LOGISTICS
TREND RADAR

Delivering insight today.

Creating value tomorrow!

Version 1: April 2013

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"Trying to think beyond our current reality to glimpse the future helps DHL to maintain its global leadership position. The new Logistics Trend Radar is a great instrument to help DHL and its customers continuously monitor logistics trends and prepare for new challenges."

Bill Meahl Chief Commercial Officer DHL

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EXECUTIVE SUMMARY

This white paper delivers a new tool enabling the reader to evaluate the latest trends in the logistics industry, and assess their potential impact. The tool screens and reports on a regular basis – this is the very first version of the tool; regular updates are planned.

The tool comprises an at-a-glance Logistics Trend Radar graphic, an overview table of the key social and business trends, an overview table of the key technology trends, numerous in-depth trend-specific impact analyses, and a multiple-page deep dive into a major trend of supergrid logistics. Information on use cases, pilots, and sources are provided in the last section of this document.

This tool is a comprehensive repository of knowledge with which DHL in cooperation with Detecon International Consulting intends to stimulate collaborative discussion throughout its networks and alliances, resulting in innovative projects that can be jointly undertaken.

The overarching aim of the Logistics Trend Radar is to help change the world of logistics for good.

INTRODUCTION

Dear Reader,

The logistics industry is busy reshaping itself, and potentially disruptive innovation is coming into focus.

Evolving ideas and concepts throw up some surprising new challenges, and often sweep away traditional commitment to incremental progress. As stakeholders in the logistics industry, we all need to continuously evaluate the latest trends and assess their potential impact. Indeed, this may be the only way to sustain market position and ensure that needs are fully met.

The new Logistics Trend Radar
To bring you closer to the key logistics issues – both those on our near horizon and those that are currently blue-sky thinking – we are proud to introduce the new Logistics Trend Radar. This unique tool, developed in cooperation with Detecon International Consulting, is designed to help you derive new strategies and develop more powerful projects and innovations.

The Logistics Trend Radar is very different to most other trend studies. It doesn't just deliver a one-off insight into global trends and new technologies. Instead it is a dynamic living document which screens and reports on a regular basis. Highly systematic research and evaluation ensure we focus on the right topics. And our methodological approach maintains focus on strategic innovation.

This tool also represents a comprehensive repository of knowledge for Deutsche Post DHL and our customers and partners to share. We aim to stimulate collaborative discussion throughout our networks and alliances, resulting in innovative projects that we can undertake together. This comes from a firm belief that participatory knowledge will enable us to change the world of logistics for good.

Social & Business Trends; Technology Trends
To help identify key drivers and growing impacts, the Logistics Trend Radar distinguishes between social and business trends on the one hand, and technology trends on the other. We're seeing super-empowered logistics consumers who can directly influence the supply chain. And of course technology is opening up countless new logistics possibilities – for example, the increasing availability of low-cost sensors and robotics, and new technology platforms enabling direct manufacturer-to-customer (M2C) supply chains.

Perfect for a quick skim-read and for a very deep dive, the Logistics Trend Radar includes a graphic highlighting the change potential of each key trend and its approximate timeframe. The Logistics Trend Radar also provides overview tables of the key social and business trends, and the key technology trends. This is followed by more detailed trend-specific impact analyses, and then a multiple-page insight into a major logistics trend.

Future updates
To create this very first version of the Logistics Trend Radar, we deployed and pooled the in-depth knowledge and experience of our entire DHL Solutions & Innovation (S&I) team , and the wider DHL Customer Solutions & Innovation (CSI) organization which supports the business units of Deutsche Post DHL. We worked in cooperation with Detecon International Consulting, one of the world's leading consulting companies combining classic management consulting with a high level of technology expertise. In future versions, we plan to build on and enrich this information not only with updates but critically also with customer and partner input and interaction.

We invite you now to enjoy a first review of the new Logistics Trend Radar.

Yours sincerely,

Martin Wegner & Dr. Markus Kückelhaus

WHAT ARE THE GLOBAL DRIVERS?

The logistics industry is influenced by many global trends, and these are driving new requirements for the future. The most significant of these are described as megatrends (see Figure 1).

Megatrends

Growing infrastructure congestion

Shifting centers of economic activity

Increasing complexity/ Outsourcing

Continuing globalization

Digitization

Global uncertainty and increasing volatility

E-substitution

Demographic changes and urbanization

Consumerism
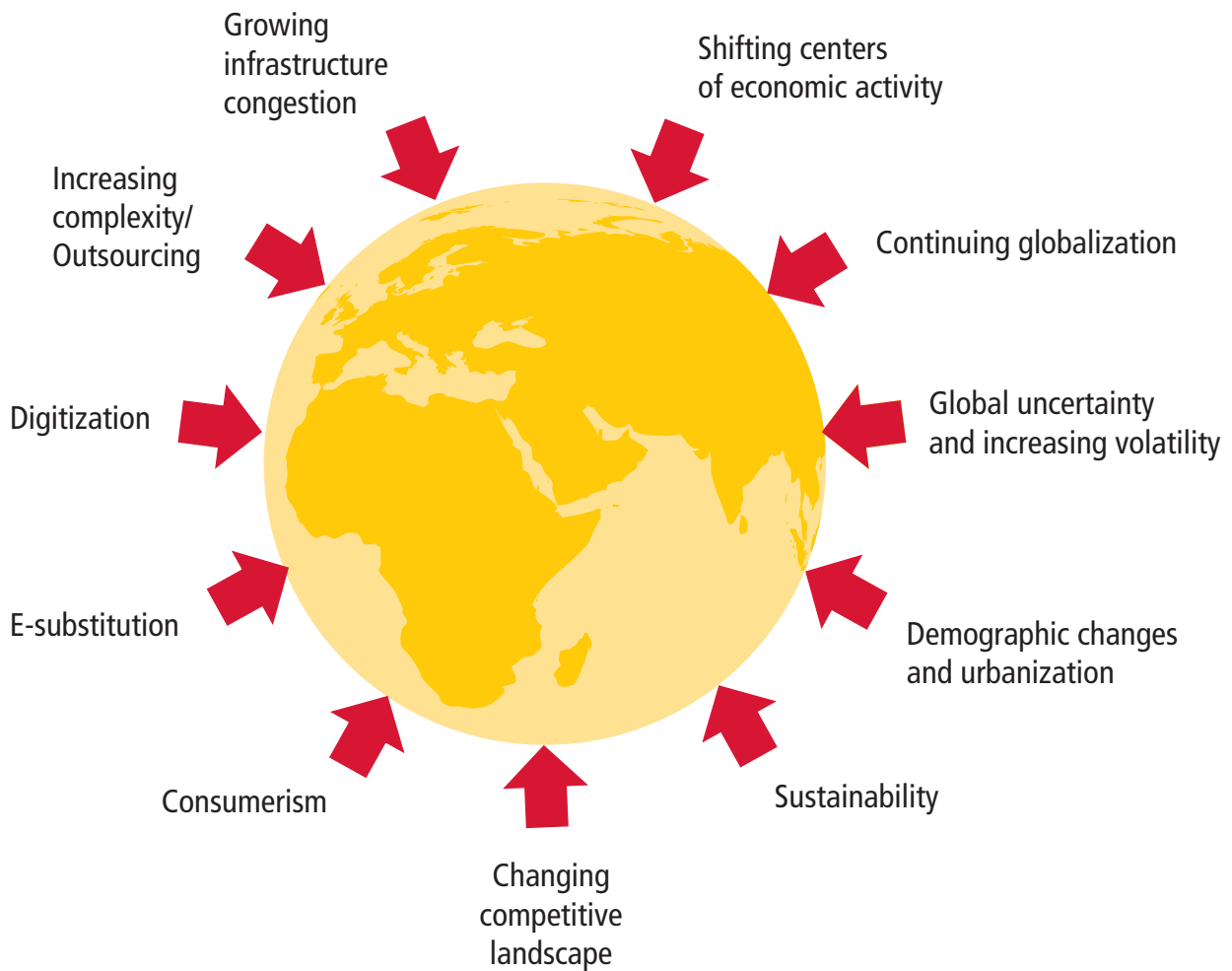
Sustainability

Changing competitive landscape

Figure 1: Megatrends driving requirements for tomorrow's logistics industry.

Many new technologies are emerging, each presenting logistics providers with exciting new business opportunities (see Figure 2). And of course there are costs and risks which must be strategically balanced; and timing is often critical too.

New Technologies

Social Business & Enterprise 2.0

Second-screen revolution

Actionable analytics

In-memory computing

Consumerization of IT

Internet of Everything

Wearable computing

Embedded technology

Next-gen mobile: smart devices and tablets

Mobile applications and html5

Enterprise app stores

Hybrid IT & cloud computing

Cloud-based marketplaces

Service brokerage

Encryption & cryptography

Security vulnerability

Figure 2: Logistics providers must consider whether and when to adopt new technologies.

Megatrends   **New Technologies**

Logistics impact assessment

Logistics Trend Radar

Social & Business Trends	Technology Trends
Logistics trends and methodologies driven by society or business which may contribute to process-oriented or organizational changes in the supply chain or necessitate new business models	Identified technology trends that are likely to have an impact on logistics operations

Figure 3: Assessment helps to identify social and business trends on the one hand, and technology trends on the other.

Undertaking an impact assessment.

In April 2013, DHL undertook a thorough logistics impact assessment of megatrends and new technologies. The aim of this assessment was to enable strategic positioning and rapid adoption of innovative concepts (see Figure 3).

Very different to most other trend studies, this assessment will not just deliver a one-off insight into megatrends and new technologies. Instead the intention is to make it a dynamic living document which screens and reports on a regular basis. Highly systematic research and evaluation ensure we focus on the right topics. And our methodological approach maintains focus on strategic innovation. In future versions, we plan to build on and enrich this information not only with updates but critically also with customer and partner input and interaction.

AT-A-GLANCE: THE LOGISTICS TREND RADAR

From its thorough logistics impact assessment, DHL has created a unique tool in cooperation with Detecon International Consulting, designed to help you derive new strategies and develop more powerful projects and innovations. The centrepiece of this tool is a graphic highlighting the change potential of each key trend and its approximate timeframe (see Figure 4).

