this way, Zara allocates the production of products with uncertain demand to European producers while leaving the production of items with predictable demand to Asian producers. The result is that approximately 60 % of production is located in Europe (Spain).

Zara's "Living Collections" are manufactured, distributed, and sold with the speed required by the changing choices and desires of its customers. With local production, Zara is able to supply its stores twice a week. The stores' offerings are completed and planned daily. It takes less than two weeks for an item designed by the design team of La Coruna to arrive in any of the shops around the world. Zara is thus able to be 12 times faster than the competition. Customers know that Zara renews its offerings twice a week and thus they visit its stores more frequently than those of its competitors.

A GE survey of several UK manufacturing organizations, held in 2012, showed that 27 % had increased their domestic purchases, compared with 13 % who had reduced them.²⁸ In an extreme situation, the Group Rhodes increased their purchases of iron castings from national organizations from 40 % to 90 %.²⁹ These are special cases. Organizations will continue to buy on a global basis, but with a more mature and careful approach.

Management of the Risks in Partnering

Given the complexity, uncertainty, and cross-functional interaction required in managing these risk scenarios, it is essential to consider a structured thought process in partnering. This kind of process includes a series of focus areas and several tools that help reinforce those focus areas.

- Penetrate and understand: think through the several types of risk, their probability, impact, and potential interdependence. Is there a “devil’s advocate” process by which to subject the project to “what if” analysis of the possible outcomes?
- Quantify: to the extent possible, quantify in probability and financial terms different risk scenarios. The reality is that doing this well can easily kill some procurement partnering initiatives with marginal returns.
- Plan: out of the understanding and quantification steps comes the need to create mitigation and contingency plans for technical, physical, financial, and communication implications of these risks. How can serious risks be mitigated, and if something does go wrong, who needs to know and what needs to be done?
- Syndicate: classic risk management theory includes syndication to multiple parties. The issue is to understand how the vendor shares the risk as well as how the joint risk with the vendor might be syndicated elsewhere (such as licensing the unique product for use by non-competing customers of the vendor and use of as many assets as possible versus building new ones).
- Own: manage vendor investments as if the buyer owned them. If something happens, communicate quickly to avoid wasted investment

at the vendor as well as internally. Consider how the organization might maintain the ability to manage setbacks without dismantling the efforts of the vendor. Tracking the history and using it to improve the results at both organizations is important.

- Portfolio management: risk is viewed in two ways—in individual projects and across multiple projects—a portfolio view. Too few organizations take this broader portfolio perspective.
- Project risk falls into three stages: project cancellation, project shortfall, and project obsolescence. However, portfolio risk requires four data views:
 - Aggregate commitments: what has the organization or business unit committed to across all its projects?
 - Competing commitments: are there two projects or more with parallel commitments that could cancel each other out or delay each other?
 - Sequential commitments: is there a next-generation project that will make the current commitments obsolete before they are paid out?
 - Vendor project aggregation: how many projects does a single vendor have, and what does that do to the vendor and to the risk profile of the organization if there are multiple failures or successes? Does the vendor have the resources to manage many projects and are the organization's priorities clear enough?

These views need to be regularly presented to the business management and updated so that as changes in schedules, priorities, or feasibility occur, the implications for the rest of the portfolio and for the vendor are communicated and managed. In addition, any financial implications should be considered well ahead of time.

Conclusions

This chapter recommends that, in enhancing organizational capabilities via agile procurement, management should focus on developing strategic vendor partnerships.³⁰ Strategic vendor partnerships leverage the strategic

and operational capabilities of individual participating organizations to help them achieve significant ongoing benefits. It emphasizes direct, long-term association and encourages mutual planning and problem-solving efforts. Strategic partnerships with vendors enable organizations to work more effectively with a few critical vendors who are willing to share responsibility for the success or failure of the products. In the end, strategic vendor partnerships could result in agile procurement that in turn would enhance performance.

The risk is inherent in the business, and especially in global supply chains. By fully analyzing all the major risk categories for global procurement partnering initiatives, taking mitigating actions, and viewing risk across the entire portfolio of projects and products, organizations can greatly reduce their exposure.

This chapter highlights that one of the big challenges of procurement partnerships is the unified management of processes, systems, and content. It is a great support within the procurement, to address the issue of unstructured content. This quantum leap is facilitated by changes in regulations and internal changes in the organization.

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6

Revenues and Agile Procurement

Introduction

An organization's revenues are not the direct responsibility of procurement. Procurement acts directly on quality and costs, and hence on the margins. Still, procurement can affect revenues in a substantial way. One of the best ways to increase the revenues of an organization is for procurement to become more agile. This requires changes, hence the need for improvement projects. Many organizations suffer from limited effectiveness, efficiency, and economics of their projects. It is essential to improve the management of projects. This chapter analyzes the management of a project of agile procurement and its effects on the revenues of the organization.

The final sections describe in detail how to manage a project with the objective of making the procurement more lean and digitized. As underlined several times in this book, this is the best way to make procurement more agile.

Management of Projects

Project management is the application of a rational model to address a number of activities aimed at achieving a goal, usually single, and in each case pre-determined, with constraints of quality, time, and cost, through the use of different resources (such as people, funds, and infrastructures).¹

The meaning of the parameters (time/cost/quality) in the management of a project is twofold. It is necessary to consider the time/cost/quality of the project itself as well as those of the outcome of the project.

A project is a process that determines the product or the result of the work of a group of persons. The professionals associated with the project organization are the project leader and his/her team.

Managing a project should not be understood in the sense of defining a technical solution to a problem (what this book indicates as the design). Rather, it is the management of all the activities and resources necessary in order to fulfill the scope of the project. Managing a project should enable the assessment and monitoring of key elements such as (Fig. 6.1):

- achievement of its objectives;
- commitment of resources of any kind associated with the project;
- respect of the planned times;
- economics of the project;
- risks of the project;
- quality;
- contribution of human and other resources.

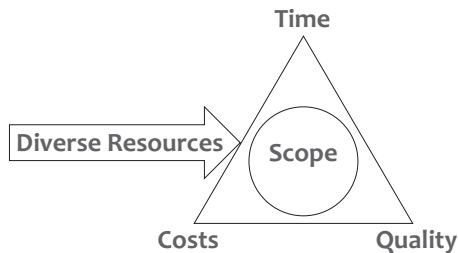


Fig. 6.1 A graphical representation of a project

Characteristics of Projects

The term “project” is used to refer to a wide variety of situations of different sizes and types of activity. Projects may be very long term (lasting years) or short/medium (months or even weeks). Longer-term projects and those covering a wide spectrum are sometimes designated as “programs.” The latter are sometimes divided into different interdependent projects. Short-term projects in some cases are referred to as tasks. In this case, the project team is called a task force. An agile procurement project can belong to any of these categories.

The issues and management tools of programs, projects, and tasks are generally the same. They relate to fundamental and specific characteristics of this type of job. A possible classification of the projects is as follows:

- Custom projects are solutions that are not the result of a simple composition of components, services, and products on the price list of the providing organization. They are based on the integration and technical and/or functional configuration of ad hoc applications, services, and products.
- Draft standard and tailor mode projects are pre-packaged or customized solutions due to the simple composition of components, services, and products of existing solutions.

Agile procurement projects tend to be of the first type, while the extension of the results of the first project to other units is of the second type.

Life Cycle of a Project for Agile Procurement

The life cycle of a project for agile procurement, similar to a Lean and Digitize approach, includes six successive main phases plus two optional phases (Fig. 6.2):²

- (preliminary);
- define and measure;

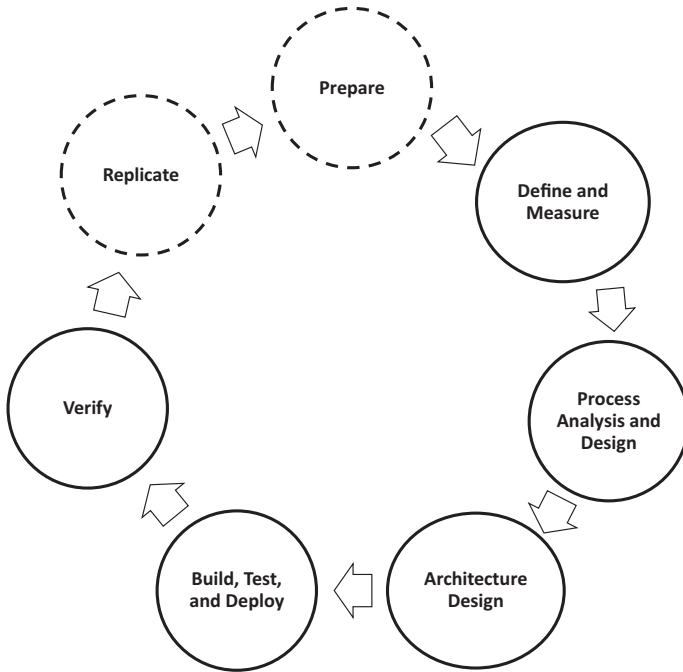


Fig. 6.2 The Lean and Digitize methodology

- process analysis and design;
- architecture design;
- build, test, and deploy;
- verify;
- (replicate).

Macro tollgates separate the different phases. There are different problems that arise in project management, with different uses of resources and various needs and control modes.

It is essential to apply this method and its tools in close collaboration with all sectors involved in the organization, quality, and support organizations (such as ICT, finance, and operations).³ The stakeholders from all the sectors of the organization and vendors must contribute to the improvement project and the project team. Lean and automation specialists can assist in bringing these projects to a higher level of cus-

customer satisfaction. Organizations need to treat the project of Lean and Digitize as the beginning of an iterative cycle in generating positive improvement. The improvement of the process should not be triggered by a problem, but should be borne in the organizational culture.

It has been possible to achieve substantial benefits with the application of the method of Lean and Digitize in very different fields, such as logistics,⁴ maintenance (Nicoletti 2010c), and the financial sector.⁵ The following paragraphs discuss in detail the method and its application to the processes of procurement.

Description of the Phases of the Lean and Digitize Method

The Lean and Digitize method is developed based on six macro phases, for 20 +1 phases. The 21st stage is optional. At the end of each phase, there is a macro control step. As is the case with Lean Six Sigma, it is called a tollgate.

Macro Phase 0: Preliminary or Prepare

1. Context: Identify the demands of customers, shareholders, and staff, the challenge of the competition, and the respect of compliance (for instance, the laws or regulations of the sector).
2. Culture: Check the culture of the organization, the community, and the society in which the organization is located.
3. Vision: Address the problems of effectiveness, efficiency, economy, quality of the process, or, if necessary, of the entire organization.
4. Strategy: Define the processes to be improved and define high-level plans.

Macro Phase 1: Define and Measure

5. Kick-Off: Launch the project through a special meeting and communicate it to all stakeholders.
6. Governance: Govern the project and establish the project team.

7. Voice of the Customer: Listen to the voice of the customer associated with the processes; in the case of public organizations, this would be the Voice of the Citizen. Both cases use the acronym VoC.
8. Metrics: Translate the VoC into critical-to-quality factors.
9. As-Is: Map the existing processes.

Macro Phase 2: Process Analysis and Design

10. Lean: Define how to improve the processes through workshops and meetings of the project team (as indicated in GE: AWO!—Action Work Out!).
11. Kaizen Plan: Define the plan for improvement.

Macro Phase 3: Architecture Design

12. Architecture Design: Define the rules, policies, and structure of the processes.

Macro Phase 4: Build, Test, and Deploy

13. Build and Test: Implement and test the solution (including automation of the important aspects of management).
14. Change Management: Manage change.
15. Deploy: Deliver the solution.
16. Documentation: Complete the documentation associated with the new process.

Macro Phase 5: Verify

17. Verify: Check the improvements.
18. Internal and External Benefits: Assess the benefits, both internal (evaluate the profitability, market share, and internal improvements associated with the new solution) and external (measure the satisfaction of customers/citizens, and of the members of the staff).

19. Lessons Learned: Learn from the experiences in the initiative.
20. Celebration: Recognize the work of the project team.

Possible Macro Phase 6: Replicate

21. Rollout: Replicate the solution so that it will be common to the various sectors or organizations in the same group of organizations.

Figure 6.2 shows a summary of the method. To ensure continuous improvement, once a Lean and Digitize project is completed, the organization should continue to work on incremental improvements using the DMAIC (Design, Measure, Analyze, Improve, Control).⁶ This typically leads to the need for change also in the information and telecommunications solutions.

The uncertainty about timing, costs, and compliance with the objectives of the initiative, which normally accompany the initial macro phases of the project, is reduced with the progress of the project. In the final macro phases, it is more difficult and expensive to recover delays. Initial macro phases are more critical because the decisions taken in these macro phases can greatly affect the progress of the project and its success.

The last macro phase, Replication, despite being a crucial moment for the results of a project, may or may not be considered a real part of the project.

Prepare

Preparation is the initial macro phase of an agile procurement initiative. The goal of this stage is to ensure the alignment of all parties to a common vision and make suitable arrangements for the execution phases of improvement projects.

This macro phase is characterized by governance actions, with the task of aligning the objectives of the project to those of the organization and defining the correct way to achieve them. Once the context, vision, and strategy of the organization have been defined, the main activity in the preparatory phase is prioritizing the improvement projects and selecting a valid project

manager. The selected project must be communicated throughout the organization (and in some cases to the vendors involved, and potentially to the end customers). The processes may be addressed with a request for information from the vendors, the RFP, payment orders, and so on. At the end of this preparation phase, it is important to set up a steering committee for the agile procurement project. It is necessary to present the proposal and the advancements of the process improvement to this committee for its approval. In the jargon of the Lean Six Sigma, this activity is known as Tollgate Zero.

Define and Measure

The project team should start by listening to the voice of the customer, whether external or internal to the organization (VoC). This is essential to focus on what is important to the success of the project. It is important that the customer details the requirements for understanding the metrics that should be measured, monitored, and improved. The most important metrics are flexibility, cycle times, and service levels. In this macro phase, it is useful to distinguish between the two stages of definition and measurement (Fig. 6.3).

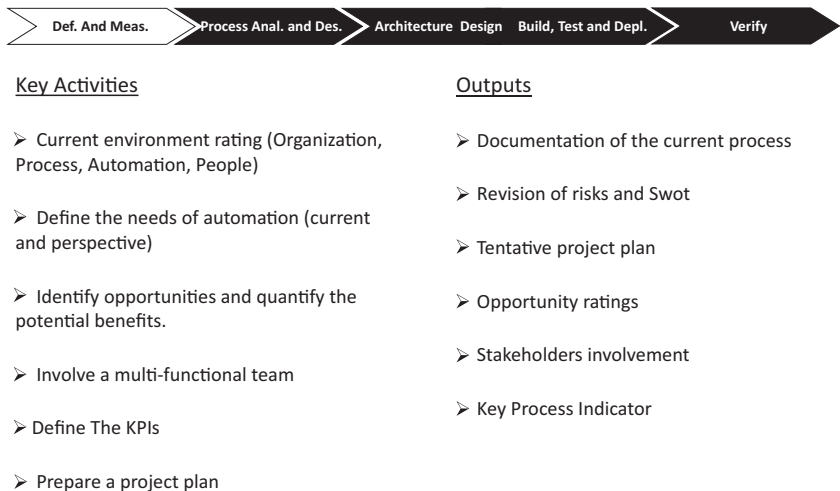


Fig. 6.3 Define and measure

The first stage in the real application of the method of agile procurement is one of definition. This stage seeks to lay the groundwork for a successful initiative. At the beginning of the next stage, measurement, it is appropriate to have:

- defined the key processes and problems to be addressed;
- agreed on the objectives of the initiative;
- identified the main parties involved in the project;
- obtained consent and approval to go ahead with the project.

The main objectives of the measurement stage are related to the definition of:

- an accurate measurement system, taking into account all stakeholders and all necessary authorizations;
- adequate information to assess the need and quantify the potential benefits;
- specific objectives to be achieved by the end of the initiative;
- approval of (or the decision not to go ahead with) the steering committee.

The main steps in this phase are to:

1. Define in detail the process and the issues that the organization wants to improve.
2. Define the macro objectives for the initiative.
3. Set the team that will work in applying the method.
4. Assess the current environment (vendors, organization, and processes).
5. Define the products/services requested (current and expected).
6. Identify opportunities and quantify the potential benefits.
7. Build the deployment plan attempts (for the whole project).

The tangible results of this phase are:

- requirements of the stakeholders;

- SWOT analysis (strengths, weaknesses, opportunities, threats) and the risk analysis of the project shared with the stakeholders;
- plan of the project throughout the development phase;
- gross initial analysis of costs and benefits.

All these aspects can be summarized in a document called the charter of the project. This document is submitted to the steering committee for its approval. In the jargon of Lean Six Sigma, this milestone is called Tollgate One.

The analysis of real cases reveals a weakness: the method adopted for measurement, the interviews, can create loss of time and lack of precision of the collected data. The analysis of other cases is rather an example of best practice: the processes are measured by extracting data from the ICT databases. This provides a quick and accurate measurement if the data available are sufficient. This example shows how the involvement of the information systems staff in the agile procurement project can also accelerate and optimize the measurement phase.

Many initiatives stagger or even fail during the measurement phase, since it is easy to get bogged down in the activities of data collection. Often, the information is not readily available or is hidden among the different groups, sectors, and stakeholders. In the absence of historical data, it may take weeks, or even months, to install a new measurement system that produces meaningful information. Moreover, in cases where there is the need for a large amount of data, simply putting in place the means for collecting information could be a whole project in itself.

Several issues should be kept in mind during the measurement of an agile procurement initiative:

- Classic measures should be used, such as the number of vendors (stratified by characteristics/service), quality of services, the terms and conditions of the contract, the number of transactions, the use of products/services, and so on.
- Information from spin-off projects should be used or retrieved, such as time monitoring services, and asset management for software and hardware products. These projects are very useful for identifying waste in the budget. The absence of these tools should not prevent the

initiative from going forward. Often, simply reducing the number of vendors is not essential and control of some critical performance parameters allows one to obtain significant benefits.

- In cases where the building of a new measurement system cannot be avoided, it is possible to deal with its implementation as a formal project. If the project is done correctly, this can be a major victory in itself.
- It is important to pay attention to the members of the steering committee and to be sure to include representatives of all stakeholders.
- The data do not necessarily have to come from a computer system. Although qualitative data are subjective, customer satisfaction surveys and focus group discussions can provide useful information.
- Although the projects are typically launched in response to a need, seemingly obvious, sometimes the data can indicate the opposite. Stopping an expensive initiative for lack of obvious benefits may constitute a correct decision as the execution of a successful project.

At the end of the measurement phase, there should be a clear understanding of the problem and future goals, and a way to measure quantitatively the progress towards the goal.

Some examples of questions to ask in terms of planning and control at the end of the first phase include:

- Have the customer and the vendors involved in the project been formally identified?
- Has the project team clearly identified the objectives of the project?
- Is it a unique project?
- Have the risks related to the completion of the project versus the risks of its unsuccessful implementation been evaluated?
- Is there a “contract” between the sponsor of the project and the project manager, on topics such as:
 - budget;
 - time and resources;
 - responsibility;
 - date of no return;
 - risks?

With regard to resources, the relevant questions include:

- Have adequate resources been identified and committed?
- Was the evaluation of resources essential and indisputable?
- Was the assessment endorsed by the stakeholders?

Process Analysis and Design

Once the macro phase of definition and measurement is complete, the following macro phase is process analysis and design (Fig. 6.4).

The main objectives of the analysis phase are to:

1. Examine possible solutions, such as: reduce the number of vendors, implement the SLA monitoring, renegotiate contracts, upgrade to multisourcing, improving processes and systems for the management of vendors and purchases also using the Web. After reviewing the cost/time/benefits of such options, a solution for the future state is identified.
2. Develop simple solutions, if possible in a single session. If the solutions are complex, they can be developed and released over time. Most

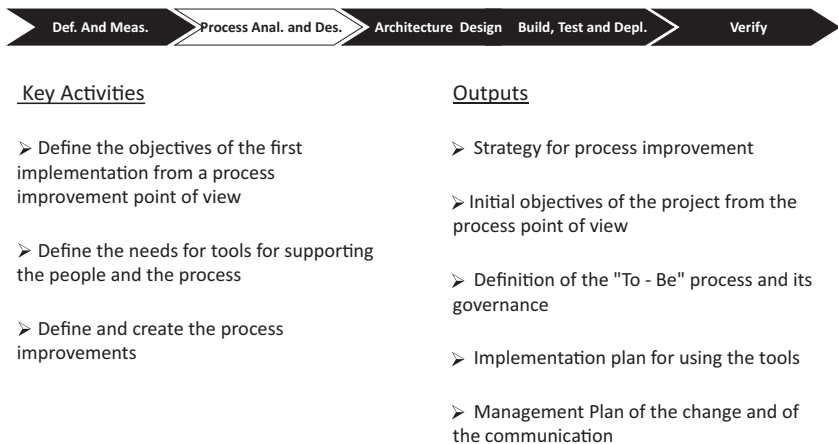


Fig. 6.4 Process analysis and design

of the solutions are implemented in stages over time. In this way, it is possible to maximize the benefits:

- Carefully choose the area to examine (perhaps a specific business unit, a single sector of the procurement organization, or the like) for the conduct of a pilot. The goal of the pilot (conducted in the next macro phase) is to:
 - demonstrate the effectiveness of the solution;
 - define the extent of support for the program;
 - further develop the plan for the overall program.

