KPMG

Future-proof procurement

Now or never: the big procurement transformation

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Contents

Preface

Future-proofing is the buzzword of the day. Even though everyone is talking about it, only few have the operational expertise to future-proof their organization. In this study, we define future-proofing as a core procurement strategy that applies market intelligence and environmental scanning, adapting and leveraging trends to transform the procurement function, forging a competitive edge for a secure, and above all successful, future. Until now, the essential criteria for future-proofing procurement and supply management has never been so purposefully compiled. This study succeeds in closing the future-proofing gap – and just in time.

Procurement professionals around the world stand on the threshold of a new age. The old paradigm of cost reduction and cost efficiency is drawing to a close. New and revolutionary concepts are spinning from the frenzied technological leaps of our time; especially in digital transformation. In this dynamic, complex and disruptive era, procurement leaders and experts the world over are searching for a secure, successful future. Future-proofing can deliver this security – provided the methodological and instrumental requirements this study discusses and proposes are in place.

This study is therefore particularly directed toward future-oriented members of executive boards, chief procurement officers, procurement managers, supply (chain) managers, and product group managers as well as procurement-relevant representatives in science, associations and politics. Other corporate functions like controlling, human resources and marketing also benefit from the future-proofing best practices presented here in greater depth – which is also interesting, as future-proof controlling does not yet exist.

Responding to the question, – Will procurement as we know it exist in the future at all? – this study provides tangible orientation and guidance scenarios for future-proof procurement.

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1 Executive summary

"We will either find a way or make one."
Hannibal (247/246–183 B.C.), general and statesman of Carthage

Future-proofing and procurement transformation are interdependent. It is not possible to achieve one without the other. An increasingly volatile and disruptive future is approaching, and can only be mastered through sweeping, future-proof transformation.

Even now, managers are intuitively applying market developments and trends to the more informal "corporate foresight". These useful components promote professional futures management, employing indispensable elements such as uncertainty analysis, scenarios, opportunities and wild cards. The following short summary presents the key results of this combination.

Total foresight

There are a few ground-breaking trend studies available for procurement, but still no extensive futures studies with long-term scenarios and wild cards. This study closes the gap.

Sweeping transformation

The uncertainty analysis of this study shows that the procurement function is under powerful pressure to transform. Consequently, there is a discussion about whether procurement will exist at all in 20 years, or if procurement tasks will be performed by algorithms and networked machines. If procurement is to survive in this disruptive environment, it must be quickly and extensively reinvented.

Visionary scenario scope

Despite this uncertain environment, radical scenarios can be plausibly deduced and consistently described. Four possible future scenarios of procurement were developed. The most pessimistic is the gradual replacement of procurement through algorithms. The most optimistic elevates the function to the veritable ruler of operational functions, due to its access to key supply chain data. The other two scenarios foresee, a) the implementation of fluid

organization, without a definite functional structure, or b) reinventing the procurement function as a creative agency. In fact, in our fluctuating environment, all four of these quadrants may be found in specific organizations.

Future opportunities

These four scenarios lead to a wealth of future opportunities. Their application symbolizes future-proof procurement while allowing for ongoing transformation. Among these opportunities are viable short-term "low-hanging fruits" such as procurement boot camps; medium-term options such as the development of global business services, and ultimately, long-term strategic opportunities such as prospecting secondary raw materials from civilization and production waste (urban mining).

Nice surprises

Wild cards make the unpredictable future more predictable. This study discusses the entire scope of these potential risks/opportunities, including the big Internet crash, fully autonomous and automated companies devoid of human staff, the negative effects of ecological terrorism, and nuclear fusion putting an end to scarcity with food from the printer and household and maintenance robots.

Strategic implications

All of the above imply strategic orientation for procurement professionals and companies, ranging from virtual collaboration rooms to innovative leadership. Another facet of this strategic orientation is intensifying the professionalism of procurement's role in education, increasingly integrating procurement in academia and in business practices.

Principles of future-proofing

The foresight process with its uncertainty analyses, scenarios, opportunities and wild cards increases the existing future-proof quality of procurement. It renders the entire organization more future-oriented, flexible and shock-resistant. The more structured the actual transformation is managed, the faster it is achieved. A checklist with the ten principles of future-proofing provides this structure and is included in this study.

2 What inspired this study?

"An investment in knowledge pays the best interest."
Benjamin Franklin (1706–1790), one of the Founding Fathers of the United States

The issue of "future" procurement has occasionally popped up, but only in severely fragmented contexts. If contemporary procurement would gaze into the future, it would predominantly discover trends. The great potential of futurology, with over 30 methods and instruments, far exceeds mere trend observation and has not even come close to being fully utilized.

Lost opportunities strongly restrict the depth, breadth and focus of any future prognoses made thus far. This study breaks through limiting restrictions by providing a profoundly more extensive variety of futurology tools. In addition, it also gives the interested reader a guide to erecting their own procurement futurology structure in the form of a handbook. Illustrating the urgent need for one's own future-proof procurement manual are the five current trends described below, which will gain importance in the future.

New key competency: dynaxibility

Smart Grid, Smart Homes, Industry 4.0, Quantified Enterprise or the Internet of Things are only some buzzwords that are responsible for the rapid spread of digitalized, autonomous and networked machines, devices and economic entities at the cusp of the Digital Age. In the course of our economy's digital transformation, new job profiles and business models are created which demand completely new role requirements, key competencies and brand new skills.[1] Or, as Eric A. Spiegel, President and CEO of Siemens USA put it: "Did you know that 50 percent of the jobs in America today didn't exist 25 years ago? And that 80 percent of the jobs students will fill in the future do not yet exist today?"[2] As a result of this increasing development of changes, structural breaks and complexity, the need arises for procurement and supply chain managers to acquire a new key competence: dynaxibility. It is the ability to competently manage dynamic and complex (dynaxic) developments – in other words, to manage our near and distant future.

The new planning paradigm

In assessing performance excellence, the choice method up until now has been benchmarking. Despite its undisputed advantages, the method also has one strategic disadvantage; it is oriented toward and focused on the past. The moment a benchmark is applied, it is already outdated. Benchmarking is simply not able to determine what the benchmarked best in class will do tomorrow, in order to maintain and improve its best in class status and increase its future return on procurement (RoP). This gap, which is particularly dangerous in dynaxic times (see above), necessitates a change in the strategic procurement planning paradigm. It should, in the actual sense of the word planning, be oriented toward the future. This can only be achieved by implementing scenarios, trend compendia and wild cards, as conveyed by this study.

Great uncertainty

An Asian automobile manufacturer shifted the bulk of his internal procurement function to the product development department. Moreover, around 70 percent of his European competitors' innovations are already coming from suppliers. This describes only two of many dramatic developments in procurement, raising urgent questions such as – Will procurement, as we know it, still exist in 20 years? Will tactical procurement soon be outsourced to India? These and many other future concerns trigger a high degree of uncertainty in management and associated representatives. This uncertainty is further intensified by widespread automation and the digitalization of current procurement processes, which brings us to another question – Will this soon be the case for the majority of procurement processes?

The trend paradox

There are quite a few good trend surveys on and about procurement. Their advantage is that they provide an abundance of information on current developments. Their disadvantage is that they

1 All footnotes: see page 51

deny the reader the most important element of a robust solution for future management – transferring their findings into management practice. And another thing, they usually don't present trends in a correlated manner. The result provides no overall picture of the near and distant future; no insight into the reciprocal influences, dependencies and causal links of the individual trends. In times of global and digital networking, this perspective is a symptom of an isolationist and reductionist world view, which is obviously obsolete. In dynaxic times, everything is interrelated; therefore, global interdependency must also be represented in planning practice. Strategic procurement planning needs more than just trends, it needs specific correlations between individual developments and management practice. Scenarios are literally predestined for this task.

Out-of-the-box

Procurement planning practices display a strong short- to medium-term orientation. This is rather one-dimensional; a much too short-lived perspective for durable future procurement. It does not account for out-of-the-box phenomena like weak signals, wild cards, structural breaks and strategic surprises, or even potential technological leaps. Admittedly, such phenomena were once isolated occurrences in the comparatively stable market conditions of the past. Today, it is not an exaggeration to say the future is full of surprises. This makes thinking out-of-the-box, also known as lateral or unconventional thinking, a key competence for future-proof procurement. The title of this study encompasses this ability to break out of established thought patterns. This is not about predicting short-term trends; it is about comprehensively transforming the entire function toward future-proof procurement.

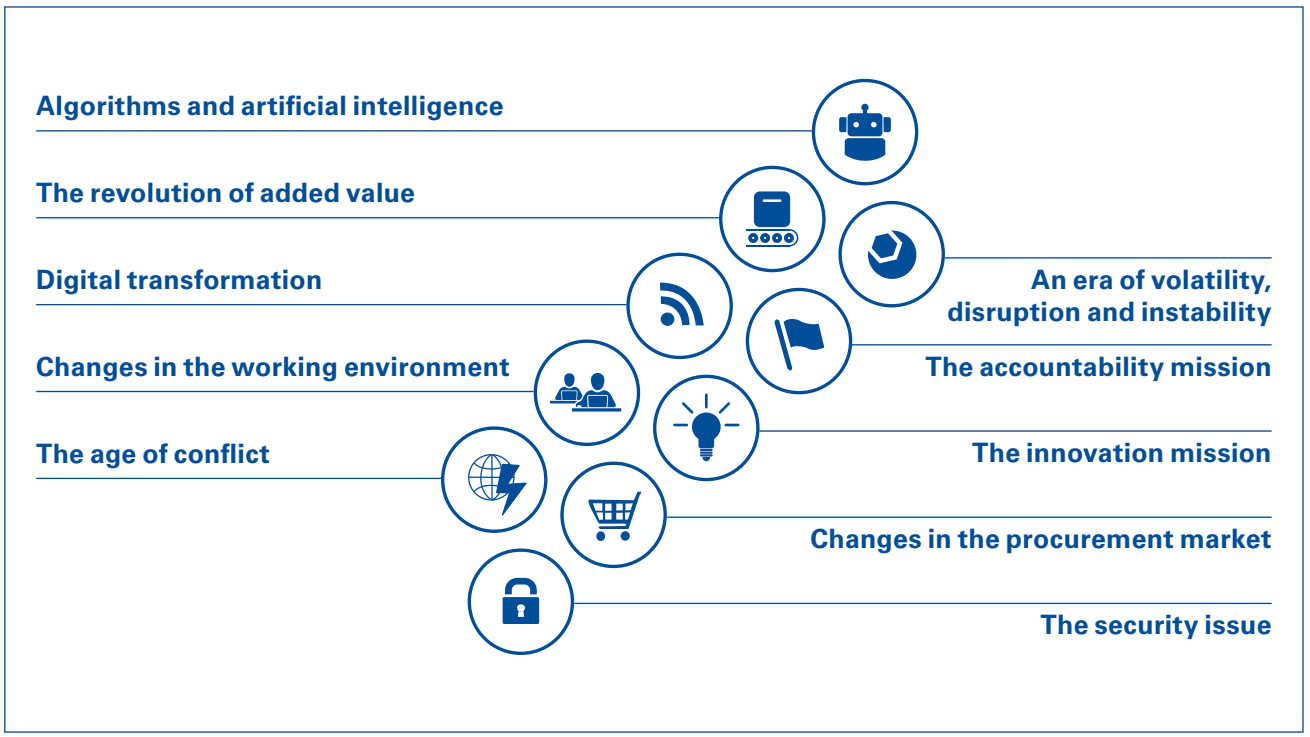
Conclusion

When we speak about future-proof procurement, we are not addressing manufacturers' and suppliers' anticipation of quarterly tariff adjustments. Every experienced purchaser can make these short-term prognoses practically intuitively – and reliably – every day. When we address future-proof procurement in the sense of enlightened futurology, we set the event horizon much further ahead, thinking "out-of-the-box" and selecting forecasting tools with the most extensive field of vision. It is the only way to provide comprehensive procurement transformation with the best possible support across its entire breadth and depth. This transformative impetus is presented on the following pages.

3 Environmental scanning: keeping uncertainties in mind

"If you do not expect the unexpected you will not find it, for it is not to be reached by search or trail."
Heraclitus (535–475 B.C.), Greek philosopher

No other phenomenon determines the future of procurement as uncertainties do. The primary threat that arises from uncertainties can be put to use. With a broad palette of uncertainty factors in mind, procurement managers can develop future scenarios and cast reliable prognoses into the future. A key challenge for future-proof procurement therefore entails accurately following as many of these uncertainty factors as possible on the radar. Below you will find selected uncertainty factors, which are especially significant for procurement in the future.



Source: KPMG, 2016

Algorithms and artificial intelligence on the rise

The procurement process is currently undergoing increasing and continuous standardization and automation. Simultaneously, the development of artificial intelligence is making such rapid progress, that algorithms will soon be able to take over a growing number of procurement tasks.

For example, in the near future, a decision dashboard is conceivable; a world map showing the buyer in which countries disturbances in the value supply chain can be expected in the coming hours, days and weeks. Google's project "Global Database of Events, Language, and Tone" (GDELT) already gives us an idea today of what could be possible tomorrow. The software analyzes one quarter of a billion television, print and web news contributions from the past 30 years, in over one hundred languages from 140 countries, for the sole purpose of anticipating developments based on historical analogy.[3] Automatically computer-generated reports are also currently spreading on the stock market, in financial institutes and in the media.[4] The AI-generated reports could also provide significant relief to procurement when it comes to documentation requirements and auditing.

Despite a world of algorithms, it would still not be mandatory to replace the buyer. The buyer could take on a proactive, creative role in company-wide risk management. While intelligent procurement systems identify anomalies and patterns in data and processes, the procurement professional uses these to initiate targeted measures such as ad hoc supplier audits or product quality tests before an incident occurs. Predictive policing systems follow the same type of logic and are currently being successfully tested in many places to anticipate when and where a crime will take place.[5] This prospective revaluation of the buyer would correspond with studies at Oxford University, which calculated that although over the next 20 years many of today's jobs are threatened by automation, they can still be upgraded to a different form.[6] Skills such as social intelligence, creativity and perception/manipulation are lacking in computerization and can be provided by a skilled buyer. In this scenario, the algorithm is then actually an indirect job upgrade.

The revolution of added value

The 3D printer is revolutionizing production and consequently, procurement. Analysts expect that the current global market for printers, materials and services of 5.2 billion USD in 2015 will grow to 20.2 billion USD by 2019.[7] The relevant technologies promote a retroactive integration of processes within the value-added chain. In the future, anything a company can print by themselves on a 3D printer must no longer be physically externally procured. Suppliers would only need to send the data for printing. 3D printing therefore creates new challenges and opportunities for skilled buyers who will have to ensure data security, safety standards and the protection of intellectual property and patents, i.e. copyrights or licensing.

In contrast, the material requirements for 3D printing would be easier to calculate, a task certainly requiring appropriate professional expertise. The pivotal question in the future will be – To which extent and for which articles will outsourcing production processes still make sense?

Considering that the in-house value creation output of various companies has fallen as low as 20 percent, it could increase again to more than 60 percent. A scenario of this nature would have massive implications for procurement. Particularly MRO (Maintenance, Repair and Operating) parts would then be produced in-house, and would not require procurement. In the future, a core procurement segment, the procurement of spare parts, could be completely taken over by production. Governments would then push retroactive integration and reindustrialization, with the intention of protecting knowledge, growth and jobs.[8]

In this type of scenario, buyers of the future would not be responsible for procuring spare parts, but bulk goods and 3D data for printing systems. As to these bulk commodities, let's say plastics or ceramics, it will be less about specification and more about price efficiency. Current estimates already project an average annual growth rate on the global raw materials market for 3D printers at 20.4 percent by 2019, amounting to 1.052 billion USD.[9]

Digital transformation

Today, the operational functions of research, development and production are increasingly shifting their planning and design processes to virtual spaces.[10] If, for example, production is planning and designing new products in a virtual space, participating employees must then actively contribute to the development of products and solutions in these virtual processes, especially in view of the oft-cited early integration of procurement. Buyers must possess the virtual competence necessary to properly manage suppliers in these virtual spaces. And not only for that. Progressively growing digitalization means procurement managers are increasingly active in virtual catalogs, marketplaces and platforms. Current surveys show that the percentage of operational buyers (B2B) who purchase goods online is growing drastically, most recently from 57 percent (2013) to 68 percent (2014).[11]

Technologically, digital avatars can conceivably provide a virtual, photorealistic viewing of supplier locations and operations. By wearing a virtual reality headset, the buyer can view onsite supplier production from the comfort of his/her office. The signs of the times point in this direction. In the real estate as well as the tourism industries, for example, such technology is currently being dubbed an "industrial revolution". Viewing apartments with virtual data goggles open up a whole new range of opportunities.[12] In the face of dwindling vacation time, the tourist industry is currently speculating on so-called

digital tourism as a contemporary supplement to, and substitute for, actual tourist travel.[13]

To the extent that digital transformation is also transforming our society into a knowledge society, our economy could likewise change into a knowledge economy, or even into a "human economy", where not only intellect, but especially creativity, passion, character and team spirit will make the difference.[14] To an even greater extent than they are today, buyers will become experts on the procurement of professional services such as creative services.[15] To achieve this, procurement would have to cooperate much more intensively with other internal functions such as human resources, engineering, and research and development.