Social & Business Trends

Technology Trends

HIGH   HIGH

MEDIUM   MEDIUM

B01 Supergrid Logistics

B03 Next-generation M2C

T04 3D Printing

T01 Big Data / Data-as-a-Service

B05 Logistics Marketplaces

B02 Real-time Services

T03 Autonomous Logistics

B06 "Logsumer"

T02 Cloud Computing

B11 Multiple-user Networks

B04 Urban Logistics

T06 Internet of Things

B13 Near- & X-shoring

B07 Crowd Logistics

T05 Robotics & Automation

T10 Low-cost Sensor Technology

B10 Convenience Logistics

T07 Next-generation Telematics

T08 Quantum Computing

B09 Grey Power Logistics

B12 Shareconomy Logistics

T09 Augmented-reality Logistics

LOW   LOW

Relevant in: < 5 years

B08 Fair Logistics

> 5 years

HIGH: Creates new ways of doing business
MEDIUM: Provides significant improvement
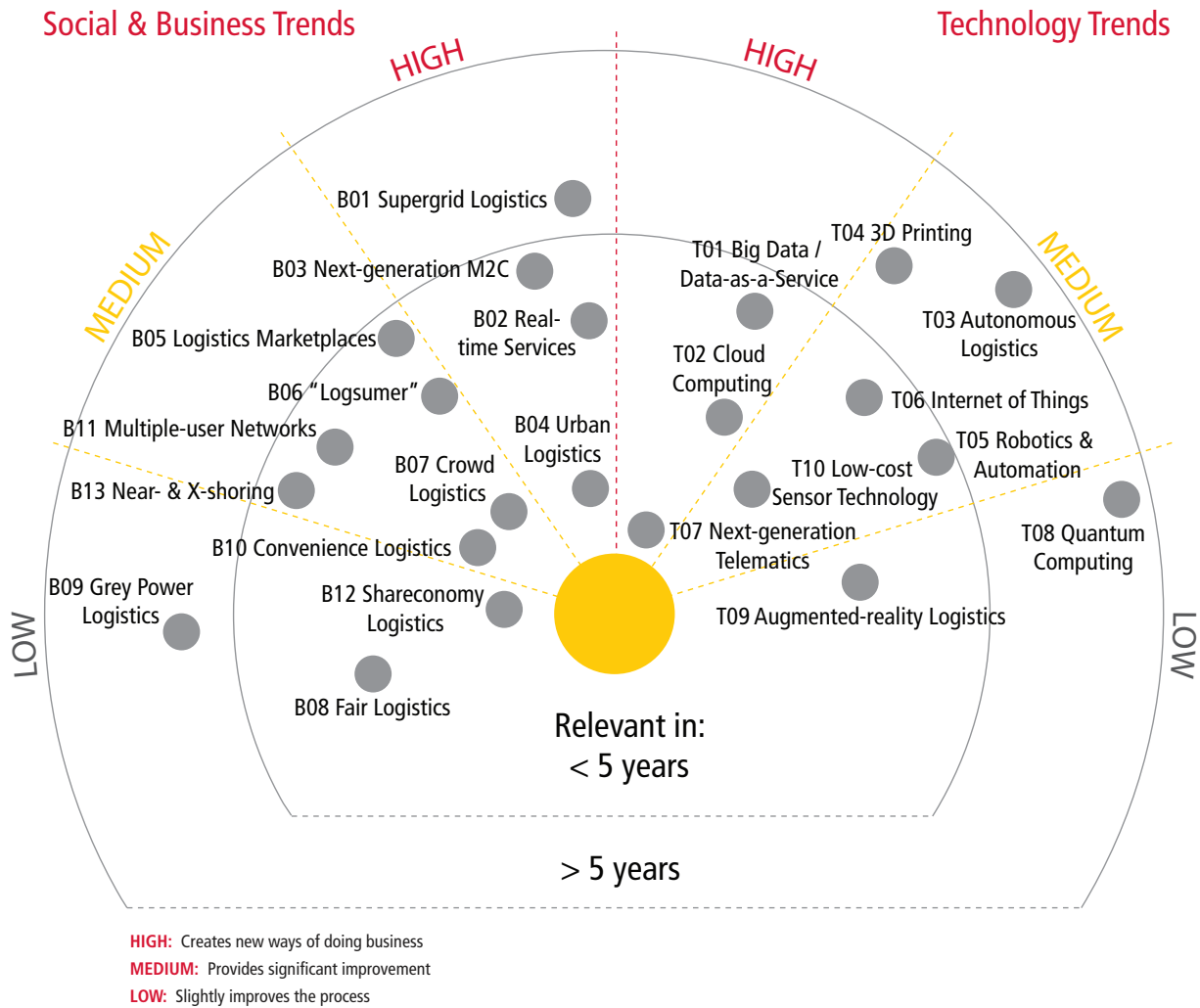**LOW:** Slightly improves the process

Figure 4: The new Logistics Trend Radar brings you closer to the key logistics issues – both those on our near horizon and those that are currently blue-sky thinking.

OVERVIEW: SUMMARY OF THE KEY TRENDS

The Logistics Trend Radar also provides overview tables of the key Social and Business Trends, and the key technology trends (see Tables 1 and 2).

Logistics Trend Radar				
	Social & Business Trend	**Impact**	**Timeframe**	**Summary**
B01	Supergrid Logistics	High	> 5 years	Supergrid logistics will bring up a new generation of logistics companies whose primary focus is the orchestration of global supply-chain networks that integrate production enterprises and logistics providers. Sample use cases: LOGICAL, InterLogGrid
B02	Real-time Services	High	< 5 years	Real-time services enable flexible and efficient adaption to changing conditions and ad-hoc optimization of supply chains by integrating real-time events into intelligent, interactive analytics frameworks. Sample use cases: agheera.pulse, Real Time Tracking
B03	Next-generation M2C	High	< 5 years	Manufacturer-to-customer (M2C) reflects the reality of a digital lifestyle; customers can order direct from manufacturers, thus setting new requirements for the design and management of global logistics networks. Sample use cases: M2C Marketplaces (Alibaba.com, globalmarket.com, chinagadgets.com)
B04	Urban Logistics	High	< 5 years	Key issues in urban areas are environmental impact and traffic density. Combined with the growing relevance of e-commerce and home delivery, this makes urban logistics solutions essential. Sample use cases: Urban Consolidation Centers (UCC), e.g., Bristol; binnenstadservice.nl
B05	Logistics Marketplaces	Medium	< 5 years	In the context of globalization and increasingly digital lifestyles, logistics marketplaces create opportunities for new services that can overcome geographical and functional segmentation. Sample use cases: Logistics Mall, Click2Transport.com
B06	"Logsumer"	Medium	< 5 years	A whole new generation of logistics consumers – the "logsumer" – can now take an active part in decision-making on the time, price, quality, and "green" or "fair" aspects of logistics services; this affects the entire supply chain. Sample use cases: MyArrival, Shutl
B07	Crowd Logistics	Medium	< 5 years	This includes crowdsourcing first-and-last-mile activities, using employee tweets for flexible re-routing, and using social network mining as a trigger for new products, significantly impacting costs, flexibility, and CO2 efficiency. Sample use cases: MyWays, polyport.ch
B08	Fair Logistics	Low	< 5 years	In future, dealing thoughtfully with earth's limited resources will go hand-in-hand with fair and respectful human interaction, and sustainable investment in regional empowerment. Sample use cases: VillageReach, TheLogisticsProject, Matternet Flying Parcels
B09	Grey Power Logistics	Low	> 5 years	In five or more years' time, the first wave of "digital natives" will enter the aged population segment; grey power logistics will offer new services to answer the resulting challenges of this demographic development. Sample use cases: DHL: Ambulance Service for NHS
B10	Convenience Logistics	Medium	< 5 years	Convenience logistics is in response to the specific requirements of next-generation e-commerce; it covers the entire spectrum of commodity goods including sensitive and cold-chain products. Sample use cases: Bio Storage Technologies, AllYouNeed.com

Logistics Trend Radar – continued

	Social & Business Trend	Impact	Relevance	Summary
B11	Multiple-user Networks	Medium	< 5 years	Innovative methods of transportation, smart packaging solutions, and real-time supply-chain monitoring enable the use of standard, existing networks to transport and store special and dangerous goods. Sample use cases: DHL: LIPS
B12	Shareconomy Logistics	Low	< 5 years	A new sharing culture leads to new logistics needs within the digitalized neighborhood. Logistics infrastructure and service sharing with coopetitors could also open new business perspectives. Sample use cases: LifeCycler.de, Craigslist.org, Sharedload.com
B13	Near- & X-shoring	Medium	< 5 years	Following on from the offshoring wave of the last decade, changing economic and social conditions will bring up new sourcing strategies such as near-shoring, re-shoring, back-shoring, and even x-shoring. Sample use cases: The Global Intelligence Group: Nearshoring Manufacturing in Mexico

Table 1: The key social and business trends affecting the logistics industry today.