Ideally, during the phase of analysis, the team should already undertake actions for the preparation of a pilot/process in order to reduce the times of its deployment.

3. Have a more detailed project plan that is frequently monitored, and if necessary updated and approved by the stakeholders. Many projects do not make it at this point. Once this macro phase is completed, the real changes begin. It is essential to have on board all the people involved.
4. Obtain approval (or agreement not to go ahead) to implement the solution and, over time, its changes. During the analysis, it is necessary to go into details. It is also necessary to look back to the larger program, in addition to the specific solution. Particular attention must be given to the plans of the various stakeholders. In procurement, there are often deep and long-standing relationships between the key people in the organization and some of the vendors. These relationships must be identified, classified, and ideally used as a lever for the success of the program. In some cases, the team must prepare mitigation plans to prevent third parties who will lose by the outcome of the project from endangering the success of the program and creating resistance to it.

The project team must map the process of As-Is. The mapping process involves both the manual and automated flows. Specifically, the project team must:

1. Observe the sequence of manual operations and layout, to understand how the physical flows and organization are regulated.
2. Detail the applications, systems, interfaces, and automated sequences, to understand how the information flow is regulated and automated.
3. Document the process from the organizational, physical, and digitization points of view (As-Is). At this stage, it is also important to define the interfaces with other processes within the organization.
4. Define and measure the metrics and identify critical issues related to the process of As-Is.
5. Identify waste in the As-Is processes.

The following phase is the macro design of the performance improvement thanks to the agile approach. The project might include several improvement activities, whose consistency is ensured by a common method and a central governance structure.

The project team must redraw the sequence of activities by eliminating all sources of waste and variability. The process should be redesigned through:

- elimination of non-value added and unnecessary activities;
- redesign of the operations generating waste, such as waiting times, non-productivity, batch manufacturing processes, queues, and stocks;
- outsourcing or centralization of low value-added but necessary activities;
- simplification, standardization, optimization, and automation of a number of manual activities;
- reduction of excessive and uncontrolled automation (for instance the production of unnecessary reports).

The most important prerequisite for the macro phase of process analysis and design is to demonstrate clearly the potential significant benefits of the project. It is also important to understand specifically how it is possible to measure the effectiveness of any new solution. There are scenarios in which the project team might want to consider moving to the macro phase of process analysis and design without the aspects mentioned above, for example when:

- there is not enough time or resources to collect conclusive information and data on the current supply program;
- a key stakeholder (senior management member of the steering committee, or similar) insists on going forward for strategic reasons or due to competitive threats or political motivations of the organization;
- the measurement phase proved inconclusive, making it possible to do a real cost–benefit analysis only by analyzing a pilot.

The macro phase of process analysis and design should begin with the full understanding and approval of the key stakeholders. The parties concerned should accept the possibility that the results of the analysis phase will indicate that the project should not go ahead or that its objectives should be substantially reduced.

Several issues are important to consider during the analysis phase of the agile procurement initiative:

- Avoid the pressure to show immediate results. In an ideal world (at least from the perspective of the partners), all members of an organization should be focused exclusively on growth and business success. In real life, people are too focused on personal growth and success in their careers. Therefore, there might be pressure, both personally and from the management, to achieve quick wins.
- Ensure that there are frequent and regular successes. This applies to any project. Results are the best way to maintain the momentum, funding, and support for an initiative. In addition, solutions that have multiple benefits are easier to manage. In this way, the risk of failure of the project can be considerably reduced. The plan may require the activation of new complex systems that require a long lead time. It is worth trying to understand the changes and improvements that can be completed in the short term or staggered over time even in a situation of this type.
- Be very cautious about visionaries. Often, the parties concerned may push certain solutions because of their vision of how things should be. Unless these visions are consistent with what has been defined during the analysis, it is necessary to avoid these ideas diplomatically, but at all costs. This factor has contributed to the failure of many projects.

- Know the impact of the decisions taken on stakeholders. Suppose one of the decisions is to reduce the number of vendors of software development services by 50 %. There are clear winners and losers both inside and outside the organization. Vendors at risk of downsizing or elimination, and the department leader who is their champion, can forcefully reject the changes. The vendors that are likely to win wider business should be very happy with the plan. It is necessary to take into account, and have an appropriate approach to, both parties. It is necessary to invest time and resources in managing vendors that are losing business and to benefit from the winning vendors.

As for each model, it is important to consider all the points of view. Detractors claim that this type of method simply adds too much bureaucracy and too many commitments to a process that should be based much more on common sense. From one point of view, they are correct. It is easy to look at a process or a program from outside and have a good idea of how it should be run and managed. However, for the person in charge of a project or program that has to work in detail, with pressures from across the organization, it is relatively easy to lose sight of the big picture. The key is to use customers, colleagues, and vendors as a means to stay on the straight path—not to take care only of people who must be satisfied.

Architecture Design

The To-Be process describes the sequence of activities that forms the future operational process. These activities can be part of the manual workflow or automation. The tasks of the architecture design macro phase are to (Fig. 6.5):

1. Plan in detail the functional and technical characteristics of each component, activity, and service.
2. Design all interfaces between automatic and manual tasks.
3. Adjust the flow rate of the process to make it more continuous and connected with the end customer.



Key Activities

- Define the objectives of the first implementation from the automation point of view
- Design the architecture from a technological point of view
- Define the needs for technologies for support People is Process

Outputs

- Architecture design
- Purpose initial of the project from a digitization point of view
- Definition of the "To - Be" from a technological point of view
- Implementation plan for the technology
- Management plan of the technological transition

Fig. 6.5 Architecture design

It is important at this stage to focus on the macro asset for the customer and for the organization. For each activity included in the procurement process, one should ask the question: is the customer willing to pay for this activity? Then waste can be eliminated by analyzing the stream map value. This waste, analogous to the waste in lean production, is associated with over-procurement, reprocessing, unnecessary movement, excess transportation, excess inventory, unnecessary processing, and waiting times. The actions to take include:

- Look to the activities of the procurement processes that can be eliminated.
- Try to consolidate different vendors providing the same type of products or services.
- Build relationships and effective partnerships with vendors; e-procurement simplifies and automates most interactions with vendors.
- Increase the visibility of relationships with vendors.
- Measure and improve the performance of vendors.
- Reduce administrative tasks.
- Try to create a continuous flow of information and products.

- Eliminate bottlenecks in the procurement administration.
- Streamline approvals.
- Improve and increase requests for proposals from vendors.
- Monitor tenders.
- Allow users to make purchases directly, with pre-set spending limits, within model contracts and possibly to use e-catalogues.
- Define purchases, having them pulled from the customer.
- Limit purchases until they are actually needed and for an essential amount.
- Automate and integrate procurement as much as possible (for instance, integrate the software for supply with the software for inventory management).
- Continually improve.
- Involve vendors in the process of continuous improvement.

Combining these approaches with digitization can bring substantial value to the organization.⁷ For example, the adoption of web-based tools in procurement processes enables organizations to both reduce transaction costs and improve the efficiency of internal processes of supply. At the same time, it allows for greater collaboration with vendors.

Build, Test, and Deploy

During the macro phase of build, test, and deploy, it is necessary to implement the To-Be process (Fig. 6.6).

The macro phase of build, test, and deploy is often referred to as the construction macro phase. The primary goal is to achieve what is defined as a To-Be in the macro phase of process analysis and design.

The new organization, the new physical structure, the new software, and the new interfaces are developed, according to the functional and technical specifications defined in the earlier macro phase of architecture planning. Each task and component is individually tested to verify the correctness of the development. A pilot must be launched. In this way, in accordance with the design and architecture, the process is implemented and simulated on a small scale, in order to verify the real functionality. In

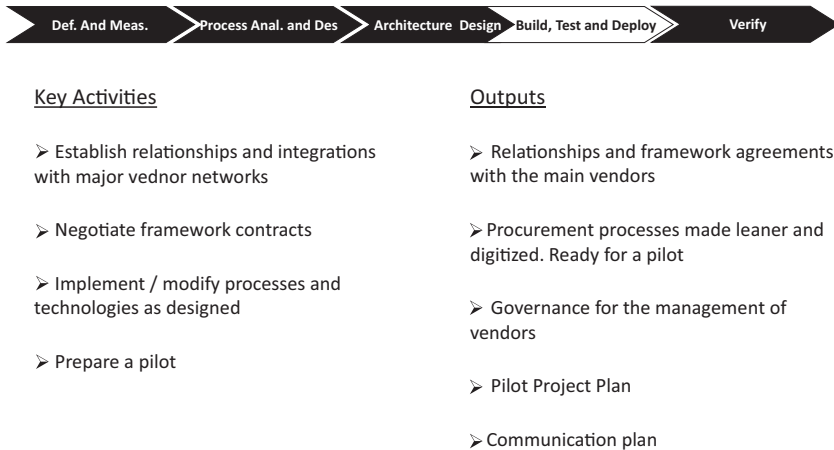


Fig. 6.6 Build, test, and deploy

case of problems, it is necessary to make the necessary changes to the solution. Once the new process is verified to be correct, it is introduced in the organization with the appropriate automation and digitization.

Almost all activities should be included in the ongoing processes in the organization depending on the stage of implementation. There may be one-off activities not covered in the future procurement processes. For example, vendor consolidation is (ideally) a one-off or as needed, while the management and maintenance of the right mix of vendors is an ongoing process. The other caveat to remember is that unlike many internal processes, it can be very difficult to launch a pilot for agile procurement without involving the vendors. For example, if part of the solution involves the introduction of a new project based on a process of outsourcing, or moving from multi- to mono-sourcing models, vendors can react as if the organization has engaged them forever and not for a pilot.

The main objectives of the macro phase of build, test, and deploy are to:

1. Prepare vendors for the upcoming changes involved in the pilot initiative of agile procurement. In cases where a process is significantly changed, very likely procurement will use incentives to help ensure

- their agreement. Incentives can be direct (for example, higher turnover for the future or bonuses) or indirect (for example, making it clear that only new projects and services will be procured through the new process, and the vendor has the advantage of knowing and learning them beforehand).
2. Depending on the nature of the pilot, renegotiate some aspects of existing contracts and/or negotiate new ones with new vendors. In many cases, however, it may be useful to define informal arrangements for all of the macro phases of design and verification of the macro phases.
 3. Install and configure any solution to be used to support the new processes.
 4. Once the macro phase is completed, the organization should start preparing to extend the process to the entire organization. New processes must be defined and communicated to all internal groups. In the same way, vendors must be made aware and accept the new processes, similar to the internal teams. There should be frequent and regular scheduled updates and meetings open to all in the macro phases of build, test, and deploy and verify.
 5. Prepare infrastructure or resources to support the start of the process developed in the initiative of agile procurement. These actions may include training, the development/modification of websites, online help websites (Intranet and Internet) and/or the hiring of temporary support staff.
 6. Once the stage is set, the processes have been laid out, the pilot of the solution is in place (if any), and vendors and internal actors are ready, it is time to start using the new processes and enter the macro phase of verification.

Several things need to be considered in the development of the macro phase of build, test, and deploy:

- Vendors are not machines. Never lose sight of the fact that strong partnerships with vendors can be more important than a mere process improvement. Online auctions, for example, can dramatically reduce

- costs. If the organization is interested in collaboration with strategic vendors, of course, this does not go well with ongoing renegotiations.
- It is not possible to change some processes related to the contractual agreements in force, at least not in the short term. Even if the desire is not to deal with these issues as barriers to success (or an excuse for failure), it might be possible to try to work around them. If one of these factors affects the success of the initiative, it must be dealt with seriously, with high-priority actions. In this way it is possible to remove the barriers, or at least to manage expectations.
 - The main cause of failure in agile procurement initiatives is the mismanagement of stakeholders. Once the foundations of the initiative to improve procurement have been laid, those responsible for the process and the project represent the largest factor in the success or failure of the improvement. The procurement team is able to manage and monitor the overall expense and service levels. People who interact with vendors on a daily basis have the ability to closely monitor and manage these services. They are able to detect deterioration in the service levels of the first process or system implementations. When properly authorized, they can also solve these problems before they become too big. Conversely, if there is resistance to the new process, the personnel involved can use the new processes of procurement as an excuse for failure, undermining the whole initiative.

At the end of the macro phase of build, test, and deploy, the teams should be ready to manage a pilot. The goal is to have strong support from senior management, the operational teams, and the vendors.

The solutions may be altered in some way in this macro phase because of existing processes and contracts, conventions, or because it is necessary to make sure that all parts work together successfully. If the ultimate solution realizes the benefits in terms of profitability (return on investment—ROI), it is possible to move to the macro phase of verification.

Verify

The last macro phase of an agile procurement project is the phase of verification (Fig. 6.7).

The process must be constantly monitored by measuring the benchmarks. An unmonitored process could degrade and cause huge losses and thus reduce customer satisfaction. At the start of the verification macro phase, when the process becomes operational, the project team must define and implement all the changes defined in the plan.

In a perfect world, the pilot should provide satisfactory results. The project team should therefore have full confidence in starting the new processes and applications in procurement, extending them to the entire organization. In fact, the verification macro phase is an iterative process of continuous improvement, development, and expansion of the program.

The likely scenario in the best case is that, following the launch of the new process, there is an improvement in the value for the customer (be it internal or external) and a cost reduction. There is often an interim period, while existing contracts are completed or vendors are changed. The investment should start to pay in the short term. In these cases, the macro phase of verification is used to validate the measurement system for the actual situation and develop a plan to extend the improvements to

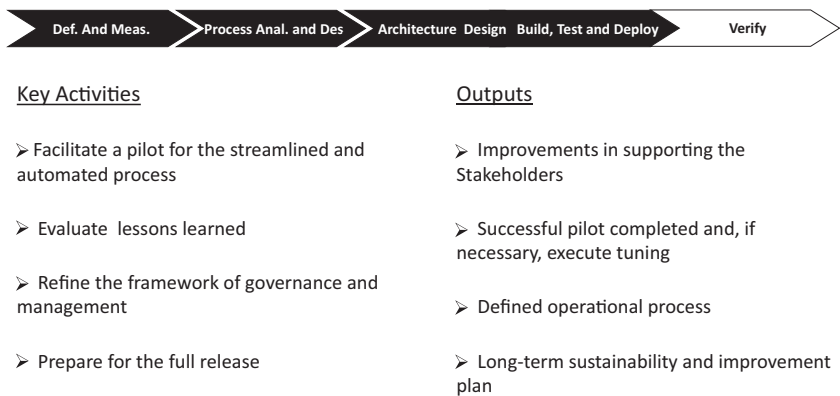


Fig. 6.7 Verify

the whole organization. In an intermediate scenario, the pilot provides the foundation for success. Some aspects may be more difficult to implement, or the costs more than expected.

Perhaps the most common problem is finding that a procurement strategy that looked good on paper did not work as expected once the actual users in the organization started using the processes defined by the project. This usually happens when a strong emphasis is given to the renegotiation and rapid deployment to support and prepare internal customers (such as ICT and operations managers) to succeed. Although this is not an obstacle to the program, it should certainly be addressed in the implementation plans and during training, and if necessary compromise solutions should be found.

In the unfortunate cases where the expected benefits are not achieved, it may be necessary to rethink the fundamentals of the strategy and the implementation of agile procurement.

Besides the lack of availability of users, other problems might arise during a pilot:

- The reduction in the number of vendors allows for savings of cycle times and costs, but it is difficult to implement because there are winners and losers.
- Changing or consolidating vendors is a delicate process due to risks of failure of the production processes or product delivery within the organization.
- Unless there is a clear mandate of the steering committee, there should be clear benefits for the users of the new processes. If they do not perceive benefits, the support will be little more than half-hearted.

In these cases, it is critical to quickly identify and resolve the deficiencies before the stakeholders are disappointed. Any organization's procurement can become leaner and more effective, but the necessary steps can be very different. There is frequently the need to remember that the purpose of the pilot is to discover difficulties. The pilot must also allow for the discovery of short-term opportunities that can be used to maintain the momentum of the program while the strategic components of procurement are revised.

The head of procurement must have time-bound targets based on savings, efficiency, and/or simplification. However, it must also have an ongoing commitment to review and continuous improvement to keep the organization agile.

Replicate

The objective of the macro phase of replication is to create conditions for the continuous improvement of performance, to achieve excellence, and to extend the initiative to other sectors or parts of the organization (in the case of a group of organizations) (Fig. 6.8).

Unlike the earlier macro phases, this last macro step is optional and may differ greatly depending on the context of implementation, in terms of depth and width of the action.

Tools for Project Management

The introduction of tools for project management can significantly improve the effectiveness of individuals and teams in many areas of activity, connected with the temporal aspects, the economics, and above all the quality of the project. A common goal for every individual and orga-

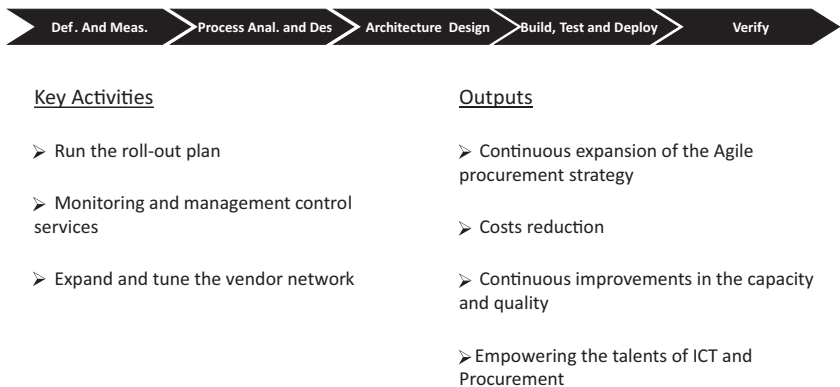


Fig. 6.8 Replicate

nization is to optimize the use of available time and resources, avoiding the wrong distribution of work, delays, and crises that could result. To do this, it is necessary to be able to establish the right priorities and promote the importance of the activities with urgency.

The tools for managing projects offer two key benefits:

- Breaking down the project into a number of basic activities makes it easily understandable and interpretable as well as providing the big picture.
- The union of the various activities under one common denominator facilitates:
 - benchmarking;
 - definition of priorities;
 - strategic choices;
 - sharing of resources.

Management of a Project

There are several possible categories of projects, classified by type, size, and duration. There are also different methods, tools, and processes available to the organization to plan and better control the project.

The opportunities that project management brings in a project of agile procurement can be summarized as follows:

- meet specific needs of the customer in order to launch the project;
- check the strategic parameters (scope, time, cost, and quality);
- drive events rather than put up with them, following the plan for emergency management;
- plan and allocate resources (human and technical) between multiple projects.

Project Governance

All projects, due to their non-repetitiveness and taking into account that the control of resources is a top priority, require careful planning and

control processes that support project governance. One of the objectives of the planning and control of a project consists in completing all the work required, through detailed communication, so that each of the participants in the project can accurately identify his/her tasks, responsibilities, and interfaces.

The relevant aspects of the governance of the project include:

- description of the activities and specific responsibilities (work breakdown structure—WBS) that must be carried out to complete the project in a structured way, divided into:
 - work packages;
 - activities;
 - sub-activities;
 - any subsequent subdivisions of detail;
- identification of critical events and activities (milestones or benchmarks of the project);
- definition of who is in charge of each activity (organization breakdown structure—OBS)
- network of activities, their timing, and sequences;
- budgeting project (cost breakdown structure—CBS);
- document management, information and project archive.

Please refer to the specialized texts for a description in detail of these tools.⁸

Control activities are based on the application of the methods and techniques used to plan and monitor the progress of the project. Effective control is based on good communication on the project.

At the beginning of the project there should be a well-defined communication plan delivered to the steering committee and to all stakeholders and members of the project.

It is also useful to organize meetings or distribute documents to share information on the progress of the project, as indicated in Fig. 6.9.