Changes in the working environment

Over the years, the diverse range of procurement activities has broadened considerably. This diversity can no longer foreseeably be encompassed within a standardized job profile.[16] It is therefore likely that the once relatively homogeneous buyer job description will be broken down into several special areas and roles, i.e. supplier coach, data strategist or e-procurement specialist. Since the mid-1990s, procurement has been steadily progressing in professionalism and academization.[17]

Considering this development in 20 years from now, there is one conjecture that is not as erroneous as it sounds - in the future, the majority of CEOs could come from procurement. Studies show that CEOs generally have a finance or engineering background and have formerly held a management position in finance.[18] And the number of prominent CPOs successfully landing a CEO position is growing. Take Apple CEO Tim Cook, an exemplary member of this group.[19]

A further aspect of the changing working environment is a result of automation and digitalization. If larger parts of the procurement process are automated, and if, simultaneously, strategic competences and decision-making in procurement are increasingly required in other functions, i.e. production, Research & Development (R&D) or Human Resources (HR), will there even be a procurement department in the future, or will procurement managers become specialists in other departments? Another question that arises is whether the future procurement professional will be employed in traditional full-time positions. Statistics confirm that we are rapidly heading toward a freelance economy. 34 percent (ca. 53 million people) of the workforce in the US are already freelancers, and forecasts predict that this number will increase to 50 percent by 2020.[20]

The age of conflicts

The greater the number and the more widespread global conflicts occur, the higher the regional and national risk to the corresponding supply chain becomes. The conflict barometer of the Heidelberg Institute for International Conflict Research recently counted a total of 424 conflicts (2014) worldwide, which are affecting a growing number of countries – the highest number reported by the Institute since it began its work in this area in 1991.[21] The disproportionate global distribution of affluence, education, opportunities and commodities provokes conflict. According to the 2014 Global Risks Study of the World Economic Forum, the widening gap between poor and rich has the greatest potential to cause massive global damage in the next decade.[22] Currently, about 1 percent of the global population owns almost half of the global assets.[23]

As war engenders social turmoil, political instability and regional conflicts, it equally threatens the economic infrastructure and the supply chain partners' delivery reliability within the afflicted countries. The Chartered Institute of Purchasing and Supply cooperates with Dun & Bradstreet to create the CIPS Risk Index for global supply chain risks. The risk index rose steadily from 24.4 points in 1994 to its previous all-time high of 84.4 points in 2013. Current risk hotspots are sub-Saharan Africa, Asia, Eastern Europe and Latin America.[24]

Another conflict initiator is the powerfully increasing demand for raw materials such as rare earth, potable water, energy resources or precious metals. Simultaneously, these same natural resources are being voraciously exploited. According to the World Wide Fund for Nature (WWF), every year we consume 50 percent more resources than the earth is able to regenerate within the same period of time.[25] According to statistics experts, this means that by 2030 two planets will be necessary to supply the global requirements for food, water and energy. In addition, within this so-called WEF nexus (water, energy, food), each resource contains its own inter-

dependent supply risks, influencing the other two. This makes it even more worrisome that over the next 15 years the global demand for food, water and energy is expected to increase by 35, 40 and 50 percent respectively.[26]

An era of volatility, disruption and instability

For companies, VUCA situations (volatility, uncertainty, complexity and ambiguity) are no longer isolated states of emergency, but rather increasingly frequent occurrences.[27] The number of natural catastrophes in the past 10 years, a total of 3,583, is four times what it was in the 1970s.[28] An S&P 500 analysis of annualized volatilities also indicates an increase of 15 percent (1982–2007) to 21 percent (2008–2014).[29] With growing supply chain disruption, instability thrives, and with it the need for a future-proof management efficiently consolidating preventive, proactive and reactive measures. In a world of flat organizational structures, characterized by global supply chains, we must become more skilled at managing VUCA.

Procurement already successfully implements planning instruments like benchmarking and portfolio and market analyses to develop targeted strategies. But increasingly turbulent environmental requirements make it necessary to adjust planning practices. In order to weigh and make reliable decisions in the future, supplementary foresight methods in the form of wild card analyses, business war gaming, game theory and risk simulations will be urgently needed.[30] It goes without saying that their implementation requires a new, broader understanding of procurement, coupled with the appropriate qualification.

Crowdfunding is an additional catalyst of high market volatility and disruption. World Bank experts deem it realistic that the global crowdfunding market will grow to 96 billion USD by 2025 (2012: 2.7 billion USD), which is 1.8 times of today's global venture capital industry.[31] The Chinese crowdfunding market share alone could account for up to 50 billion USD. This would result in small and minor innovations, previously stifled by insufficient budgets, receiving more funding than ever before, even in emerging markets. This could lead to a profoundly fragmented product and technology landscape, consequently generating new complexities in the global procurement market. A key skill for procurement planners of the future is to develop tracking systems that follow crowdfunding capital, seizing these innovations before one's competitors.

The accountability mission

Economic responsibility in procurement has gradually expanded over the last few years. Nowadays, purchasing departments are also subject to extensive calculations and evaluations pertaining to ecological and social sustainability. This applies to the economy as well as to the public sector, whose procurement volumes add up to 2 trillion EUR per year in the EU alone.[32] Corresponding integrated sustainability goals can be found in the Europe 2020 strategy (Green Public Procurement). Most recently, government leaders at the G7 Summit 2015 in Elmau, Germany called for social and environmental standards, and their consistent implementation in global supply chains.[33]

One challenge for organizations will carry on into the future – the prevailing ecolabel jungle. Many procurement managers are still familiar with IIRC, UN Global Compact, GRI, CDP or SASB standards, but the Ecolabel Index Directory lists a total of 463 ecolabels in 199 countries, across 25 industrial sectors (status, March 2015).[34] Certificates and quality labels are therefore the latest trend. Experts expect their numbers to grow in the years to come.[35] This will make it even more difficult for procurement managers to maintain an overview of ecolabel diversity and content, particularly regarding their suitability, efficiency and public reception.

A special aspect of accountability is the trend toward end-to-end procurement solutions. When these are applied, procurement is responsible for the complete "cradle to grave" lifecycle of procured items and goods. For example, products with components that can be neither replaced nor repaired or become obsolete will be harshly evaluated as an infringement against holistic responsibility. Issues of workplace safety, child labor and supplier accountability will become more visible in transparent global supply chains and need to be managed.

Procurement will also be accountable for newly introduced legal aspects regarding technological development. With reference to 3D printing, for example, there are still many legal issues concerning intellectual property rights that have yet to be clar-

ified. Experts estimate damages due solely to illegal 3D copies at 100 billion USD by 2018.[36] As to the Internet of Things, a network projected to connect billions of devices, machines and systems, the procurement agent will be confronted with the responsibility for electronic security.

The innovation mission

Procurement holds enormous innovation leverage, especially for boosting the cost efficiency of new products. Under the same conditions, procurement can achieve more with innovations than sales can (known as purchasing multiplier in procurement and materials management). This is particularly the case when cost-saving programs are not implemented perforce, ad hoc and under acute cost pressure, but rather continuously, in a targeted and innovative manner. A current example is the frugal engineering trend, which basically develops simpler, more cost effective, higher quality and more robust products for mass market needs in emerging countries.[37] This requires supply chain partners to enter a new dimension of innovative spirit, particularly when decision-makers aim to serve users who face extreme affordability constraints. Frugal engineering usually starts with a strong focus on removing nonessential features of products.[38] Procurement's innovative power makes it pivotal in achieving such goals.

When it comes to innovations, a well-informed procurer also knows which suppliers can and should be involved in development processes. He/she is the gatekeeper to the suppliers, initiating early supplier involvement. Proficiency in cooperation and collaboration, in coopetition and co-creation are crucial to the innovative strength of procurement, even more so in the future. This, however, requires a transition from classical, hierarchical customer-supplier relationships to partnerships on equal terms, opening innovation processes (open innovation).

Innovative impulses for future procurement will also and specifically arise from social media, which provides a transparency in information dissemination that spreads virally, practically instantaneously. A central challenge will be implementing appropriate platforms to capture important, company-specific information, while discarding the irrelevant. Decision-makers particularly want impulses toward a more effective, responsive and cost-efficient communication throughout the value creation chain.[39]

Changes in the procurement markets

In some cases, numerous factors fuel radical change in procurement markets. A powerful impetus for change is the progressive industrialization of production markets like China, which raises labor costs, while curtailing the allure of outsourcing and offshoring in these markets. Since 2001, hourly wages for Chinese production have increased on average of 12 percent per year.[40] Alternative destinations in Asia (e.g. Vietnam, Myanmar and Indonesia) and Africa (e.g. Ethiopia and Kenya) but also European sourcing markets are gaining in importance. As a result, the number of multinational companies (MNCs) should continue to grow worldwide. MNCs have increased from 7,000 to almost 104,000 in the last 50 years and could continue to grow to 140,000 by 2020.[41]

A second force stimulating change is the constant technological development in production; primarily additive production and cyber-physical systems. It is conceivable that erstwhile production networks will develop strongly in the direction of decentralized "fab shops", which, as cross-industry contract manufacturers, will print parts and products for all industries. Within these production networks, suppliers will increasingly act as development service providers for electronic models. The global market for industrial robots is expected to grow from 28.93 million USD (2013) to 44.48 billion USD in 2020.[42]

A shift in consumption structures presents a third change-influencing factor for procurement markets. Particularly the trend toward collaborative consumption (shareconomy) can decisively change procurement. For example, many car manufacturers now offer car-sharing services as an alternative to owning a car. Users can access a car when and where they need it, paying for usage by the minute, for example. Experts estimate the global shareconomy market as high as 350 billion USD.[43] What would the (procurement) world look like when only 20 percent of consumables were produced and 80 percent shared?

The security issue

It is a known fact that purchasers represent a special risk group due to their decision-making power over big budgets, some of them more than 50 percent of the company's turnover/sales. Thus, the

damage caused by economic crimes in procurement can devastating.

As a result of digital transformation, the risk of supply chain disruption is also rapidly growing. Therefore, it doesn't really help if a company succeeds in keeping its security standards up to date, since the Internet of Things and increasing exchange of machine-to-machine (M2M) information are not only popular for their productivity driving properties, they are also developing into the perfect gateway for cyber criminals. Current studies show massive economic damage provoked by data security incidents. For large companies, such an incident causes damages averaging at 720,000 USD.[44] When it comes to extensive supply chain networks and major supplier bases, cyber criminals obviously don't aim for the strongest, most highly secured link in the chain, but for the weakest. Reports of cyber-attacks on third-party suppliers, to obtain, for example, confidential customer information, are on the rise.[45] In this age of digital transformation, viable security leak prevention demands that integrated supply chains make an even greater effort to bundle digital information, allowing for a comprehensive assessment of the value chain's protective architecture. This is especially the case when companies increasingly follow the quantified enterprise trend, aiming to maximize data management for organizational knowledge production.[46]

For all company functions, cyber security costs will evolve into a major expenditure and, according to analysts, can even expect a growth rate of 20 percent in the coming years.[47] As a result, buyers must be more intensively schooled in technical solution options – providing that they are able to acquire the corresponding competence in time to support the other in-house functions as a business partner.

Cyber security will increasingly become a top spend for all other functions of a company and, according to analysts, can even expect a growth rate of 20 percent in the coming years. As a result of this development, buyers must be more intensively integrated in the selection of technical solutions.

Management transfer: uncertainties on the radar

Uncertainties are the absolute basis for strategic foresight. More precisely, their careful and continuous collection.

1. The more uncertainties targeted by your future-proof procurement, the more substantiated, transparent and robust your future decisions will be. Experienced future managers have 150 to 200 individual uncertainty factors (UFs) on the screen.

2. The uncertainty category encompasses everything involving conflicts, areas of tension, crises, threats, problems, structural breaks or technological leaps.

3. Maintain a wide range of these factors in a database and prioritize them. The traffic light (red, yellow, green) system has proved successful in practice.

4. Uncertainties are not static, your database "lives". Week after week, depending on the level of information, some factors will become less important while others gain importance, depending on their current intensity and significance for your procurement and your company.

5. For a better overview, classify uncertainties according to their sectors, i.e. politics, economy, technology, ecology and society. Validate the uncertainties, or better yet cross-validate them (with two or more sources), e.g. using expert talks, literature, Internet, trend databases, news channels, surveys, studies, blogs ...

The UF paradox says, the more uncertainties that you have on your screen, the more certain your foresight of the future will be.

4 Scenarios 2035Plus: thinking in alternatives

"We view things not only from different sides, but with different eyes; we have no wish to find them alike."
Blaise Pascal (1623–1662), modern theory of probabilities founder

"There is no longer one future on the horizon" – at least not from a current vantage point. That is why determined attempts to forecast a single scenario for the future only heighten the risk of being off the mark with a solitary "shot". A selection of scenarios taking a wide range of options into account is much more reliable and relevant. In the following chapter, we will present a selection of scenarios, applying the scenario-axes-method (2×2 matrix).

We have selected the following scenario axes: The organizational structure of the company and its supply chain are on the horizontal axis. The vertical axis indicates the degree of digitalization with a specific focus on artificial intelligence distribution. Both phenomena are crucial to developments over the next 20 years since, depending on their magnitude, they signify essential changes in procurement strategies and processes.