Logistics Trend Radar

	Technology Trend	Impact	Relevance	Summary
T01	Big Data / Data-as–a-Service	High	< 5 years	Big data analytics represents the "industrial revolution of data"; it allows the processing of previously untapped data sources and enables real-time analytics on a broader scale. Sample use cases: nugg.ad (DP Mail), NavAir Deckplate (US Navy)
T02	Cloud Computing	High	< 5 years	Beyond the hype, the paradigm of cloud-based services is increasingly tangible for logistics; new process cloud-based concepts (S-BPM) support management of globally distributed, federated logistics networks and enterprises. Sample use cases: Red Prairies (DHL Pilot), Logistics Mall, LOGICAL, Metasonic S-BPM Suite
T03	Autonomous Logistics	Medium	> 5 years	Autonomous logistics enables innovations such as cellular transport systems, self-steering vehicles, and unmanned aerial vehicles, offering new and efficient transport solutions for existing infrastructures and in remote areas. Sample use cases: Self Driving Car (Google), Unmanned Aerial Vehicles (Matternet)
T04	3D Printing	Medium	> 5 years	This disruptive production technology will change tomorrow's logistics by necessitating specific networks for materials delivery; but it will also offer new business opportunities for logistics providers. Sample use cases: DHL CSI research project "3D Printing", DirectSpare research project (EU)
T05	Robotics & Automation	Medium	< 5 years	Robotics and automation technologies support zero-defect logistics processes and enable new levels of productivity; self-learning systems can flexibly adapt to changing logistics environments. Sample use cases: Parcel Robot, Robot Cell Light (DHL), Stewart Gough Platform (Effizienzcluster LogistikRuhr)

Logistics Trend Radar – continued				
	Technology Trend	**Impact**	**Relevance**	**Summary**
T06	Internet of Things	Medium	< 5 years	Internet of Things technology will enable physical objects to become active participants in logistics processes; in addition, smart objects will enable self-steering processes and new services such as event-driven solutions.
				Sample use cases: Tracing Intelligent Logistics Objects (TiLO) (Effizienz-cluster LogistikRuhr)
T07	Next-generation Telematics	High	< 5 years	The next generation of telematics will be based on real-time shipment and traffic data, enabling new solutions for dynamic routing and value-added services such as flexible delivery offerings.
				Sample use cases: Smart Truck (DHL), Connected Drive, TeleMatics (BMW, MAN, T-Systems)
T08	Quantum Computing	Low	> 5 years	Quantum computing will cause a paradigm shift, offering operational speeds far exceeding those in conventional computing; in addition, quantum cryptography will make information transmission completely secure.
				Sample use cases: IBM Quantum Computing, D-Wave One (D-Wave Systems)
T09	Augmented-reality Logistics	Low	< 5 years	By adding virtual layers of context-specific information at the right time and in the right place, augmented reality will provide new perspectives in logistics planning, process execution, and visual analytics.
				Sample use cases: DSC Global IT Strategy & Solutions: AR project for "Vision Picking – Augmented Reality Solution for Warehouse Operations"
T10	Low-cost Sensor Technology	Medium	< 5 years	With the cost of initial investment dropping, the next few years are likely to see new creative uses of established consumer sensor technologies (e.g., Kinect, 3-D-Scanning) for logistics purposes.
				Sample use cases: DHL Solutions and Innovation: Research project Trans4Goods

Table 2: The key technology trends affecting tomorrows logistics industry (See Text from fig. 1)

IN-DEPTH: SOCIAL AND BUSINESS TRENDS

The Logistics Trend Radar also provides more detailed trend-specific impact analyses. Below are the in-depth analyses of the identified social and business trends.

B01 Supergrid Logistics

Topic
Supergrid logistics will bring up a new generation of logistics companies whose primary focus is the orchestration of global supply-chain networks that integrate production enterprises and logistics providers. Many will be able to profit from new business opportunities – 4PL providers, companies with special expertise in complex or special services, and even small local logistics providers.

Description
Based on modular, flexible, and configurable logistics services, the concept of logistics-as-a–service (LaaS) introduces a new generation of business models affecting the entire logistics market.

- Supergrid drives new market segmentation: The logistics provider market will split into new actor categories such as service specialists, users, configurators, orchestrators of complex logistics solutions, and service mall owners. Global players will focus primary on cross-border integration, premium services, and orchestration of regional and local service providers (coopetitors) to a global supergrid. Logistics malls will establish a new degree of market transparency and give small local companies access to the global market.

- Supergrid enables cost-efficient premium services: Services with constantly growing complexity and high development costs (such as risk management and security, customs clearance and compliance) will be developed by only a few specialists. Premium e-services (e-billing, e-compliance, e-clearance) will become the new differentiators.

- Supergrid adds business value: Logistics services will be sold not only to customers but also to service partners and even competitors. Cooperation will also impact infrastructure development, support capacity, and resources utilization (e.g., by shared fleet) to secure corridors, reduce costs, save energy, and be more sustainable. Coopetition will drive economic growth by supporting states investing in infrastructure (rail, bridges, and hubs)

### Benefits

For the logistics provider
- New business opportunities for global players to enhance their networks and for small companies to participate in the global market
- Reduction of infrastructure and service development costs, rapid time-to-value, scalability of services, elasticity of infrastructure

For the provider's customer
- More flexibility, fast and cost-efficient configuration of individual solutions and scenarios, and cost reduction

Concerns
- Currently only few cross-company pilots / logistics malls
- Pilots / use cases for logistics-as-a-service / logistics mall-based business models for global 4PL providers are still not in place
- Several companies offer single, most standard, cloud-based logistics services under the descriptor LaaS
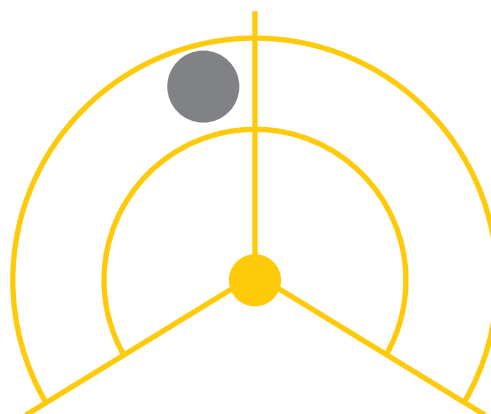
Relevant in: > 5 years
Impact: High

B02 Real-time Services

Topic

Real-time services enable flexible and efficient adaption to changing conditions and ad-hoc optimization of supply chains by integrating real-time information into intelligent and interactive analytics frameworks. This can deliver enhanced levels of visibility and transparency throughout the entire supply chain. It also enables additional business capabilities, increases operational efficiency, and boosts customer intimacy by providing cost-efficient support for individual requirements.

Description

Real-time services provide data in cycles tuned to seconds that can be received, analyzed, and integrated into operational activities at any time and in any location.

- Real-time tracking services: Independent of the location, continuous data transfer of the shipment or a smart package (track events) provides information about position, condition (e.g., temperature, humidity), and integrity (e.g., electronic seal with flexible access authorization)

- Real-time risk management: Real-time information about changes in the condition or integrity of transported goods enables immediate intervention in case of risks (e.g., recall of products, temperature control, and electronic sealing)

- Real-time dynamic routing services: These track the activities and position of trucks, and have the potential to change current routing solutions from preplanned milk runs to flexible pick-up and delivery locations

- Real-time inventory services: The foundation for omni-channel operations based on inventory virtualization; this replaces disparate inventory silos and, via a software solution, virtualizes each channel of retailer operation

- Real-time tracing of intelligent logistics objects: Complex solutions for controlling and operating complete logistics systems, combining various technologies such as video, 3D-scanning, RFID, and sensors

Benefits

**For the logistics provider**

- Increases efficiency through faster processes and real-time data

- Enhances customer service, enables value-added services

- Asset control/reduction, shrinkage/theft reduction

- Improves visibility, transparency, capabilities, and security functions

For the provider's customer

- Information at any time about the location and delivery status of goods

- More transparency, flexibility, and rapid configuration of individual solution scenarios (e.g., flexible last-mile delivery options)

Concerns

- High data volume, velocity, variety cannot be handled properly by established solutions, especially for analytics (e.g., when analyzing transactional event data in the context of master data, geographical, and other complex data to create augmented-reality services)

- Available systems do not work across company boundaries yet

- High investments needed in end-to-end supply chains
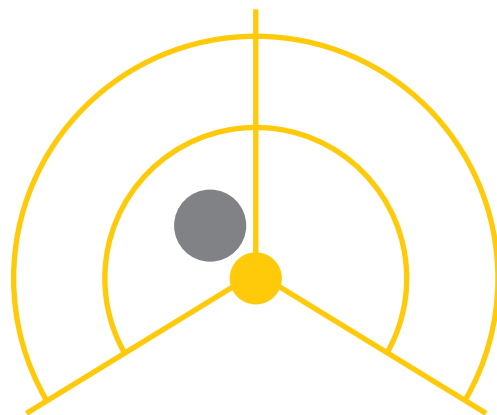
Relevant in: < 5 years
Impact: High

B03 Next-generation M2C

Topic

Manufacturer-to-customer (M2C) reflects the reality of a digital lifestyle; customers can order direct from manufacturers, thus setting new requirements for the design and management of global logistics networks. M2C introduces a new business model in which the manufacturer, bypassing any retailers, directly sells and delivers products or services to the end consumer.

Description

Web and social media expansion enhances manufacturers' access and negotiating power, and enables a direct relationship with end consumers – transactions can be done anytime and everywhere. By shortening value chains, consumers can access individually configurable products at lower prices, and manufacturers can quickly react to market trends and customer expectations. To meet the needs of M2C, logistics providers are required to re-envision their network strategy:

- Direct warehouse-to-customer delivery leads to longer delivery distances but reduces manual handling costs for on- and off-loading, as well as re-packaging at different intermediate warehouses

- Logistics supergrid for M2C: Global logistics supergrids will be necessary to orchestrate and efficiently steer the delivery streams from decentralized manufacturers to decentralized end consumers. Logistics infrastructure and orchestration services will replace parts of the existing retail networks, and will have to be integrated with the remaining retail infrastructure to optimize costs and utilize capacity (e.g., by sharing B2C logistics infrastructures with M2C)

- Circulatory flow management: The logistics provider will become a partner to the manufacturer, taking over responsibility for managing the entire lifecycle of products including packaging, shipment, and value-added services such as recall and recycling solutions

Benefits

For the logistics provider

- New business opportunity as a supply-chain orchestrator between manufacturers and customers: global supergrids including warehousing, consolidation / deconsolidation capabilities, customs handling, transport, and security insurance services to replace retail distribution networks

For the provider's customer

- Cost savings through direct sale from the manufacturing side, with proof of origin

- Closer relationship to manufacturers, easier and cheaper customization

Concerns

- Product liability (items will be manufacturer-guaranteed but not retailer-guaranteed)

- Longer distances might cause longer delivery times and higher transportation costs if delivery streams cannot be consolidated

- Ownership of legal issues (e.g., customs clearance) unclear

- Decrease of retail business, market diversification, and dynamically changing distribution strategies (classic B2C, M2C, W2C, or parallel distribution structures) requires dynamic logistics solutions
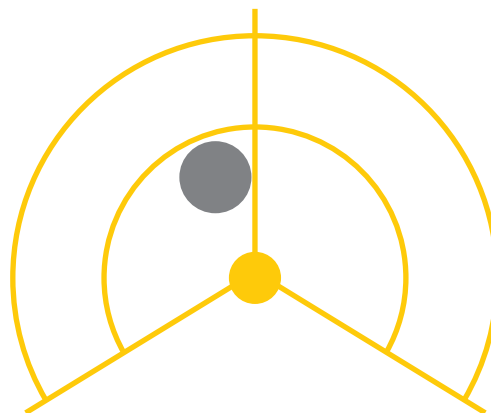
Relevant in: < 5 years
Impact: High

B04 Urban Logistics

Topic
In less than five years, more than half of the world's population will be living in urban areas. Even today, key issues in urban areas are environmental impact and traffic density. Combined with the growing relevance of e-commerce and home delivery, this makes urban logistics solutions essential, especially those tailored to the specific requirements of urban areas.