Project Management Dashboard	
Project:	
Date of revision:	Revision Number:
Short project status to the review:	
Key signs of auditors during the audit:	
Actions and next steps planned for the project:	
Suggestions for improving the next review:	
Issues / concerns raised during the review:	

Fig. 6.9 Dashboard of progress of a project

GE Oil & Gas

The Lean & Digitize method has been used in several situations. One of the most interesting applications has been in the Italian branch of a large multinational organization, operating in the construction of large facilities.⁹

This model of procurement has improved the way the organization achieves its goals (such as project-based procurement). It has produced significant benefits, such as:

- substantial reductions in costs;
- quick answers to the needs of the organization;
- more flexibility;
- a selected range of vendors;
- risk reduction with supplies.

Precautions in the Application of Lean and Digitize

The Lean and Digitize method has several positive aspects, but it is essential to take into account some precautions in applying it.

- ICT can provide exciting opportunities for innovation. On the other hand, it may impose restrictions or rigidity in processes. An organization, instead of behaving as if it has access to a clean slate, should rec-

ognize the restrictions and/or rigidity in the systems, both within the organization and in its customers and vendors. The change might require new processes. It is important to understand their implications and try to use them in the best possible way. This is true in general, and especially when trying to deploy commercial software packages. The processes considered by commercial software packages can be more rational and logical than those used by many organizations (as they are designed to be used in different environments). Some packages, however, do not fit the processes of the specific organization because, as with many facilities for organized functions, packages are designed to support specific functions rather than processes.

- When a process is developed within an organization with customers and vendors part of the delivery processes, it might be difficult to introduce changes. It is not possible to wait for a customer or a (non-exclusive) vendor to change its internal systems to provide better process innovation to another organization. It is important to verify the restrictions imposed by internal but especially external systems and processes.
- Considering existing environments of the system as a limitation of the process might seem to limit radical innovation. If an organization chooses not to change a number of their systems, the ability to innovate processes is limited. If these constraints are analyzed rationally, however, it is possible to consider the potential trade-offs. The Theory of Constraints,¹⁰ instead of starting from the beginning of the new clean processes and systems and then getting into difficulties with existing systems, considers the existing systems from the outset and accounts for their rigidity in the design of the new processes.

Factors of Success and Failure of a Project for Agile Procurement

Taking into account many projects, the critical success factors (or the failure factors, in the opposite direction) of an agile procurement project include the following:

- The project must be born of a good idea, with:
 - external consistency (with the external environment);
 - internal consistency (with a need within the organization, taking into account the culture, the vision, and the strategy).
- The sponsor must be clearly identified.
- Effective and clear programming and control should be in place.
- The project leader should have strong management capabilities.
- There should be a viable plan of communication and therefore a high capacity of the project leader to communicate inside and outside the project team.
- The project manager must be a team builder. In other words, he/she must make sure that the individual members of the team (the different resources) see themselves as part of the project, understand what their contribution is, and be fully committed.

In an agile project, it is important not to “streamline” the procurement too much. The need to handle emergencies should be kept in mind. Think of what has happened in terms of providing different products with the Fukushima disaster in Japan.¹¹

The most important factor for the success of the project remains the project manager and his/her leadership skills. Many people believe that the members of the project team should all be exceptional, but what is needed are team players, not prima donnas. The successful project manager can appreciate the people that he/she receives as part of the team and discover the talents in each of them.

Project for e-Procurement

The project to implement an e-procurement system in an organization develops in several phases.

- Decide which sector to focus on, for example:
 - maintenance;
 - consumables (including fuel);

- real estate and related work;
- information and communication technologies;
- clothing.
- Decide which part of the procurement cycle to focus on, for example:
 - sourcing strategies;
 - activities prior to purchase;
 - supply management;
 - spend analysis.
- Launch the initiative.
- Set up the project team.
- Define the objectives in detail.
- Kick off the project.

The interested readers can refer to some interesting descriptions of the critical success factors in e-procurement projects.¹²

e-Procurement in Newham

The London Borough of Newham has created a fully integrated paperless process with one of its main vendors.¹³ Before adopting e-procurement, this office was placing an average of 5,000 orders per year (total value 250,000 euros) with an error rate higher than 10 %. The orders were placed manually, a method that included processing eight documents and passing six steps of authorization.

In the year following the implementation of the e-procurement system, 2,800 orders (with a total value of 280,000 euros) were issued with an error rate of less than 1 %. Orders are fully automated and provide a single document, and require only one authorization step.

Conclusions

Improvement projects for change management are the basis of the benefits that the procurement organization can bring and the increase in margins for organizations. Tools and project management are critical to the success of agile procurement.

On the other hand, the importance of the people who are part of the project should never be overlooked, whether they are part of the organization, partners, or vendors.

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7

A Case Study in Agile Procurement

Introduction

This chapter considers the case of one of the largest financial institutions (FIs) operating in Italy.¹ It employs almost 4000 people, has a customer base of around half a million, and maintains hundreds of branches across the country.

This FI is a traditional European “universal bank.” It offers services spanning the following areas:

-
- consumer banking
 - corporate banking
 - private banking
 - investment banking
 - insurance services
 - mortgage credit
 - private equity
 - savings, asset and wealth management
 - securities
 - electronic payments
-

The assets currently under management exceed 1.5 trillion euros, with equity as high as 62 billion euros. The cost/income ratio is 75 %, leading to a 4.4 % Return on Equity (RoE).

The FI's governance falls into the Italian dualistic model, with a *Consiglio di Gestione* (management board) and a *Consiglio di Sorveglianza* (oversight board).

As-Is

The Italian FI organization is itself a group. It has a mixed structure, made up of an infrastructure dimension, which encompasses the following C-levels:

- Macro-Area Chief Financial Officer
 - Finance Director
 - Treasury Director
 - Fiscal Director
 - Corporate Insurance Director
- Macro-Area Chief Credit Officer
 - Credit Approval Director
 - Portfolio Management Director
 - CRM Director
 - Monitoring Director
 - Out and Collection Director
- Macro-Area Chief Operating Officer
 - Operations Director
 - Cross Divisional Services Director
- (HR Director)

This dimension is associated with a product-related dimension, which is made up of:

- private and business customers;
- asset and wealth management;
- corporate banking and securities;
- global transaction banking.

The FI has a number of subsidiaries that carry out important functions. Of particular interest is a subsidiary, wholly owned by the group at national level, that is entrusted with the task of providing the organizations of the group with comprehensive purchase and management of physical assets and services with regard to administration, consulting, and maintenance matters.

The role of this subsidiary is key in the procurement activities for the FI group, assuring consistency at a domestic level as well as at the global level.

The subsidiary operates in the following areas:

- technology;
- business services (business corporate operations);
- operations (business retail operations);
- global sourcing (procurement and invoice accounting);
- corporate and real estate services.

The rationale behind the current separation is that of developing specialized competencies in procurement/real estate administration/solutions while letting the FI group focus on the banking core competencies that drive, in a strict sense, the competitiveness of the organization in the industry. On the other hand, the subsidiary is eligible for incorporation as an Italian Law consortium, and thus it benefits from some fiscal exemptions and other important benefits.

As of 2014, the spend carried out by the FI was structured according to the main indicators shown in Table 7.1.

Table 7.1 Main indicators

Item	Relevant figures
Income from banking activities (rounded)	€1,000,000,00
Operating costs (rounded)	€700,000,00
Administrative and staff expenses	94.14 %
Staff expenses	49.19 %
Administrative expenses	44.95 %
Administrative expenses (of which)	44.95 %
ICT costs	11.77 %
Real estate costs	11.12 %
Indirect staff expenses	0.45 %
Number of employees (rounded)	3900
Number of branches (rounded)	365
Total staff expenses	49.65 %

Source: Benchmarking—2014. The FI—from annual reports

This table shows the areas of major attention for the FI from the point of view of spending, its impact on the organization, outlook, and implications for the agility of procurement.

The operating costs are approximately 70 % of the operating income. The major items, in terms of value, are:

1. staff expenses (49.65%);
2. ICT costs (11.77%);
3. real estate costs (11.12%).

A large part of spend is due to staff expenses, which are not easy to change due to labor legislation. In fact, 94 % of the operating costs are due to administrative and staff expenses.

Staff expenses are a particular category of spend, due to strict labor market laws and mechanisms. This sometimes makes it very difficult to reduce the spend/right-size the headcount. Furthermore, the shift towards a less branch-centered customer interaction (which entails a minor requirement in terms of physical branches and therefore less branch staff) is somehow less likely to have a drastic impact on staff expenditure and real estate costs. This is due to the high relevance of the reputation of a financial institution among its customers. The customer response that can reasonably be expected from a shift in the interaction paradigm is often misinterpreted, and usually reported by media as a signal of instability or crisis in a financial institution.

Therefore, due to strict labor laws and reputation logics, drastic reductions in staffing levels have not often been observed in Italian financial institutions. In times of mergers and acquisitions, staff is often retained beyond the actual need. Actually, this FI has not pursued any drastic downsizing in terms of staff employed.

Scalability when it comes to HR is often achieved with the use, if applicable, of outsourcing, often achieved through the purchase of consulting, ICT, and legal services. This makes up in some cases for the additional full-time equivalents (FTEs) temporarily required. In other cases, there may be a form of outsourcing of special capabilities. This is done when it is not efficient to develop these capabilities in-house and/or they are not connected with the core business.

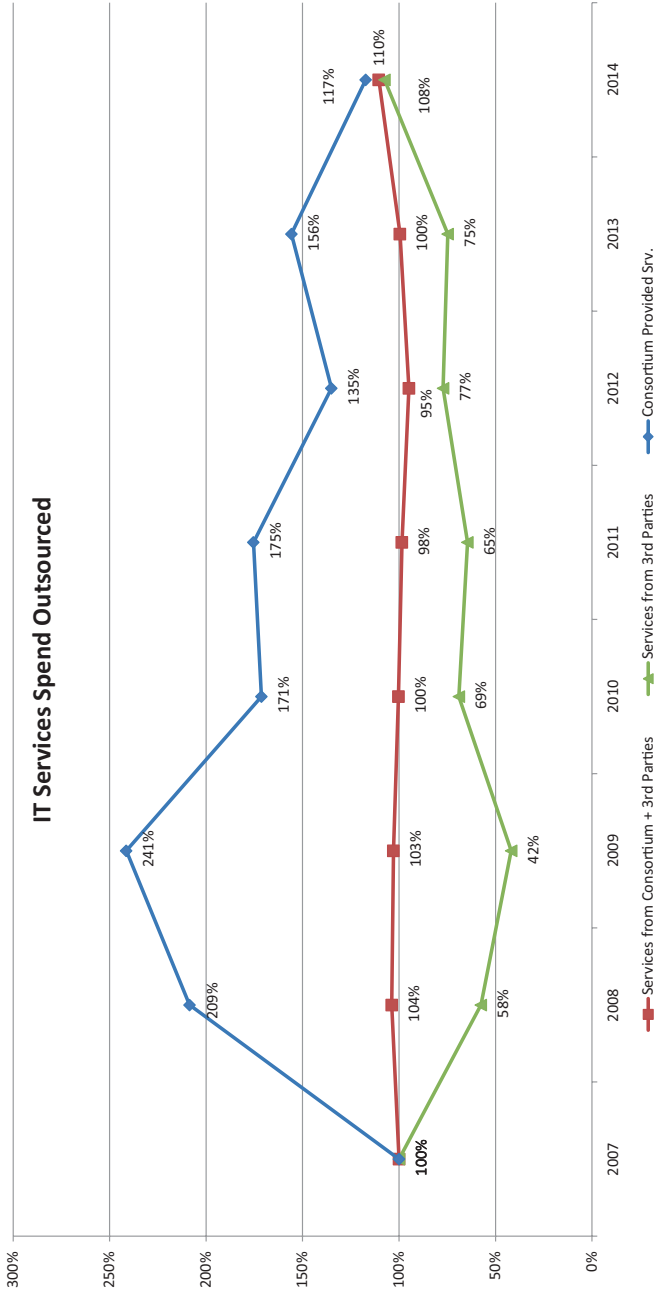


Fig. 7.1 IT services spend outsourced. Source: FI's Consolidated Annual Reports 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014—Adjusted for inflation. Note that the "Consortium Provided Srv." figure is a simple difference between consolidated and non-consolidated accounts

Therefore, at least part of the agility observed can be attributed to increasing outsourcing through external consulting/contracting firms. With reference to this aspect, it is helpful to observe the trends in purchases of outsourced services (Fig. 7.1):

It is possible to see that the ICT spend has remained quite flat. The source of the service has changed over time. In the period between 2007 and 2009, the FI has increased its spend in services purchased, 2007 being the year of incorporation of the group consortium. This fact highlights how spending with the consortium has dramatically increased in three years, with a specular trend in spending towards third party service vendors. The total spend, over that period, has remained stable. Therefore, it represents primarily a replacement of sources rather than an increase or decrease in services purchased.

The spend in the years after 2009 shows an opposite pattern, in which the share of services purchased from the group consortium decreased from 241 % of the figure recorded in 2009 to a more modest 117 % of the 2014 figure. Similarly, the externally provided services went up, from 42 % in 2009 to 108 % in 2014. The resulting trend in consolidated purchase of services (mainly ICT) in 2014 is 110 % from 2007 (Fig. 7.2).

The following 2014 benchmarking takes into account the key spend indicators of the FI compared to a basket of direct competitors. Some indicators are shown in Table 7.2.

The cost/income indicator shows an above average value for costs relative to income (Fig. 7.3). This means that in 2014 the organization ran on a quite high operational cost, as it seems to be a consolidated pattern for the FI.

These figures suggest that the structural level is around the 70 %, which is quite high if compared to the closest competitors.

The performance in terms of staff expenses/income or staff expenses/total cost means the organization manages to keep the cost structure of personnel under control.

The real estate (RE) expenditure over the income is in line with the market. The low number of branches drives down the performance of the ratio between income and RE expenditure. This may signal that the expenditure in RE might be an issue. On the other hand, it is reasonable to assume that the lower number of branches would bring with it a higher percentage of prime locations that have higher costs. The RE strategy of the FI in 2014 involved the sale and lease back of 95 locations.

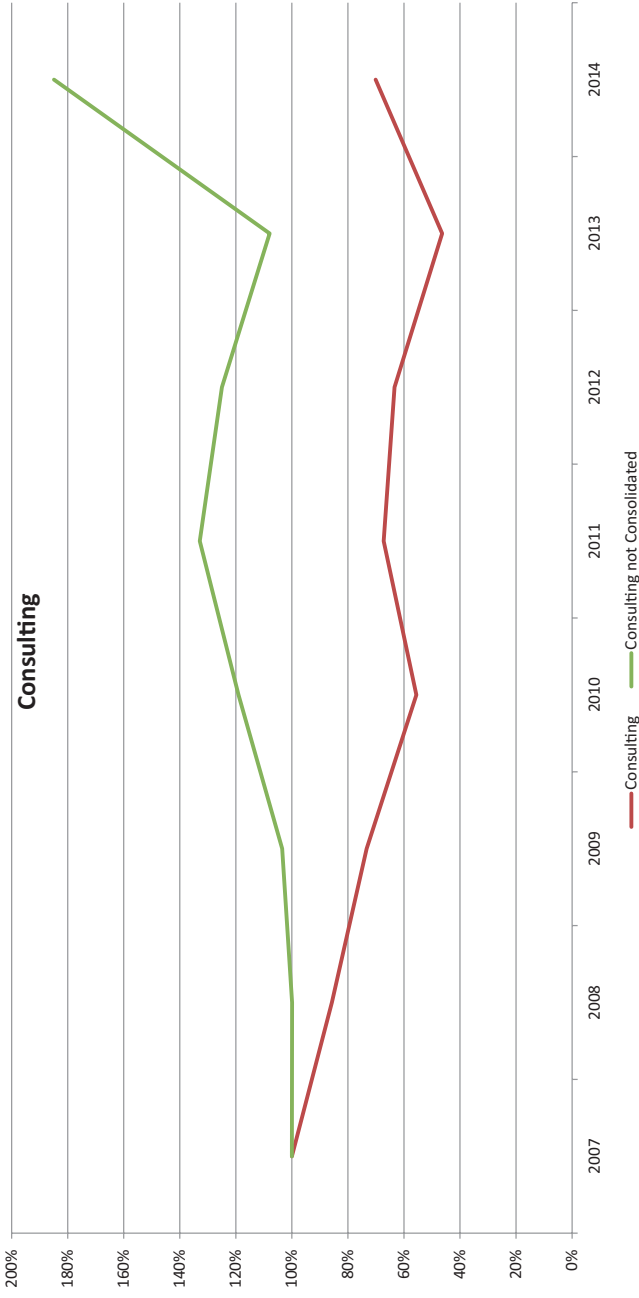


Fig. 7.2 Trend of consulting, consolidated and not consolidated. Source: FI's Consolidated Annual Reports 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014—Adjusted for inflation

Table 7.2 Benchmarking of the FI vs. the Italian market

Fiscal year 2014	The FI	MKT avg.	FI vs. avg.
Cost/income	72 %	62 %	9 %
Staff exp./admin + staff	52 %	58 %	-5 %
Admin/admin + staff	48 %	42 %	5 %
<i>Excluding Indirect Personnel Cost</i>			
Staff exp./income	35 %	38 %	-3 %
Staff exp./total cost	49 %	61 %	-12 %
Staff exp./num. employees in euros (thousand)	88	77	10
Income/person in euros (thousand)	249	219	30
Cost/person in euros (thousand)	178	28	50
Num. employees/branches	11	11	-1
<i>Staff Expense</i>			
Including indirect personnel cost			
Staff exp./income	36 %	39 %	-4 %
Staff exp./total cost	50 %	62 %	-13 %
Staff exp./num. employees in euros (thousand)	88	79	9
Income/person in euros (thousand)	249	219	30
Cost/person in euros (thousand)	178	128	50
Num. employees/branches	11	11	-
<i>Real Estate (RE) Expense</i>			
Income/RE exp. in euros (thousand)	13	20	-7
RE exp./income	8 %	6 %	2 %
RE exp./total cost	11 %	9 %	2 %
RE exp./num. employees in euros (thousand)	20	12	8
RE exp./admin exp.	25 %	21 %	4 %
RE exp./num. branches in euros (thousand)	213	131	82
<i>IT Expense</i>			
Income/IT exp. in euros (thousand)	12	58	-46
IT exp./income	8 %	3 %	5 %
IT exp./total cost	12 %	5 %	7 %
IT exp./num. employees in euros (thousand)	21	7	14
IT exp./admin exp.	26 %	12 %	14 %
IT exp./branches in euros (thousand)	225	88	137

Market: Unicredit, Intesa Sanpaolo, MPS, Banco, UBI, Banca Popolare dell'Emilia Romagna, Deutsche Bank, Cariparma, BNL, BPM, Carige, BPV, Veneto, CREDEM, Credito Valtellinese, BPS, MedioBanca

As already stated, the banking sector is looking at a period of less need for a physical presence on the territory. Nevertheless, the FI is not dismissing for the time being a large number of branches. There are frequent opportunities to renegotiate thanks to a weak RE market.

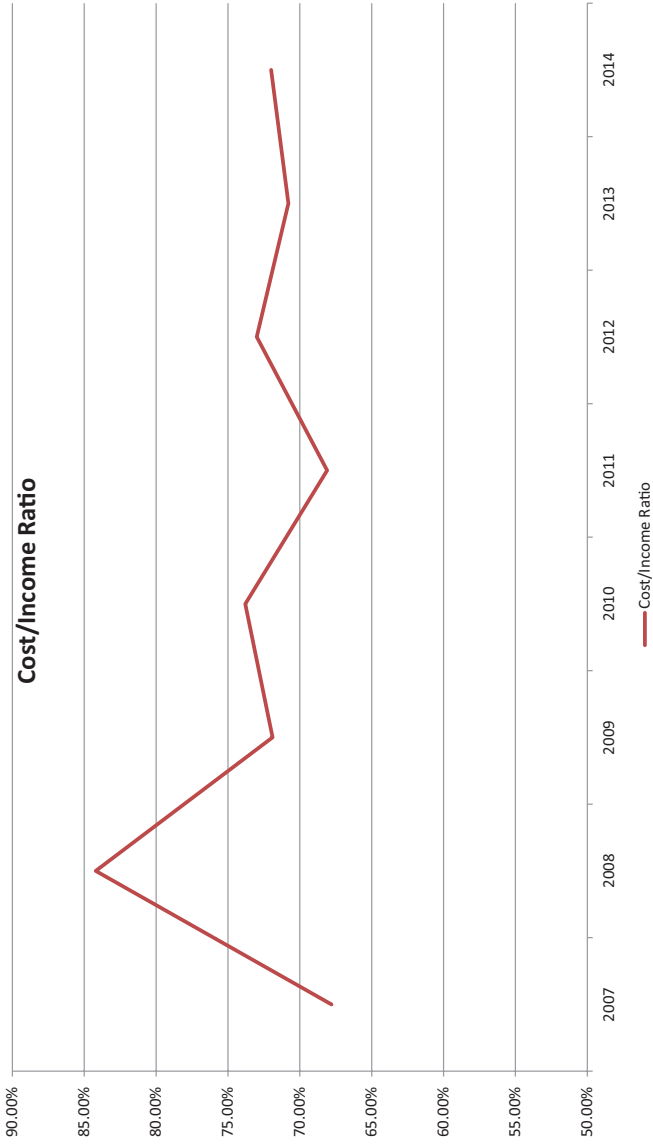


Fig. 7.3 Cost/income ratio for the FI. Source: Benchmarking—2014. The FI—from Annual Reports

With reference to ICT expenses, the FI has the highest percentage of income that is spent on ICT, as well as the highest share of total costs going to ICT (the FI's ICT spend/total costs is 12 %, compared with the market average of 5 %).