Degree of digitalization

Age of human centricity — **2035Plus** — **Age of algorhithms**

– Physical	– Autonomous
– Manual	– Organized/planned
– Self-determined	– Sequential

– Virtual	– Networked
– Automated	– Global
– Unbound	– Dynamic
– 24/7	– Real-time
– Other-directed	

Organization structure

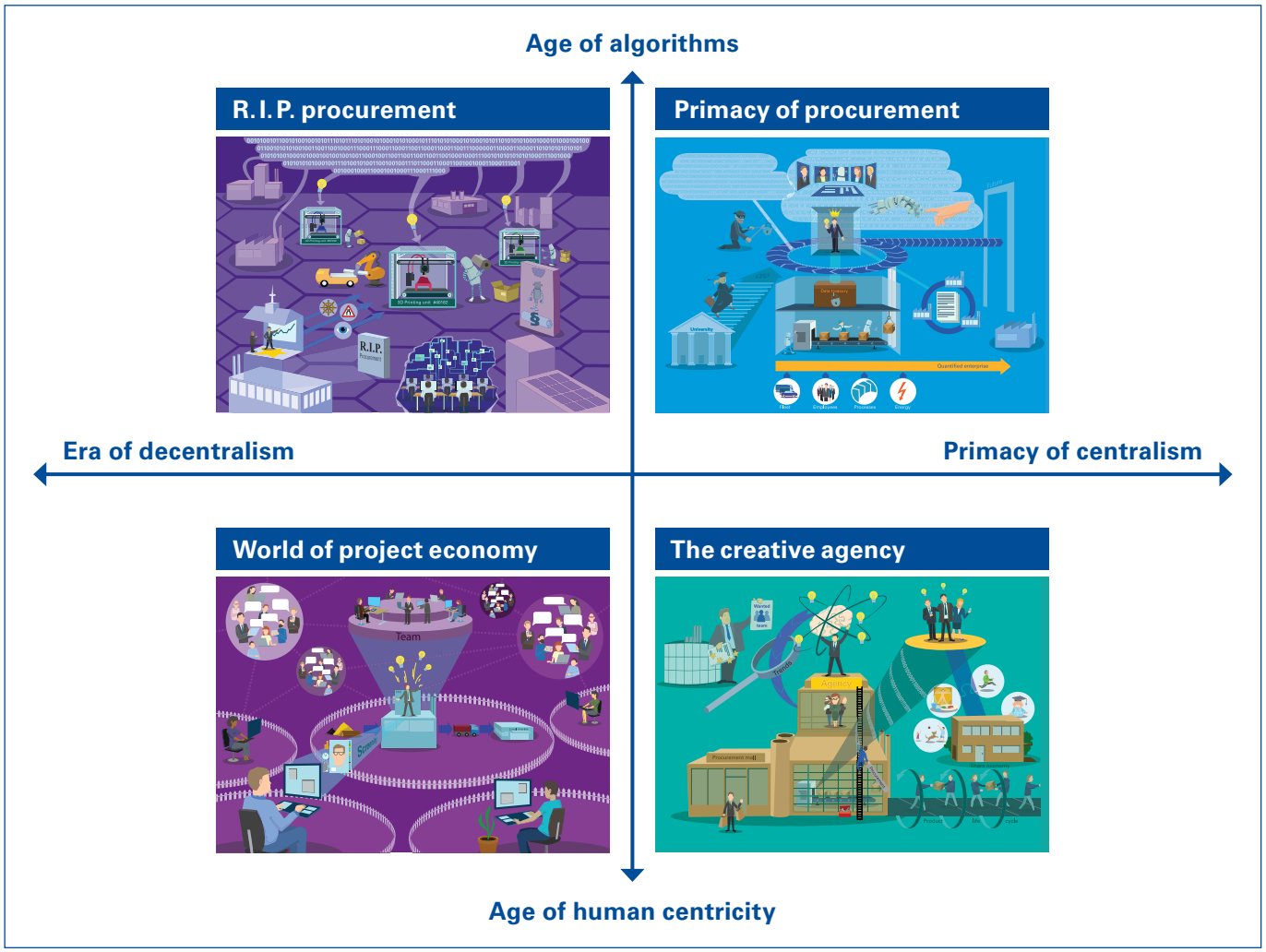
Era of decentralism — **2035Plus** — **Primacy of centralism**

– Flexible	– Distributed
– Fluid	– Local
– Atomized	– Fragmented

– Clustered	– Synergetic
– Combined	– Concentrated
– Regional/ centralized	

Source: KPMG, 2016

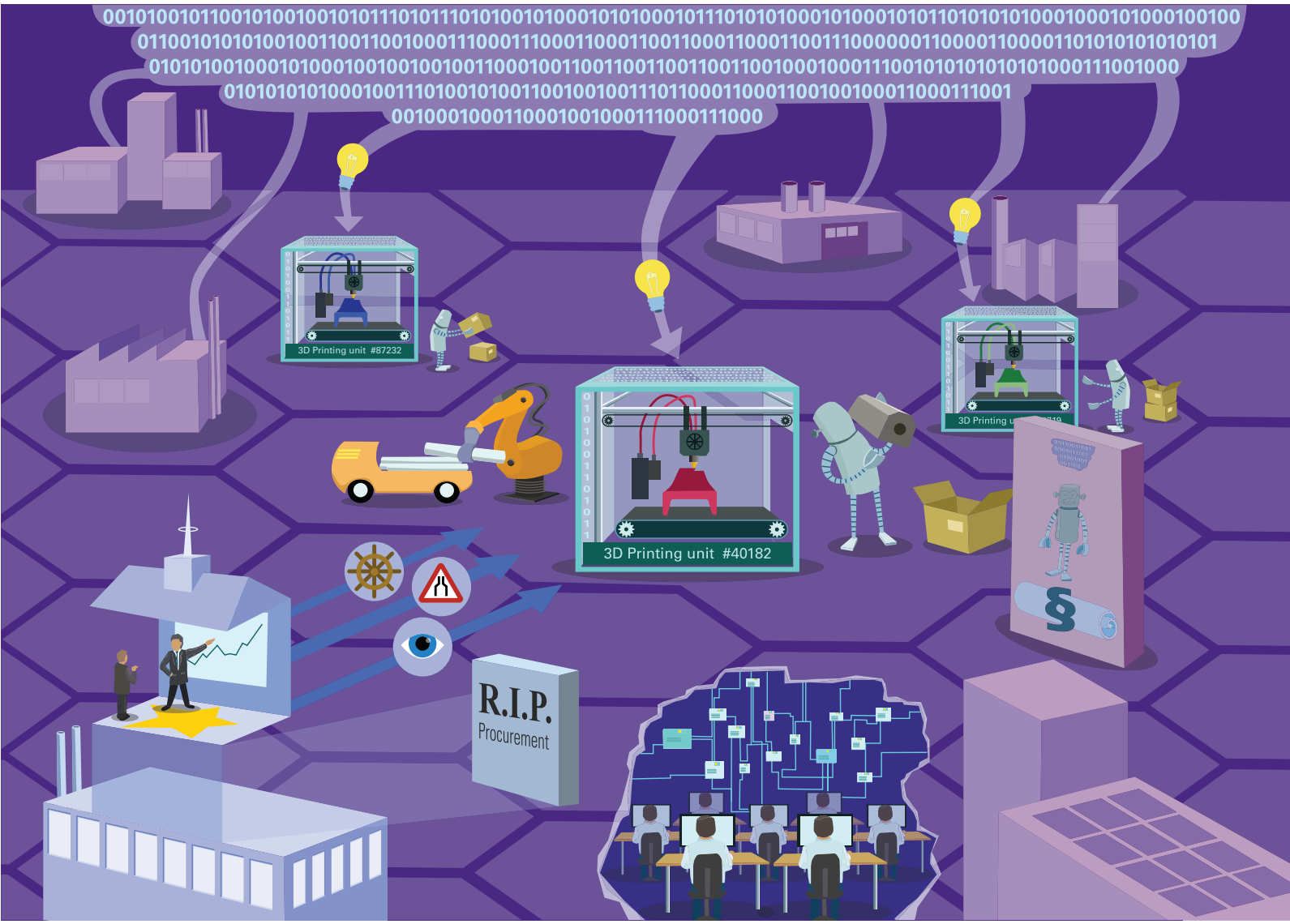
Two axes result in four scenarios. These four schemes do not characterize any "comfortable" futures, but rather present a stark picture of the years to come. When transferring information into practice, extreme images are clearer, sharper and significantly more graphic than moderate descriptions. The objective here is to combine many conceivable elements to shape consistent and plausible scenarios. Therefore, varying themes can be weighted in varying degrees.



Source: KPMG, 2016

Scenario I
R.I.P. procurement: procurement is passé

"Rest in Peace" – In this scenario, procurement is laid to rest because technology has developed so dramatically (vertical axis) that most procurement processes are fully automated, making procurement as we know it obsolete. Artificial intelligence is widespread and company organization is predominantly decentralized (horizontal axis).


3D Printing unit #87232
3D Printing unit #40182
R.I.P.
Procurement

The world…

… has changed dramatically. In the meantime, there are more robots and artificial intelligence (AI) than people on earth. Both of these technological advancements have become so crucial to economy, administration and society, that AI personality rights are being implemented.

Technology…

… is omnipresent in everyday production and consumption. The keyword is ubiquitous computing (UbiComp). Cross-industrial corporate networks are fully transparent. Prices for products, services and raw materials can be accessed in real-time from the cloud. Risk management is fully automated and in real-time.

Companies…

… produce goods in a predominantly uninhabited, machine-operated world. Almost all processes are digitalized and automated. This results in a new, decentralized organizational paradigm for the economy. Strictly speaking, corporate headquarters no longer exist. Controlling and monitoring are spatially separated from production.

The working environment…

… is characterized by polarization. Algorithms have replaced humans for all information processing jobs – particularly office jobs. While middle and lower management have ceased to exist, an elitist top-management class and a host of operational system supervisors has emerged.

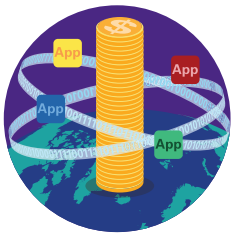
Value creation…

… is decentralized to many production shops, producing for all industries and scattered around the globe. This is made possible by, among other things, the rapid spread of 3D printing. For example, one day factory shops print a chassis for the automotive industry and on the next they print components for the prefab construction industry.

Security…

… is at an even greater risk than it is today. The automated world offers a multitude of potential gateways for hackers and industrial criminals. One of the main tasks of people in this world is to ensure safety and stability. Therefore, most corporate jobs serve to monitor and improve processes and systems.

2020



Digital transformation: 65 percent of Fortune 500 companies have disappeared from the market since 2000 (2015: 52 percent)

Market for the Internet of Things grows worldwide to 6 billion USD (2013: ca. 2 billion USD) – Worldwide shortfall of more than 1.5 million cybersecurity experts (2014: 1 million)

2025

Top news: "50 billion networked devices in the Internet of Things" (2015: ca. 5 billion)

Global market for cloud computing (software, hardware, services) surpasses the 500 billion USD mark (2015: 183 billion USD)

Innovations …

… are no longer a result of traditional research, but come from the cloud. Comprehensive data analyses detect new patterns in the data cloud, which are subsequently developed to create new concepts, services and products. Predictive analytics recognize trends independently and prescriptive analytics subsequently recommend the appropriate intelligent and automated innovative products.

Accountability …

… is ultimately a rule; a routine; a mathematical function of intelligent systems. Machines automatically ensure that all orders meet sustainability and compliance criteria such as the Zero Waste Regulation.

… and procurement?

Generally speaking, the tactical and operative tasks of procurement have been taken over by systems and machines, by networked cyber-physical devices and artificial intelligence. Strategic decisions determining, for example, supplier partnerships in a corporate network, are no longer made by procurement, but are now the responsibility of product management and development or of executive management – and even these decisions are researched and established by the systems. Hence, the traditional procurement department no longer exists. As a result of technical innovations and algorithms, it has gradually self-destructed. Interestingly enough, the traditional sales person's job is also obsolete. In this R. I. P. scenario, the marketer's aim has shifted to vying for the highest ranking on search engine algorithms.

The systems handle all processes fully automatically, within a defined parameter. They procure material/services, initiate the order, handle monitoring and even learn from previous mistakes. System monitoring and testing for inconsistencies is now in the hands of so-called data strategists and system operators.

In the era of cloud dominance and transparency, little attention is given to cost-saving measures. The focus now lies on system stability and winning the best partners for your network.

2030

News: "Historical Moment: Earth is populated by more robots than people"

TV evening talk show: "Crown law for robots!"

3D printers at home in 5 percent of private households (2015: less than 1 percent)

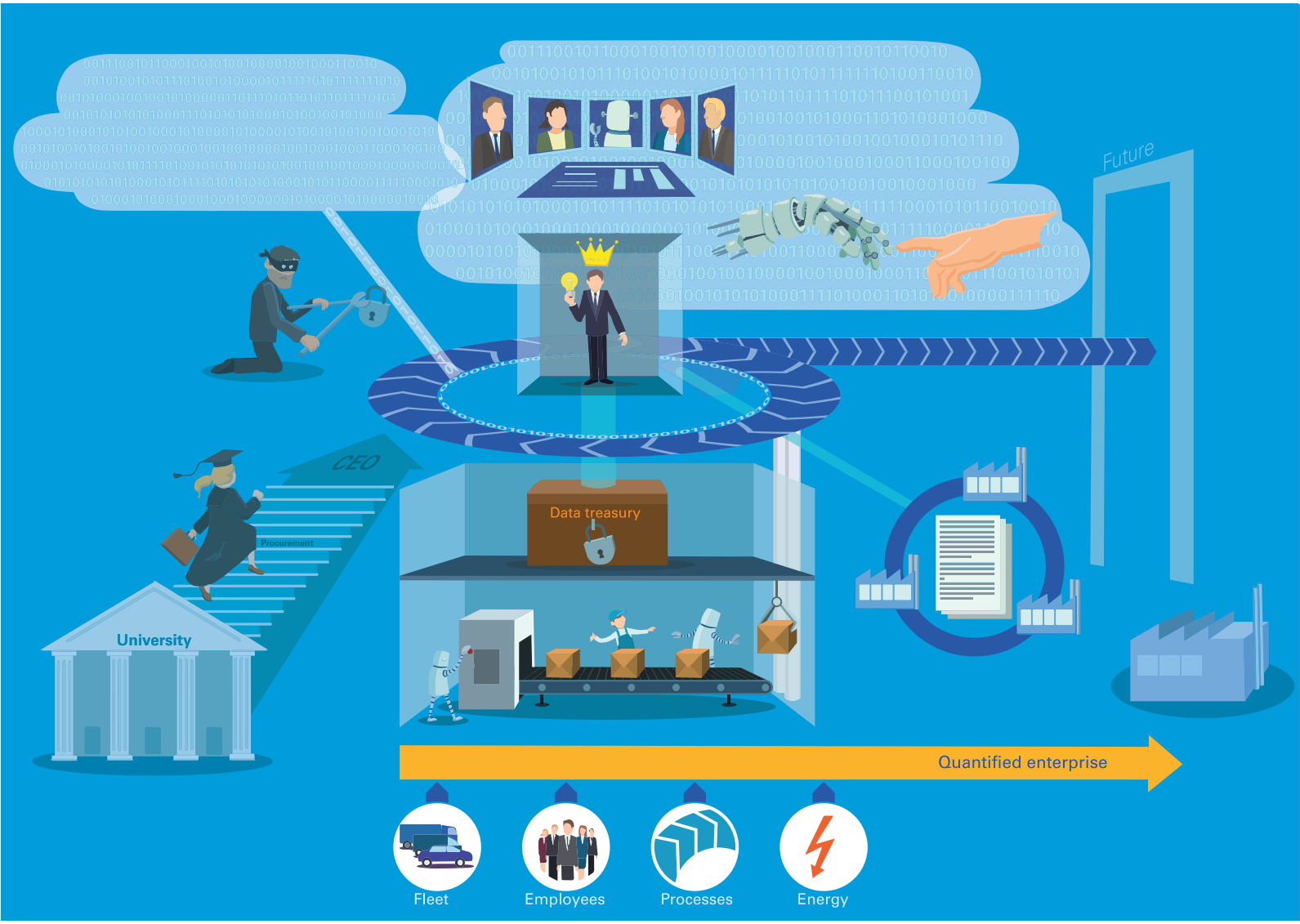
2035+

90 percent of all news on the Internet is written and published by algorithms

Computers are 1 million times more intelligent than in 2015

Scenario II
Procurement primacy: procurement as the center of power

In this scenario, digitalization is also well-advanced, but humans have not yet been supplanted by machines (vertical axis). In fact, democratic co-existence prevails. Digitalization has not established itself as a job-killer. On the contrary, it has led to more diversified roles, tasks and responsibilities. In addition, the business world is centralized (horizontal axis). All information runs together at one central point – procurement: Procurement is the ruler of operational functions.


Future
CEO
Procurement
University
Data treasury
Quantified enterprise
Fleet
Employees
Processes
Energy

The world…

… is managed by humans and machines in a cooperative effort. Artificial intelligence "audits" committees, commissions and meetings. The borders differentiating the physical world from the virtual world are increasingly blurred by augmented and virtual reality applications.

Technology…

… supplements, but does not supplant, humans in the age of so-called quantified enterprises. Since all value chain data converges in procurement, procurement managers enjoy a unique position. In view of "data dominance," procurement is predestined to make strategic decisions for the entire company.

Companies…

… are strongly characterized by procurement primacy. Buyers have left the cost-cutting monocracy behind them, and are first and foremost supply chain integrators and innovation promoters. They manage the value chain from start to finish by applying end-to-end procurement solutions, taking risks and tax aspects into account.

The working environment…

… has shifted its focus to sustainability. The classical career ladder to CEO now starts in procurement and requires CPO experience. This is due to the fact that the CPO possesses the complete supply chain "data treasury," the necessary IT and risk assessment skills and comprehensive budget management expertise. Data analysis, IT competence, risk and budget management are four future-ready proficiencies, making CPOs the only logical choice for the CEO position.

Value creation…

… is re-industrialized. Western companies have brought home the production of many goods they had formerly outsourced to low-wage countries. Production also takes place in virtual factories. These factories are similar to a loosely organized consortium, inducted for a limited time. They are selected, connected and managed by procurement. This means that procurement no longer only buys goods, but manages and buys entire production facilities. This is another reason why procurement rules.