Description
The sustainable and climate-friendly supply of goods and services, when weighed against customer demand for consumer products and home-delivery services, will influence the development of logistics solutions tailored to the specific requirements of urban areas. Pollution avoidance for inner-city areas requires anticipatory development and then fast implementation of fresh, sustainable, and holistic solutions across all of the urban logistics and supply systems.

- Urban freight consolidation: Consolidation through logistics clusters or in Urban Consolidation Centers, with aggregated streams to different consignees within a specific area (e.g., a shopping mall, skyscraper, hospital, etc.)

- Urban supply-stream consolidation: Bundling of logistics and non-logistics services (e.g., retail, MRO, medical care, convenience services) into a "smart grid" for cities, optimizing supply and demand

- Utilization of urban infrastructure: Using existing infrastructure for additional logistics purposes (e.g., overnight use of inner city parking garages as warehouses and distribution centers, utilizing otherwise unused public transport capacities)

- Sector-specific urban navigation solutions: Next-generation PUDOs (pickup and delivery automation solutions) with advanced functionality (e.g., cold-chain integration into mass customization and forward-stocking production value chains)

Benefits
#### For the logistics provider
- New operational areas for logistics providers to offer 4PL services: integrated logistics planning for airports, hospitals, construction sites, etc., and innovative logistical rent-and-share solutions, urban mining, and reverse logistics

For the provider's customer
- Decreased variability through adopting a planned model

- Reduced externalities associated with last-mile deliveries

- Improvement of flexibility, speed, and quality of logistic services

Concerns
- No funding to improve existing urban infrastructure

- Limited public sector financing to incentivize innovation and new business practices

- Stakeholder complexity when engaging with city authorities

- Lack of willingness to collaborate across the logistics sector

- New operating models might dilute volumes on existing networks
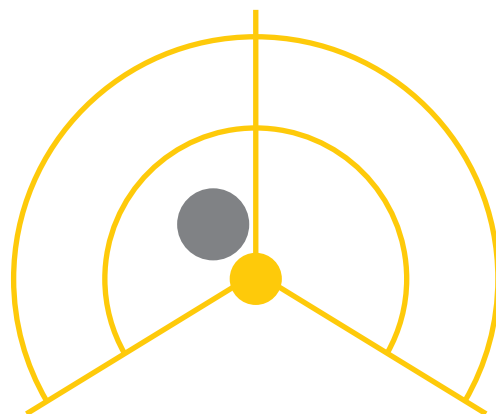
Relevant in: < 5 years
Impact: High

B05 Logistics Marketplaces

Topic

In the context of globalization and increasingly digital lifestyles, logistics marketplaces create opportunities for new services that can overcome geographical and functional segmentation, and significantly enhance cost efficiency and capacity utilization.

Description

Electronic logistics marketplaces (ELM) offer business partners, as well as private customers, flexible logistics services tailored to the specific one-off requirements of a shipper at time of request.

- B2B logistics marketplaces offer business customers the opportunity to find the right carrier for their load at the right time by choosing from a wide range of service providers; they profit from better comparability and transparency of offers, optimized price/performance ratios, and high security through member certification and rating systems. For logistics providers, ELM offers the chance to reduce empty running, find fast and efficient additional cargo capacity, reach wider sources of logistics demand, and collaborate smoothly with other logistics companies

- M2C and B2C logistics marketplaces are being established to serve growing customer demand for cheap, reliable company-independent courier and transportation services; consumers can compare quotes and book upfront, and name their own price or receive auction-style bids from logistics providers (ranging from independent owner-operators to the largest freight carriers and brokers)

- C2C marketplaces for transportation services (e.g., car sharing for parcels and cargo) follow the new culture of sharing; they are becoming an increasingly serious and attractive alternative to standard logistics networks and providers

Benefits

For the logistics provider

- Access to a broader customer base
- Optimized capacity utilization, acquisition of additional capacity, reduction of empty rides
- Cost reduction
- CO_2 reduction

For the provider's customer

- Access to flexible logistics services;
- More price and service transparency
- Cost reduction

Concerns

- Guaranteed quality of services only on platforms with member certification
- Customer decisions often rely on customer feedback and rating systems
- Fraud and theft risk
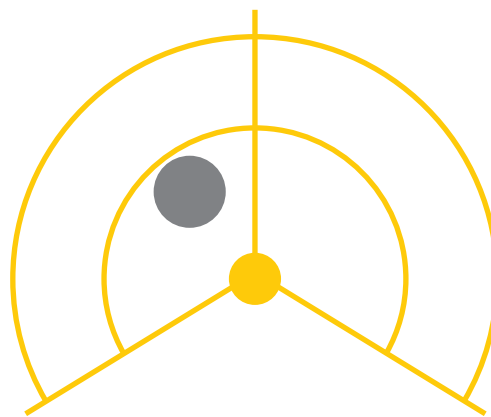
Relevant in: < 5 years
Impact: Medium

B06 "Logsumer"

Topic
A whole new generation of logistics consumers – the "logsumer" – can now take an active part in decision-making on the time, price, quality, and "green" or "fair" aspects of logistics services; this affects the entire supply chain. The logsumer not only wants to decide on the products they are buying, but also on the logistics provider who delivers them.

Description
Today, consumers want full flexibility on ordering and delivery channels and times. As e-commerce is growing with the split between several devices, and while mobile / smartphone usage is growing even faster, it's becoming everyday practice to interrogate price, product details, and availability, and to use mobile devices as the payment device. On the other hand, the huge number of non-integrated mobile apps and services on personal smartphones represent a new complexity still to be addressed.

- Integrated logistics services: The integration of digital added value into logistics becomes crucial as customers expect logistics to be on the same level as the overall online experience. As for marketing, digital engagement, and real-time and data analytics, targeting and speed are imperatives for logsumer logistics. Consumers expect logistics provider services to be smoothly integrated in their daily routine activities, enabling state-of-delivery checks, options for re-directing orders, and customized check-out functions

- Personalized logistics services: Logistics providers are expected to support the customer experience with location-based, right-time services respecting the individual behavior, interests, and routines of each person

- Fair logistics services: The social and environmental engagement of a logistics provider influences customer decisions. Expectations focus not only on environmentally friendly delivery but also on the complete lifecycle of goods and packaging material, including re-collection, re-integration into the production lifecycle, and recycling

Benefits

For the logistics provider
- Opportunities for new products and services or new methods for service integration into each customer's daily routine
- Opportunities to expand the customer base, involve customers into logistics processes and decisions, and increase customer identification with "their" logistics provider

For the provider's customer
- More variety of service options, tailored to specific demands

Concerns
- Fragmentation of courier-express-parcel (CEP) delivery networks
- Increasing competition in same-day delivery
- Dominance of big players like Amazon
- Ad-hoc rerouting and resource planning not yet supported by established infrastructures

Relevant in: < 5 years
Impact: Medium

B07 Crowd Logistics

Topic

Social networks offer new business opportunities for logistics providers. This includes crowdsourcing first-and last-mile activities, using employee tweets for flexible re-routing, and using social network mining as a trigger for new products, significantly impacting costs, flexibility, and CO_2 efficiency.

Description

The new culture of sharing, bartering, and re-selling personal goods leads to increased trade activities between consumers, especially on local, regional, and national levels. Logistics companies are required to support those activities by offering flexible, straightforward first-and-last-mile services smoothly integrated into the daily life of the customer.

- Crowdsourcing: Currently, almost 70% of the available transport (rail, road, private cars) capacity is not being used. By involving customers in the pickup and delivery process, not just transportation costs can be significantly reduced. Consolidation of transport volumes per route makes a significant contribution to CO_2-reduction

- Crowdnavigation: Networks like Twitter used by employees provide real-time information and often allow a quicker reaction to, say, road incidents, traffic jams, and other significant events than traditional navigation and telematics solutions

- Crowdmining: This refers to regular monitoring of comments in social networks about companies, brands, and products, as well as tweet updates about special offers, discounts, and time-sensitive deals, reaction to compliments and feedback in real-time, detection of incidents tweeted by customers, and reaction again in real-time
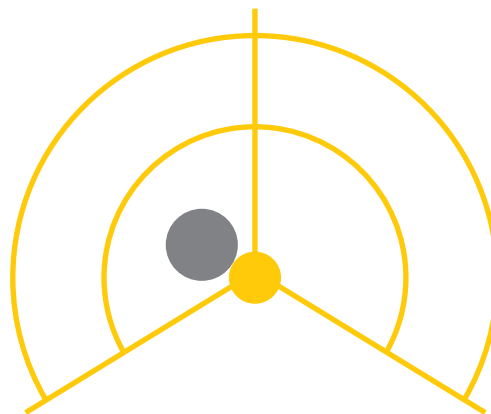
Benefits

For the logistics provider

- Network enhancement, better capacity utilization, reduction of transportation costs

- New business opportunities by providing crowd-based logistics solutions for C2C-driven last-mile delivery

For the provider's customer

- Reduction in transportation costs

- Flexible service options for deliveries

- Make use of bartering services for unused items (financial benefits)

Concerns

- Legal / compliance restrictions for customer contribution to pickup and delivery processes

Relevant in: < 5 years
Impact: Medium

B08 Fair Logistics

Topic

Logistics will lead the way into a fair, sustainable, and ecological society by generating social benefits with its products and services. In future, dealing thoughtfully with earth's limited resources will go hand-in-hand with fair and respectful human interaction, and sustainable investment in regional empowerment and infrastructural development around the globe.