The group consortium handles ICT services and each year runs improvement projects with reference to processes, investments, and innovation.

In recent years, the consortium has run the following main projects:

Technology Area:

- a project whose main objective is to redesign the incentive and reward system in the network and with reference to branch personnel;
- a project concerned with the release of a multipayment platform in online banking services offered by the FI;
- a project for reviewing the saving deposit and database compatible with the SAP application and to release a Single Euro Payments Area (SEPA) services platform;
- opex initiatives such as merging of operations of the consumer credit and payment cards divisions;
- implementation of advanced analytics for credit risk in compliance with the latest reporting requirements regulations;
- a project to implement a new mobile banking.

Global Sourcing Area In 2014, the FI performed a redesign and rollout of the new “Procurement-to-Pay” platform that entailed a comprehensive review of the authorization processes for purchasing, ordering, and invoicing.

Corporate and Real Estate Services In 2014, the main project carried out led to the sale and lease back of 90 bank branches.

Agility of the FI in Procurement

The FI has since 2007 made efforts to provide a consistent, evolving, and concrete organizational structure. The FI consortium got functions that were previously the prerogative of the general management. It is, in its very nature, an agility outcome. Many other Italian financial institutions

have followed a similar approach, since the strategic and fiscal pressures have become greater in the years since 2007.

In particular, the FI consortium benefits from the less heavy fiscal regime of the consortium fiscal policy. It is an independent entity, free to operate according to the change needs as foreseen in its activity and to collaborate with the organizations of the group to deliver the actual change.

Creating a separate entity has helped the FI maintain a stable and efficient environment within the organizations of the group while fostering more change-centric thinking in the FI consortium.

The FI has thousands of registered vendors and has worked continuously toward their consolidation. Therefore, the largest amount of spend is concentrated in the top 50 vendors, who have long-term relationships with the FI and frequent interactions with it. These top vendors have developed over time the most relevant model agreements with the organization. Those agreements have a contractual base. In order to be agile, they are ever changing and run on the trust built up over the years between the parties.

The FI consortium at its core is organized as shown in Fig. 7.4.

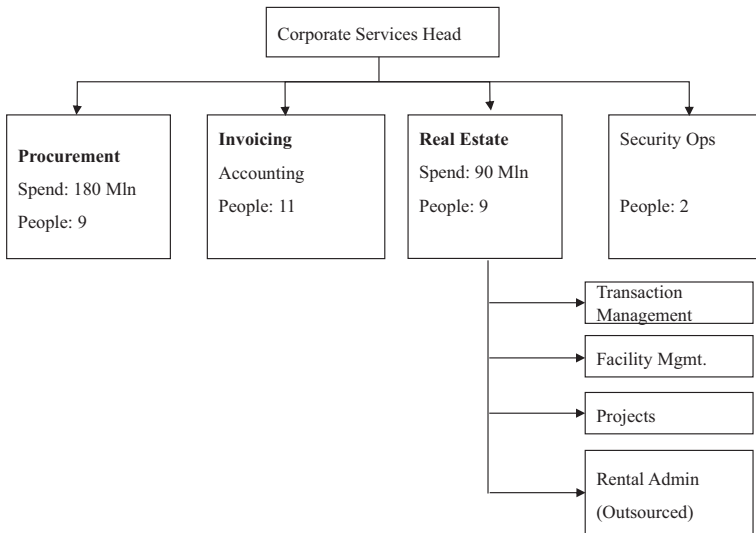


Fig. 7.4 Organization of the corporate services

Relationship with the Global Structure

The group, in connection with the foreign headquarters, handles many functions at an international level. This creates synergies and economies of scale in terms of bargaining power, analytics, and infrastructure.

With reference to the actual procurement, spending is managed locally and the procurement team in the previous organizational chart manages nearly 180 million euros locally. Online auctions are performed through the central infrastructure that manages that spend.

Centralized procurement is used for commodities. It covers nearly 20 million euros. The trend in the centralization of procurement is stable since the rest of the spending is often too stable.

Part of the operational risk management is centralized, as are the vendor rating activities.

The central structure affects domestic procurement mainly through guidelines and requirements. Sometimes it acts directly by providing international rate cards that are valid for all the organizations of the FI family around the world.

Despite being a remarkable effort towards economies of scale, the central structure often falls short in agility since it does not allow for a most-favorable-condition situation. Very often, the centralized conditions are more convenient for the domestic organizations that belong to the same cost band of the central organization. All the others, which belong to lower cost bands, still need to derogate from the central rates in order to get their (more convenient) domestic rates.

Therefore, the degree of centralization versus decentralization is weighted more toward decentralization, showing a maturity according to the KPMG findings.²

Contracts

The FI is very much aware of the need for flexibility while drafting contracts. They tend to work on a model agreement basis. Model agreements are of medium fixed duration. The practice is to renew them tacitly by carrying on as agreed beyond the contractual period.

Model agreements do have an important role to play. Yet a large part of the FI's spend is very specific and difficult to provide for in a contract drafted when the object of the purchase is not yet clear. In particular, RE, consulting, and ICT fall in the category of spend that is better addressed in separate contracts.

RE has the peculiarity of being an item in which the vendors are usually fragmented. Financial institutions can decide to become owners of locations, reducing the complexity of bargaining/negotiating rentals, but effectively bringing to the FI the associated risk. On the other hand, financial institutions carry out significant investments in properties they do not own. Contracts in this situation have the purpose of defining to what extent the parties have the capacity to protect their interests. The financial institutions want low rents, flexibility in renegotiating rates, and flexibility in withdrawing. The ownership wants high rents and the assurance of long periods of occupancy. Therefore, the RE contract needs to be tailored based on the relevance of the location in the RE strategy of the firm, conditions, bargaining power, investments carried out, and other variables. For this reason, the FI has a dedicated RE negotiation team that conducts activities to ensure that the RE portfolio of the financial institution is run efficiently, effectively, economically, and ethically according to the FI strategy. It is important also to ensure the flexibility needed according to the expected environmental changes. The agility of the organization lies in the capacity of the RE people to foresee needs and to create contracts that allow the FI to continuously adjust.

The FI has closed a sale and lease back deal. This deal allows for the use of model agreements also in this area of spend, effectively covering rental agreements for 95 locations.

With reference to ICT spend, the FI faces an inevitable expertise deficit connected with the ever changing technologies that make developing in-house capabilities inconvenient. Due to their complexity, the systems and projects have a very high rate of falling short on capabilities during a project. In response, the FI develops its ICT projects with the aid of third parties that have over time become partners of the organization.

The rationale behind this organization is that the partners always push the FI toward innovation. On the other hand, in the contract, they can shift the operational risk to the solution vendor. This kind of turnkey

fixed price project allows for better management of spend. The reliability of the solution vendor is assured by the long partnership. Furthermore, the agility is preserved with clear statements in the contracts with regard to the obligation to deposit documentation and escrow source codes (codified knowledge) as part of the project. Codified knowledge allows for potentially self-conducted maintenance of the services and allows other ICT vendors to carry out additional projects building on what the previous vendor has left them. This is one of the major and more visible tools for agility. It is a clear sign of a forward-looking frame of mind in resources employment. This flexibility is negotiated in the contract and does come at a cost. The FI is clearly aligned on the need for agility and therefore accepts higher rates for it.

The assignment of a project to a certain vendor is achieved through a bidding process in which there are qualified “preferred” vendors that compete in scorecard-based bidding to secure the contract.

Consulting, in general, accounted for more than 110 million euros in costs in 2014, of which nearly 92 million euros were in ICT costs. The remainder was spent on other types of consulting, including management consulting. In this case, the projects are of a shorter duration.

Flexibility is achieved through a contractual shift of risk towards the vendor. Additional caution is applied by assessing the results in a pilot project before investing and creating change-related disruption in the organization.

To-Be

A desirable business model for an agile organization in the financial sector should leverage the effectiveness of its procurement function. With this aim in mind, it is best to identify the key areas of interest of the business model. At that point, it is necessary to work out the primary agile objectives to achieve in these areas. The concrete activities will derive easily from these objectives.

Once the objective To-Be pursuit is identified, it is necessary to use a number of key tools to aid the organization in the achievement of their agile objectives. This is performed as an inductive process. The process starts from the general knowledge available on business models and agile

Partnership and Collaboration	Processes and Activities	Value Propositions	Customer Relationships	Market: • Customer • Competitors • Compliance
	Resources and Systems		Channels	
Costs and Investments		Revenue Streams		

Fig. 7.5 The business model canvas

and lean organizations in order to create a general platform, generically suitable to any FI organization.

The main tool that should be used is the business model canvas presented in Chap. 3 of the first volume of this book (Fig. 7.5). It offers a reference for working through all the areas of interest.

For each agility objective for the procurement organization, it is interesting to highlight the underlying rationale, in terms of enterprise effect.

The FI makes extensive use of many of these tools with the aid of its consortium organization, as shown in their Financial Reports, in the project section.

Conclusions

The agility the FI strives to achieve in this case study is mainly concerned with portfolio agility, as defined by Donald Sull: “Portfolio agility is the capacity to shift resources—including cash, talent, and managerial attention—quickly and effectively out of less promising business areas and into more attractive ones.”³ The FI continuously assesses opportunities and seizes them in a way that resources can be mobilized.

Furthermore, the FI considered in this chapter has developed a very agile and lean structure for its procurement department, effectively reducing the low-value-added workload by reengineering their Procurement2Pay process, automating and digitizing most of the interactions, and outsourcing the remaining resources.

The teams involved in procurement are continuously encouraged to promote projects that have as their objective savings, effectiveness, and agility, as shown in this chapter in the brief summary of the main initiatives undertaken in recent years.

As shown, the FI has carried out a number of projects that have a clear agile imprint. The FI procurement organization focuses on the forecasting, identification, and mitigation of challenges that the organization may face. It is quite aware of the link between good and sustainable performance and the ability to foresee opportunities or risks, to change swiftly and with efficiency or maintain effectiveness, and to react to changes manageably and based on a long-term perspective.

Notes

1. For this chapter I am indebted to the support of my student Riccardo Cordiner at the Università Tor Vergata, Rome, Italy.
2. <https://home.kpmg.com/cn/en/home/insights/2014/11/a-survey-of-global-cpos-o-201310.html>, Accessed 25 March 2016.
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8

The Future: Procurement 4.0

Introduction

The future of agile procurement is closely related to some more general developments that are currently taking place. This chapter considers one of the most interesting developments—Procurement 4.0,¹ which is closely related to the Industry 4.0 initiative.² This initiative stems from the fourth industrial revolution based on digital transformation.³ There is still no comprehensive definition of the phenomenon. Some analysts describe it as a process that will lead to entirely automated and interconnected industrial production. This would involve a series of changes in the management of organizations. Industry 4.0 also involves a change in procurement,⁴ labeled in this book Procurement 4.0. Procurement must become faster in responding to the requests of the organization, more interconnected, and more agile.

In the case of procurement, there have been successive phases, indicated by a progression of numbers.⁵

- Procurement 1.0 supports the basic functions of procurement, where the function manually tries to get the right product to the right place, at the right time, and in the correct conditions;

- Procurement 2.0 indicates the development of integrated procurement services.
- Procurement 3.0 is procurement based on collaboration and partnerships.

The characteristics of Procurement 4.0 are the topic of this chapter. It considers several important aspects. Procurement 4.0 must provide a powerful support to the Industry 4.0 initiatives for collaboration, inside but particularly outside the organizations. To perform these tasks, it must be based on the following fields:

- The use of the Internet of Things provides significant support to the interactions through the Internet of everything—not only of people but also of objects, thanks to the increasing availability of sensors and the support of the Internet network to transmit the data.
- Data is used as a tool to create value. This is called data monetization. This aspect includes all issues related to data warehouses, big data, data lakes, and so on. The goal is to assemble the data, once available, to be processed.
- Once the data are collected, analytics should use them to get benefits for the customer and the organization.
- The use of smartphones and tablets can facilitate interactions with the systems and with other operators at any time, at any location, and with any device.

For better use of these resources, it is essential to use cloud computing (or simply the cloud). The NIST, the US standardization body, defines cloud computing as a model for enabling, through the network, widespread access, easily and on demand, to a shared set of configurable computing resources (for example, networks, servers, storage, applications, and services) that can be captured and released quickly and with a minimum of management effort or interaction with the service provider.⁶ The cloud model is composed of five essential characteristics, three service modes, and four deployment models. For a description of them, please refer to specialized texts.⁷

Cloud computing allows for switching from a traditional supply chain to a value network. In other words, the cloud substantially facilitates coordination and collaboration among organizations and their vendors, partners, and/or other organizations of the group distributed in the territory. At the same time, they enable the flexibility and agility characteristics of Industry 4.0.

When moving to Industry 4.0, and therefore to Procurement 4.0, one might face at the same time two challenges:

- innovation in technology solutions to meet the needs coming from the market opportunities and the requirements of delivery of digitized services;
- innovation in procurement processes, structures, and, ultimately, also in the human resources to meet the challenges and opportunities of the digital transformation.

In fact, the procurement portfolio will change more and more rapidly in the future due to the production trend toward small batches, at the limit of one unit, and the move from delivery of products to so-called servitization.⁸ The latter is the joint provision of products and their servicing. Procurement will need to respond more quickly and with greater agility in the near future.

Over time, Procurement 4.0 will influence all procurement processes, including:

- the procurement value network, allowing open and flexible operations;
- inbound procurement, with the support of big data analytics enabling predictive procurement and supporting operational decisions;
- warehouses and storage management to support the management of a network of stocks in the value network and a reduction in storage and non-storage costs;
- internal procurement processes: in Industry 4.0, there is a move away from traditional forklifts toward automated guided vehicles (AGVs) that cooperate with the production machines, which themselves are strongly supported by different types of robots;⁹

- outbound procurement supporting the management of autonomous deliveries and predictive management;
- optimized procurement routing: self-transport (for instance, drones or driverless cars)¹⁰ and real-time connections for rerouting.

Looking further into the future, with 3D printing the digital transformation will have an even greater impact on procurement. In this case, procurement must take on new challenges, finding new ways and tools to manage the materials and components used by 3D printers.

Rolls-Royce

Rolls-Royce is a pre-eminent engineering company focused on excellent power and propulsion systems.¹¹

Rolls-Royce is working on the development and commercialization of a drone ship.¹² It can ensure an improvement in fuel efficiency since it does not need residence space for a crew. It can also ensure a larger load capacity since the goods transported could occupy the whole ship. The vessel could be lighter and have more space for cargo as it would be possible to dispense with the bridge and life-support systems. Beyond that, there would be savings from not having to pay a crew to run the ship. However, there are problems: for instance, the risk of pirate attacks makes it necessary to develop a legal and insurance system.

Hitachi, Ltd.

Hitachi, Ltd. is a Japanese multinational conglomerate company headquartered in Chiyoda, Tokyo, Japan.¹³ It is the parent company of the Hitachi Group and forms part of the DKB Group of companies.

Hitachi, Ltd. has developed an AGV called Racrew, which it has introduced into the procurement center of the Hitachi Transport System. This AGV enables efficient picking up of long-tail products. Thanks to this AGV, Hitachi plans to double its productivity compared with its previous distribution center.¹⁴

Industry 4.0

Briefly, Industry 4.0 represents the convergence of ICT and machinery automation. The term Industry 4.0 was born out of an expected fourth industrial revolution. It stands for advanced digitization within factories,

in the form of a combination of Internet technologies with future-oriented technologies in the field of smart objects (machines and products). This enables and transforms industrial production systems in the direction of products controlling their own production process. Besides the focus on digitization, Industry 4.0 is supported by the interaction of technological innovations whose quantitative effects together create new products, processes and ways of production, and business models.

The term Industry 4.0 was first published in 2011 when an association of representatives from business, politics, and academia promoted the idea as an approach to improving the competitiveness of the German manufacturing industry.¹⁵ The German Government supported the idea by announcing that it was an integral part of its “High-Tech Strategy 2020 for Germany” initiative.¹⁶ Later, it set up the “Industrie 4.0 Working Group,” which developed the first recommendations for implementation, published in April 2013.¹⁷

History

Industries have undergone evolution over time. These changes in industry can be roughly divided into four main periods corresponding with the four industrial revolutions.¹⁸ Between one disruptive change and another, there was continuous improvement. It is still possible to consider, for simplicity, four waves in the innovation of industry and procurement (1.0, 2.0, 3.0, and 4.0).¹⁹

First Industrial Revolution. Procurement 1.0

Industries were born long ago. The manufacture of bricks in the Roman Empire provides an example. This industry first changed from manual work to machine production around the second half of the seventeenth century in the UK, later spreading to Western Europe and North America, then to the rest of the world. It represented a move away from working with manual tools and animal force toward working with the infrastructure of industrial production and transportation of goods and people.²⁰

This revolution succeeded also thanks to the steam engine, introduced by James Watt in 1782.²¹ This innovation made it possible to achieve a significant increase in productive capacity by using energy supplied at

every location. The development of ships and railway networks, along with the spread of steamers and aircraft in the second half of the nineteenth century, brought an evolution without precedent and significantly enhanced transportation capacity and speed.

In terms of procurement, this period led to a reduction in the impact of distance thanks to the mechanization of transport. Until that time, procurement tended to be done mainly with local vendors. Individual owners or partners managed most of the procurement of their businesses. The owners acted as entrepreneurs, operators, and procurement agents.

Inbound and outbound procurement was based on push delivery. Products were pushed through the market, from the production side up to the retailer. The manufacturers set production at a level based on the historical ordering trends of the market. As a result, they were slow to respond to changes in demand, leading to overstocking, bottlenecks and delays, unacceptable service levels, and product obsolescence.

The warehouse was simply a room where materials or finished products were stored. The intra-value network, or the movement of goods inside the factory, was done manually, with a trolley steered by workers or in some cases by animals. Steam trains and ships allowed for procurement routing and transportation of materials and goods over greater distances.

Second Industrial Revolution. Procurement 2.0

The second industrial revolution was characterized by several breakthroughs. The most important was the introduction of electricity, and the second was the telegraph. These innovations made possible drastic advances in communication and transportation. Materials such as steel, copper, and aluminum gained importance in building machinery and products. In addition, the chemical industry was greatly expanded.²²

The second industrial revolution was also characterized by other innovations that helped reduce substantially the price of a large number of products. The introduction of the principle of the division of labor by Frederick W. Taylor in the early twentieth century led to a revolution in industry and set the model for industrial factories for several decades.²³ At the same time, Henry Ford pushed the idea of the assembly line.²⁴

Procurement experienced an expansion of the location of vendors thanks to advances in transportation, and procurement management started to operate more and more globally. As organizations began to consider vendors not necessarily in close proximity to the factories, lasting supply relations and partnerships were established. The new types of industry required expertise in mechanics, electricity, and engineering. Organizations began to hire professional procurement managers with new competences and expertise.

Push processes were still used for inbound deliveries, where the materials were replenished in relatively large batches as they were used. The warehouse automation started with a transfer apparatus moving along a rack in a warehouse to store in a pallet, or retrieve it from the rack. The movement of goods inside the factory was done with forklifts, normally with electric motors steered by operators. Fleet vehicles, trains, and ships transported the finished goods and materials.

Third Industrial Revolution. Procurement 3.0

The third industrial revolution was marked by the introduction of the computer: a device with a separation of hardware and software.²⁵ This allowed for great flexibility, several technological breakthroughs, and the introduction of completely new types of solutions:

- The numerically controlled machines provided the flexibility needed for optimized mass production. These machines have computers with built-in memory and are numerically controlled and programmed.
- Joseph F. Engleberger manufactured the first industrial robot in the USA in 1961.²⁶ The 1970s saw a leap forward, with computers embedded in the robots. As their cost was drastically reduced, it became more profitable in many situations in the Western world to employ robots rather than human labor in manufacturing.
- Computer-based applications were implemented to support the organization's functions.
- Container ships were introduced in 1956.²⁷ This greatly simplified the transportation of goods at a distance, in a secure and less labor-intensive way.