2020

Investments in computer centers increase worldwide to more than 280 billion USD (2015: ca. 165 billion USD)

Global digital data volume generated annually exceeds 40 zettabytes, which is equal to 40 billion gigabytes (2015: 8.5 zettabytes)

2025

Industry share of EU gross domestic product (GDP) at 28 percent (2015: 15 percent)

Global revenues for virtual reality hardware at over 5 billion USD (2015: ca. 0.7 billion USD)

Security …

… is at a particularly high risk due to extensive value chain IT integration. Cybercriminals not only attack major, well-secured companies, they also hack into smaller, more vulnerable companies in the supply chain cloud, giving them easy access to the big fish.

Innovations …

… come mainly from procurement. Those who have all the data at their fingertips and manage a broad network of suppliers and partners are more likely to find innovative patterns in the data cloud. The procurement function facilitates the innovation process; it connects the relevant business partners to the process on demand.

Accountability …

… is deeply rooted in the company DNA. If a CPO is promoted to CEO, unsustainable behavior in the supply chain will be penalized. Those who have gained their experience in the sustainable supply chain will transfer this awareness to all company management teams.

… and procurement?

Procurement primacy dominates. The procurement department has become the center of information and power in organizations. Its data sovereignty and comprehensive internal knowledge makes it the decision-maker for all major strategic issues of the future.

Supplier audits, meetings and workshops generally take place in the virtual world. Participants put on a headset and take along their personal avatar, and within seconds, reach the desired photorealistic destination.

In this scenario, procurement's added value lies less in cost savings and more in data management insight. Intelligent algorithms are consultants and colleagues alike.

This corresponds to a sharp increase in responsibility and skill requirements placed on procurement managers and employees. It is also a reason for the significant changes in management development: those who take on leading procurement positions in the years 2035+, are not merely intended for procurement, but are selected, qualified and developed for executive positions.

2030

New working environment: 60 percent of jobs new since 2015

Tweet: "65 percent of the global population now online" (2015: 43 percent)

International understanding: Real-time language translation of 1,000 languages possible (2015: ca. 50)

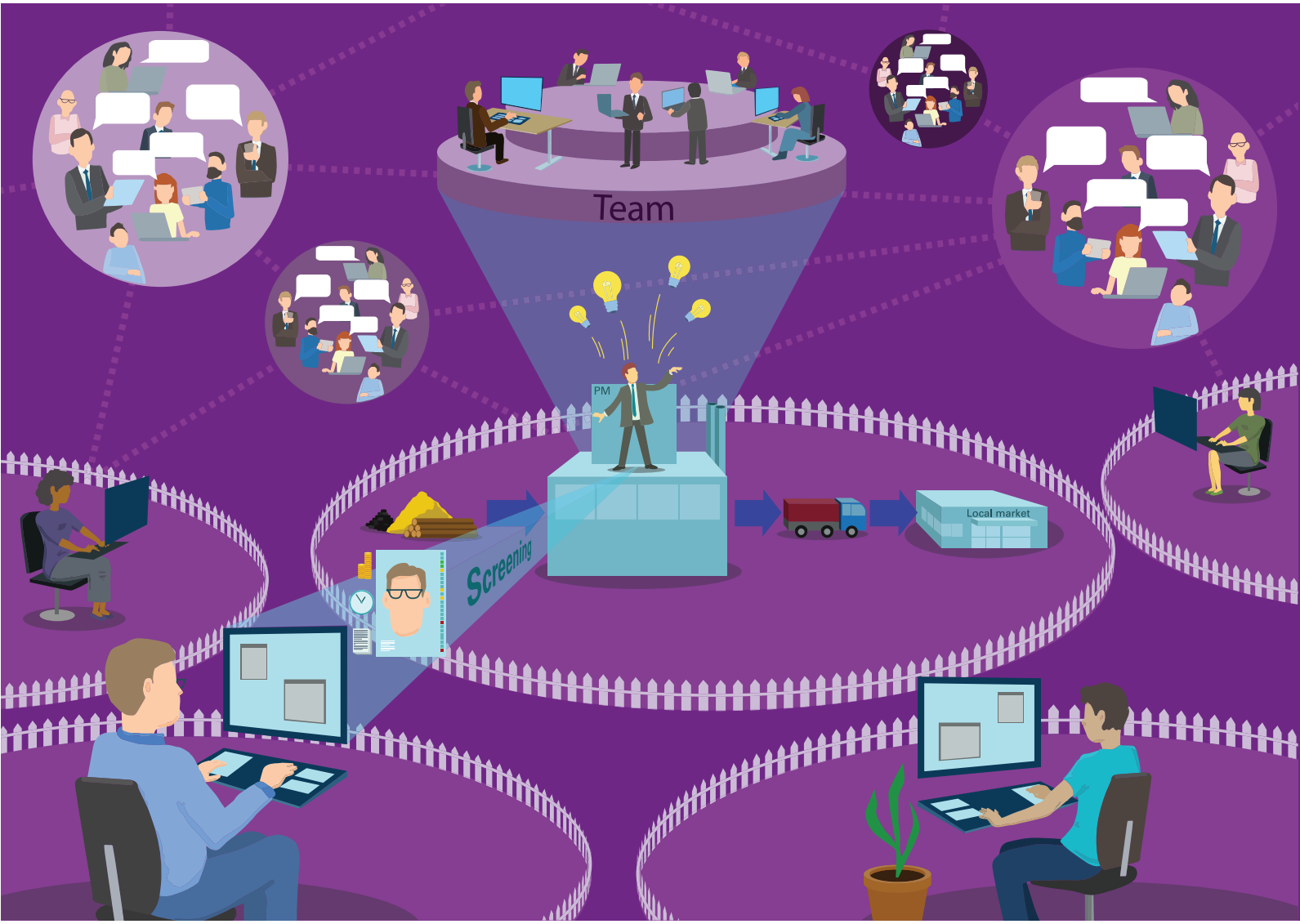
2035+

Ratio of humans to machines is 1 : 100

News: "Cashless society: Denmark and Sweden cash-free; more countries plan to join them"

Scenario III
Project economy world: the procurement department dissolves

The age of human centricity (vertical axis) characterizes this scenario, while company organization is simultaneously decentralized (horizontal axis). This picture of the future is not shaped by machines, but rather designed and locally organized by humans. The main burden of value creation is borne by a legion of free-lancers scattered around the globe.


Team
PM
Screening
Local market

The world…

… has rekindled interest in human beings in the wake of technological euphoria and excess. Humans aspire to self-empowerment, personal development and time sovereignty, primarily in freelance work and entrepreneurship.

Technology…

… serves a new, pragmatic humanism and fulfills the role of human needs facilitator. Social media has evolved into communications and work platforms for legions of click-workers.

Companies…

… operate on project economy. Dynamic teams and work groups determine the new "fluid" organization image. Traditional departments no longer exist. Project teams are interdisciplinary and composed according to proficiency profiles.

The working environment…

… has changed drastically. Steady employment is quite rare and offered primarily to project managers. A minimum of work communication is done via e-mail (push principle). The majority of work communication is via Wikis, blogs, company forums and communities (pull principle). Project information is a "debt to be collected".

Value creation…

… is locally oriented. Production follows the principles local for local (a defined share of a product must be locally sourced) and frugal engineering (the end product is adapted to local conditions). The operating costs for (professional) services have increased dramatically in relation to material costs. Project businesses outsource peripheral routine tasks to low-wage countries.

Security…

… is a structural risk in this freelance economy due to fragile company loyalty and high employee turnover. As a result, project managers invest a great deal in profile screening, conscientious selection and freelance staff maintenance, using tools such as freelance management systems.

2020

Top-Trend: "50 percent of the working population in the US are now freelancers" (2015: 34 percent)

The number of active social media accounts exceeds 3 billion (2015: ca. 2 billion)

2025

The share of project economy in the national value creation of many industrial nations is more than 20 percent (2007: Germany e.g. less than 5 percent)

Over 90 percent of the global population owns a mobile telephone (2015: 50 percent)

Innovations …

… are cropping up all over with the general interdisciplinary structure of the freelance teams, provoking substantial management effort. The local principle (see above) and limited availability of raw materials and services become the driving force behind innovation.

Accountability …

… is a powerful side-effect of local for local principles, i.e. fewer transport routes, lower emissions and intensified regional labor market and structural development.

… and procurement?

The procurement department has been dissolved and replaced by fluid organizational structures. There is no longer the purchasing agent; instead project managers purchase project-related materials and services at decentralized production sites. They also take over human resources management for interdisciplinary teams. Ironically, many former procurement staff members are also freelancers now, taking on temporary employment as project and risk managers for specific product categories.

For procurement activities, project managers are still mainly rated by their dexterity with costs and savings, as in the previous decades. This is particularly the case in this project economy, as labor costs and daily rates fluctuate strongly. Consequently, there is a significant increase in partner and employee negotiations.

2030

News: "Enterprise Social Networks and the end of E-mail? Only 50 billion (business) e-mails are sent and received worldwide per day" (2015: ca. 113 billion)

News: "Seminar boom: Offline management in the digital age"

2035+

Over 60 percent of the global population lives in cities (2015: 54 percent)

41 megacities with more than 10 million residents worldwide (2014: 28 million)

BRICS nations share of global GDP exceeds the 50 percent mark (2014: ca. 30 percent)

Scenario IV
The creative agency: procurement reinvents itself

Human beings are also at the heart of this scenario (vertical axis). Strong centralization (horizontal axis) collects all relevant information at a single location – at procurement – which has reinvented itself, adapting to this new world. The procurement department has become the primary agency for business model development and trend management, even providing creative services.


Wanted
team
Trends
Agency
Procurement mall
Procurement
Share economy
Product
life
cycle

The world…

… has gone from a knowledge-based society to a human economy, where abilities like collaboration, communication, creativity and flexibility are in demand. Innovation, individualism and services are the driving forces of the times.

Technology…

… has been relegated to serving this age of innovation. High-tech has become "shy-tech", taking a back seat, timidly adapting to human needs (and not vice versa). Collaboration tools and platforms are designed to promote creativity and intuitive operations.

Companies…

… have extended their primary focus on shareholder value to include the aspects of a "careconomy". Supporting and promoting individual employees and their families is a high priority. Living and working environments are largely integrated.

The working environment…

… demands a high degree of creativity and innovation from employees in the age of the human economy. Although the focus is on human beings, humans must, can and want to design each individual project more innovatively, flexibly and productively.

Value creation…

… is influenced, among other things, by the shareconomy, meaning less production and more service provision. Since everyday products are shared, the demands on them increase. They must be sturdier and more durably designed.

Security…

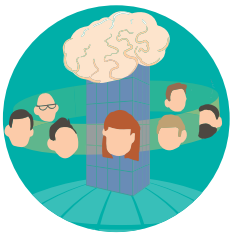
…is endangered by the "talent war" to recruit the most creative and innovative minds. The notorious brain drain threatens the success and existence of companies, when, for example, entire teams are wooed away by competitors.

2020

Tweet: "Share don't own: Shareconomy booms"

Value of the global creative economy soars to 4.5 trillion USD (2000: 2.2 trillion USD, 2013: ca. 3.6 trillion USD)

2025



Number of global patent applications increases to 4 million (2013: 2.57 million)

News: "Top Trend: Seminars on Intellectual Capital Statements in Organisations"

Innovations …

… are rapidly pumped out one after the other since creative teams want to live up to their reputations. Here, all creativity is pooled in the agency once known as "procurement". The agency's work now requires a new, future-oriented mindset and the corresponding tools.

Accountability …

… is focused on maintaining the company's existence. Employee retention and safeguarding intellectual property are essential for its continuing survival.

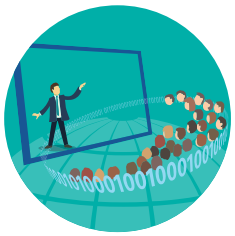
… and procurement?

Procurement no longer exists in its previous form. It is now structured as an internal agency, developing new business and finance models for the company. This agency selects and manages the scientific network, the numerous creative minds and the innovation teams of the company.

Procurement specialists not only provide their know-how centrally to the agency, but also to co-workers and colleagues. With so-called procurement malls, which also bundle private uses, they achieve substantial volume discounts and other reductions with their purchasing power, for example, for end consumers and colleagues.

Procurement managers bring all the currently applied prerequisites to this new agency role, i.e. knowledge of the company's products, innovation expertise accumulated over years of supplier innovation maintenance and finally, traditional negotiations and leadership competence. The bottom line in this scenario: procurement has reinvented itself.

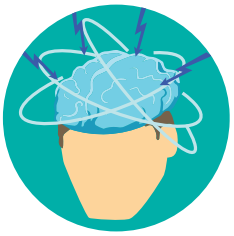
2030



Global crowdfunding market surpasses the 100 billion USD mark (2012: 2.7 billion USD)

Global education market of MOOCs (Massive Open Online Courses) rises to 40 billion USD (2015: ca. 15 billion USD)

2035+



70 percent of knowledge is new compared to 2015

Study: "Trend neuro-enhancement: 70 percent of employees are doping in the workplace" (2014: Germany ca. 7 percent)

Management transfer: further development of scenarios

Scenarios are not a static or one-time event. They should be developed further as the world changes:

1. Initiate a scenario circle.

2. The optimal team size is comprised of 4–5 persons with different functions.

3. An interdisciplinary structure is also ideal.

4. Once monthly is a sensible frequency for scenario meetings.

5. The circle further develops existing scenarios and creates new scenarios.

6. It particularly adapts scenarios to the company-specific circumstances (please also adapt those from this study).

7. A completely new scenario development is recommended every one to two years – depending upon the speed of change in the environment and the industry.

8. The circle can, may and should also develop new axis constellations, such as "Change in the Industry Environment" and "Pace of Innovation", "Degree of Supply Chain Integration" and "Geopolitical Development", "Degree of Local Sourcing" und "Level of Consolidation on the Procurement Market".

9. Based on the scenarios, the circle can and should continuously review their own procurement strategy and develop new product category strategies.

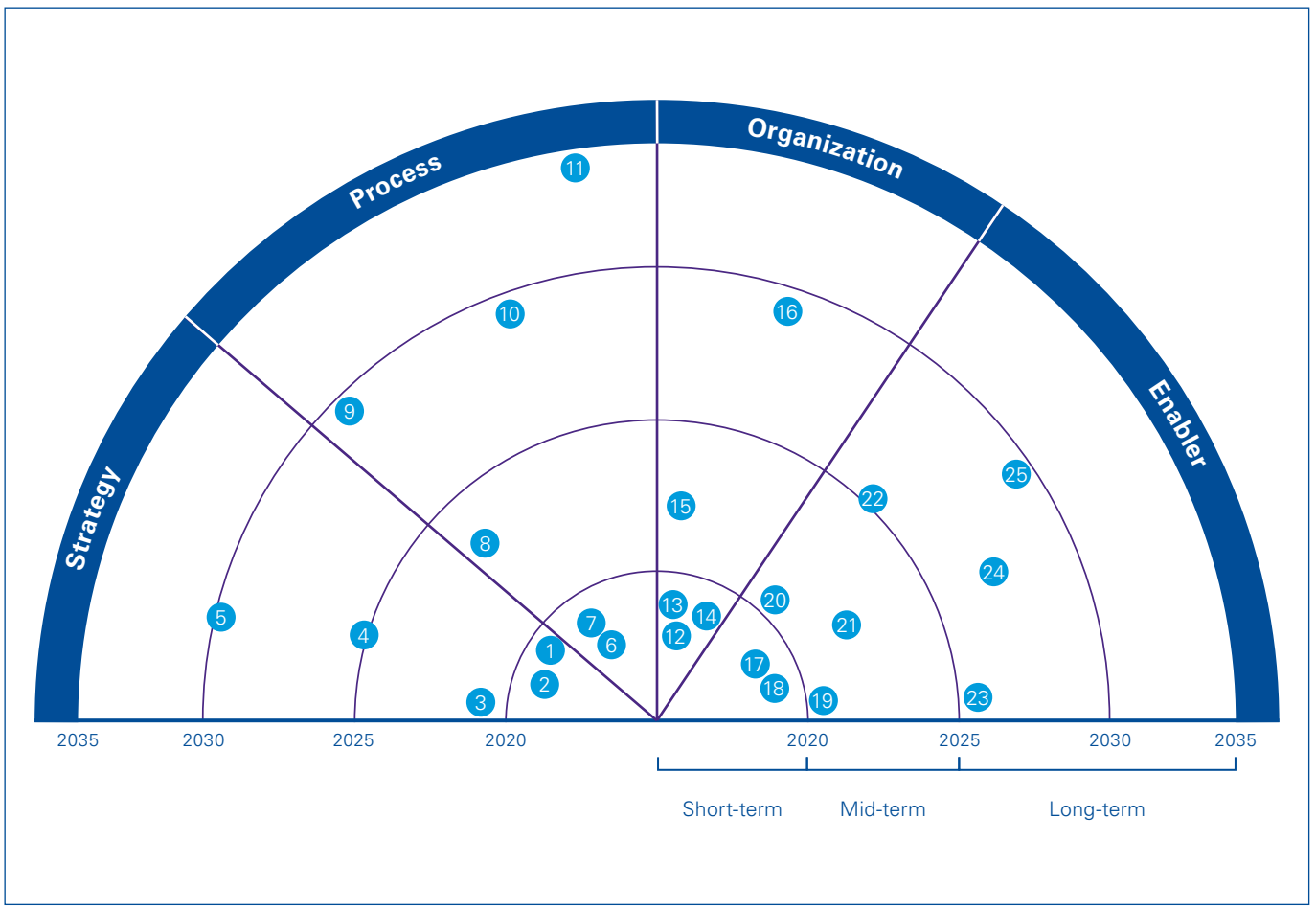
If scenarios are regularly developed and increasingly adapted to fit company specifications, procurement will be able to respond with much greater speed to any future trends.