Description

As a responsible member of the global society, logistics is challenged to proactively address social and environmental issues, and to develop concepts and solutions providing social benefit, creating value, and generating humane win-win outcomes for all parties involved along the supply chain. For example:

- Encourage fair society: Foster the global establishment of a fair society (e.g., the establishment of fair products as a standard part of retail portfolios, fair-trade promotion, empowerment of underdeveloped regions and social groups)

- Establish collaborative business models: Involve private individuals from around the globe and expand the logistics supergrid via crowdsourcing; give participants a fair chance to benefit from their contribution by developing collaborative business models for, say, areas with underdeveloped logistics infrastructures

- Empower local logistics and manufacturing companies all over the world by providing access to global markets via, say, logistics marketplaces and M2C networks; enable open logistics networks with the opportunity of fair collaboration for all participants, independent of company size and location

- Promote fair end-to-end logistics chains: Take over responsibility for fair conditions and social benefit along the entire supply chain (e.g., fair working conditions, fair pricing, environmentally friendly transportation and production)

Benefits

For the logistics provider

- Become a specialist service provider for circular economy business (e.g., reuse / recycle)

- Improve business sustainability by solving social problems (e.g., logistics service with revenue instead of donation)

For the provider's customer

- Support in achieving a fair lifestyle

- Transparency about social / fair footprint of logistics providers

- New revenue opportunities via crowdsourcing and collaborative logistics

Concerns

- No standards and classifications about fair logistics in place

- Social benefits vary geographically
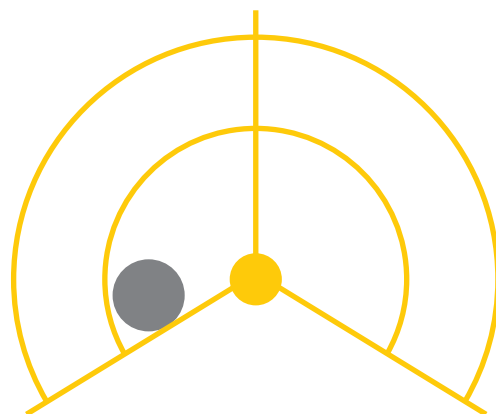
Relevant in: < 5 years
Impact: Low

B09 Grey Power Logistics

Topic

In five or more years' time, the first wave of "digital natives" will enter the aged population segment. Grey power logistics – the logistics for an aging society – will offer new services to answer the resulting challenges of this demographic development (e.g., special home delivery services and health logistics services).

Description

In industrial societies, the percentage of seniors (60+) will increase from 15% to 26% from 2005 to 2050. The population aged over 65 in India and China will rise from 160 million in 2010 to 280 million by 2020. By 2100, there will be 1 billion in these two countries alone. Active ageing, ageing in place, smart home, remote health, and social care technologies, along with 3D solutions and peer-to-peer (P2P) networking for social "togetherness" will have diverse implications for the logistics industry.

- Emergency & welfare services: The aging population needs both emergency healthcare and well-being services delivered in a clinic, hospital, surgery or at home; these services must be significantly enhanced around the globe. Demand will increase (and include broader product lines) for new or adapted services (e.g., in home safety and care, smart homes), personal activity and healthcare (real-time fitness monitoring, proactive emergency assistance and medicine supply), mobility and transportation (trip planning, driving, routing, navigation) as well as home delivery

- Grey power workers: Working beyond the age of 67 will require flexible HR conditions for logistics workers (self-employment, home and flexible office hours, part-time employment, etc.)

- Silver surfers: The percentage of web users aged 60+ increased from 0.2% in 1997 to 39.2% in 2012; today's e-commerce digital natives will become the next generation of seniors

Benefits

For the logistics provider

- Potential new business opportunities (e.g., transportation of elderly, sick, and disabled people, proactive supply)

- Further expansion of e-commerce with special focus on aged customers leads to increased transport volumes

For the provider's customer

- More products and services meeting the specific requirements of the aged population: greater autonomy, security, flexibility, mobility, welfare, better integration into social life

Concerns

- Due to demographic changes, logistics providers will have to cope with a lack of human resources in logistics operations

Relevant in: > 5 years
Impact: Low

B10 Convenience Logistics

Topic

Convenience logistics is in response to the specific requirements of next-generation e-commerce; it covers the entire spectrum of commodity goods including sensitive and cold-chain products. Demand is constantly growing, especially for home delivery of fresh and frozen food through standard networks. This requires the development and implementation of special processes and packaging (from -18°C to room temperature).

Description

For most customers, a major driver to buy goods online is not just price advantage but convenience. Online shopping saves costs, time, and physical effort, and provides 24-hour product information. This well-established customer habit will increasingly extend into areas of consumer and sensitive goods.

- Cold-chain network enhancement: Sensitive goods (medicines, food, high-tech) need a constantly secure and monitored cold-chain. Chilled items as well as ambient ones must be delivered at customer-preferred times with a minimum of packaging, ready to be stored away

- Standard network enhancement: Convenience logistics does not have a standardized logistics service yet. Solutions integrating real-time prediction with standard time-schedule solutions enable dynamic and cost-efficient delivery integrated into the standard logistics network

- Pickup and delivery enhancement: Established automated pickup-and-delivery solutions can be enhanced to enable cold-chain services independent of the customer's presence at the delivery location (e.g., a cold-chain packstation)

- Packaging innovation: Smart, reusable, and recyclable packaging, tailored to standard logistics network capabilities (e.g., hubs, trucks, sorters within the parcel network) are required to enable the efficient handling of convenience goods, reduce customer effort in handling, storing, and disposing of packages, and support environmental protection

Benefits

For the logistics provider

- New business opportunities in the field of B2C food logistics

- Lower food distribution costs, due to using standard networks

- Need to develop flexible solutions to connect with customer (B2C)

For the provider's customer

- Home delivery of food (whole range of goods)

- Savings in terms of costs, time, and physical effort

- Minimized shopping inconvenience (e.g., improved recall solutions)

Concerns

- Logistics markets will develop in different ways; beside global players, there will be a steady and increasing role for niche specialists

- Food ordering via the internet is not yet a big market (GER food online <1%, DVD/BlueRay 35%), but is primary limited by insufficient logistics infrastructure supporting this business segment

- There's a need to provide interfaces for the connection of different specialists with different customer systems
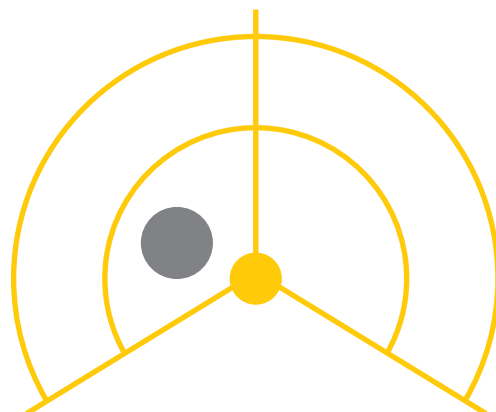
Relevant in: < 5 years
Impact: Medium

B11 Multiple-user Networks

Topic

Innovative methods of transportation, smart packaging solutions, and real-time supply-chain monitoring enable the use of standard, existing networks to transport and store special and dangerous goods. This allows better network and capacity utilization and reduces costs and delivery times for both customers and logistics providers. Alternative, existing non-logistics networks (e.g., public transport) can be utilized for logistics purposes or integrated with the logistics infrastructure.

Description

Traditionally, logistics networks for different categories of goods serving different industries and sectors coexist in parallel (e.g., food, medicines, chemical; public sector, retail, and health sector supply chains). They also coexist with standard logistics networks (CEP networks, as well as rail, road, air, and ocean logistics networks).

- Multiple use of standard networks with enhanced capabilities: Goods requiring special transport and warehousing conditions (e.g., temperature control), dangerous goods, and high-value goods all require special networks typically with individual cost- and time-intensive solutions. In future, standard network providers will enhance their capabilities to enable temperature-sensitive transport and handling services for, for example, B2C food-chain deliveries. These capabilities can be re-used for multiple purposes (e.g., for the transportation of special goods). Standard logistics providers opening their networks for multiple-usage purposes will have to include reliable identification and authentication services, and obtain special certificates

- Use of public transportation for logistics purposes: Public transportation networks offer significant opportunity to optimize the pickup and delivery procedure in urban areas (e.g., by establishing an integrated network of bus and packstations, using multipurpose vehicles or taxis with integrated parcel loading space, or using metro tunnels for shipping goods during the night and at off-pick times)

**Benefits**

For the logistics provider

- Optimized load capacity for standard network trucks with enhanced capabilities (e.g., temperature control utilities) for special and dangerous goods

- Cost savings due to better resource efficiency and capacity utilization

For the provider's customer

- Buying logistics services with constant quality, independent from the logistics provider and from sector and industry-specific cost- and time-intensive solutions

Concerns

- There is still a gap between special goods requirements and network standards

- Low volume of special or dangerous goods versus high initial investment for capability enhancement: the business model is reasonable for already established capabilities within a standard network (e.g., for B2C food-chain deliveries) that need to be better utilized
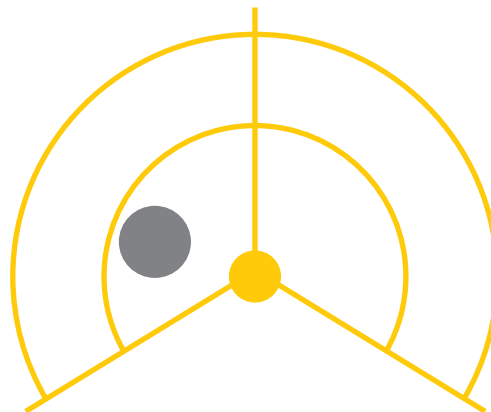
Relevant in: < 5 years
Impact: Medium

B12 Shareconomy Logistics

Topic

A new sharing culture leads to new logistics needs within the digitalized neighborhood. "Shareconomy" describes the societal shift from owning to sharing in the offline world, enabled by online technology. Logistics infrastructure sharing and service sharing with coopetitors will open new business perspectives for logistics providers, and will create new forms of collaboration across enterprises.

Description

The web and its open-source culture has expanded the circle of people with whom each of us can share; it has taught us how to share, and made sharing a commodity of social interaction. The increasing utilization of social media, transforming the internet into a place for collaborative action, will impact business models in all industries.