Several applications were developed to support procurement management. Software applications were launched, including what are now known as the WMS (warehouse management system) and the TMS (transportation management system), as well as other ICT solutions. Later e-procurement started to spread, making possible the integrated computer application support of the procurement. All this significant progress was possible thanks to the use of computer applications to manage and control the procurement processes.

The automation in cargo handling was another big advance in procurement.²⁸ The spread of the container ship made the mechanization of port cargo a very important innovation. The container was much more secure and easily transportable from one mode of transportation to another.

As procurement management became more and more global, with selection of the best vendors occurring across a global market, relationships tended to become shorter.

Application software is used to plan all orders to vendors. When it is useful, the application can receive the orders automatically through the network. In this way, the inbound procurement is planned and controlled by software applications. Software-based systems and service platforms play a major role in production processes. They are the best way to bring connectivity, including data analysis, to machines and work pieces in production.²⁹

The internal movement of goods inside the factory is often done using automatic lines. Operators drive forklifts. More and more, robots were introduced.

Fleet vehicles with a pre-plan and a schedule with optimized routes, computed by software applications, transport the materials and the finished goods. The delivery process of the items is managed according to a plan and a schedule established before the start of production.

Industry 4.0

Figure 8.1 shows the environment of Industry 4.0: a synthesis between ICT and automation. This section focuses on the ways agile procurement can support Procurement 4.0.

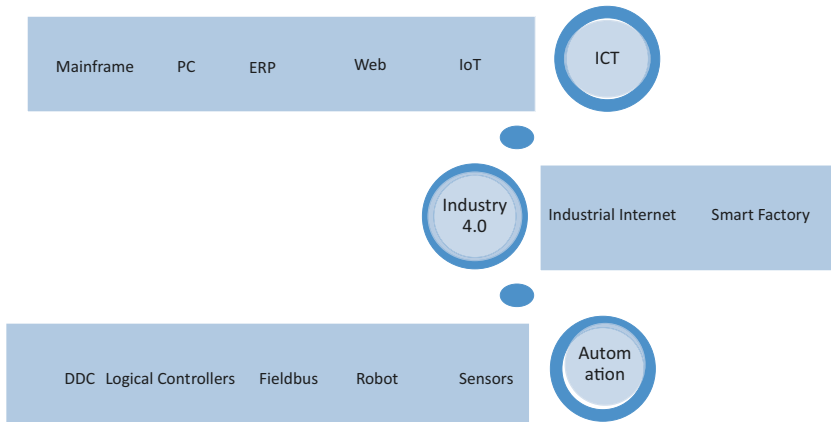


Fig. 8.1 Industry 4.0

Industry 4.0 is a term that represents the vision of the future “smart factory,” and therefore of “agile procurement” as well. It might be defined as the embedding and management of smart products into digital and physical processes. Digital and physical processes interact with each other and across geographical and organizational boundaries.³⁰

This fourth industrial revolution supports two fundamental developments: on the one hand, an application pull that induces a change in the operational model conditions, and on the other hand, an application push.

The first aspect, the pull, leads to social, economic, and political changes. The most important of these include:

- Fast development and innovation cycles: high innovation capability becomes an essential success factor for many organizations.
- Customized sales: over time, customers have gained the ability to define the conditions of trade. This trend has led to increased customization of products. At its limit it represents the “one unit lot” of production.
- Flexibility: due to the characteristics of the markets, flexibility is essential in the entire operation of an organization.

- Decentralization: to deal with the new model requirements, faster decision-making procedures are necessary. The organization structure should be as flat as possible.
- Sustainability: there is a push for economic and ecological efficiency in production, due to increased prices for resources as well as social awareness of ecological issues.

The second aspect is a technological push, as the use of smartphones, 3D printers, laptops, apps, and so on becomes more and more widespread. In industrial practice, these innovative solutions are not yet widely used. The approaches of these technological innovations include:

- More technological aid to support physical work as well as the adoption of more automatic solutions. Examples are the autonomous automated guided vehicles (AGVs) with their routes programmed or “pulled” by another machine or by the product itself.
- Digitization and networking: new technologies such as simulation, artificial intelligence, digital protection, and virtual reality are driven by the increasing digitization of all production and production-supporting tools. Similarly, there is increased networking of technical components. The software allows for the collection and analysis of sensor data, read from tags attached to the goods, and hence the tracking of goods within the factory or even managing and maintaining products in the customer’s premises.³¹
- Miniaturization: computing devices required a great deal of space in the past, but miniaturization has meant that devices with better performance can now be installed in a small space. Nanotechnology is also becoming more widely used. This makes possible new fields of application, especially in procurement.

In short, the term Industry 4.0 describes different changes, mainly driven by technology, ICT, and automation, in production systems and consequently in procurement processes. These developments have technological implications as well as process, organizational, and labor implications.³²

Industry 4.0 investments are increasingly made on the basis of the entire value network. The conclusion is that organizations in all sectors focus their investments also on the optimization of the procurement system, underlining the importance of procurement management in this fourth industrial revolution.

Barilla

In 2016 Barilla, the Italian industrial pasta maker, built the world's largest automated warehouse with laser guided vehicle (LGV) technology in Pedrignano.³³ The warehouse is at the group's historic headquarters on the outskirts of Parma and serves several Barilla plants and some of its vendors. With an area of 40,000 square meters, 80,000 pallets, 120 trucks loaded every day, and 54 carts with Italian LGV technology, the new Barilla warehouse is an example of excellence in the sector of logistics at the global level.

Barilla aims to improve the service it offers to its clients (specifically, to the large organized shopping chains) and thus to be more competitive in its own reference market.

This warehouse will manage a quarter of the global volumes of Barilla and almost half of all the pasta and sauces produced by the company and sold all over the world, from Brazil to Japan. This structure relies heavily on the LGV technology applied to the carts used to move and store the goods, and the software for supervision of the installation. The carts move without the need of wires or tracks, using sophisticated software that identifies the orders, locates the position of the pallet to be stored or withdrawn in real time, and interacts with the carts by means of a radio frequency network.

The structure—which required an investment of almost 15 million euros—is also a model of energy and environmental efficiency: it eliminates about 3000 trips a year to outside warehouses, thereby lowering CO₂ emissions, as well as cutting 40 % of the lighting costs and 20 % of heating costs.

Main Components

Industry 4.0 includes a set of technologies enabling smart products as well as processes integrated into inter-connected digital and physical processes. It is changing products, processes, business models, organization, and procurement significantly (Fig. 8.2).³⁴

It is possible to define an architecture for Industry 4.0. It is composed of different components, which for mnemonic reasons this book indicates with “C” initials.

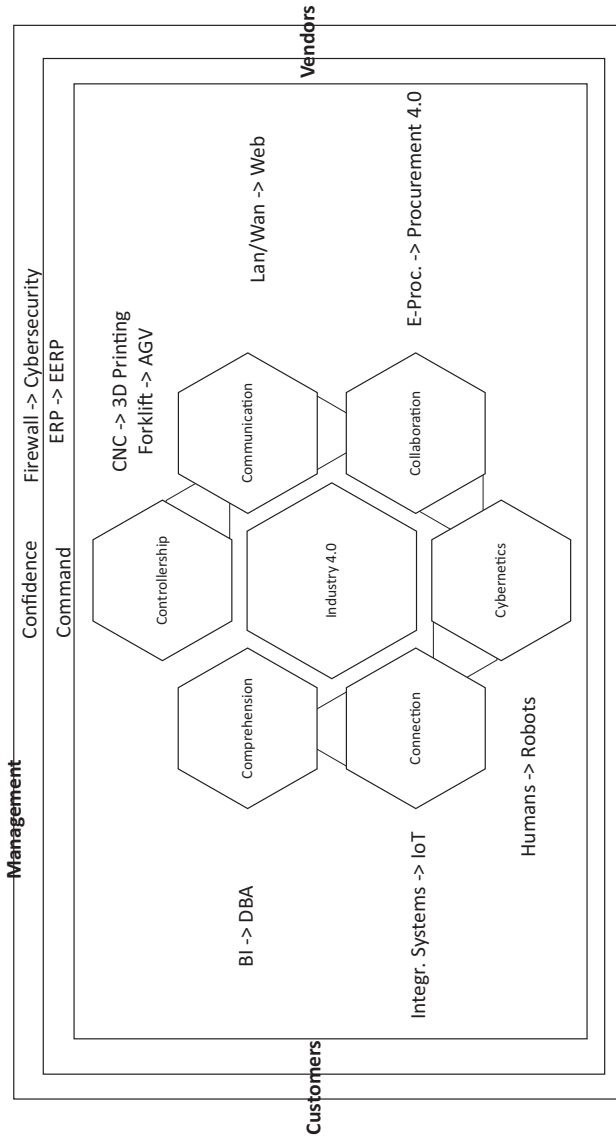


Fig. 8.2 Model and technologies of Industry 4.0

The model considers first a classification of tools as either hard or soft: hard tools have an infrastructural base, whereas soft tools are more software oriented. For each of them, it is possible to name a technological solution that can support the implementation of Industry 4.0. All these sets of tools require strict governance (or command to continue with the C initials) that in its turn should be supported by specific tools.

Hard Tools

- Cybernetics refers to the use of computers, be they in a data center or distributed in the organization. The term cyber-physical system (CPS) describes the unification of digital (cyber) with real (physical) flows. In procurement and production, this means that the physical steps are accompanied by computed-based processes, using the concept of ubiquitous³⁵ and pervasive³⁶ computing. More and more, artificial intelligence systems are used for robots.
- Communication refers to the need to link together the computational devices and all the machines in a LAN or WAN, normally the Internet.
- Controllershship refers to the numerical control of the machines, essential to make them as autonomous as possible and eliminate the need for human operators. Midway between cybernetics and controllershship are robots and AGVs. These advanced automated devices are fundamental to Industry 4.0.

Soft

- Collaboration refers to the need to have all the machines, robots, and operators working together. Tools like ERP are useful to support, in the most automated way, all the management and operational processes. CPS includes sensors and automated actuators used to collect and send data. These CPSs are based on the Internet as the means of communication.
- Connection is essential to support the integration of all the machines. The Internet of Things, or better the Internet of Everything, can provide support to allow humans to be part of the connected elements of

the organization. The IoT is the part of the CPS that enables communication with other CPSs and between the CPS and the users. It makes it possible to create networks incorporating the entire production processes, facilitating horizontal as well as vertical integration. Horizontal integration refers to the integration of ICT systems in the different stages of the business planning process, including inbound procurement, outbound procurement, production, and marketing, and between different organizations (value networks).³⁷ In Procurement 4.0, procurement management pushes communication and collaboration with the network of vendors (outbound procurement), the internal organization (inbound procurement), and the network of customers (outbound procurement). On the other hand, vertical integration refers to the integration of different hierarchical levels, including corporate planning, production management, production, quality, and so on.

- Comprehension or knowledge is based on the intelligent use of the data. All the information systems, sensors, and numerical controls (all of which are connected, thanks to the connection tools) generate big data. These data need to be analyzed. Big data analytics is essential in Industry 4.0. Data mining and distribution of big data is a critical issue due to the variety, volume, and speed needed to process the data from the CPS. Therefore, it is essential to implement the appropriate computing system and software to manage these data.

Würth

The Würth Group is a worldwide wholesaler of fasteners, screws and screw accessories, dowels, chemicals, electronic and electromechanical components, furniture and construction fittings, tools, and machines.

Würth provides a good example of a CPS in its intelligent bin (iBin),³⁸ which helps in managing the C-Parts. This term originated from the Pareto principle, also called ABC-Analysis.³⁹ The C-Parts are characterized by high procurement effort compared to low procurement value. The iBin contains a built-in infrared camera module for C-parts management. This determines the number of C-parts within the iBin. If the quantity falls below the safety stock, the iBin automatically orders new parts via RFID. This allows for consumption-based C-parts management in real time.

A very important additional component is necessary to assure the governance (or Command) of the systems, the machines, and the processes. This implies the need for Coordination. This can be ensured by proper design, management, and operations of all the elements included in the system.

The model should also include two other components that are examined in a later section:

- Condivision or Command of the data and of the documents is fundamental to support Industry 4.0. There are traditional and advanced tools that can ensure such sharing, not limited to the internal organization but also externally to connect with vendors, partners, retailers, and customers. The Internet of Services (IoS) enables service vendors to offer their services via the Internet. It consists of participants, infrastructure for services, business models, and the services themselves.
- Confidence ensures trust in the solutions. The basis of the trust, the confidence, in Industry 4.0 is very strict security. Cyber attacks would be extremely dangerous for a system based essentially on non-humans and that is very integrated, and hence fragile.

Main Challenges

The fourth industrial revolution is characterized by increasing digitization and the interconnection of products, processes, value chains, and business models. It requires significant investment.

Two organizations, PwC and Strategy&, surveyed 235 German organizations for a 2015 study of the production and engineering sector in the automotive and process industries.⁴⁰ The respondents expected that digitization would lead to a significant transformation of their organizations. They estimated that the share of investment would account for more than 50 % of their planned capital investments for the following five years. Therefore, the first and main challenge is the investment required to implement Industry 4.0 solutions.⁴¹ Other challenges include the often unclear business cases for the new industrial Internet applications and the availability of sufficient talent to meet the needs of developing,

maintaining, and operating digital solutions. Moreover, binding standards must also be defined and challenges in the field of ICT security have to be solved. It will be necessary for research centers, organizations, trade unions, and associations to cooperate in order to spread this fourth industrial revolution.

To use other organizations' data in procurement, such as those in the vendor systems, it is essential to have access to the data but also to be able to process them. A solution in this direction is offered by Linked Data.⁴² Linked Data is a method that allows one to aggregate and collect data coming from distributed sources. To make these data accessible via the Web,⁴³ they must be published under the condition "open" use for a certain category of users to make it possible to consult and navigate them (by any means and through deep linking and aggregation).

Linked Data is now a mature solution with great potential. It requires large masses of data linked together to become useful in practice. Linked Data can provide a powerful representation of the relationships (links).⁴⁴

Procurement 4.0

One of the key paradigms of Industry 4.0 is the use of modern ICT. ICT has supported Procurement processes have long been supported by ICT. The concept of e-procurement is well established,⁴⁵ and the architecture of e-procurement has been well defined.⁴⁶ Industry 4.0 pushes further the concept of automation based on the characteristics of the initiative. Industry 4.0 integration requires a comprehensive approach combined with process re-engineering.⁴⁷

The widespread use of telecommunication networks (and especially of the Internet) marked the start of another revolution. The introduction of the IoT and advanced software applications combined with machine automation in the production environment has introduced the fourth industrial revolution.⁴⁸

Industry 4.0 has been always compared with previous disruptive innovations in production, such as the industrial revolutions. They have in common that they were initiated not by a single technology but by the interaction of a number of solutions whose effects created new means of production.⁴⁹

This new paradigm shift is the result of the Internet. It enables communication between machines and humans or other machines in real time and at very low cost. This allows for the use of what are known as “smart products and smart services” as well as advanced digitization within and among factories.⁵⁰ The smart factory makes it possible to connect potentially all the elements involved in the production processes. It makes possible the application of concepts such as adaptability, interconnectivity, efficiency, and ergonomics.⁵¹

Procurement 4.0 is the progress of “labor saving and standardization by the evolution of IoT.”⁵² Technologies such as warehouse robots and automatic driving vehicles allow for the introduction of processes that do not require operation and determination by human labor. The aim is the integration of automation and information and communication solutions.

The implementation of these types of solutions to turn factories into “smart factories” will take some time and require significant investments and special education programs. The return will be a substantial improvement in the cost performance of procurement, saving time and especially providing flexibility.

Network value equipment, such as automatic warehouses and automatic sorting, is already widespread. Its expansion is limited, however, since it becomes a dedicated system in line with the shape and characteristic of the set of interests of the initiative. Therefore, the aim is to introduce new solutions that save labor in terms of handling work, save time in transport, and especially increase flexibility.

It is possible to facilitate logistics by using warehouse robots that can carry goods from the warehouse to the final means of transport. Even more interesting, the movement of materials can be done at the request of the production machines themselves or even of the products.⁵³

The literature on Procurement 4.0 is limited. Henke and Schulte (2015), for example, claim that procurement at the interface of vendors and production solutions offers the opportunity to position itself as the key driver of Industry 4.0 development and postulate a number of questions around this.⁵⁴ Other publications either have a more technical focus,⁵⁵ or they focus on specific aspects such as logistical integration.⁵⁶

The Model of Procurement 4.0

This section examines in detail each aspect of Procurement 4.0 from the point of view of procurement processes and systems, what this book calls the six Cs, relative to the model of Industry 4.0: Cybernetics, Communication, Controllorship, Collaboration, Connection, and Comprehension.

There are other Cs that are important as well. Coordination requires strong governance of Procurement 4.0. At the same time, Condivision and Confidence are the basis for the success of this initiative.

Cybernetics

The base of the Procurement 4.0 is the move from supply chain to a value network. The intelligent machines and computer applications connect all the functions and share information in real time. There is also a need to optimize procurement processes. Procurement 4.0 is the integration of information and communication technology and automation in support of procurement.

Therefore, in the future smart factories will work in a smart way, sharing information in real time between all the stakeholders and making the procurement processes optimized and transparent. With this use of cybernetics in procurement, it is necessary to develop a secure system to ensure that data are protected and are available at the right moment in the right place in support of the procurement activities.

Procurement 4.0 management is a large network to which all stakeholders in the procurement process (customers and vendors) have access. An Internet platform is used to manage in real time all orders from customers and to vendors.

The intra-value network, or the movement of goods inside the factory, is more and more completely automated with the use of autonomous AGVs. These vehicles have their routes programmed, either according to the predictive inbound/outbound procurement or on request by the processing machines based on information received from the Internet platform used by all the stakeholders.

Warehouse expenses are reduced because customers' orders and orders to vendors are processed at the same time. There is an exact forecast of the dates to receive all the materials necessary for the production in order to deliver the final products in the right quantity and quality and in time.

Fleet vehicles have a route programmed according to the information provided by the Internet platform. Customers and vendors are able to track the vehicles using GPS in order to know their precise location in real time. All the automation has the primary aim of aiding humans in their activities and providing a safer workplace for the workers.

Communication

One key aspect of the paradigms of Industry 4.0 is the emphasis on smart ICT systems.⁵⁷ This is different from the support of manual work provided by e-procurement.⁵⁸ It could be expected that the adjective “smart” in smart procurement stands for the automation of the end-to-end procurement processes, but it means much more. Smart solutions automatically recognize the demand for a certain material and independently generate an order for it. This is transmitted to the respective vendor without any human intervention. In-depth automation distinguishes Procurement 4.0 from e-procurement. In technical jargon, it can be defined as a straight-through processing (STP) system, as it is called in financial systems.⁵⁹

Controllershship

The elements of the model of Procurement 4.0—even if not all are relevant to every organization—imply a substantial change to the way procurement

works. They demand a fundamental rethinking relative to the organization and the capabilities. Both need to be reshaped over time. In addition, digitization and automation support globalization. They speed up communications in an ever more closely connected world. In the past, it was enough to know about certain low-cost supply markets such as China and Eastern Europe. Procurement 4.0 requires a procurement organization with a global mindset. For example, having the core of the procurement organization housed at the headquarters might have worked in the past. In the future, however, more and more buyers should be near (physically or virtually) to the most competitive supply markets for each category.

Collaboration

The paradigm in terms of enhanced “collaboration productivity” in Industry 4.0 defines another difference between Industry 4.0 and the existing approach of e-procurement.⁶⁰ The productivity benefits resulting from e-procurement initiatives are mainly connected with a reduction in transaction and process costs.⁶¹ E-procurement transforms paperwork into electronic ICT applications. In this way, there is a transformation from labor-intensive tasks to automatic workflows and ICT-supported processes. E-procurement also supports strategic tasks such as the management of vendor relationships.⁶² The key drivers of collaboration productivity in Industry 4.0 are enhancements in procurement, production, and engineering. According to Schuh et al., Industry 4.0 enables radically short production development processes. It can enable new product-service functions and improve the organizational procurement set-up.⁶³ E-procurement focuses on process efficiency, while Industry 4.0’s goals are increased productivity and performance to satisfy highly customized demands.⁶⁴

Connection

The operations of movements define the efficiency of moving products.⁶⁵ Optimizing the external transportation and internal movement processes has a significant impact on the cost structure of procurement.