5 Future radar: a screen full of opportunities

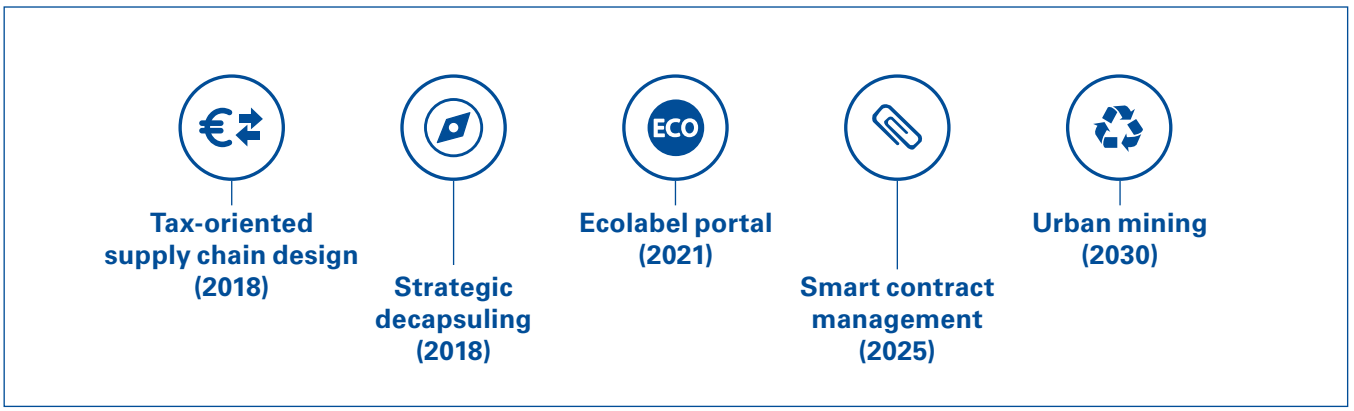
"Opportunities are never lost; someone will take the one you miss."
Author unknown

The primary intent and purpose of forecasts is not to describe possible futures, but more specifically, to detect new opportunities, attractive business models, products and services. The following chapter touches upon only a few of these opportunities and potentials. It would be impossible to present them all, since the world of opportunities is endless.

The decisive factor here is not the actual concrete opportunity, but rather whether and how fast it appears on your radar– and whether you can count on receiving this concrete future opportunity. That's why there is a time frame specified for each of the opportunities listed below. Where scenarios paint the big picture in long-term futures, opportunities sketch concrete potentials within scenarios and en-route to these futures. Scenarios and opportunities complement each other perfectly.



Source: KPMG, 2016



Strategic opportunities

#1 Tax-oriented supply chain design (2018)

In connection with the harmonization of national corporate tax (BEPS Initiative) from OECD countries, it is conceivable that in the future, taxes must be paid on profits in the country where profits were made. Procurement is one of the key value drivers in the corporation-wide value chain. A tax-oriented supply chain design thus evaluates locations for centralized procurement, as well as for the type and range of added value based on extended criteria.

#2 Strategic decapsuling (2018)

Decapsuling takes a company's historic documents and decision-making principles of procurement strategies out of the "time capsule" of the past and analyzes them. Why, and how successfully, did we select our previous strategies? Using historical analogy, it will also be possible to anticipate and evaluate future developments.

#3 Ecolabel portal (2021)

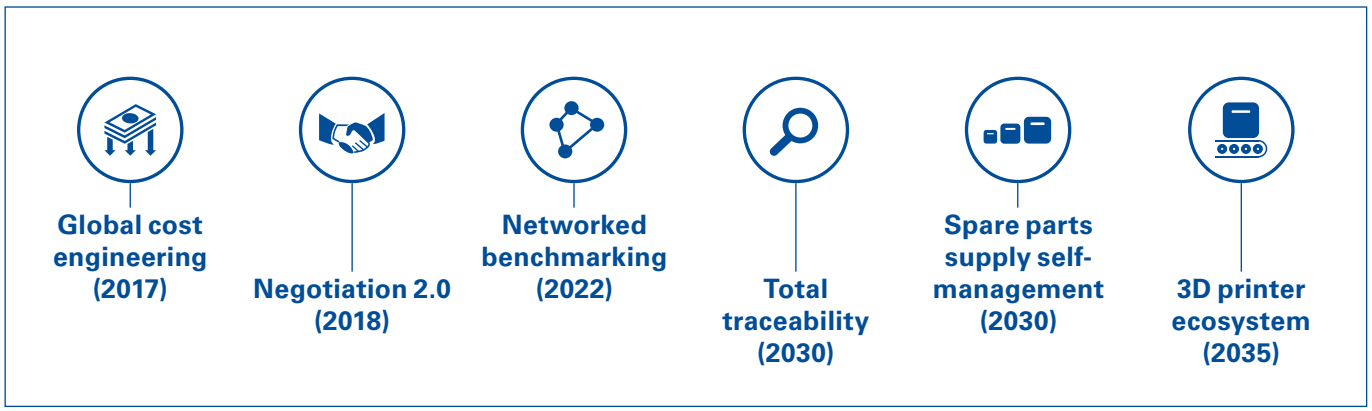
Today, the Internet features a great deal of comparison portals. In the future, it is projected that comparison portals will exist for the explosively increasing number of eco-certificates, eco-codes and ecolabels. Procurement will then launch targeted searches, assess criteria and measures, receive recommendations and compliance case studies along with the possibilities of cross-company experience exchanges.

#4 Smart contract management (2025)

Conceivably, intelligent systems will handle future contract management in just a few minutes, using algorithm-based and paperless solutions. It is possible that artificial intelligence is able to check contracts cross-departmentally, to assess risks and draw up and negotiate their own "smart" contracts independently via Big Data and contract databases. Also imaginable are negotiation strategy recommendations, conflict costs calculations as well as IP and license management automation.

#5 Urban mining (2030)

In a future world of resource scarcity, a large share of raw materials will no longer be extracted from mines, but from the urban environment itself. Closed reusable material cycles will become the norm and manufacturing companies will become secondary raw material producers. Innovations will allow for very cost-effective production. Procurement will be an expert in resource logistics and in the recirculation and recycling of materials and products.



Procedural opportunities

#6 Global cost engineering (2017)

In procurement, it was once possible to achieve significant savings by standardizing, bundling and negotiating prices. In the future, engineering carries more weight. In this process, procurement directly begins by selecting a combination of development suppliers who, with improved product planning and shorter product development cycle times, enable multiple cost savings throughout the entire life cycle.

#7 Negotiation management 2.0 (2018)

Using business war gaming, game theory and nudging, mathematicians and behavioral psychologists counsel procurement managers on improving their negotiation strategy, on successfully and more rapidly wrapping up negotiations in both multistage decision-making processes and when dealing with negotiation partners in scarcity situations.

#8 Networked benchmarking (2022)

A central system platform gives cooperating companies, which are not direct competitors, the opportunity to compare their procurement's performances and qualities. Each company learns and develops further, according to the numerous assessments and best practices of the other.

#9 Total traceability (2030)

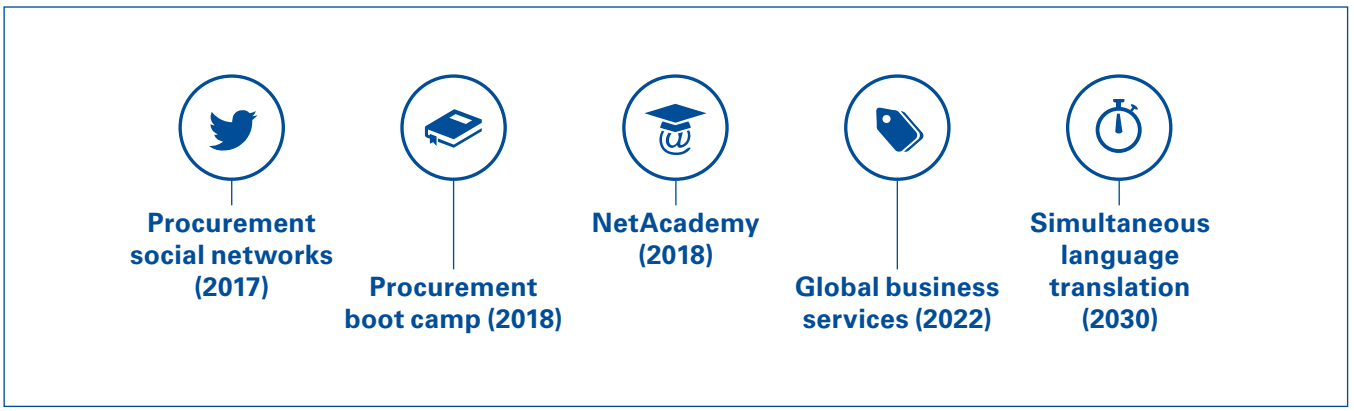
Already today, batch traceability in the pharmaceutical and food industries is excellent. In the future, this total "traceability" could seamlessly apply to all materials and subcomponents for all products down to the last screw, and the employee who turned it. In cases of inconsistencies, the missing signature immediately lets the procurement manager know which error in the supply chain must be eradicated.

#10 Spare parts supply self-management (2030)

Before a machine break downs, smart machines order their own replacement parts or manufacture them independently. This is accomplished by using predictive maintenance (PdM) and artificial intelligence. Procurement plays a minor role in spare parts supply by focusing on increased process efficiency for both tactical and strategic MRO procurement tasks.

#11 3D printer ecosystem (2035)

The 3D printer makes a closed CO_2 cycle possible. For example, CO_2 emissions from a coal-fired power station can be collected and processed to make graphene Nano flakes, a raw material for the 3D printer. This cycle is practical because such printers require much more energy in production than other manufacturing processes.[48]



Organizational opportunities

#12 Procurement social networks (2017)

Procurement managers are able to disseminate targeted network information via social media. Suppliers can use their contributions to promptly inform procurement managers, as well as other suppliers, about ideas and innovations. Knowledge sharing on social platforms particularly promises strengthened relationships, thus accelerating supply chain integration.

#13 Procurement boot camp (2018)

Procurement's rapid growth in recent years has left it with qualification gaps in engineering, product management and cross-departmental team leadership. New career programs, so-called procurement boot camps, close these gaps with cross-functional curriculums. These boot camps address critical procurement topics such as: 1) construction buying; 2) purchased parts analysis; 3) strategic procurement; 4) procurement budget control; 5) risk management and; 6) project management.

#14 NetAcademy (2018)

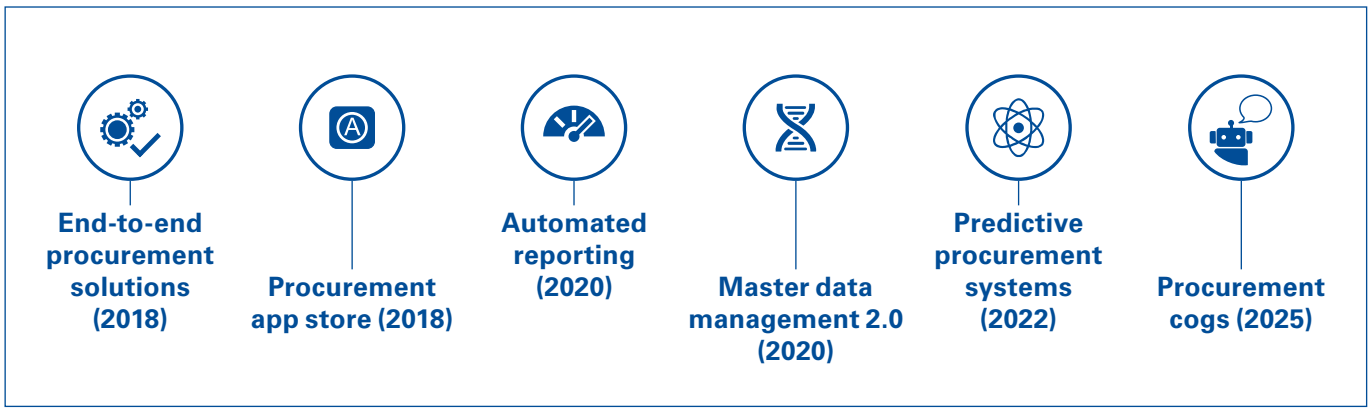
Those who work together across the supply chain beyond company boundaries, will also train together in the future – at the NetAcademy. The NetAcademy offers the complete curriculum of supply chain proficiencies, as well as important qualifications for key topics like digital transformation and cross-industry innovation.

#15 Global business services (2022)

In the future, it could be possible for multinational companies to have only one central (virtual) location, managing shared services and service providers for all countries, while providing their own services; from human resource management to marketing to travel management. Procurement skills are essential for these global business services.

#16 Simultaneous language translation (2030)

In 3rd generation global sourcing, speaking an exotic language is no longer a barrier keeping the best global sources from procurement. Real-time translation of spoken and written languages eliminates the language barrier. Each document or spoken word is translated into every other language (almost) in real-time.



Technological opportunities and enablers

#17 End-to-end procurement solutions (2018)

Procurement no longer "only" has procurement data at its fingertips, but also data on the complete life cycle of a product and the supply chain; from the first supplier to point of sale and even more for networked products. This makes it an enabler for predictive procurement (see Opportunity #21) and for automated reporting (see Opportunity #19). Of course, the end-to-end solutions of the future are available on mobile devices.

#18 Procurement app store (2018)

Everything that procurement has to offer to internal customers and supply chain partners is provided literally by a single source. In the future, a procurement app store could supply an entire customer- and partner-friendly service program, clearly presented and digitally retrievable, as an app for smartphones and tablets.

#19 Automated reporting (2020)

Buyers no longer lose time with analyses, documentation and reporting. This will be the job of algorithms in the future. Robot-journalism is slowly but surely conquering the news, sports and financial portals.[49] This gives procurement managers more time for strategic procurement, supply chain innovation and other major topics.

#20 Master data management 2.0 (2020)

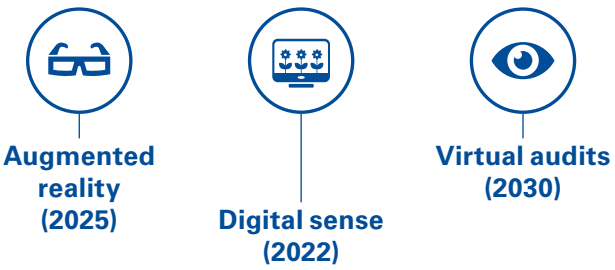
Supplier data, prices, conditions, addresses – all data is available. Unfortunately, it is frequently stored in five different systems with varying updates and connectivity. Master Data Management 2.0 pledges to reconcile these differences and achieve data conformity – fully automatically. Automatic data compilation and updating facilitates the availability of data that is both relevant and highly operational, hence, complete usability. The overriding long-term goal is to secure data quality and consistency.

#21 Predictive procurement systems (2022)

Similar to the concept of predictive policing, future predictive procurement systems could anticipate and recommend targeted solutions (prescriptive analyses) for real-time procurement risks. As a result, for example, disruptions in the supply chain could be prevented in advance. Even identifying independent suppliers based on recommendation and current procurements is conceivable.

#22 Procurement cogs (2025)

In contrast to apps and Wikis, which transmit knowledge statically, in the future, new cogs (an abbreviation for cognitive computing) will provide customized, situation-specific responses in real-time to individual buyer questions. Cogs interface with supercomputers, which learn with every action and request.