- Collaborative consumption: Today's digital neighborhood brings people closer together and facilitates collaborative virtual communities. Sharing and swapping as peer-to-peer models saves costs and time, preserves the environment, and allows people access to products and services which are expensive to own or are being used infrequently

- Collaborative business: By sharing development, investments, logistics infrastructure (warehouses, fleet, networks, etc.), and services with coopetitors within flexible, smart business networks, logistics providers can increase capacity utilization, and reduce costs and CO_2. Open networks involving small enterprises (e.g., one-off cooperation) foster local and regional empowerment. Collaboration between logistics providers and public sector institutions (e.g., to integrate transportation of people and goods, logistics pooling, or shared usage of public space) offers benefits such as sharing investment and maintenance costs. Co-working business models involving established enterprises and start-ups in creative factories will speed innovation and shorten development and implementation lifecycles

Benefits

For the logistics provider

- Flexibility, agility, elasticity, better capacity and capabilities utilization, "on-demand logistics infrastructure", one-off cooperation
- New hybrid business models, listing excess capacity (truck load, warehouse capacity, and equipment, etc.) on peer-to-peer rental sites
- Operational costs optimization, environmental protection, CO_2 reduction

For the provider's customer

- Cost and time savings, contribution to CO_2 efficiency
- More comfort and convenience through access to a broader range of high-value products, services, and infrastructure

Concerns

- Regulatory uncertainty (e.g., taxes for peer-to-peer services), rules need to be updated to protect consumers
- Possibly unclear liability and uncertain quality standards within open business networks
- Competition between incumbents and peer-to-peer providers (e.g., hotels vs. home swappers, official vs. peer-to-peer taxi services)
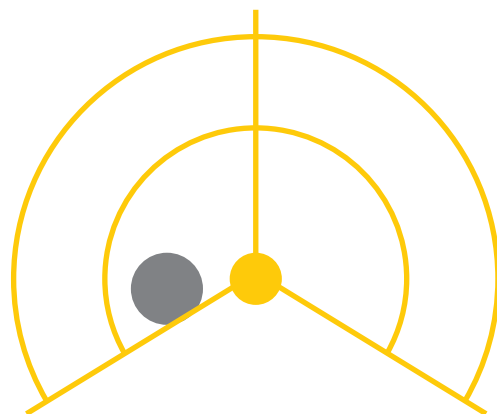
Relevant in: < 5 years
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B13 Near- & X-shoring

Topic

Following on from the offshoring wave of the last decade, changing economic and social conditions will bring up new sourcing strategies such as near-shoring, re-shoring, back-shoring, and even x-shoring. As an alternative to the offshoring praxis, near-shoring moves core business and enabling services closer together (e.g., to neighboring countries). The concept of X-shoring provides holistic methods to dynamically rebalance logistics networks, meeting a broad range of decision criteria.

Description

Rising wages and fuel costs, as well as increasing supply-chain risks, drive many globally operating enterprises to re-envision their sourcing strategies.

- Near-shoring: In recent years, the economy conditions in "classic" outsourcing countries (e.g., Asia) changed significantly. Together with the growing complexity of globally fragmented supply chains, this is forcing global enterprises to reconsider the location of services and manufacturing facilities. A typical development is the closer collaboration between US and Mexican companies. Sourcing from a neighbor country lowers logistics costs, offering multi-modal services (flexibility to choose air, road, rail, and even LTL shipments); shorter delivery cycles enable more effective inventory control; and due to shorter distances, costly warehouses and fulfillment centers can be avoided

- X-shoring is the next evolutionary step in 3PL, implying the dynamic rebalancing of supply chains. The approach give companies the choice of the most appropriate sourcing strategy with respect to current economic conditions (in some cases, it might be offshoring, in others near-shoring). X-shoring decisions are driven by a broad range of criteria including risk, quality- and service-related costs, impact on innovation and customer goodwill, time-zone and currency advantages, transit and transport times, intellectual property protection, natural disasters, political risks, trade regulations and compliance, legislative environment, and environmental sustainability

Benefits

For the logistics provider

- Lower freight and in-transit inventory costs
- Supply-chain risk reduction
- Improved speed-to-market
- Greater forecasting flexibility
- Time-zone advantages
- Improved cultural alignment

For the provider's customer

- Same as for the logistics provider

Concerns

- Adaptability of network
- Modular approach for infrastructure set-up
- Need for highly flexible, skilled workforce
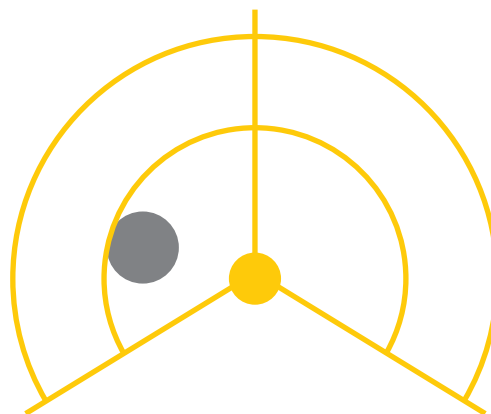
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IN-DEPTH: TECHNOLOGY TRENDS

The Logistics Trend Radar also provides more detailed trend-specific impact analyses. Below are the in-depth analyses of the identified technology trends.

T01 Big Data / Data-as-a-Service

Topic

Big data analytics represents the "industrial revolution of data". It allows the processing of previously untapped data sources and enables real-time analytics on a broader scale. In the context of real-time logistics and the "Internet of Things", big data helps to cost-efficiently explore huge volumes of structured and unstructured data that may be widespread and high-velocity, and use this to transform hard-wired supply chains into agile, flexible ones.

Description

Traditionally, applications supporting logistics processes cover traditional data types such as structured transactional and time-phased data. Today, additional data types such as unstructured (social, channel-specific, customer service input, warranty), sensor (RFID, GPS etc.), and new data types (mapping and GPS, voice, video, digital images) are becoming increasingly important. Big data combines the methods of data and text mining, pattern recognition, rule-based ontologies, learning systems with parallel processing, map / reduce and in-memory analytics.

- Big data-enabled real-time logistics meets the challenges of data velocity, variety, and volume by acquiring, organizing, consolidating, and analyzing data from various sources and by making new data sources and types accessible and evaluable

- Big data in logistics is driven by expansion of the so-called Internet of Things that generates enormous volumes of fast-changing and widespread data. Big data improves significantly the ability to handle exceptions and to drive the transformation of supply-chain visibility from near-real-time to real-time, enriched by geo-location information

- Big data's 4Vs: Big data provides the highest benefits in areas where more than one of the 3 Vs (volume, variety, velocity) or a combination of those occur, or where it offers potential to generate new business opportunities (the 4th V: value)

Benefits

For the logistics provider

- Enhance operational efficiency, visibility, and control over supply chains, assets, and personnel enable real-time adjustment, reacting to demand and capacity fluctuations, providing insight into customer buying behavior, increasing customer intimacy by enabling smarter pricing and service offering, and reducing costs and CO_2 emissions

For the provider's customer

- More reliable, customized, personalized logistics services

- More transparency, control, information, participation

Concerns

- Frontrunner use cases primarily from other industries and sectors

- Limited capabilities of current hardware and software to handle big data streams
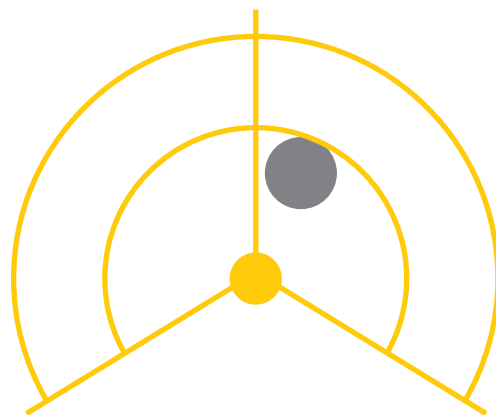
Relevant in: < 5 years
Impact: High

T02 Cloud Computing

Topic
Beyond the hype, the paradigm of cloud-based services is increasingly tangible for logistics. logistics-as-a-service (LaaS), logistics mall, supply chain-as–a-service (SCaaS), and on-demand SCM belong to the "Future Topics of Logistics", according to the Scientific Advisory Board of the BVL. Process cloud-based concepts such as subject-oriented BPM (S-BPM) provide new methods to cope with the complexity of globally distributed, federated logistics networks and enterprises.

Description
Cloud computing meets the challenges of complex, distributed, uncertain, volatile, and less-predictable logistics environments.

- Cloud logistics: This is an environment of virtual systems that facilitate supply chains' overall coordination and use of distributed resources, capacities, processes, and services from supply-chain partners; it establishes a new paradigm not only for the further development of logistics-related IT services but also for entire business models, especially those of 3PL and 4PL providers

- Cloud services: Cloud computing enables the provision of scalable service levels (e.g., fixed or flexible delivery times) without additional resources. Services can be integrated into customized logistics solutions or removed dynamically with respect to changing volume requirements or to requested additional capabilities (e.g., compliance)

- Cloud-based subject-oriented BPM: Logistics services rely on globally seamlessly synchronized processes. S-BPM is a new method of business process modeling and management that allows both bottom-up process integration within federated environments and stepwise top-down standardization supported by a cloud-based reference process model containing immediately executable processes; S-BPM tools such as Metasonic combine the capabilities of process modeling and BPM solutions

Benefits

For the logistics provider

- Reduction of the total cost of services (including costs for installations, upgrades, maintenance fees, IT resources)

- Pay-per-use model offers more agility, flexibility, and elasticity of business, as well as quick and cost-efficient reaction to less-predictable events and changing customer requirements

- Risk reduction, globally accessible services, easy and fast implementation

For the provider's customer

- Customized, personalized logistics services become affordable and more of a commodity

- More transparency, control, information, participation

Concerns

- High diversity of business models and offerings referring to cloud logistics (single service providers, platform providers, etc.)

- Several cross-company projects working on the implementation of cloud logistics service marketplaces in Europe with mostly transnational or regional scope

- No clear evaluation of cloud logistics users cases and business models for different types of logistics providers
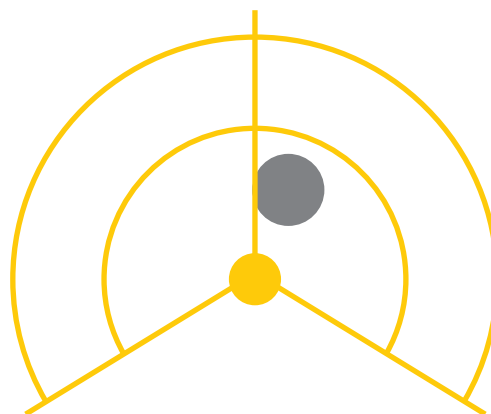
Relevant in: < 5 years
Impact: High

T03 Autonomous Logistics

Topic
Autonomous logistics enables innovations such as cellular transport systems, self-steering vehicles, and unmanned aerial vehicles, offering new and efficient transport solutions for existing infrastructures and in remote areas. Vehicles and objects moving autonomously via artificial intelligence, video cameras, radar sensors and/or laser range-finders open new opportunities for logistics suppliers to offer more flexibility in service offerings.