Forklifts are currently very important for facilitating physical connections. In Industry 4.0, they are replaced by AGV forklifts. If the automatic

operation, warehouse robots and similar autonomous control solutions are established, they can solve some of the problems in the current AGV forklifts such as low speed.

To achieve “automation driving,” changes are required in several parts of the transportation process. It is necessary to implement an automatic highway among the workstations and the warehouses. It is also necessary to consider legal and insurance aspects in addition to the technical considerations. Even partial automation of the “highway” has already had a large impact on procurement costs, since it reduces personnel expenses for truck drivers but also increases the overall safety of the workplace.

Another future implementation of procurement solutions is the use of drones. The world’s largest value network organization, DHL, is planning to use drones as an emergency means of delivery.⁶⁶

Comprehension

Data analytics are probably the most important enabler for Procurement 4.0.⁶⁷ Smart technologies and algorithms allow for the aggregation, processing, and analysis of very large volumes of data from many heterogeneous sources. In this way, it is possible to understand vendors, markets, and customers; predict market trends; and look into machine and product defects. They can enable managers to make better and more informed decisions. In an increased number of cases, big data operational analytics can automatically drive procurement decisions.⁶⁸

Analyzing data and using them smartly is one of the key success factors for organizations that want to exploit the potential of Procurement 4.0. Data analytics tools can support vendors to improve the design and performance of their components. Predictive information, about where and when to expect the next defect, offers the opportunity to optimize maintenance services and the availability of spare parts.

Procurement should ensure that all of the opportunities offered to the organization through big data analytics are exploited. Procurement and vendors should assure that both the organization and the vendors are benefitting from the resultant improvements in the value network effectiveness, efficiency, economics, and ethics.⁶⁹

Coordination

Another implication of Industry 4.0 for procurement ICT systems is part of the organizational paradigm in Industry 4.0. While there has been considerable advocacy for exchanging information with vendors in e-procurement,⁷⁰ the technological advances in Industry 4.0 greatly increase the potential for doing this. The key change is the move from “exchanging information” to the “free flow of information” in the value network among connected products, services, and organizations.⁷¹ The exchange commands some degree of activity by a buyer and a vendor, such as providing software interfaces or supplying actual data as a conscious act.⁷² The free flow implies a much higher degree of exchangeability of data itself, a higher degree of automation of the information exchange, and possibly even the integrated use of the data under the concept of big data analytics,⁷³ or, in perspective, of private blockchain, as underlined later in this chapter.

These implications can be used to distinguish between e-procurement and Procurement 4.0.⁷⁴ The actual advance occurred in two dimensions: firstly, the degree of functional and cross-organization integration, and secondly, the degree to which systems can reduce manual work in the procurement tasks. This can be done via automation, but even more with the agile procurement approach of this book, based on leaning processes, digitizing them, and automating the infrastructure. Considering Procurement 4.0 in this way, it becomes clear that both the depth of integration (especially across organizations) and the potential of automating the entire procurement process is much more that of e-procurement. The latter is limited to ICT-based facilitation of tasks and customized information and documentation exchange. The automation process and a higher degree of integration characterize Procurement 4.0. This is one of the basic differentiations with respect to e-procurement. Procurement 4.0 stands for the advanced digitization and automation of the function within the organization and its vendor environment. It is not limited to the use of new and enhanced solutions. Alongside the degree of integration, vendor relationships can also change in Procurement 4.0 (for instance, around new procurement goods and services).⁷⁵ The impact of Procurement 4.0 on organizations is extensive and pervasive.

All these elements of the model pose a substantial challenge and potential change to the procurement works. They require fundamental and holistic rethinking in terms of the organization and capabilities, both of which should change in a synergetic way.⁷⁶ Organizations need to create new job profiles, for example, whether for buyers of new categories of items, contract experts on intellectual property, or data scientists for relevant data analysis, management, and mining. To find these talents, new sources must be unlocked with the help of procurement partners such as academic partnership programs and research centers. It is also useful to explore new channels, such as social networks, social media, and top-performing employees. The largest organizations should consider establishing their own procurement management academies to conduct educational and informational activities, cross-functional training, and vendor workshops. Only if procurement personnel has the e-competence can an organization fully benefit from the opportunities provided through digitization.⁷⁷

Amazon.com

[Amazon.com](https://www.amazon.com) is the leading e-commerce company in the world. From 2012, with the acquisition of Kiva Systems, a robot manufacturer, [Amazon.com](https://www.amazon.com) promoted the automation of the picking process.⁷⁸ They use a robot, called "Kiva," that eliminates the need for "workers of walking." It has succeeded in enhancing the labor productivity of each distribution center.

Amazon has in 2017 five warehouses with fully automated logistics systems in Europe (three in the UK, one in Poland, and one in Spain, and building one in Italy and in Poland). They provide 15 % of more processed volumes, on equal footing.⁷⁹

These robotized centers, similar to the vacuum cleaners that rotate under tables and sofas, carry within a completely enclosed area shelves to fill by robots that move independently. They use a proprietary system that moves these warehouse robots in a 20-hour business day, with four-hour breaks for shift and small maintenance. In the UK (24,000 employees), the working day at Amazon is ten hours for four days a week.

A robotic logistics system improves the working conditions of the human workers in robot-enabled warehouses.⁸⁰ They are typically quieter and cooler. They can provide more reasonable working conditions, in contrast to the conditions reported at some non-robotic warehouses.

BMW Group

BMW is a leading car manufacturer based in Germany.⁸¹ BMW customers are increasingly able to customize vehicles with many options online. From this arises a need for production planning that covers not months but the next few hours. The advanced automation helps, but more agile procurement and lean processes are also essential.

For BMW, this transformation starts with the customer order received online and moves through the supply base, flexible factory lines, and outward to dealers and customers.

BMW was convinced that it could not work alone in implementing Industry 4.0, with 70 % of the value creation in the vehicles made with vendors. It has to rely on their competence for the maximum use of the system it was implementing.

It is moving fast in the implementation of Procurement 4.0. The objective is to clear the so-called yellow line, with reference to the point where the parts are delivered to the assembly line and which traditionally separates procurement from production at BMW.

To implement Procurement 4.0, BMW is moving towards a management system of the command chain and digital bidding. It is working on the reorganization of the production processes, connecting all workflows in the procurement sector. The idea is that, through digitization, the global value network becomes transparent. In the long term, BMW intends to abandon a central drive in favor of self-managing objects in the procurement.

BMW recognizes that these new approaches will depend on secure data interfaces and standards that allow the original equipment manufacturer (OEM), its first-tier vendors, and the materials and equipment in the procurement to communicate digitally via cloud networks.

Blockchain

The Industry 4.0 model, and that of Procurement 4.0, is based on the six Cs: Cybernetics, Communication, Controllership, Collaboration, Connection, and Comprehension. Two additional aspects that could be relevant for procurement processes are Condivision and Confidence. An emerging solution could support both of them. It is called blockchain.

The blockchain is an open ledger in which every transaction on the network is recorded and available for all participants to see and verify. It is a kind of secured data set. It sits in the cloud and can be accessed by

multiple involved parties. It can also be seen as a “digital trust,” in the sense that it is a trusted data set because it is based on consensus.

From a technical point of view, a blockchain is a database that runs across a global network of independent computers. By providing a shared view, a blockchain eliminates the need to transfer information between organizations through such objects as files, messages, web services, emails, spreadsheets, direct network connections, and phone calls. It helps to eliminate any difference in data between vendors and customers. For example, blockchains could be used to handle such things as vendor quality certificates, proof of ownership, vendor quotes, contracts, and purchase orders. It could help organizations quickly resolve delivery discrepancies by retrieving data collected end-to-end throughout the order-to-remittance process. It could provide proof to auditors that materials come from certified environmentally and socially responsible areas.

The blockchain can be categorized as Data Management (DM) 4.0, in the sequence:

- DM 1.0 data set in one application;
- DM 2.0 database in the DB/DC architecture;
- DM 3.0 web service in the client/server architecture;
- DM 4.0 blockchain in the cloud.

The blockchain is a type of telematics ledger created to ensure that once a party transfers a digital asset, the party cannot transfer (or sell) it to anyone else. Unlike other ledgers, its participants own blockchain, and decisions about what it records are subject to participant consensus.

Multiplication ensures recording accuracy. Every participant has a copy of the full ledger. Discrepancy-resolution mechanisms ensure that all copies reflect an identical history. Though permissions can be managed with a good degree of control, by default any authorized participant can view all transactions. Thus, together with immutability, notarization, and assured provenance, transparency is a core blockchain characteristic.

Blockchain in Procurement

The blockchain is a powerful support to the digital transformation of procurement.⁸² A shared database can support the various stakeholders associated with the procurement processes of an organization: the company, its customers, vendors, partners, and, if necessary, regulators. It can manage a portfolio of vendors, their administration, sourcing, and management of any complaints. The blockchain is able to provide good visibility of shared data. It can provide a seamless, reliable, and uninterrupted messaging service to support an ecosystem of organization supply. It is a method to facilitate the availability and exchange of data between many parties involved in procurement processes. It allows for increasing the effectiveness, efficiency, and economy of an ecosystem of procurement.

The applications of blockchain are relevant in all areas of procurement. Figure 8.3 shows the typical high-level process of procurement. The blockchain can be useful throughout the entire cycle.

- The blockchain can be used at the time of vendor participation in a bid or in its qualification, to verify its identity or limit any risk associated with the acquisition by that vendor.
- The blockchain could help in the exchange of sourcing documents, warranties, and specifications as certified and accessible by both sides. SafeShare, a British organization, provides an example of this type of use of blockchain.⁸³ It uses the blockchain to confirm the obligations between two parties. This solution facilitates the agile delivery of a product that meets customers' needs. Other examples might include the support of different types of contracts, certificates, and similar documents.
- Vendor quotes, with the original information collected from vendors, can be saved in a blockchain to remain irrevocable and immutable to avoid future complaints from rejected vendors. The same would apply to purchase orders, time-stamped to become valid (and legally binding—a blockchain characteristic not yet available today but likely to be introduced in the near future).

- The blockchain can support the management of shipments of finished goods inventory. The finished goods warehouse receives the product from the factory, identifies it, and stores it. It is important to ensure the inventory accuracy and product availability. Then, it agrees with a carrier the shipping, transportation, and delivery to the customer of the goods. At the same time, there is the need to process and verify the carrier transport documents, provide legal documentation and execute the customs clearance, subscribe cargo insurance, and process invoices for the services provided. In all these series of operations, there are many partners and companies involved. With the blockchain, all parties may refer to the same digital register: precisely the blockchain. In this way, it would be possible to ensure control of the existence and verification of completeness of shipping documents. There would be fast resolution of unmatched deliveries by retrieving data collected throughout the order–receipt processes and adequately time-stamped, recorded, activated, and supported with documents, all living in the blockchain. Potential disputes could be resolved much more quickly.
- The blockchain can also help with the cash flow associated with procurement: the so-called trade finance. The blockchain could record the different movements between the parties. It would allow authorized customers to track and refine transactions securely and quickly in paperless mode. All parties would be able to verify immediately the status of their reconciliation. The blockchain allows for

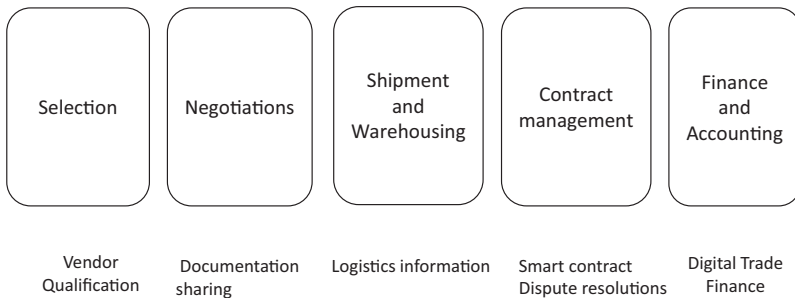


Fig. 8.3 Blockchain and the procurement processes

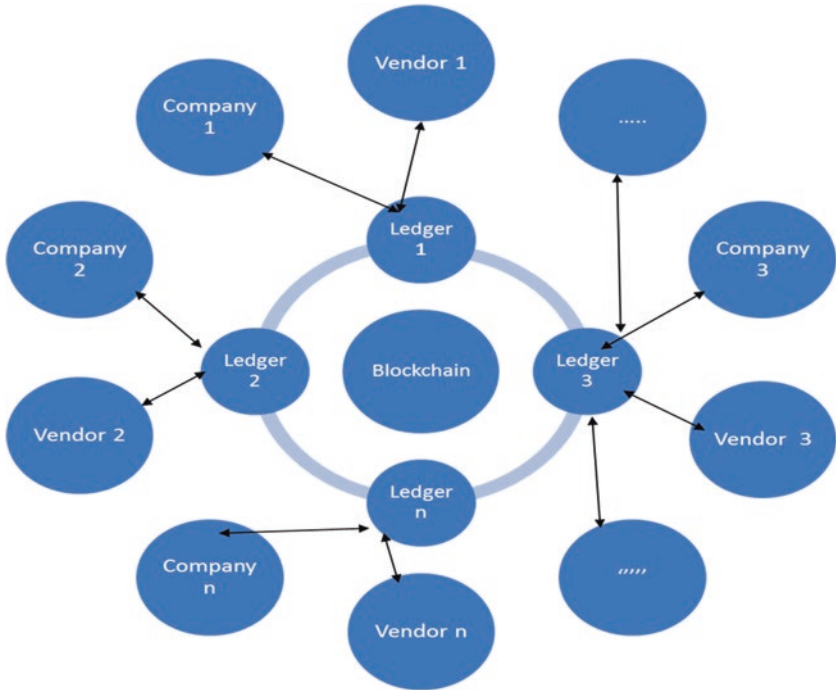


Fig. 8.4 Blockchain model for procurement

a seamless connection between the parties involved in a transaction, simplifying management, monitoring, and settlement of domestic and international transactions. This would apply not only for large companies but also for small and medium enterprises (SMEs). The financial transactions would be recorded on the blockchain, speeding up the processes with full transparency and security.

Figure 8.4 shows the interfaces of an ecosystem based on the blockchain. In addition to reducing or eliminating bureaucracy, the blockchain solutions ensure transparency end-to-end of the entire process, reducing the barriers of distrust that often hinder especially small businesses when it comes to operating in new markets, for example in foreign countries.

Tradle

Tradle is a start-up.⁸⁴ It can store information with high resilience to potential hackers and cyber attacks.⁸⁵ It created a platform to compensate for blockchain's limitations, such as low transaction throughput, extreme data storage limits, the absence of transactional semantics, and the high cost of computations.

Trust in Motion (TiM) is Tradle's app on this platform.⁸⁶ It allows users to start a secure line of communication and go on the record to exchange confidential documents, verifications, attributions, and agreements. Resulting records are stored securely and irrevocably. The system has strict access control and high resilience to hackers, spying, and take-down demands.

In this way, it allows, for instance, a partner financial institution to share data about their customers. The partner organization of the financial institution can offer a very quick and streamlined process for subscribing to a product without asking for data already available in possession of the financial institution.

Walmart

Like most merchants, Walmart, the world's largest retailer, struggles to identify and remove food that has been recalled. When a customer becomes ill, it can take days to identify the product, shipment, and vendor. With the blockchain, Walmart is able to obtain critical data from a single receipt, including vendor, details on how and where the food was grown, and who inspected it.⁸⁷ The database can include information from the pallet and from the individual package, entered by the company and its vendors.

With blockchain, Walmart can perform strategic removals and inspire greater trust among consumers and organizations. This enhanced traceability is also good for other aspects of the food system.

Blockchain and Procurement Finance

Blockchain can help in the procurement finance area, by greatly simplifying and making more agile and secure the trade finance commercial transactions among companies and financial institutions. This application aims to make domestic and cross-border commerce easier, especially for SMEs. This is achieved thanks to the capabilities of the distributed ledger solution, which is intended to seamlessly connect the parties involved in a trade transaction (that is, buyer, buyer's financial

institution, seller, seller’s financial institution, and logistics operators) online and via mobile devices. This product simplifies trade finance processes for SMEs by addressing the challenges of managing, tracking, and securing domestic and international trade transactions (see Fig. 8.5).

Larger companies use documentary credit as a way of reducing the risks involved in doing business. The documentary credit is not always suitable for SMEs or for companies that prefer open account solutions. The secure records on this blockchain-based application would accelerate the order-to-settlement process and decrease administrative paperwork significantly. A platform of this type also enhances end-to-end transparency. This can provide SMEs with the confidence to open trade opportunities with new partners in their home market or in other foreign markets. By pooling expertise and resources, the participants in this blockchain application can jointly exploit the benefits of a digitized and lean trade network. This simplifies and makes more agile the management and accounting especially of international trade transactions.

Procurement finance leverages the buyer’s credit-worthiness to improve the vendor’s cash flow.⁸⁸ It can help in several ways. For instance, it can

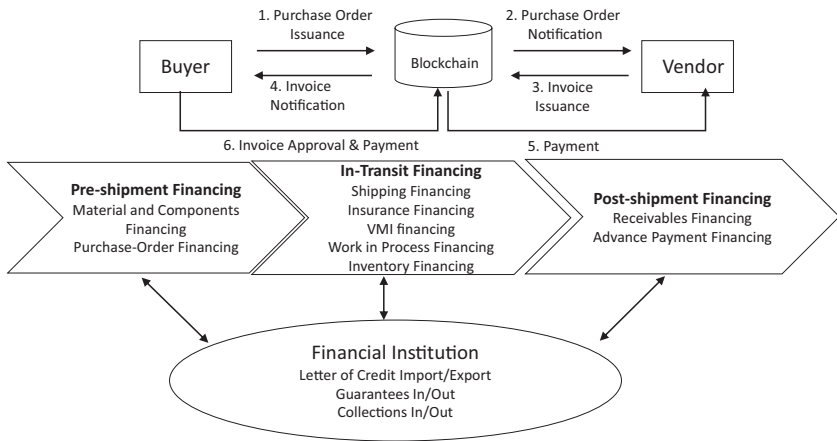


Fig. 8.5 Procurement finance model with blockchain

support the credit transfer, if the buyer's rating is strong enough to finance not only the vendor but also the vendor's vendor (a Tier 2 vendor) and possibly beyond. Procurement finance can also help to equalize the cost pressure across the buyer's entire upstream value network.

Unlike highly customized procurement finance systems, the design of blockchain is decentralized and collaborative. Adding new participants (such as the Tier 2 and 3 vendors in the previous example) is relatively straightforward. It may be done fairly easily by authenticating participation with a digital signature (with an associated public key).

The systems to implement what is described in the previous paragraphs exist today. Blockchain-based procurement finance platforms have varying degrees of sophistication in terms of workflow, customizability, and linkages with standard ICT systems.

The visibility and auditability that are characteristics of the blockchain solutions allow financial collaboration across the extended value network, including potentially vendors, financial institutions, partners, and customers. According to recent estimates, of the annual global trade expenditure of \$18 trillion, Procurement 4.0 can address \$255–280 billion with existing Procurement 4.0 tools.⁸⁹

The potential of blockchain solutions in Procurement 4.0 are only now starting to be analyzed and implemented. For instance, the value network solutions described above are mainly supported by emerging fintech start-ups. Traditional procurement finance applications are only now being modified to allow for these new solutions.

Advanced predictive big data analytics can support complex decision-making scenarios based on a variety of performance tests, in different and critical market conditions. Such business simulations can support the design and redesign of procurement operations.⁹⁰ For example, by simulating different market and competitor scenarios, the use of blockchain and open data can help in assessing business agility and resilience of a given vendor or risks.

Another example of the use of blockchain is Ethereum, also a global network of computers.⁹¹ Examples of what this network can register and monitor include debts and delivery promises.

The Fluent Network is a blockchain-based financial operating network that streamlines value network finance.⁹²

Barclays

Barclays, in partnership with an Israeli start-up, conducted on September 2016 the first trade transaction using blockchain for dematerializing a bill of lading (BOL).⁹³ The transaction guaranteed US\$100,000 in dairy exports from a cooperative in Ireland to a Seychelles trading company. The BOL is a document issued by carriers that includes details about a shipment, generally the type of goods, quantity, and destination, and gives title of the property to a certain party. In this way, it is possible to transfer trade documentation, cutting processing times from ten days to less than four hours. It is also possible to reduce the costs of procurement finance.