#23 Augmented reality (2025)

With the help of augmented reality and data glasses, purchasers and their partners can access required data such as prices, inventory and user operations, just by looking at it, and in real-time – as well as accessing negotiation strategies during talks. The glasses also enable users to project holograms of products and articles.

#24 Digital senses (2027)

The digital senses of smell and taste bring the Spanish farmer's strawberry directly from the field to the buyer's office. What they previously evaluated via video imaging or supplier assessments of onsite visits, buyers can now smell and taste for themselves. Digital senses offer the same experience for pre-products required for production. Now buyers can virtually perceive far-away products with all their senses.[50]

#25 Virtual audits (2030)

The buyer must only audit the supplier onsite in exceptional cases. Options for virtual audits are so extensive, that all test criteria and processes can be experienced in photorealistic, real-time virtual space. Using a headset, for example, buyers can move through the actual production facility of their suppliers.

Management transfer: finding and using opportunities

Opportunities are the gold nuggets of the future. The intention here is to "pan" for this gold, relying on a targeted, systematic, exceptionally well-organized method – and not on luck:

1. The "opportunity team" should be a group that is well-informed about their company's innovations, products and services, but also comprises market researchers, technology experts, supply chain managers and buyers.

2. A series of creative workshops is an optimal organizational method for identifying opportunities.

3. Do not start out by limiting the scope of potential innovations in advance. It is better to cluster the abundance of discovered opportunities afterwards, subsequently eliminating redundancies.

4. A good team proposes up to 100+ concrete opportunities within a few hours (after clustering and eliminating redundancies).

5. The team follows up with research: What innovations, products, pilot projects or studies exist for each opportunity? Two to three reliable sources are sufficient (these can also include expert surveys).

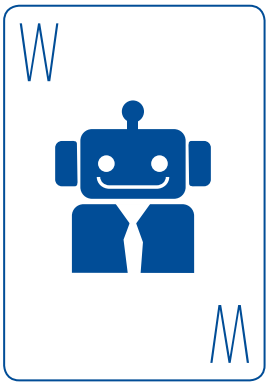
6. After researching them, the opportunities are subsequently prioritized according to market potential and other criteria. Prioritization makes it easier to present, communicate, advocate and keep track of opportunities.

6 Wild cards: managing surprises

"Probable impossibilities are to be preferred to improbable possibilities."
Aristotle (384–322 B.C.), ancient Greek philosopher and scientist

Wild cards are game changers. That's why they are crucial to every foresight. Those who keep an eye on their wild cards gain two major advantages. Firstly, nasty surprises can no longer really take them by surprise. And secondly, a manager with a sense for wild cards is able to make use of "good surprises" more quickly than those who are regularly "completely surprised by the development in the procurement markets".

A wild card is an event with a low probability of occurrence. If, however, the event does occur, its impact is either catastrophic or revolutionary (depending on the wild card's prospects). As a result, wild cards are a necessary supplement for scenarios and unpredictables.

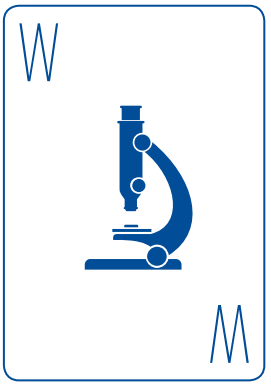


Wild card "Computer corporations"

In the future, a large part of the economy may be comprised of so-called decentralized autonomous corporations (DACs).[51] These are uninhabited, robot-operated and computer-driven companies; so-called automated agents. In this type of computer corporation, all business processes are carried out automatically – even procurement workflows. As a result, procurement is fully automated and foregoes buyers.

Among the factors responsible for making this humanity-void automation possible is the dramatic development of artificial intelligence and the creation of crypto currencies like Bitcoin. Algorithms are already performing many banking processes. Those who are still around after such an emergence of computer corporations must negotiate with algorithms and automated agents. Human influences like friendliness, give-and-take, empathy, trust or even "negotiation tricks" thereby no longer play a role. System errors replace human error. On the other hand, industrial crime in procurement would be drastically reduced: computers can't be bribed (without human manipulation or hacking).

According to Ray Kurzweil, Google's Director of Engineering, technology will reach a human level of intelligence by the year 2029.[52] In an open letter of January 2015, Stephen Hawking, Elon Musk and countless respected experts warn against the dangers of artificial intelligence and call for guidelines.[53]



Wild card "The end of classical research"

In this wild card scenario, there are no longer any classical researchers. Instead, artificial intelligence discovers correlations and patterns for new products and services in Big Data. For this reason, Chris Anderson, former Editor-in-Chief of Wired Magazine, heralded the impending "End of Theory" years ago.[54] Traditional methods of knowledge production (intuition, models and theories) would be superfluous. Critics complain that even algorithm programming must be based on implied theories and that correlations don't fill the bill. Still, the development of artificial intelligence and data growth is advancing rapidly.

It is conceivable that in the future AI, and not developers and researchers, will come up with recommendations for new products and innovations. Technology scouting and supplier innovations would be things of the past. In a newer sense, research would entail procurement professionals interpreting and selecting AI-generated solutions. Procurement managers would become data specialists, analysts and developers.

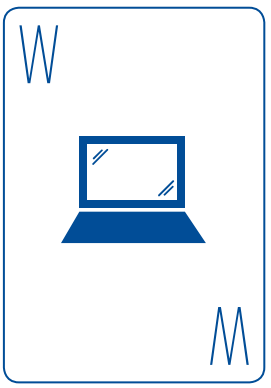
Just recently, artificial intelligence required only 42 hours to find the answer to a biology problem that had remained unsolved for 100 years.[55] The global data volume is expected to increase tenfold from currently 4.4 zettabytes to 44 zettabytes by 2020; this means that it will more than double every 2 years.[56]

Wild card "Internet companies trump governments"

The power held by just a few Internet companies could, to a great extent, supplant governmental power. These companies define their own community standards. Unfortunately, some of these standards are not necessarily consistent with the applicable laws in the corresponding country. Governmental power could gradually be replaced by algorithmic regulation.[57] The influence of Internet companies is growing in an increasing number of areas. Internet companies are providing a growing range of services in energy trade, banking and in the insurance industry, in medicine and telecommunications and even in infrastructures, mobility and robotics.

The monopoly of governmental authority would be dissolved into data states. In such a far-reaching wild card scenario, procurement managers would still be buying, but the sourcing decisions of the buyer would be strongly influenced by external factors. Although the manager still believes he is making his own choices freely, algorithms and automated processes are actually providing him with filtered information. This filtering would turn us into "digital wards of a data dominion", as the American legal academic Frank Pasquale called it in an interview.

In 2015, Facebook reported a total of 1.49 billion active users per month[59], which exceeds the current population of China (nearly 1.4 billion inhabitants). If Facebook's market capitalization of roughly 275 billion USD (2015) were to be classified as GDP, the company would rank 56 (status April 2015) on the list of the world's richest countries.[60]

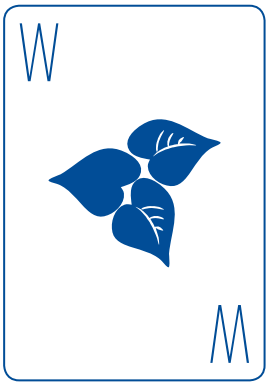


Wild card "The internet crash"

Even today, there are many things which can disable the Internet, from solar storms to hacker attacks; from technical failure to power outages. Such a crash occurred in 2014, for example, in North Korea. The entire country was affected for almost 10 hours.[61] A similarly long downtime in any industrial nation would have had a crippling effect on the economy and society. Therefore, (not only) procurement must have failure protocols and contingency plans. There must be a conventional alternative for handling urgent processes like under the wire orders – which will be difficult, since IP telephony would also be down. Companies could therefore once again begin keeping an appropriate inventory, so that production could be continued, even during an Internet crash. Providing, of course that networks, such as cyber-physical systems and the Internet of Things, are not shut down too. Traditional communication vehicles such as cell phones and faxes would serve as the bridge to supplier performance until an Internet crash is remedied.

In addition, vital data may not be stored in the cloud, but copies must also be stored locally.

In 2011, while searching for scrap metal, a 75-year-old Georgian woman damaged a broadband cable and crashed the Internet in Georgia and Armenia for over five hours.[62] According to analysts, a crash at only one of the major cloud suppliers could trigger a shock similar to the Lehman crash.[63]

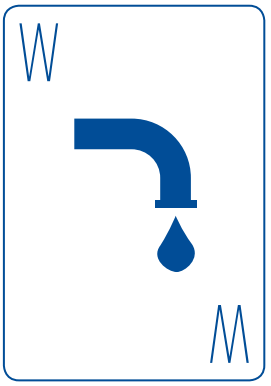


Wild card "Ecological radicalism"

In a possible future world of ecological extremes, managers might also be targeted by eco-terrorists.[64] The supply chain would be particularly at risk here, because its decisions have a direct effect on the company's ecological footprint. Ecological terrorists may vehemently demand "sustainable procurement" – and attempt to achieve this by means of force, i.e. threats, blackmail, kidnapping, attacks on warehouses and value chains, cyber-hacking e-procurement platforms and hate campaigns on the Internet. As a result, CPOs might require personal security protection.

On the other hand, many companies could choose a proactive adaptation strategy. In order to protect themselves against attacks, they could intensify their sustainability efforts, communicating these publicly, actively and intensively.

Between 1970 and 2010 the number of terrestrial and marine animal species dropped by 52 percent.[65] By the year 2030, the Arctic pack ice could melt completely in the summertime.[66] According to the FBI, within five years (2003–2008) ecological terrorists caused property damage valued at 200 million USD – tendency rising.[67]



Wild card "The end of scarcity"

In many countries, the age of scarcity could be overcome in future decades. Scarcity would give way to a new age of post-scarcity economy. Resource shortages could be solved by game changers like

- nuclear fusion on the energy sector
- rare earth elements from phyto-mining (extraction of raw materials from plants)
- in-vitro meat and food from 3D printers on the food sector
- care robots on the social sector and
- free access to massive open online courses on the education sector.

At the end of scarcity, prices for all essentials could plummet in freefall. Nobody would have to mobilize cost and effort to obtain food, shelter or clothing any longer. People would place greater focus on non-material things like health, awareness, recognition, education, individualization and self-realization. The possession of goods loses significance and the quinary based economy (tourism, recreation, wellness and health) would boom. The working world would be characterized by local structures, automation, freelance and voluntary activities along with collaborative consumption.

According to Mark Post, the pioneer of "In-vitro Burgers", we will reach market maturity of so-called cultivated, artificially produced meat in 10 to 20 years.[68] Nuclear fusion generated from one-half pound of rock and two liters of water could supply an average private household with electricity for one year.[69]

Management transfer: put your wild cards on the table

The more turbulent the environment, the more necessary and useful wild cards become. The more wild cards you have in your hand, the less surprises are in store for you in the future:

1. There are special databases for wild cards, for example the EU iKnow WI-WE database, which lists 501 wild cards, established by more than 2,200 active community members.

2. Become a member of such a community in order to actively participate in the discovery and development of wild cards.

3. Listing wild cards shouldn't be a singular activity, but rather an ongoing search where they are evaluated according to various criteria and entered into a wild card database.

4. Each wild card receives its own profile stating the company's adaptability to this wild card, its effective period, probability and reach, response plans, the individuals responsible, and wild card precursors.

5. Scoring models are useful for prioritizing wild cards.

6. The team in charge of recording and documenting wild cards should include risk managers, strategists, technology experts (if the wild card is technology-oriented), controllers …

7. Validate the plausibility of wild cards with one or two reliable sources. This source specification is incredibly important for the internal acceptance of wild cards, since management occasionally tends to place such "wild prospects" at the bottom of the list.

Wild cards are particularly important in times of disruption, dynaxity and global sourcing since they pose one of the most severe threats (and greatest opportunities!) to the supply chain, and therefore to procurement.

7 Strategic implications: drawing conclusions

"The voyage of discovery is not in seeking new landscapes, but in having new eyes."
Marcel Proust (1871 – 1922), French novelist and critic

Challenges, scenarios, opportunities and wild cards are only as useful as the implications that you draw from them for your strategic orientation. The following gives insight to these conclusions and options.

In principle, each reader of this report can either draw general conclusions or concentrate on specific focal points such as concrete opportunities, specific scenarios, etc. The important thing is that one can derive specific implications relevant to each individual's specific procurement situation from the following general implications.

Momentum of change

Procurement is in a paradox situation across all industries. Although the procurement function has gradually changed over the past 20 years, scenarios now indicate significant quantum leaps and herald The Big Procurement Transformation. This fundamental transformation will only be implemented successfully by those CPOs/procurement managers who generate a momentum of change with high transformation competence. For example, by implementing their own transformation team, which is supported by applying suitable methods. In order to be extensively prepared for cultural change, CPOs/procurement managers must incorporate specific foresight tools, such as scenarios or wild cards, as integral elements in their procurement strategy playbook.

Example Strategic foresight and scenarios are most successful when they are anchored in the organizational culture, as seen at Royal Dutch Shell.[70] At Shell, scenarios have been able to provide a common learning culture, contribute to shared sense-making and foster a mediation base, to name a few.

Transformation with a team

The principle of change also applies to the transformation of procurement. Change requires both organizational acceptance and a structure to implement such change. The transformation team, which reports directly to the CPO/procurement manager, is a central structural element. This team prepares the new strategic alignment of procurement. It also advises procurement management on issues relevant to transformative innovations, which focus exclusively on enhancing the future-proof quality of the procurement organization. The transformation team is supported at the CEO level, and is both cross-functional and interdisciplinary. Lateral (creative) thinkers are specifically recruited for the team. The resulting diversity of minds is the best basis for capturing the necessary momentum across entrepreneurial and industrial boundaries - diversity drives transformation.

Example At the electric utilities company EnBW, the team assembled to master (cultural) transformation is comprised of engineers, technicians, economists, computer scientists, psychologists, and even a theologian.[71]

Knowledge and networked education

Many procurement organizations have become receptive to scientific findings and methods. It is also evident that transforming to a new, strategic orientation succeeds more easily and quickly with scientific support. Scenario 4 ("The Creative Agency") specifically addresses creativity – and science is always a rich source for creative concepts, ideas and innovations. Even the transformative transitions to Scenario 3 ("World of Project Economy") are facilitated by scientific input. Continuous supply chain networking also takes on a role that is just as strategic to transforming procurement. For example, a supply chain academy (e.g. com-

pany-run or as a university-company partnership) promotes relationships and mutual understanding between partners. Such networked education for professionals of partnering firms creates a common language, mindset, culture and cooperation. The entire supply chain is networked, improved and developed through the educational efforts of its own internal university.

Example The Supply Chain School project was funded by the German Federal Ministry of Education and Research (BMBF) in the framework of its leading-edge cluster, Logistics. Project partners established a consortium of business practitioners and academics who developed a virtual learning platform for advanced supply chain education, comprising 270 modules including audio books, business games and tutorials.[72]

Digitalization and collaboration rooms

Future procurement requires a substantial commitment to technology as well as to external and internal IT expertise. In the wake of cyber-physical systems, especially in the event of Scenario 1 ("R. I. P. Procurement") and Scenario 2 ("Primacy of Procurement"), procurement becomes intensively digitalized, automated, autonomous and networked. The war for talents is replaced by the war for digital talents. Virtual collaboration rooms and communities take on a growing significance. Here, the vertical integration of supply chain information, so vital to transformation, is achieved. This transformation leverage is particularly important for Scenario 2 ("Primacy of Procurement"), where the procurement function is the great integrator of the cloud supply chain. This also applies to Scenario 3 ("World of Project Economy"), since social media represents the main platforms for communication and work.

Example The AGCO Corporation has integrated a fully automated, multi-dimensional e-solution for risk management in its global procurement strategy, containing data that is consequently integrated in all contract award decisions.[73]

Innovation leadership

Innovation is a decisive factor in every scenario – which is why it is also a dimension of every scenario. It doesn't matter whether the innovations have been developed by algorithms or human beings. The only matter of importance is that procurement should design and apply its processes and structures in a way that does not impede or prevent innovation. In companies with highly integrated supply chains, the majority of innovations today are created by (system) suppliers and not internal R&D. Since procurement mainly controls the supply chain, it must consequently become the company's central business partner for innovation. To accomplish this strategic standard, future procurement will work on a more interdisciplinary level, developing more technical skills, and participating more actively in product development processes.