Description
In the next few years, autonomous logistics objects will impact and rationalize all application areas for logistics services:

- Autonomous logistics in warehousing: Cellular systems using swarm intelligence reduce transport volumes in warehouses up to 50% and offer a high degree of flexibility and scalability. Autonomous units enable fast execution of tasks, and secure interactions with people and things, and enhance operational productivity

- Autonomous logistics on the road: Autonomous vehicles equipped with radar, lidar, GPS, DGPS, RTK, and ultrasonic sensors can model the world around them in 3D and are not constrained by human limitations. Via vehicle-to-vehicle (V2V) communication, they can both broadcast their location and speed to others while also creating ad-hoc networks and enabling dynamic real-time routing depending on traffic and events. Combined with smartphone customer allocation apps, this technology enhances the efficiency of logistics operations and facilitates high-quality services

- Autonomous logistics in the air: According to Matternet, autonomous self-steering parcel drones can transport up to 2 kg on a maximum distance of 10 km. By 2015, a next generation with higher capacity and operating distance is expected. UAVs use solar energy; loading, unloading, and assembly at ground stations are fully automated. They contribute to traffic reduction in cities and make remote areas accessible. As sensor costs reduce, GPS, accelerometers, and magnetometers can be used as a standard in smartphones, accelerating UAV enhancement

Benefits
For the logistics provider
- Reduction of traffic, risks, accidents, congestion, and pollution
- Increased reliability and elimination of human error
- Increased operational productivity
- Logistics network expansion and enhancement
- HR cost reduction

For the provider's customer
- Increased service availability and flexibility
- Reduced transport costs and time

Concerns
- Potential risk from hackers and software viruses
- Legal restrictions
- Cultural differences / reluctance of some social groups
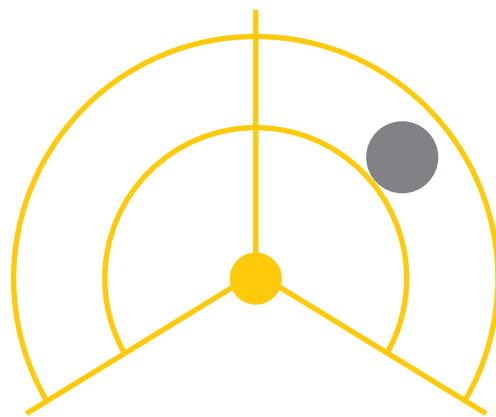
Relevant in: > 5 years
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T04 3D Printing

Topic

3D printing is a disruptive production technology that will change tomorrow's logistics by necessitating specific networks for materials delivery; but it will also offer new business opportunities for logistics providers such as digital warehousing and 3D-model hosting. Logistics providers will have to adapt to more centralized production on demand. Innovative logistics providers will get the chance to become thought leaders and specialists, integrating and orchestrating complex networks including traditional and 3D manufacturers.

Description

3D printing or additive manufacturing (AM) is a layer-by-layer technology, producing 3D objects directly from a digital model. 3D printing is already applied in prototyping, tooling, and direct part manufacturing (e.g., hearing aids, surgical implants, jewelry). The global AM market is expected to grow from $1.8 bn in 2012 to $3.5 bn in 2017 (CAGR: 13.5%).

- 3D impact on logistics networks: 3D printing will radically transform the logistics industry if AM techniques can fully replace traditional manufacturing techniques. Currently, expert opinion on future development differs: some experts believe in development of hybrid solutions in the mid-term (combining AM and traditional techniques); the integration between traditional and 3D supply, manufacturing, and delivery networks will challenge established logistics networks

- 3D-driven business opportunities for logistics providers: 3D printing will change tomorrow's supply chains with the need for logistics providers to adapt accordingly, but it will also offer opportunities in new market segments. Those range from purely supporting the new logistics needs of the industry (e.g., 3D printing infrastructure, material supply) to becoming a player in the industry itself (e.g., production of 3D objects, hosting of 3D data models)

Benefits

For the logistics provider

- Opportunity to become a thought leader in new, potentially disruptive technology, and an orchestrator of complex and fragmented supply chains

- Participate in new market segments such as a "digital warehouse" and "3D printing shop"

For the provider's customer

- Logistics costs reduction (in stock items, delivery routes)

- Gain a trusted service provider for secure data hosting and exchange (e.g., through online platforms for spare part items)

Concerns

- 3D printing will only radically transform the logistics industry if it fully replaces traditional manufacturing techniques

- To become a relevant player in the market, new business models are needed that do not fit the core business of logistics providers (e.g., data hosting for 3D data models, producer of 3D objects)

- Lack of clarity about the risks of product liability, and ownership of IP rights for 3D data models
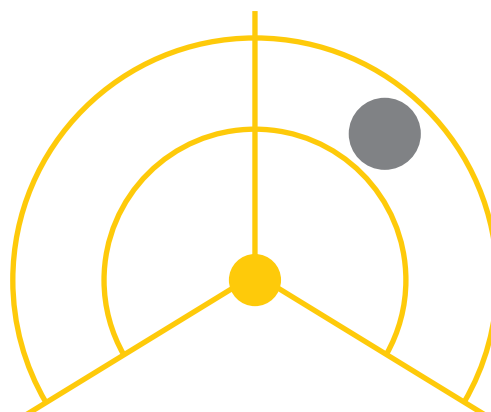
Relevant in: > 5 years
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T05 Robotics & Automation

Topic

Robotics and automation technologies support zero-defect logistics processes and enable new levels of productivity. Self-learning systems can flexibly adapt to changing logistics environments. The new generation of robots and automated solutions, characterized by significantly improved performance and enhanced sensing capabilities, offers a serious alternative to manual handling.

Description

Due to the growing popularity of e-commerce, an increasing number of small individual orders have to be handled in warehouses, and fulfillment and distribution centers. Constant improvement in robot performance, speed, and repetition accuracy, and rapid progress in grip and sensor technology, the cost-effective use of 3D object recognition, and an improved price/performance ratio will lead to more intensive adoption of these technologies in different operational areas

- Flexible automation in warehousing and fulfillment: In order to fulfill e-commerce orders more efficiently, many retailers or their distribution and fulfillment partners are embracing a flexible automation approach. Up-and-down scalable automation systems like tilt-tray sorters enable accurate, high-speed sorting, and quick and efficient transportation for a wide product mix and huge variety of materials

- Automation for transshipping in courier, express, and parcel services: Containers or vehicles filled with loosely stored parcels of different sizes represent time-intensive laborious activities. Parcel robots enable seamless, automated connection between parcel delivery in a transshipping center and their subsequent distribution

- Automated pick-up and drop-off points (PUDOs) are being adopted by more and more companies. Further capability enhancements (e.g., cold-chain PUDO) and collaborative urban networks consisting of bus stop / PUDO nodes connected via integrated people / parcel transport units can meet the growing demand for convenience logistics

Benefits

For the logistics provider

- Flexible automation and robotics solutions offer more agility and elasticity of logistics infrastructure capacity to cost effectively meet market fluctuations

- Optimization of time-intensive laborious activities

- Improved efficiency and cost reduction

For the provider's customer

- More personal flexibility through 24/7 service availability

Concerns

- Cost-prohibitive infrastructure requirements currently limit greater uptake and application of robot technology

- Requires the right balance of flexibility and automation; the concept of fully automated factories, warehouses, and fulfillment centers has been revised in favor of hybrid concepts
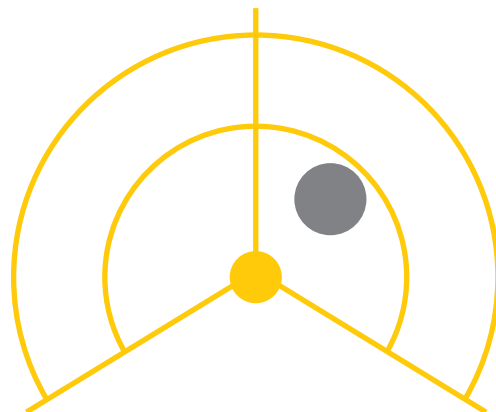
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T06 Internet of Things

Topic

Internet of Things technology will enable physical objects to become active participants in logistics processes. In addition, smart objects will enable self-steering processes and new services such as event-driven solutions. Logistics is one of the major industries where the intelligent conjunction of information and material flows may create highly efficient and profitable business processes.

Description

The Internet of Things (IoT) is disruptively changing industry rules; the fourth industrial revolution is imminent. Wireless sensor networks combine the physical space and the space of information processing into a seamless entity; material and information streams are synchronized and enable maximum flexibility in logistics.