Seven Banks Plan Blockchain Platform to Help European SMEs Increase Trade

A group of seven banks has agreed in principle to develop an advanced shared platform application in seven European markets: Belgium and Luxembourg (KBC), France (Natixis, Société Générale), Germany (Deutsche Bank, UniCredit), Italy (UniCredit), the Netherlands (Rabobank), and the UK (HSBC).⁹⁴

These banks signed a Memorandum of Understanding to collaborate on the development and commercialization of a new solution called Digital Trade Chain (DTC). This product is based on a prototype trade finance and supply chain finance solution introduced in KBC and tested to “proof of concept” stage. DTC won the Efma Accenture Innovation Award for “best new product or service of 2016” in October.⁹⁵

Smart Contracts

One of the most interesting potential implementations of blockchain is the so-called smart contract. This model is still under definition from a technical and legal point of view. The scheme aims to make contracts “live” by turning specific contractual provisions into executable digital codes, designed for self-execution in a blockchain system. In the context of value network management, such programs can be self-executing

smart contracts that manage the flow of funds based on the automatic application of the contractual conditions. In this way, it is possible to apply effective and efficient real STP. Potentially there would be no need for human involvement in executing a deal. Contracts may be authored in order to algorithmically specify and autonomously enforce transaction rules. All interactions for which delivery arrangements are made can be automated with fixed rules and agreements.

The potential cost savings could be large since it allows for a reduction in administrative costs for reconciliation and error. It could also reduce the risks and disputes connected with contractual relationships. Smart contracts, powered by a blockchain, could also provide procurement organizations with the tools to manage claims in a transparent, responsive, and irrefutable manner. Contracts and claims could be recorded onto a blockchain and validated by the network, ensuring that only valid claims are paid⁹⁶ (Fig. 8.6⁹⁷).

There are interesting new ways in which contracting could be performed, for instance within the US Department of Defense, and how contracts could be handled.⁹⁸ The contract could cease being a static document file on a computer server. The contract could manage itself. The contract could become empowered. It could take action independent of human direction. The solution exists to bring the contract to life.

In programming jargon, the word “object” means a component with properties and methods. Properties are what an object knows about itself. Methods are what an object knows it can do. A contract, as an object, will know things about itself.⁹⁹ It will know its value. It will have all essential information, such as who signed the contract, who administers the con-

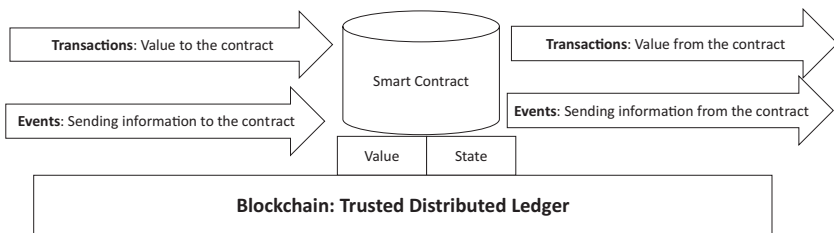


Fig. 8.6 Schema for smart contracts

tract, the schedule of payments, the events that activate such payments, and when the contract is supposed to be completed. With a little additional development in the application managing the contract object (smart contract), the contract would be able to interact with other objects. That would enable all the stakeholders to know from the same source the movements of funds between customers, contractors, and financial institutions and how much of the funds are left. The contract would know how to close itself out. If a problem arose, such as funds remaining when the contractor is no longer in business, the contract would know how to manage the situation. Among its many benefits, the smart contract would eliminate the problems associated with institutionalized knowledge. The use of blockchain for smart contracts would extend their action beyond the single organization and could help the entire ecosystem.

The City of Kuovola

It is not only start-ups that are pushing the innovation boundaries in the value network field. The Finnish city of Kuovola has received 2.4 million euros in European funding to develop a project called SmartLog that applies the blockchain and smart contracts to shipping containers.¹⁰⁰ The city is a hub for trade between the EU, Russia, and Asia. Its region is host to around 700 logistics organizations.

Conclusions

The future will see a revolution in the management of procurement.

Procurement 4.0 is an essential component for supporting Industry 4.0 and making it a reality. This chapter presents a model that underlines the main components and technologies that can make Procurement 4.0 effective, efficient, ethical, and economical.

It is not easy to predict what the future holds. Procurement 4.0 represents a revolution in e-procurement. Blockchain as a digital consensus mechanism, and smart contracts as self-executing contracts, are only some examples of future implementations. New solutions will surpass the imagination.

It is interesting to note that the amount of time between one industrial revolution and the next has decreased. Procurement 5.0 lies in the near future!

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9

Conclusions for Agile Procurement Systems

This volume has focused on a number of characteristics that define the very basics of the agile model for systems in support of an agile enterprise. This model has been placed in the context of procurement, outlining the meaning that this has acquired in the theory and practice of organization management.

An exemplification of the major transformations that procurement systems are experiencing has been presented. This has followed a business model in order to be exhaustive. For a long time, procurement has been considered purely a support function in the organization. Well-managed procurement can be a substantial component of the organization, contributing to its value added for customers and the business.

The findings of this exercise outline innovation as the major driver in procurement. Secondary drivers are the changes in management of relationships with vendors, and changes in the way of producing and of managing procurement reflected by radical changes in the environment.

This volume defines a model for process improvement and digitization of procurement. In particular, this second volume analyzes the digitization aspects in detail. The model provides a logical and holistic sequence for the rationalization and digitization of procurement processes: streamline them and, at the same time, automate the management of procurement, with

benefits for the end customer, the organization, and the procurement ecosystem. In this way, it is possible to avoid including in the information and automation solutions all the waste in the existing processes that could be the cause of ineffectiveness, inefficiencies, and diseconomies of the procurement processes.

This volume outlines a target agile business model for the procurement organization for identifying the desirable outcomes in each of its components. In doing so it utilizes the Business Model Canvas. The resulting model has been matched with a number of viable management tools that, if properly tuned and implemented, may substantially improve the enterprise agility in the procurement processes.

The findings define the need for an organization to move to an agile enterprise business model also in the procurement organization. Organizations may improve their agility through greater use of digitization solutions as an aid, in particular in identifying opportunities, patterns, and trends. In so doing, they can substantially improve the operations of the organization and even influence its strategy. This is arguably a challenge that all organizations are facing. Digitization potential in procurement processes management is largely yet to be discovered and exploited.

By using the model described in this book, organizations may launch many programs to propel them towards agility in a more direct way. In the past, agility was viewed as a collateral effect of initiatives that pointed mainly in the direction of achieving savings. In fact, agility is a way to add value for customers and for organizations.

This volume presents a real case in the financial services sector, in order to verify whether the findings apply and to appreciate also any other peculiarities procurement has in terms of variability and trends. The case is interesting in that it frames innovative procurement in an industry characterized by tight regulations. Furthermore, macroeconomic issues (economic crisis) and industry-specific issues (faced by the industry with reference to bail-out/bail-in) are seriously affecting the results and therefore the competitive pressures.

Therefore, the point taken from that case is that the industry is undergoing many changes with reference to products and interaction with customers, as well as quite drastic and immediate changes with reference also

to procurement. The complexity of the industry produces a great deal of uncertainty. Therefore, organizations face ever growing demands in order to provide more value added.

Chapter 8 of this volume is devoted to the identification and discussion of future trends in agile procurement, with particular reference to Procurement 4.0 in support of the Industry 4.0 initiatives. The striking fact is that the future of agile procurement is inevitably tied to changes in processes, digitization, and automation. These changes unlock new management styles and interaction paradigms, and create an opportunity for collaboration and integration. All these aspects greatly increase the complexity of the processes, creating a need for new solutions to meet ever expanding challenges.

It might be assumed that agile procurement has to do entirely with purchasing, distribution, global sourcing, and other activities that relate directly to procurement management. However, within a new type of enterprise, with the traditional supply chain replaced by a value network, everything influences everything else. In order to make real progress, there is a need to see things holistically across the enterprise. The Business Model Canvas used in this book underlines those agile procurement requirements of a commitment at the top of the organization to configure the organization for a correct blend of effectiveness, efficiency, economy, and ethics. It requires innovation to open up the internal processes to vendors, partners, and customers, and a commitment to digitization once the processes have been made lean.

The rewards are great for those organizations that move on this agile journey. Those rewards show up clearly on the bottom line. Lower investment in inventory, greater customer satisfaction, and less work involved in managing vendors are the benefits the organization can realistically expect to enjoy when it uses the right enterprise applications to bring lean and digitization to the value network of the organization.

The approach presented in this volume is an example of a method for improving processes to make procurement agile. This means leaning and digitizing procurement. On this basis, and with a focus on the model of agile procurement, it is possible to synthesize two aspects resulting from the research at the core of this book:

Proposition 1: Unlike other sectors, where agility sometimes requires a reduction of digitization, in procurement, digitization is essential for process improvement.

Proposition 2: In the context of procurement, digitizing a non-optimized process is counterproductive.

A corollary to Proposition 2: In the context of procurement, it is necessary to use the sequence of implementations that provide an improved quality of service and the streamlining of the process by eliminating any waste. At the same time, it is necessary to take into account the need for digitized management.

Stay tuned. The future brings new challenges and new exciting solutions!

Glossary

Account Payable a legally enforceable liability to a creditor recorded on the balance sheet, usually arising from purchases of goods and services on an open account basis and evidenced by a received invoice due to be paid within an agreed time frame.

Account Receivable a legally enforceable claim for payment held by a business entity against its customer for goods supplied or services rendered in execution of the customer's order, and recorded on the balance sheet. Such claims generally take the form of invoices raised by a business and delivered to the customer for payment within an agreed time frame.

Agile Committee See Steering Committee.

Agility a metric to measure how quickly a solution responds as the customer's resource load scales, allocating additional resources to the activity.

Algorithms an essential part of modern advanced applications. They are used for a range of tasks from recommending books, movies, and music to automating investments online. In stock markets, algorithms are plugged directly into an electronic market and trading happens without any human intervention. They suggest where the most money can be made faster and more accurately than any human being, according to the BBC.¹ Pedro Domingos offers a simple definition: "An algorithm is a sequence of instructions telling a computer what to do."² He goes on to explain that algorithms are reducible to three logical operations: AND, OR, and NOT. While these operations can be

linked together in complex ways, at their core algorithms are built out of a relatively simple rationale.

Analyze the third phase of DMAIC. In it, the details of the process are analyzed to identify opportunities for improvement.

Anti-Money Laundering (AML) Anti-money laundering regulations are a set of procedures, laws, and regulations designed to stop the practice of generating income through illegal actions. In most cases, money launderers hide their actions through a series of steps that make it look like money coming from illegal or unethical sources was earned legitimately.

App short for application. It is a program or piece of software, especially as downloaded by a user into a mobile device.

Application a software program that uses basic software, middleware, and network environments to achieve a specific function related to the purposes of the organization.

Application Programming Interface (API) a specification for the interfaces used by software components to communicate with each other. The specifications include a set of requirements that define how two pieces of software can interact with each other. It allows for moving data between applications. An API may include specifications for routines, data structures, object classes, and variables. These are important because they enable other programmers to use components of existing software, allowing for faster and more reliable software development. This is a major component of the fintech movement.

Application/App store a virtual location for the distribution of digital applications, available on mobile devices.

Audit the process by which financial records, business processes, and information systems are independently verified by an internal or external auditor.

Authentication the verification of the identity of a user by a system or service.

Authorization the procedure to check whether a customer or another person inside or outside the organization has the right to do a certain action, for instance, transfer funds or access sensitive data.

Automation the automated handling of services or goods. It is also the percentage of requests to the vendor handled without any human intervention.

Availability the metric that measures the percentage, usually calculated on a regular (such as monthly) basis, and net of planned or unplanned service downtimes of service coverage.

Basel 2 and 3 the second and third Basel accords were signed in 2004 by the G10 central bank governors (Basel 1 was signed in 1998). Basel 2 is a package of measures designed to introduce new rules for prudent credit risk management.

Financial institutions are required to put aside equity capital to reduce the risks of their lending and investment activities, thereby bringing greater transparency and reliability to financial institutions' solvency. In 2010, the central bank governors introduced further proposals for international banking regulation in the Basel 3 reforms.

Belt the “belts” are the members of the working team for Six Sigma projects, experts in the method and facilitators of its application.

Benchmarking the comparison of processes and/or measures to other processes and/or measures implemented by well-organized entities, or to a large number of them.

Big Data an all-encompassing term for any collection of data sets so relatively large and complex that it becomes difficult to process them using traditional data processing applications. Big data have the five V characteristics—volume, velocity, variety, veracity, and value.

Biometrics the process to detect and possibly record a person's unique physical and other traits with an electronic device or system as a way of confirming identity.

Bitcoin a token of value exchanged between two parties.

Black Belt a term used to describe a level of expertise. The Black Belt can help or direct a group that applies the Six Sigma method and other process improvement initiatives. A typical Black Belt must have successfully completed a number of training courses and at least one major project. In some organizations, there is a process of official registration. It is a full-time position.

Block a recording of transactions validated by a set of cryptographic keys. Once completed, it goes into the blockchain as a permanent database. A block makes transactions recordable and trackable, representing the source of truth for the contained transactions.

Blockchain a distributed database where trust is established through mass collaboration. Each transaction is recorded continuously and sequentially on a public “block,” creating a unique ongoing “chain.” The blockchain is the technology used by Bitcoin transactions.³ It can record cryptocurrency transactions. It operates like a distributed public ledger where information, once entered, cannot be altered. Blockchain technology has several potential non-cryptocurrency uses, including smart contracts and the recording of digital assets. It can record data—a digital ledger of transactions, agreements, contracts—anything that needs to be independently recorded and verified as having happened. The blockchain technology runs across several, hundreds, or even thousands of computers. Every time a new batch of transactions is

encrypted, it is added to the ledger “chain” as a “block.” Its appeal stretches beyond fintech into government and other fields. The simplest definition is that the blockchain solution is a decentralized digital ledger. It records all digital transactions as a string of data stored on a global network of computers. Every time the network encrypts a new batch of transactions, it is added to the string (or chain) as a “block.”

Blockchain as a Service (BaaS) a relatively new term for 2016, coined by William Mougayar of Virtual Capital Ventures in early 2015.⁴ Equivalent terms include Ethereum blockchain-as-a-Service (EthBaaS), or “blockchain-as-a-Platform” (BaaP). It refers to the growing landscape of services based on blockchain solutions available in cloud computing. One example is Microsoft EthBaaS on the Microsoft Azure cloud platform. This platform allows organizations to begin working with blockchain solutions without having to make significant investments in hardware.

Broad Network Access facilitates network capabilities and their access through standard mechanisms. Heterogeneous thin or thick customer platforms promote the use of the platform. Notebooks, tablet PCs, PDAs, smartphones, and so on are among the devices that can access the network.

Business Intelligence (BI) a broad category of applications and technologies for gathering, storing, and analyzing, retrieving, and providing access to data to help users make better organization decisions. BI applications include the activities of decision support systems, querying and reporting, online analytical processing, statistical analysis, forecasting, and data mining. Analytics has generalized and extended BI.

Business Model Canvas a strategic management and entrepreneurial tool. It allows for describing, designing, challenging, inventing, and pivoting a business model.

Business to Business (B2B) refers to organizations that relate to other organizations, rather than to customers.

Business to Consumer (B2C) indicates the solutions from an organization to the consumer.

Buy-Back Agreement or Guarantee an agreement between a purchaser and a seller in which the seller agrees to repurchase goods or property from the purchaser if a certain event occurs within a specified period. The buy-back price is usually set out in the agreement. It is specifically used in the context of distributor finance, a term defined herein.

Buyer in the context of supply chain finance, a buyer is a corporate entity procuring goods and services, issuing orders, and making payments to the vendors, which form its supply chain.

- Buyer Credit** a form of financing that is put in place by a buyer to purchase goods or services, or provided for its benefit by a third party such as an Export Credit Agency (ECA). Contrast with a vendor credit. Buyer credits may be incorporated into supply chain finance (SCF) transactions.
- Buyer-centric** a description of an SCF transaction where the origination usually takes place through a relationship with a buyer, sometimes referred to as the anchor party.
- Cloud** a metaphor for a global network or synthetic for cloud computing. Initially, it referred to the telephone network. It now refers to the Internet.
- Cloud Computing** a computing capability that provides convenient and on-demand network access to a shared pool of configurable computing resources. These resources can be rapidly provisioned and released with minimal management effort or vendor interaction. Cloud computing has six essential characteristics: pay-per-use, self-service, broad network access, resource pooling, rapid elasticity, and measured service. In general terms, cloud computing enables three possible modes: infrastructure as a service (IaaS), platform as a service (PaaS), software as a service (SaaS), and business process as a service (BPaaS). It can be public, private, or hybrid.
- Collaboration Risk** the risks arising from the legal structure of a joint venture, for example, while the finances of each partner in a joint venture may be robust, the joint venture vehicle itself may be poorly capitalized and carry a real risk of insolvency.
- Commercial Finance** a “super-category” or umbrella term used by finance providers to describe their business lines, organizational units, and activities. Commercial finance is usually used as a generic term for a range of asset-based finance services.
- Commodity** a raw material, for instance, foodstuffs, metal ore or refined product, crude oil or oil product, for which there are normally liquid markets and which represent attractive collateral for the provision of finance.
- Compliance** the respect for the internal and external compulsory rules of the organization.
- Consensus Mechanism** a mechanism that allows computers to agree regularly on how to update the database, after which the modifications they have settled on are rendered unchangeable with the help of complex cryptography.
- Consent** the strategy of making a decision based on conviction and approval by all the members, who undertake to support the decision.
- Control** the last phase of DMAIC in which solutions, once implemented, are verified in performance to determine the sustainability of the improvements.

Corporate Performance Management (CPM) the information system for the management of key business metrics.

Country Risk a collection of risks associated with investing in or creating exposure to a particular country. These risks include political risk, exchange rate risk, economic risk, sovereign risk, and transfer risk, which is the risk of funds being frozen for external transfer by government action. Country risk varies from one country to another.

Credit Risk the risk that a borrower or obligor might default on any type of debt or contractual obligation by failing to make required payments.

Crisis a situation formally declared a service interruption, or the deterioration of one or more critical or systemically important processes because of incidents or disasters.

Critical Path Method (CPM) a tool for planning and control of projects through a network approach.

Crowdfunding the practice of funding a project or venture by raising money from a large number of people. This takes place most often via online platforms. Seedrs is an example of an equity-based crowdfunding platform in the UK.⁵ Debt-based crowdfunding is when people lend to an organization. The lenders earn a rate of return based on the interest charged on the loan. Typically, loans are secured against an asset, which provides the investors with some protections should the borrower fail to repay. Donation-based crowdfunding is when people donate money to a project. In return, backers may receive token rewards that increase in prestige as the size of the donation increases; for small sums, the funder may receive nothing at all.

Customer the person who pays for the product, service, or activity. This is not necessarily the user of the product, service, or activity. It can be external or internal to the organization. In the latter case, unless there is a system of interior “prices,” the internal customer does not pay for the product, the service, or the activity but uses it. Customers should be seen as the reason for the existence of the process and not just because of the process of the receptors. In this book, it refers to the customer. It could be either external or internal to the organization. In some cases, the word “customer” indicates the access device. In this latter meaning, there is always in this book a specification (such as a thin customer). Legally it is the contracting authority of the contract.

Customer Relationship Management (CRM) the information system to manage relationships with customers. It is a tool that can manage the life cycle of the customer, the acquisition of new customers, increased customer relation-

ships, and the customer loyalty in terms of the relationships with the organization. It lowers transaction costs between customers and the organization and integrates the processes of customer management.

Customer Value Proposition the benefits a product or service holds for a customer; the reasons why a customer might buy that product or service.

Cycle Time this term can be used in different situations. The cycle time suggests the time it takes for a product/service to go from its beginning stage to delivery. In the case of a manufacturing organization, in production the cycle time is the time that elapses between the arrival of the raw materials and payment for the finished product. If the cycle time instead is evaluated from the point of view of the end customer, it can be defined as the total time the customer must wait to receive a product/service after having ordered it.

Data Collection the process of collecting data to generate information that can be used to make decisions. In the case of manual data collection, they are called check-sheets to be used to collect information and provide for their initial classification.

Data Governance and Compliance defines who is responsible for what, and the policies and procedures that persons or groups need to follow. Data governance requires governing the organization's own infrastructure and the infrastructure that the organization does not totally control. Data governance has two key components: understanding compliance and risk, and organization performance goals.

Data Source a database of personal information used by identity verification/identity proofing services to validate an identity. Examples of data sources include credit bureau records, government records, property files, customer marketing data, and telephone/utility records.

Data Set or Database a collection of data, usually from a common source and assembled for a particular business or another purpose. The term is used generally to define data that could historically have been brought together in a document, but in an automated process is transmitted as a data set. Under the rules of the BPO, data sets must be matched prior to a payment obligation becoming due.

Defect lack of fulfillment of customer expectations by a process or service.

Defects to Million Opportunities (DPMO) where opportunity means a chance of non-compliance and failure in the output of the process with a few specifics unmet. By this calculation, one can make quick assessments of the dispersion and process variability.