Example Covestro AG (formerly Bayer Material Science AG) joins other companies and universities to identify and develop projects that allow for cross-industrial creativity and idea generation. The very best are selected for the Vision-Works Award.[74]

Management transfer: deriving strategic implications

The functional procurement strategy, the individual product group strategies and sourcing all benefits from each attained conclusion. Therefore, the following provides a blueprint to develop future innovative strategies:

1. Compile a list with the strategic options derived from your assessment of scenarios, opportunities and wild cards.

2. In a typical strategy workshop, participants normally compile a list of 15–20 of these options.

3. Cluster and rank these options according to criteria, i.e. associated entrepreneurial risk, relevant existing capacities, duration of implementation (low-hanging fruit vs. long-term projects and programs) …

4. Very concrete options should be derived from this exercise. Examples range from the development of new procurement markets to procurement co-operations, from renegotiations to an internal procurement academy.

5. When deriving conclusions from these strategic foresights, always consider your (often implicit) business's fundamental strategic orientation. This can range from a "proactive orientation" to a "median course," or, finally, to a "wait and see" strategy. Do you want to actively shape the future (proactive orientation)? Or is your goal agile and flexible adaptation to the future (median course)? Or perhaps you would rather not make any premature commitments, keeping all your options open and deciding when the time is right (wait and see approach)?

8 Future-proofing checklist: making procurement fit for the future

"Let him who would move the world first move himself."
Socrates (470–399 B.C.), Greek philosopher

Future-proofing is already being successfully developed and practiced as a planning approach in several industries (i.e. electronics, engineering, construction).[75] Essentially, future-proofing signifies any type of architecture that is planned and realized to be fundamentally maintained for the long haul, even if requirements and components are subject to change in the future. This is the first study to deliver an original transfer of future-proofing principles for procurement-relevant issues in the form of the checklist below:[76]

1 Future-proof structures

- ☐ Our organization systematically identifies and records established procurement and supply chain structures, which have unfortunately become inefficient.
- ☐ Our cross-functional teams continuously monitor and proactively eliminate efficiency obstacles. This insures that efficiency obstacles (and future-proofing hurdles) are not only addressed ad hoc, or as a result of projects or crises.
- ☐ Our established structures permit agile implementation and flexible changes in core processes, like replacing a supplier or introducing the open book policy in the supply chain.

2 Future-proof identification

- ☐ Our purchasing and supply managers fully identify with the effect of their work on the end product or service (return on procurement), and consequently on the resulting effect on the user and customer.
- ☐ Due to global monitoring orientation, procurers fluently change their approach and behavior to accommodate surprising developments.
- ☐ This global identification is experienced and understood as transformation leverage, especially in decentralized organizations.
- ☐ The concrete added value that procurement contributes to our company's success is defined and respected – not only within procurement, but also by the members of all other functions.

3 Future-proof agility and flexibility

- ☐ We apply foresight tools such as opportunity radars, uncertainty analyses and scenarios for the early recognition of an organization's capacity for making adjustments.
- ☐ The consistent, systematic adjustment of structures (see above Item 1.) lays the foundation for increasing procurement adaptability.
- ☐ When applying change management tools, we counter organizational and individual inertia.

4 Future-proof added value

- ☐ The future-proof procurer not only manages supplies and product groups, as a service provider he/she also acquires internal customers, manages services and develops his/her skills further to become a strategist for data and innovation.
- ☐ He/she is familiar with the technical and economic aspects of new technologies such as 3D printing and/or the development of procurement and supply chain academies.
- ☐ As a result, he/she is able to advise specialist departments as an internal partner, thereby significantly increasing his/her value contribution toward the company's success.

5 Future-proof resistance

- ☐ Decision-making and steering structures are not only (see above Items 1. and 3.) as adaptable as possible, but simultaneously as stable as necessary.
- ☐ The decision-making and steering structures provide smooth, fast and reliable potential decisions, even under stressful situations.
- ☐ These resistant structures protect the company from external shocks, structural breakdowns and disruptions by applying, among others, stress tests and supply chain risk management tools.

6 Future-proof employees

- ☐ Versatile and motivated employees are committed to propelling procurement transformation.
- ☐ Their quality of decisions is secured by structural elements like tandem arrangements. In tandem arrangements, if one manager is not available, their tandem partner automatically takes over.
- ☐ The quality of decisions is functionally secured by methodological and resiliency training for procurers and partners in the supply chain (networked education).

7 Future-proof continuity

- ☐ Future-proofing is understood and perceived as a continuous task by all members of procurement and the company, and not merely as a project.
- ☐ Since today's uncertainties, scenarios, opportunities and wild cards can literally change overnight, environmental scanning is continuously updated.
- ☐ The responsibility for these updates is strategically managed and those responsible have the necessary methodological expertise.

8 Future-proof horizon

- ☐ Actively practiced future-proofing is not oriented on quarterly goals, but rather consciously selects strategic far-reaching planning horizons – some more than ten years in the future.
- ☐ The time horizon is held open through the establishment of seamless core processes. One example of this is open innovation.
- ☐ The short-term, medium-term and long-term perspectives and their potential outcomes are considered equally and integrated in procurement planning.

9 Future-proof globalism/localism

- ☐ Procurement not only procures and employs locally, but develops and utilizes value creation and ecosystems within its local economy.
- ☐ Procurement does not replace globalization with localization, but rather combines both strategies to form an enterprise-specific balance.
- ☐ This balance considers not only economic effects, but also cultural and sustainability aspects.

10 Future-proof tradition

- ☐ Future-proofing does not reject traditional processes and existing knowledge.
- ☐ On the contrary, it reduces the company's knowledge drain and harnesses experience for practical use and application.
- ☐ This is supported, among other things, by setting up and maintaining a relevant database.

Access to the future

The objective of future-proofing is not to immediately implement the ten principles in one step. That is neither possible, nor recommended. Future-proofing is an ongoing task and, like the future, it is infinite and should be implemented accordingly.

Methodology

"The true sign of intelligence is not knowledge, but imagination."
Albert Einstein (1879–1955), German-born theoretical physicist

Futures research is less about presenting a representative image of opinions than it is about detecting and analyzing advantageous cause and effect relationships; about strategically anticipating future developments, opportunities and surprises.

This anticipation and analysis has been fed into the current study via interviews and evaluations of selected external experts; a scientific advisory board, and managers and researchers at the two study partners, KPMG and Florida State University. The experts interviewed were chosen for the study based on criteria such as their years of experience and innovative competence, a proven strong sense for detecting weak signals in markets and procurement functions, and particularly for their cross-industrial competence. These experts form this study's core team. A broader team, comprised of experts in IT, production, data & analytics, technology, public sector and procurement, developed the individual scenario concepts in a series of scenario workshops.

In addition to the expert discussions and workshops, a literature survey of over 120 national and international scientific futures and scenario studies were reviewed, excerpted and accessed as inspiration for the study.

The study is structured according to the exemplary model of the foresight process, which an interested reader and his/her organization would ideally practice, i.e. from scanning environmental uncertainties, to the foresight phase and, finally, to transfer. In order to provide the best possible support for this future-oriented practice, each chapter of the study contains a checklist for management transfer, which transforms the study document into a working document.

Scanning (uncertainties)
In addition to tapping the comprehensive experience of participating experts and the extensive literature review, particular use was made of focus research and trend databases, for example from TRENDONE and iKnow.

Foresight (scenarios, future radar, wild cards)
In agreement with the World Future Society vantage point, we take a multifaceted view of the future and apply the "3P plus 1W" approach, probable, preferable and possible (3P) futures plus W for wild cards.[77]

Transfer (implications, future-proofing, management transfers)
This essential aspect deals with strengthening management's capacity to act. To achieve this, not only are the study's strategic implications intended for practice in various workshops, but the principles of future-proofing delineated herein have been developed for procurement, and the chapter-by-chapter transfer check is intended for their direct implementation.

Footnotes

1 Cf. also: KPMG (2013)
2 Spiegel, Eric A. (2014)
3 Cf. The GDELT Project (2016)
4 Yang, S. (2015)
5 Huet, E. (2015)
6 Frey, C. B./Osborne, M. A. (2013)
7 Canalys (2015)
8 Bienkowska, E. (2015)
9 MarketsandMarkets (2014)
10 Cf. Allison, P. R. (2015)
11 Acquity (2014)
12 Morris, K. (2015)
13 Coldwell, W. (2014)
14 Seidman, D. (2014)
15 Cf. Hajkowicz, S. (2015); Czerniawska, F./Smith, P. (2010)
16 Cf. KPMG (2013)
17 Chick, G./Handfield, R. B. (2014)
18 Sanders, J. S. (2011)
19 Blascovich, J. D. (2007); Bartolini, A. (2012)
20 Wald, J. (2014); Freelancers Union/Elance-oDesk (2014)
21 Heidelberg Institute for International Conflict Research (2015)
22 World Economic Forum (2014)
23 Fuentes-Nieva, R./Galasso, N. (2014)
24 Chartered Institute of Purchasing and Supply (2014)
25 World Wide Fund for Nature (2014)
26 US National Intelligence Council (2012)
27 Cf. Bennett, N./Lemoine, G. J. (2014); World Economic Forum (2015)
28 Guha-Sapir, D./Hoyois, P. (2015)
29 Koesterich, R. (2015)
30 Cf. Busch, J. (2013); Vecchiato, R./Roveda, C. (2014)
31 Information for Development Program (infoDev)/ The World Bank (2013)
31 Information for Development Program (infoDev)/ The World Bank (2013)
32 Cf. European Commission (2011)
33 The Group of Seven (G7) (2015)
34 Cf. Ecolabel Index (2016)
35 Stoiber, M. (2012)
36 Gartner (2013)
37 Radjou, N./Prabhu, J. (2015)
38 Govindarajan, V./Trimble, C. (2012)
39 Cf. Gonzales, A. (2013)
40 The Economist (2015)
41 UNCTAT, cited in: Allianz (2015)
42 Transparency Market Research (2014)
43 WEF YGL (2013)
44 Kapersky Lab (2014)
45 Cf. Kuchler, H. (2014); Trichur, R. (2014)
46 Rossi, B. (2015)
47 FBR Capital Markets, cited in: Norton, S. (2015)
48 UBS (2014)
49 Cf. Simonite, T. (2015)
50 Cf. Rajan, N. (2013)
51 Cf. Morris, D. Z. (2015); Butarin, V. (2014)
52 Loria, K. (2014)
53 Future of Life Institute (2015)
54 Anderson, C. (2008)
55 Lobo, D./Levin, M. (2015); Tufts University (2015)
56 IDC/EMC (2014)
57 Cf. O'Reilly, T. (2013)
58 Lobe, A. (2015)
59 Facebook (2015)
60 IMF (2015); Ogg, J. C. (2015)
61 Perlroth, N./Sangerdec, D. E. (2014)
62 Francis, H./Grubb, B. (2014)
63 Zurich Insurance Company/Atlantic Council of the United States (2014)
64 Cf. to Eco-terrorism: Jarboe, J. F. (2012)
65 World Wide Fund for Nature (2014)
66 Overland, J. E./Wang, M. (2013)
67 Baldwin, B. (2008)
68 Johnston, R. (2013)
69 Mundzeck, Till (2011)
70 Wilkinson, A./Kupers, R. (2013); Shell (2012)
71 Student, D. (2013)
72 EffizienzCluster LogistikRuhr (2015)
73 AGCO (2015)
74 von der Gracht, H. A./Stillings, C. (2013)
75 Cf. Georgiadou, M. C./Hacking, T. (2012); Georgiadou, M. C./ Hacking, T./Guthrie, P. (2012)
76 Rich, B. D. (2013)
77 Cf. World Future Society (2016); World Future Society (2002)

Literature

Acquity (2014): 2014 State of B2B Procurement Study: Uncovering the Shifting Landscape in B2B Commerce

AGCO (2015): AGCO Wins Excellence in eSolutions Award, Pressemeldung, 2015.04.01, www.agcocorp.com/news-and-media-center/purchasing-award-bme-2015.html

Allianz (2015): Allianz Risk Barometer. Top Business Risks 2015, www.agcs.allianz.com/assets/PDFs/Reports/Allianz-Risk-Barometer-2015_EN.pdf

Allison, P. R. (2015): Virtual reality comes of age in manufacturing. In: ComputerWeekly, 2015.02.16, www.computerweekly.com/feature/Virtual-reality-comes-of-age-in-manufacturing

Anderson, C. (2008): The End of Theory: The Data Deluge Makes the Scientific Method Obsolete. In: WIRED Magazine, 2008.06.23, http://archive.wired.com/science/discoveries/magazine/16-07/pb_theory

Andreessen, M. (2011): Why Software is Eating the World. In: The Wall Street Journal, 2011.08.20, www.wsj.com/news/articles/SB10001424053111903480904576512250915629460

Baldwin, B. (2008): Wade's War. In: Styleweekly.com, 2008.02.06, www.styleweekly.com/richmond/wades-war/Content?oid=1381402

Bartolini, A. (2012): From CPO to CEO: How the CEO of the World's Largest Company (Apple) Used His Procurement Background to Thrive. In: CPO Rising, 2012.08.17, http://cporising.com/2012/08/17/from-cpo-to-ceo-how-the-ceo-of-apple-used-his-procurement-background

Bennett, N./Lemoine, G. J. (2014): What VUCA Really Means for You. In: Harvard Business Review, Vol. 92, No. 1/2, p. 27

Bienkowska, E. (2015): Reindustrialisation of Europe: Industry 4.0 – Innovation, growth and jobs. Forum Europe conference, 2015.06.23, http://ec.europa.eu/commission/2014-2019/bienkowska/announcements/reindustrialisation-europe-industry-40-innovation-growth-and-jobs-forum-europe-conference_en

Blascovich, J. D. (2007): From CPO to CEO. In: Inside Supply Management, April 2007, p. 6

Busch, J. (2013): New Procurement KPIs and Thinking: A New Approach to Scenario Planning. In: Spend Matters, 2013.08.15, http://spendmatters.com/2013/08/15/new-procurement-kpis-and-thinking-a-new-approach-to-scenario-planning

Butarin, V. (2014): DAOs, DACs, DAs and More: An Incomplete Terminology Guide. In: Ethereum Blog, 2014.05.06, https://blog.ethereum.org/2014/05/06/daos-dacs-das-and-more-an-incomplete-terminology-guide

Canalys (2015): Global 3D printing market to reach USD 20.2 billion in 2019 – Market expected to grow 56 percent in 2015, 2015.04.14, www.canalys.com/newsroom/global-3d-printing-market-reach-202-billion-2019#sthash.zYZZBJ80.dpuf

Chartered Institute of Purchasing and Supply (2014): The CIPS Risk Index – Global Retrospective. CIPS, Stamford et al., www.cips.org/Documents/cips-for-business/CIPS_RISK_INDEX_RETROSPECTIVE_WEB.pdf

Chick, G./Handfield, R. B. (2014): The Procurement Value Proposition: The Rise of Supply Management. Kogan Page, London et al.

Coldwell, W. (2014): Travel industry switches on to virtual reality. In: The Guardian, 2014.10.25, www.theguardian.com/travel/2014/oct/25/travel-industry-virtual-augmented-reality

Czerniawska, F./Smith, P. (2010): The Economist: Buying Professional Services: How to get value for money from consultants and other professional services providers. London

Ecolabel Index (2016): Global directory of ecolabels, www.ecolabelindex.com

EffizienzCluster LogistikRuhr (2015): Supply Chain School Project Performance Documentation, www.effizienzcluster.de/files/1/25/1093_supply_chain_school.pdf

European Commission (2011): Buying Green! A Handbook on Green Public Procurement. EC: Luxemburg, http://ec.europa.eu/environment/gpp/pdf/handbook.pdf

Facebook (2015): Facebook Q2 2015 Results, http://files.shareholder.com/downloads/AMDA-NJ5DZ/653729985x0x842064/619A417E-5E3E-496C-B125-987FA25A0570/FB_Q215EarningsSlides.pdf

Findler, D. (2015): Here's How Managers Can Be Replaced by Software. In: Harvard Business Review, 2015.04.21, https://hbr.org/2015/04/heres-how-managers-can-be-replaced-by-software

Francis, H./Grubb, B. (2014): Ten ways the internet can be shut down. In: The Sydney Morning Herald, 2014.12.24, www.smh.com.au/digital-life/digital-life-news/ten-ways-the-internet-can-be-shut-down-20141223-12cry0.html

Freelancers Union/Elance-oDesk (2014): Freelancing in America: A National Survey of the New Workforce, https://fu-web-storage-prod.s3.amazonaws.com/content/filer_public/c2/06/c2065a8a-7f00-46db-915a-2122965df7d9/fu_freelancinginamericareport_v3-rgb.pdf

Frey, C. B./Osborne, M. A. (2013): The Future of Employment: How susceptible are Jobs to Computerization? Oxford Martin School, University of Qxford, www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

Fuentes-Nieva, R./Galasso, N. (2014): Working for the Few: Political capture and economic inequality. Oxfam, Oxford, www.oxfam.de/sites/www.oxfam.de/files/20140120-working-for-few-political-capture-economic-inequality-en.pdf

Future of Life Institute (2015): Research Priorities for Robust and Beneficial Artificial Intelligence: an Open Letter, http://futureoflife.org/AI/open_letter

Gartner (2013): Gartner Reveals Top Predictions for IT Organizations and Users for 2014 and Beyond, Press release, 2013.10.08, www.gartner.com/newsroom/id/2603215

Georgiadou, M. C./Hacking, T. (2012): Strategies and techniques to future-proof the energy performance of housing developments. In: International Journal of Energy Sector Management, 6(2), pp. 160 – 174

Georgiadou, M. C./Hacking, T./Guthrie, P. (2012): A conceptual framework for future-proofing the energy performance of buildings. In: Energy Policy, 47, pp. 145 – 155

Gonzales, A. (2013): The Social Side of Supply Chain Management. In: Supply Chain 24/7, 2013.09.05, www.supplychain247.com/article/the_social_side_of_supply_chain_management_all_pages

Govindarajan, V./Trimble, C. (2012): Reverse innovation: Create far from home, win everywhere. Harvard Business Press: Boston

Guha-Sapir, D./Hoyois, P. (2015): Estimating populations affected by disasters: A review of methodological issues and research gaps. Centre for Research on the Epidemiology of Disasters: Brussels, March 2015, http://cred.be/download/download.php?file=sites/default/files/Estimatingpopulationaffectedbydisasters.pdf

Hajkowicz, S. (2015): Why is the creative economy growing so strongly? Global Strategic Foresight Community of the World Economic Forum, Annual Meeting 2015, 2015.01.18, https://agenda.weforum.org/2015/01/why-is-the-creative-economy-growing-so-strongly

Hawking, S./Tegmark, M./Russell, S./Wilczek, F. (2015): Transcending Complacency on Superintelligent Machines. In: Huffington Post, 2014.04.19, www.huffingtonpost.com/stephen-hawking/artificial-intelligence_b_5174265.html

Heidelberg Institute for International Conflict Research (2015): Conflict Barometer I 2014. HIIK, Heidelberg, www.hiik.de/de/konfliktbarometer/pdf/ConflictBarometer_2014.pdf

Howkins, J. (2013): The Creative Economy: How People Make Money from Ideas. London et al.

The GDELT Project (2016): The Global Database of Events, Language, and Tone, http://gdeltproject.org

Huet, E. (2015): Server And Protect: Predictive Policing Firm PredPol Promises To Map Crime Before It Happens. In: Forbes, 2015.11.02, www.forbes.com/sites/ellenhuet/2015/02/11/predpol-predictive-policing

IDC/EMC (2014): The Digital Universe, 7th ed. IDC, www.emc.com/leadership/digital-universe/index.htm

IMF (2015): IMF World Economic Outlook (WEO), April 2015, www.imf.org/external/pubs/ft/weo/2015/01/weodata/index.aspx

Information for Development Program (infoDev)/The World Bank (2013): Crowdfunding's Potential for the Developing World. World Bank: Washington, DC, www.infodev.org/infodev-files/wb_crowdfundingreport-v12.pdf

Jarboe, J. F. (2012): The Threat of Eco-Terrorism. Testimony before the House Resources Committee, Subcommittee on Forests and Forest Health, Washington, DC, 2002.02.12, www.fbi.gov/news/testimony/the-threat-of-eco-terrorism

Johnston, R. (2013): Researchers put synthetic meat to the palate test. In: Nature News Blog, 2015.08.05, http://blogs.nature.com/news/2013/08/researchers-put-synthetic-meat-to-the-palate-test.html

Kapersky Lab (2014): IT Security Risk Survey 2014: A Business Approach to Managing Data Security Threats, http://media.kaspersky.com/en/IT_Security_Risks_Survey_2014_Global_report.pdf

KPMG (2013): FUTUREBUY: The Future of Procurement – 25 in 25: Delivering procurement value in a complex world, www.kpmg.com/ZA/en/IssuesAndInsights/ArticlesPublications/Management-Consulting/Documents/futurebuy-procurement-25-in-2025.pdf

KPMG (2013): Future State 2030: The global megatrends shaping governments, www.kpmg.com/ID/en/IssuesAndInsights/ArticlesPublications/Documents/Future-State-2030.pdf

KPMG (2014): Going beyond the data: Achieving actionable insights with data and analytics, www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Documents/going-beyond-data-and-analytics-v4.pdf

KPMG (2014): Sourcing Governance 2030, www.kpmg.com/CH/en/Library/Articles-Publications/Documents/Advisory/pub-20140717-sourcing-governance-en.pdf

KPMG (2015): Fast forward – Future-proofing the life sciences supply chain, www.kpmg.com/AU/en/IssuesAndInsights/ArticlesPublications/Documents/fast-forward-life-sciences-supply-chain.pdf

Koesterich, R. (2015): Swimming With Black Swans: The Volatile Decade Ahead. In: Market Realist, 2015.01.28, http://marketrealist.com/2015/01/market-volatility-increased-since-2007-stay

Kuchler, H. (2014): Hackers find suppliers are an easy way to target companies. In: Financial Times, 2014.10.20, www.ft.com/intl/cms/s/0/b4807a14-5097-11e4-8645-00144feab7de.html#axzz3hS8Varan

Laguna, R. (2014): Rise of the Data States: How the Big Internet Players Became Global Powers. In: Huffington Post, 2015.04.16, www.huffingtonpost.com/rafael-laguna/rise-of-the-data-states-h_b_5162692.html

Lobe, A. (2015): Macht der Internetkonzerne: Amerika ist abgebrannt, wir leben jetzt in Google-Land. In: F.A.Z., 2015.06.09, www.faz.net/-gsb-849vj

Lobo, D./Levin, M. (2015): Inferring Regulatory Networks from Experimental Morphological Phenotypes: A Computational Method Reverse-Engineers Planarian Regeneration. In: PLOS: Computational Biology, 2015.06.04, DOI: 10.1371/journal.pcbi.1004295

Loria, K. (2014): KURZWEIL: Human-Level AI Is Coming By 2029. In: Business Insider UK, 2014.12.29, http://uk.businessinsider.com/ray-kurzweil-thinks-well-have-human-level-ai-by-2029-2014-12

MarketsandMarkets (2014): 3D Printing Materials Market – Global Trends & Forecasts to 2019

Morris, D. Z. (2015): RoboCorp: Get ready for companies that run themselves. But will the autonomous economy set us all free, or just make the rich richer? In: aeon, 2015.01.26, http://aeon.co/magazine/technology/are-we-ready-for-companies-that-run-themselves

Morris, K. (2015): Virtual-Reality Tours Come to Commercial Real Estate. In: The Wall Street Journal, 2015.06.28, www.wsj.com/articles/the-office-space-in-your-head-1435541344

Mundzeck, T. (2011): Kontrollierte Kernfusion: Kann Sonnenfeuer schon bald Atomkraft ersetzen? In: DIE WELT, 2011.11.06, www.welt.de/wissenschaft/article13696760/Kann-Sonnenfeuer-schon-bald-Atomkraft-ersetzen.html

Norton, S. (2015): FBR Predicts 20% Uptick in 'Next-Gen' Cybersecurity Spending. In: The Wall Street Journal, 2015.02.24, http://blogs.wsj.com/cio/2015/02/24/fbr-predicts-20-uptick-in-next-gen-cybersecurity-spending/?mod=wsjde_finanzen_wsj_barron_tickers

Ogg, J. C. (2015): How Facebook Market Cap Now Higher Than GE, JPMorgan and Wal-Mart. In: 24/7 Wall Street, 2015.07.21, http://247wallst.com/investing/2015/07/21/how-facebook-market-cap-now-higher-than-ge-jpmorgan-and-wal-mart

O'Reilly, T. (2013): Open Data and Algorithmic Regulation. In: Goldstein, B./Dyson, L.: Beyond Transparency: Open Data and the Future of Civic Innovation Paperback, Code for America Press, San Francisco, pp. 289–300

Overland, J. E./Wang, M. (2013): When will the summer Arctic be nearly sea ice free? In: Geophysical Research Letters, 40(10), pp. 2097–2101

Perlroth, N./Sangerdec, D. E. (2014): North Korea Loses Its Link to the Internet. In: The New York Times, 2014.12.22, www.nytimes.com/2014/12/23/world/asia/attack-is-suspected-as-north-korean-internet-collapses.html

Radjou, N./Prabhu, J. (2015): Frugal Innovation: How to do more with less. New York

Rajan, N. (2013): Digital Senses. In: Money Today, 03/2013, www.businesstoday.in/moneytoday/technology/cognitive-senses-next-big-thing-in-computing-world-ibm/story/192657.html

Rauner, M./Schröder, T. (2015): Künstliche Intelligenz: Die Cogs kommen. In: ZEIT Wissen, No. 02/2015, www.zeit.de/zeit-wissen/2015/02/kuenstliche-intelligenz-cognitive-computing-cogs

Rich, B. D. (2013): The 10 Principles Of Future-Proofing Historic Buildings, http://principlesoffutureproofing.com/wp-content/uploads/2014/11/Future-Proofing-Literature-Review.pdf

Rossi, B. (2015): Being connected is not enough: how to transform into a quantified enterprise, 2015.02.16, www.information-age.com/technology/information-management/123459024/being-connected-not-enough-how-transform-quantified-enterprise

Sanders, J. S. (2011): The Path To Becoming A Fortune 500 CEO. In: Forbes, 2011.12.05, www.forbes.com/sites/ciocentral/2011/12/05/the-path-to-becoming-a-fortune-500-ceo

Seidman, D. (2014): From the Knowledge Economy to the Human Economy. In: Harvard Business Review, 2014.11.12, https://hbr.org/2014/11/from-the-knowledge-economy-to-the-human-economy

Shaughnessy, H. (2012): Will IBM's Bet On A Realigned Jobs Market Be Its Undoing? In: Forbes, 2012.10.22, www.forbes.com/sites/haydnshaughnessy/2012/10/22/how-far-can-ibm-push-its-bet-on-a-realigned-jobs-market

Shell (2012): 40 Years of Shell Scenarios: 1972–2012, http://s05.static-shell.com/content/dam/shell-new/local/corporate/corporate/downloads/pdf/shell-scenarios-40yearsbook080213.pdf

Simonite, T. (2015): Robot Journalist Finds New Work on Wall Street. In: MIT Technology Review, 2015.01.09, www.technologyreview.com/news/533976/robot-journalist-finds-new-work-on-wall-street

SpencerStuart (2006): Route to the Top, www.arecentstudy.com/studies/S&P%20500%20CEOs.pdf

Spiegel, E. A. (2014): What we can do for the next generation. In: The Washington Post, 2014.02.07, www.washingtonpost.com/business/capitalbusiness/what-we-can-do-for-the-next-generation/2014/02/07/b139e206-8cfb-11e3-833c-33098f9e5267_story.html

Stoiber, M. (2012): Eco-labels: Is Design Thinking Bringing Clarity to the Chaos? In: Huffington Post, 2013.02.05, www.huffingtonpost.com/marc-stoiber/ecolabels-is-design-think_b_2229513.html

Student, D. (2013): Energiewende. Das Tagesprogramm des EnBW-Heilers Mastiaux. Manager magazin online, 2013.09.20, www.manager-magazin.de/magazin/artikel/tagesprogramm-frank-mastiaux-energiekonzern-enbw-a-933423.html

The Economist (2015): The future of Factory Asia: A tightening grip, 2015.03.14, www.economist.com/news/briefing/21646180-rising-chinese-wages-will-only-strengthen-asias-hold-manufacturing-tightening-grip#vKYygqTysUv3rd3B.99 41

The Group of Seven (G7) (2015): Leaders' Declaration G7 Summit, 7–8 June 2015, www.g7germany.de/Content/DE/_Anlagen/G8_G20/2015-06-08-g7-abschluss-eng.pdf?__blob=publicationFile

Transparency Market Research (2014): Industrial Robotics Market – Global Industry Analysis, Size, Share, Growth, Trends and Forecast, 2014–2020

Trichur, R. (2014): Cyber-attack on Bell supplier highlights rising hacker threat. In: The Globe and Mail, 2014.02.02, www.theglobeandmail.com/report-on-business/bell-small-business-customer-information-breached-in-hacking-attack/article16653395

Tufts University (2015): Planarian Regeneration Model Discovered by Artificial Intelligence Robot science does more than just crunch numbers. Press release, 2015.06.04, http://now.tufts.edu/news-releases/planarian-regeneration-model-discovered-artificial-intelligence

UBS (2014): 3D Printing: Mass Customization Ahead. Investment Research Report, 2014.03.31, www.wisburg.com/wp-content/uploads/2014/09/UBS-3D-Printing-Mass-Customization-Ahead.pdf

US National Intelligence Council (2012): Global Trends 2030: Alternative Worlds. NIC, Washington, https://globaltrends2030.files.wordpress.com/2012/11/global-trends-2030-november2012.pdf

Vecchiato, R./Roveda, C. (2014): Foresight for public procurement and regional innovation policy: The case of Lombardy. In: Research Policy, 43(2), March 2014, pp. 438–450

von der Gracht, H. A./Stillings, C. (2013): An innovation-focused scenario process – A case from the materials producing industry. Technological Forecasting and Social Change, 80(4), pp. 599–610

Wald, J. (2014): 5 Predictions for the Freelance Economy. In: Forbes, 2014.11.24, www.forbes.com/sites/waldleventhal/2014/11/24/5-predictions-for-the-freelance-economy-in-2015

Wang, R. R. (2015): Disrupting Digital Business: Create an Authentic Experience in the Peer-to-Peer Economy. Boston

WEF YGL (2013): Circular Economy Innovation & New Business Models Initiative, Young Global Leaders Sharing Economy Working Group, Position paper, Geneva, https://thecirculars.org/documents/04%20Sharing%20Economy%20Paper.pdf

WFS (2002): The Future: An Owner's Manual, A brief overview of the study of the future and the services of the World Future Society

Wilkinson, A./Kupers, R. (2013): Living in the Futures. Harvard Business Review, 91(5), pp. 118–127, https://hbr.org/2013/05/living-in-the-futures

World Economic Forum (2014): Global Risks 2014, Ninth Edition. WEF, Geneva, http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2014.pdf

World Economic Forum (2015): Deep Shift: Technology Tipping Points and Societal Impact, September 2015, www.weforum.org/reports/deep-shift-technology-tipping-points-and-societal-impact

World Economic Forum (2015): Volatility as the New Normal (Session in cooperation with The Wall Street Journal), January 2015, Davos, www.weforum.org/videos/volatility-new-normal

World Future Society (2002): The Future: An Owner's Manual, A brief overview of the study of the future and the services of the World Future Society

World Future Society (2016): About the World Future Society (Press Room), www.wfs.org/node/215

World Wide Fund for Nature (2014): Living Planet Report 2014. Species and spaces, people and places. WWF, Gland, www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/WWF-LPR2014-EN-LowRes.pdf

Yang, S. (2015): Can You Tell the Difference Between a Robot and a Stock Analyst? Wall Street tries out research reports written by artificial intelligence. In: The Wall Street Journal, 2015.07.09, www.wsj.com/articles/robots-on-wall-street-firms-try-out-automated-analyst-reports-1436434381

Younger, L. (2015): Big Disruptive Ideas – R. I. P. The Procurement Function. In: LinkedIn, 2015.05.04, www.linkedin.com/pulse/big-disruptive-ideas-rip-procurement-function-lance-younger

Zurich Insurance Company/Atlantic Council of the United States (2014): Risk Nexus – Beyond data breaches: global interconnections of cyber risk. April 2014, www.atlanticcouncil.org/images/publications/Zurich_Cyber_Risk_April_2014.pdf

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