Define the first phase of DMAIC in which problems, opportunities, and customer needs are defined by the working group.

Define, Discover, Develop, and Demonstrate (DDDD) a structured method for innovation.

Define, Measure, Analyze, Develop, and Verify (DMADV) the Six Sigma method for drastic improvement of processes.

Define, Measure, Analyze, Improve, and Control (DMAIC) the Six Sigma method for continuous process improvement. This structured process eliminates unproductive steps, focusing on new measurements and applying solutions for improvement.

Design for Six Sigma (DFSS) another name of DMADV when applied to the design function.

Disruptive Innovation an innovation that completely changes the way people do something (for example, Amazon vs. in-store shopping). It describes innovations that improve products or services in unexpected ways and change both the way things are done and the market. The smartphone is an example of a disruptive solution. It has the potential to change completely the way in which users connect to ICT services.

Distributor a person or entity that supplies goods on a wholesale basis to retail outlets or organizations. It may be a manufacturing entity, an arm of a manufacturing entity, or an independent entity.

Distributor Finance an SCF technique defined herein in which a finance provider provides financing for a distributor of a large manufacturer to cover the holding of goods for resale and to bridge the liquidity gap until the receipt of funds from receivables following the sale of goods to a retailer or end customer.

Documentary Trade Finance a term that covers a large element of the traditional trade finance market relating to tools such as Documentary Credits, Documentary Collections and Guarantees, which are usually governed by rules published by the International Chamber of Commerce (ICC) (for example, UCP 60 for Letters of Credit (or later version) or URC 522 for Collections or URDG 758 for Guarantees). Although not SCF techniques in their own right, these tools can be incorporated into SCF transactions or used alongside SCF techniques.

Dynamic Discounting describes a number of methods through which early payment discounts on invoices awaiting payment are offered to sellers and funded by the buyer. The service is dynamic in the sense that the earlier the payment, the higher the discount.

- Ecosystem Participants** a set of organizations or individuals that can work together in order to gain synergies.
- Electronic Data Interchange (EDI)** the computer-to-computer exchange of business documents in a standard electronic format between business partners.
- Electronic Invoicing or e-Invoicing** the exchange of the invoice document between a seller and a buyer wholly in an integrated electronic format or data set. Traditionally, invoicing, like any heavily paper-based process, is manually intensive and is prone to human error, resulting in increased costs and processing life cycles for organizations.
- Encryption** the process of encoding messages or coding to protect the customer's information assets. Encryption is vital to fintech, the blockchain, and anything else that needs to be secure. Documents or data, like names and numbers, are turned into a code using algorithms (mathematical formulas). A key is required to turn that code back into useful data (decryption).
- End User** the end or final user of an application.
- Enterprise Content Management (ECM)** the management of all content (data, unstructured documents, email, voice, video, and so on).
- Enterprise Resource Planning (ERP)** the extension of the Manufacturing Resource Planning II to the remaining functions in the organization, such as engineering, finance, and personnel administration and management. It consists of a software package with a single data model that facilitates the horizontal and vertical integration of all inter-organizational processes, improves process efficiency, and monitors processes through special key performance indicators (KPIs) according to quality, economic values, service levels, and timeliness. Some components of an ERP are accounting, industrial accounting, payroll, sourcing, warehouse management, production, project control, sales, distribution, and facility maintenance.
- Electronic Procurement or e-Procurement** E-procurement indicates the set of technologies, processes, operations, and organizational procedures for the acquisition of goods and services online thanks to the Internet and electronic commerce.
- Extended Enterprise Resource Planning (EERP)** an evolution of ERP that adds tools for the control of connected partners (subsidiaries, sales channels, customers, vendors, and so on).
- Facilitator** a person who helps a group achieve its full potential, through the identification and removal of barriers. He/she leads the group to achieve its mission.

- Factoring** an SCF technique defined herein as a form of receivables purchase, in which sellers of goods and services sell their receivables (represented by outstanding invoices) at a discount to a finance provider (commonly known as the “factor”). A key differentiator of factoring is that usually the finance provider becomes responsible for managing the debtor portfolio and collecting the payment of the underlying receivables.
- Finance Provider** a financial institution, or other regulated or non-regulated provider of finance and related services, specifically herein in the context of procurement finance.
- Financial Institution (FI)** a provider of financial services in the broad sense, usually referring to banks and other regulated entities such as insurance companies, investment dealers, and trust companies. It includes, by definition, a range of non-bank financial institutions. These are the institutions that handle financial transactions and are normally the place where people deposit their money or get credit. It is a tradeable asset of any kind: either cash, evidence of an ownership interest in an entity, or a contractual right to receive or deliver cash or another financial tool. In Forfeiting, rights under the financial tool are normally independent of the underlying transaction that gave rise to the financial tool, since they rely on the legal obligations created by the legal status of the financial tool itself.
- Flow** the progressive implementation of operations from the beginning of the process until the release of the result. According to one of the principles of Lean Thinking, the flow is such that it must proceed “forward,” that is, toward the customer (internal or external), and proceed without interruptions. It should be ensured that all activities create value “to flow” without interruption from beginning to end so that there are no waiting times, idling or waste during a step or between phases.
- Flowchart** a diagram or map of a process that uses symbols (for activities, decision points, and other events) in a horizontal sequence to show what actually happens in a process or in the design of a new process.
- Governance** refers to the controls and processes that ensure the effectiveness, efficiency, and economics of a sector. The sector might refer to the entire organization or to an organizational unit, a process, or data.
- Guarantee** any signed undertaking, however named or described, provided for payment (by the guarantor) on presentation of a complying demand. Guarantees may also be subject to internationally recognized rules of practice issued by the ICC URDG 758. Guarantees, both financial and performance-related, issued by finance providers form an important category of traditional

trade finance techniques. More generally, a guarantee is a promise to take responsibility for another party's financial obligations, if that party cannot meet its obligations. The party assuming this responsibility is called the guarantor.

Identity verification the identification of individuals using their physiological and behavioral characteristics to establish a mapping, from a person's online identity to their real life identity.

Improve the fourth phase of DMAIC, in which ideas and solutions are generated and implemented.

Improvement Team See Project Team.

Incident any event that is not part of the standard operation of a service and that causes or may cause an interruption to, or a reduction in, the quality of that service.

Information and Communication Technology (ICT) the combination of computers, storage, network, applications, and so on that provides integrated computer-based services.

Input a resource introduced into the system or consumed in its operation that helps in getting a result or output.

Integration the process of combining components or systems into an integrated entity.

Internet of Things (IoT) a development of the Internet in which non-human objects have network connectivity, allowing them to send and receive data. The IoT has the ability to record, receive, and send data. This covers internet-connected vehicles, devices, switches, sensors, and everything in between. It is based on using the Internet to communicate between objects, machines, and any other inanimate things.

Internet Protocol (IP) the primary protocol for transmitting data or information over the Internet.

Interoperability the ability of systems to operate in multiple environments.

Invoice a document, or electronic version of a document, addressed by a vendor of goods and services to a buyer recording and describing a transaction for the supply of goods and services, requesting payment by a specified due date, and setting out any applicable taxes to be collected and remitted to a tax authority.

Kaizen the Japanese term to indicate continuous improvement. It is also used to indicate the seminars for improvement in a lean initiative.

Kanban a tool that allows for the flow of information and materials as part of a process. The concept is relatively simple. A production department must be

activated to produce the quantities that are communicated by the next department downstream according to a card (precisely the Kanban in Japanese), which is delivered by the department downstream.

Key Performance Indicators or Key Process Indicators (KPIs) the metrics (or measures) used within corporations to measure the performance of one department against another with respect to revenue, sales lead conversion, costs, customer support, and so on.

Know Your Customer (KYC) the process of an organization verifying the identity and the standing of its customers and the character of the business or transactions they generate. The term is also used to refer to the legal regulations that govern these activities.

Lead Time the time taken by a piece (a part, the transaction of a product or a service) to move through a whole series of processes linked to a value network, from beginning to end. It also includes time not in process, such as queuing.

Lean and Digitize the method used to lean processes and automate them at the same time, wherever necessary. It aims to make the process automated and streamlined.

Lean Manufacturing See Lean Production.

Lean Production an organizational and management model that achieves a structure in which the main objective is the optimization of the production system, in terms of the speed of the process and eliminating waste. It involves the application of improvements and standardization, and many other concepts and tools to improve the quality, cost, or time of production. Many of the lessons learned in lean manufacturing can be applied to the operation of lean services.

Lean Six Sigma (LSS) a complete, flexible, and highly structured method aimed at achieving, maintaining, and increasing customer value.

Loan making money available to another party in exchange for future repayment of the principal amount plus interest or other finance charges. A loan may be for a specific, one-time amount or can be available as a variable credit line or overdraft up to a specified ceiling amount. It is also possible to make loans of actual real and financial assets.

Logical Security a set of processes and activities aimed at obtaining confidentiality, integrity, and availability of data and information through the adoption of measures—technical (systems for access control, antivirus, firewalls, intrusion detection systems, and so on), organizational (definition of policies,

safety standards, user profiling and related ratings, and so on), and procedural (process definition).

Management Process a method to optimize the organization as a system, determining what processes need improvement and/or control, defining priorities, and providing leadership to initiate and support efforts to improve processes.

Manufacturing Requirements Planning (MRP) a computer application that automatically provides the timing and amount related to purchases and production. The outputs of these packages are obtained by analyzing the input data (cycle time, bill of materials (BOM), inventory situation, political shuffle, and so on) from one or more databases.

Marketing defined by the American Marketing Association (AMA) as the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, partners, and society.

Matrix Activities/Responsibilities Matrix is used in projects to assign different responsibilities to project participants. It is also called RACI Matrix, where RACI stands for responsibility, accounting, control, information, which are the potential actions of the different parties.

Measure the second phase of DMAIC, in which the specific key measurements and the way to collect data are defined.

Metrics an index of the performance of an organization that indicates whether a goal is reached.

Milestone a relevant date in the life of the project.

Mission the way to proceed toward the vision.

Mobile Device includes smartphones, feature phones, and tablet computers. The term “mobile device” is also used interchangeably with “mobile handset” or “handset.”

MRP II a successor of manufacturing and material resource planning (MRP). The MRP II with respect to the base MRP adds a scheduler module for the calculation of production capacity and the leveling of workloads.

National Institute of Standards and Technology (NIST) a US Department of Commerce agency that promotes the effective and secure use of cloud computing within organizations.

Node in this book, an element of the blockchain solution that receives/sends transactions.

Organization in this book, a company, public institution (either central or local), department, or non-profit organization.

- Output** the result of product or system processes. It can be a product or a service.
- Outsourcing** defines an operation whereby an organization relies on an outside vendor for the management of a specific process or activity already operational within the organization (usually non-core assets such as the purchase of indirect materials, administrative management, and so forth). It is the acquisition from an external vendor of products or services that currently result from direct production activities and internal management organization.
- Pareto Principle** a principle arguing that few “vital” elements (20%) justify the 80% of the consequences. The economist Vilfredo Pareto introduced it. Joseph Juran popularized it.⁶
- Party** any entity that becomes engaged in a financial or commercial transaction, whether a natural or legal person such as a company, corporation, financial institution, unincorporated business, government organization, or not-for-profit entity.
- Payment** a means of settlement for a commercial or other obligation, such as an electronic credit transfer, direct debit, credit or debit card payment, wire transfer, automated clearinghouse payment (ACH), check, or cash. The payment is completed when the creditor receives the funds.
- Personal Productivity Software** software used for processing individual standards (for instance, WinZip, Adobe, MS Office, Google Apps, MS Project, and so on).
- Physical Value Network** a term used to describe the totality of organizations, systems, people, activities, information, and resources involved in moving a product or service from vendor to buyer.
- Platform** a business processing capability embedded in an information and communication system and its surrounding management.
- Policy** a general term for an operating procedure.
- Portability** the ability to run applications, components, or systems on one implementation and to deploy them on another, for instance that of another vendor.
- Problem** the cause of an incident. Incidents that cannot be resolved due to the lack of an available solution, as well as repeated incidents related to a known issue (“known problem/error”), pass through the process of problem management. A workaround could remediate the problem, before finding the root causes and resolving them.

- Process** a set of inter-related activities that transform a set of inputs on one or more results. Sometimes the process is identified with a system. It would be correct to regard it as a component of a system.
- Process Improvement** a continuous effort to learn the causes and effects in a process in order to reduce the complexity and the variations, and reduce the time required. The process is improved by removing the incorrect causes. Through the redesign of the process, it is possible to reduce the variations in common causes.
- Process Management** a method used to optimize the organization as a system, determine which processes need to be improved and/or controlled, define priorities, and encourage leadership to initiate and sustain process improvement efforts. It manages the information obtained in these processes.
- Process of Continuous Improvement** a structured approach that improves the overall performance of the organization by using methods appropriate to its problems. Its scope may be the quality or social responsibility of the business. Continuous improvement is called Kaizen in Japanese.
- Procure to Pay Cycle or Process (P2P)** represents the process steps and time interval between procurement, the issue of a purchase order, delivery of goods and services, receipt of invoice, and payment to the vendor.
- Procurement** refers to the initiation, design, development, acquisition, logistics of goods and services for the organization. Procurement generalizes further management of the supply chain, including strategic aspects and those outside the organization.
- Procurement Finance** this term generalizes the supply chain finance, including all financial aspects of the entire procurement process.
- Procurement Transaction** sets out descriptions, quantities, prices, discounts, payment terms, date of performance or shipment, and other associated terms and conditions, and identifies a specific vendor. It is used to control the purchasing of products and services from external vendors. When accepted by the seller, it forms the basis of a contract binding on both parties. It is also called an order.
- Program** a set of projects with similar objectives. An example is the improvement of systems installed at different subsidiaries of the same group.
- Project Teams** groups consisting of people from the same sector or, better, from different fields working for a certain period of time to improve the process.
- Purchase Order** a buyer-generated document or data set that authorizes a purchase.

- Quality** a concept not easily defined, because there are several variants, at times specified by an adjective or specification added to the name. In general, one can say that the quality is profitable customer satisfaction for the organization.
- Quality Checks** tools and operational activities undertaken to meet the quality requirements.
- Receivable** the amount due from a debtor or obligor to a creditor. This includes, but is more extensive than, trade-related account receivables. For instance, it covers the amount due under a negotiable tool.
- Relationship Manager (RM)** a dedicated customer service manager assigned to look after specific customers, usually high-net-worth customers.
- Reporting** consists of supplying and updating representative data and indicators whose degree of detail tends to vary depending on the person or organization for whom or for which they are intended. For the purposes of sustainable development, tools such as the GRI (Global Reporting Initiative) enable a standardized method to be agreed on at the international level. In a certain number of countries, there are laws that require that all organizations beyond a certain size publish a Corporate Social Responsibility or “sustainability” report.
- Service Vendor** an organization such as a bank, a telecommunication organization, or a merchant that provides services to be integrated, for instance, with mobile payments. By using technologies such as Near Field Communication (NFC).
- Sharing Economy** an economic model based on sharing, swapping, trading, or renting products and services, enabling access or use over ownership. It is reinventing not just what is consumed but how it is consumed.
- Short Message Service (SMS)** a system of communicating by short messages over a mobile telephone network. It can be rather secure if encrypted.
- Sigma (σ)** the eighteenth letter of the Greek alphabet. In statistical theory, it is connected with variance. It is a metric based on the number of defects that occur per million opportunities.
- Six Sigma** a method and a performance goal. The method is a structured approach to continuous process improvement. The goal is a measure of the performance of a process defined as the number of defects per million opportunities. It is a philosophy and a performance objective.
- Smart Contracts** a computer program that automatically executes a contract or part of it. These are automated and often blockchain-based contracts. They could save time and reduce costs in common transactions. Smart contracts

are computer protocols that facilitate, verify, or enforce a digital contract. The idea is that these programs potentially replace notaries, lawyers, and financial institutions when handling common legal and financial transactions. Technically, it is a piece of code which is stored on a blockchain, triggered by blockchain transactions, and which reads and writes data in that blockchain database.

Software as a Service (SaaS) a software distribution model in which applications are hosted by a vendor or service vendor and made available to customers over a network, typically the Internet. The users can access them online for a subscription fee, as opposed to users buying a software license outright.

Sponsor a person in the organization that sponsors the project, having the necessary authority and power. It is normally a member of the executive. Important to the success of the project.

Stakeholder an individual, group, or organization that is likely to be affected, directly or indirectly, by an activity, a program, or a particular arrangement of an organization. Stakeholders include all those groups that participate or are otherwise involved in its economic life (employees, customers, vendors, shareholders), those who observe the organization (unions, non-governmental organizations), and those that it affects either directly or indirectly (civil society, local authorities, and so on).

Standards indications of voluntary standardization.

Steering Committee also referred to as the committee of agile procurement. It includes representatives of the executive, the project leader, and the facilitators who meet regularly. Its main responsibilities are management of the efforts of the improvement process, assessment of the needs and oversight of the support and training within its area of responsibility, communication of progress to all stakeholders, and direction of the efforts.

Straight-Through Processing (STP) the implementation of a system that requires no human intervention for the approval or processing of a customer application or transaction.

Supply Chain Finance (SCF) defined as the use of financing and risk mitigation practices and techniques to optimize the management of the working capital and liquidity invested in supply chain processes and transactions. SCF is typically applied to open account trade and is triggered by supply chain events. Visibility of underlying trade flows by the finance provider(s) is a necessary component of such financing arrangements, which can be enabled by a platform.

System defined by Deming as “A network of interacting components that cooperate to achieve the objectives of the system.”⁷

Tablet a general-purpose computer contained within a single panel, with a touchscreen as the input device.

Takt Time the pace of production of products assigned to a cell.

Telematics denotes the synergy between telecommunications and informatics, indicated in this volume as ICT.

Throughput a metric of how quickly the service responds.

Time to Market in the process of development of new products, the time that elapses between the first phase of the concept of the new product and the launch on the market.

Total Cost Management (TCM) a business philosophy of managing the entire organization resources and the activities that consume those resources. Managing costs in a TCM approach means focusing on the activities and the events, the circumstances, or the conditions that cause or drive these cost-consuming activities.

Total Cost of Ownership (TCO) a metric that takes into account the costs throughout the life cycle of a solution. Typically, it includes procurement costs, installation, testing, maintenance, use, and disposal at the end of the useful life.

Trade Finance a “super-category” or umbrella term used by finance providers to describe their business lines, organizational units, and activities. Trade finance is usually used as a generic term for a range of traditional trade finance techniques and evolving SCF techniques.

Transaction the action of executing a function or an application. An example of a transaction is the execution of the purchase at the point of sale and the processing of authorization and clearing messages.

Trust the ability for two parties to define a trust relationship, with formal authentication of the two parties.

Validation a method to provide specific personal information to prove ownership of the identity for the purpose of identity verification.

Value Conceptually, it is the relationship between benefits and cost/damage of a product or service, expressed in terms of a product/service able to meet his/her needs at a given price and at a given time. It is also possible to talk about the value perceived by the customer as all the features of the product/service that the customer deems necessary and valuable.

Value Network a set of activities required to design, order, manufacture, and supply (or provide in the case of a service) a given product. These activities cover the entire path of the product/service from organization to end cus-

tomer. Objective analysis of the value network is to classify tasks into categories. The supply chain can be seen as the sequence of activities that brings value to the customer (and indirectly to the organization).

Value Network Mapping the identification and subsequent graphical representation of all the activities that are performed in the value network for a product/service or a family of products/services.

Variance in statistics, the average of the squared deviations. It is a dispersion index.

Variations changes in the quantity or time value between cases caused by acts and not predictable.

Vendor a person or organization that provides goods or services for use by the process that is designed.

Vendor Kanban it is a Kanban for handling/withdrawal. It is used for the handling of the material from the outside of the site/s of the organization in accordance with the management vendors.

Vendor-Managed Inventory (VMI) a family of business models in which the buyer of a product (business) provides certain information to a (supply chain) vendor of that product and the vendor takes full responsibility for maintaining an agreed inventory of the material, usually at the buyer's consumption location (such as a store). It is analogous to the holding of consignment stock.

Vision the expression of what would represent success for the organization. The goal is to produce a mental image to strive for in order to make sure the organization produces creative tensions between the current reality and the vision. Mission is the manner in which the organization must make progress towards the vision.

Voice of the Customer (VoC) the customer's voice, or the voice of the citizen in the case of public organizations.

Web 2.0 includes the web applications that facilitate interactive information sharing, interoperability, user-centered design, and collaboration on the World Wide Web.

Working Capital the financial resources invested by a business in financing its current trading operations, usually expressed as the difference between current assets (receivables, inventory, and operating cash balances) and current liabilities (payables and short-term debt).

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