- Intelligent objects, smart packages and load units: Intelligent material flow objects using swarm algorithms find their way to autonomously process real-time-information and contribute to self-orchestrated operational efficiency

- Intelligent grids: Sensor network, sensor cloud, or even smart planet – an overall dynamic framework with self-configuring capabilities enables smart services by interconnecting (physical and virtual) things, taking into account object identification, virtualization, and decentralization, ensuring interoperability across application areas

- Intelligent technologies enabling IoT: include RFID, near-field communication, barcodes, visual recognition, 3D scanning, remote control, machine-to-machine (M2M) communication, object-generated content (OGC), device-to-grid, geotagging, GPS, augmented reality, mobile internet, semantic data integration, and IPv6

- Smart application areas: Smart cities (lighting, traffic control), smart transport (electro-mobility, smart cars), smart buildings (presence sensors, thermostats), smart energy (electric grid), smart living (entertainment), smart health (bio sensors, remote health), smart industry (production control, robotics), smart planet (environmental sensors)

### Benefits

For the logistics provider

- IoT increases significantly the transparency, traceability, and reliability of all logistics processes

- IoT automates decision-making in complex environments, and increases efficiency through flexible use of logistics infrastructure and equipment

For the provider's customer

- Logistics costs reduction (in-stock items, delivery routes)

- End-to-end real-time monitoring of goods condition, and smart interactive logistics solutions, tailored to individual requirements and routines

Concerns

- Little or no thorough assessment of IoT business potential; need to develop new business models for incumbents and new, innovative players

- Little or no public evaluation of use cases, business models, and ROI for different types of sensor-enabled logistics networks

- Privacy protection concerns
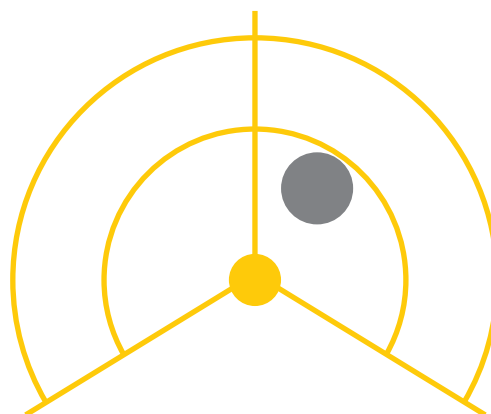
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T07 Next-generation Telematics

Topic

The next generation of telematics will be based on real-time shipment and traffic data, enabling new solutions for dynamic routing and value-added services such as flexible delivery offerings. New application segments for telematics (e.g., health telematics, insurance telematics, e-telematics, metropolitan navigation, mobile parking, pay-as-you-use) meet the challenges of new demographic and urban developments.

Description

Telematics comprises the convergence of wireless communications, location technology, and in-vehicle electronics; it is being used to integrate vehicles into smart information networks.

- Fleet and asset management supports real-time vehicle monitoring, including position, condition and properties of vehicles and freight. Control capabilities measure and monitor fuel consumption, and driver behavior and mileage; they generate environmental impact reports and support transport planning activities for the entire enterprise fleet

- Dynamic navigation, traffic control, and route optimization facilitate the handling of intensively changing situations (e.g., cancelled deliveries, altered environmental conditions, emergency warnings). Specific navigation for urban surroundings provides customized information and route planning (e.g., heights for trucks, delivery times in pedestrian zones). Intermodal travel planning interconnects seamlessly local, regional, and national transport services

- Intelligent vehicle telematics: Smart cars benefit from new telematics technologies such as V2V / V2R / V2I (vehicle-to-vehicle / vehicle-to-roadside / vehicle-to-infrastructure control) solutions, enabled by 3G/4G, wi-fi, and 5.9-GHz dedicated short-range communication (DSRC), eco-friendly navigation, augmented-reality navigation, advanced driver-assist systems (ADAS), in-car-connectivity, seamless position services, integrating outdoor and indoor navigation, and smart mobility solutions, offering enhanced connectivity, convenient driver experience, and increased safety

### Benefits

For the logistics provider

- Optimized and dynamic route planning, increased flexibility

- Reduced transportation costs, increased vehicle and capacity utilization, CO_2 reduction, improved asset management

- Extended connectivity, enhanced driving experience, improved safety

For the provider's customer

- Optimized delivery service, increased flexibility on enquiries

- Decreased delivery time, shorter transportation routes

- Less environmental pollution

Concerns

- No standards established

- High implementation costs
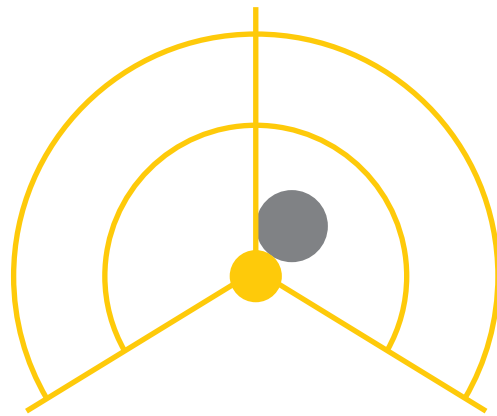
Relevant in: < 5 years
Impact: High

T08 Quantum Computing

Topic

Quantum computing is one of the groundbreaking technologies that will cause a paradigm shift in the ICT market. It will offer operational speeds far exceeding those in conventional computing and will be able to perform calculations that are currently too complex to complete in a reasonable time. Additionally, quantum cryptography will make information transmission completely secure.

Description

In 2012, the US Army Logistics Innovation Agency (LIA) selected "Quantum Computation and Communication" as one of the top five themes for future logistics innovation (themes that will significantly improve logistics effectiveness).

- Quantum computing becomes reality: Introduced in the early '80s, for several decades the quantum computer was still a theoretical concept. Now it has hit a new level of maturity. In February 2012, IBM reported breakthroughs in quantum computing that put us "on the cusp of building systems that will take computing to a whole new level". In April 2012, a multinational team of researchers constructed a two-qubit quantum computer on a crystal of diamond doped with some manner of impurity; it can easily be scaled up in size and function at room temperature

- Quantum computing and communication will cause a substantial improvement of the acquisition, transmission, and processing of logistics information. It will be able to handle a new stage of data volumes and information complexity, to decrease decision cycles and support real-time operations, dynamic logistics planning, and simulation

- Quantum cryptography will set new standards for data security, authenticity, and real-time availability in globally distributed environments

Benefits

**For the logistics provider**

- Ground-breaking acceleration of operational processes; real-time, highly secure information transfer to globally distributed instances with zero latency

- Dramatically increased data security, authenticity, real-time availability

For the provider's customer

- Faster response to changing requirements, more flexible solutions, more participation possibilities

- Enhanced security and protection of customer-related transactional and master data, faster data transmission, real-time information availability

Concerns

- Pilots not yet industry-tested

- Different levels of development in different areas – mature quantum encryption solutions are already available on the market (ID Quantique & MagiQ); quantum computers have yet to reach the stage of maturity necessary for industrial usage
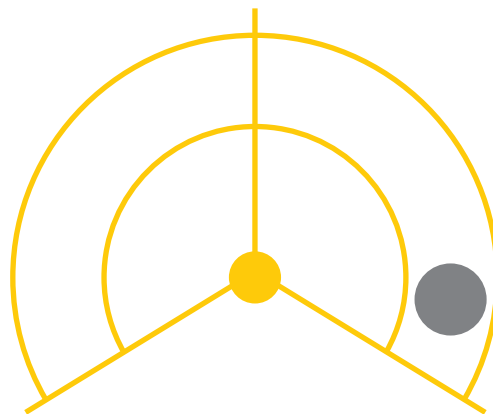
Relevant in: > 5 years
Impact: Low

T09 Augmented-reality Logistics

Augmented-reality logistics is defined by real-time interactivity and the relation of every virtual element to physical objects in the real world. By adding virtual layers of context-specific information at the right time and in the right place, augmented reality will provide new perspectives in logistics planning, process execution, and visual analytics.

Description

Augmented reality expands physical reality by adding contextual coexistent virtual objects. The technology was first introduced in the maintenance and repair sector in 1990 (Boeing applied the term to a head-mounted digital display that guided workers through assembling electrical wires in aircraft). Currently, the adoption of augmented reality is expanding in various sectors (e.g., retail shops, maintenance and repair, tourism, education, gaming, military). In logistics, augmented reality offers significant benefits in the following areas:

- Logistics planning, operations, manufacturing, and production: Integrative modeling of, say, warehouses including virtual walkthroughs, air, light and acoustic simulations, conveyance integration, material flows, etc.; execution of warehouse operations such as picking and assembly (pick-by-vision), service, and maintenance of facilities, staff training, risk, quality management, and incident management

- Logistics transport, first-and-last-mile logistics: Examples include augmented-reality apps for intelligent navigation and transport, courier support by mapping shipment data to real-time scans of physical entities (buildings, streets etc.)

- Visual analytics: supporting fast operational decisions by 3D or 4D visualization of complex data

- Customer solutions: support customer decisions by providing, say, augmented reality-supported assistance in choosing the right solution for a shipment

Benefits

For the logistics provider

- Picking solutions enable higher efficiency, error-free processes with ongoing quality checks and navigation guides (reduces training time)

- Reduction of assembly training

- Shorter warehouse handling times

- Business opportunity to become pioneer and market leader in the logistics industry for augmented-reality technology

For the provider's customer

- Increase in performance, decrease of costs, improved quality

Concerns

- Complications with integration to existing warehouse management systems

- Difficulties in meeting customer-defined requirements of standards and disclosure

- Cost-intensive

- Robustness and reliability of AR systems

Relevant in: < 5 years
Impact: Low

T10 Low-cost Sensor Technology

Topic

With the cost of initial investment dropping, the next few years are likely to see new creative uses of established consumer sensor technologies (e.g., Kinect, 3-D-Scanning) for logistics purposes, giving new opportunities to logistics providers. This is particularly true in the area of logistics security (e.g., public supply and international trade); low-cost sensors can provide new ways to cope with challenges such as attacks, accidents, natural disasters, and criminal activity. Combined with further technologies such as RFID, they offer great potential for process optimization and operational cost reduction.

Description

Sensor technology is about measuring or detecting conditions such as motions, humidity, heat, light, acceleration, pressure, position, and proximity. Sensor technology is being used in almost all industries; however, the greatest focus is on sensors within smart devices and gaming consoles.

- High-tech sensors become commodity: The consumer electronics market is rapidly growing, causing sensor technology prices to drop (e.g., smart phones with a market share of 60.1% in 2012, rising to 66.7% in 2016

- Industrial benefits of technology transfer: Transferring consumer low-cost sensor technology to industrial purposes may replace currently used sensor technology at a much lower price level; due to an excellent cost-benefit ratio, low-cost sensor technology is being used on a broader scale, and this is affecting affect global supply chains

- Application areas: Low-cost sensors offer a broad range of opportunities for logistics processes (e.g., enabling package volume recognition and shipping space surveillance); low-cost sensor technologies support smart packaging by integrating sensing capabilities into, for example, pharmaceutical and healthcare logistics, and contributing to grey power logistics and other specific logistics requirements

Benefits

For the logistics provider

- Internal process optimization
- Substitution of existing systems
- Simplified usage of system due to low complexity
- Reduction of sensory technology investment and running costs

For the provider's customer

- Logistics cost reduction
- Guaranteed security for sensitive transports, end-to-end transparency on freight condition and integrity

Concerns

- No public evaluation of use cases, business models, and ROI for different types of low-cost sensor technology in logistics
- Industrial usage limited by technical characteristics of consumer products (e.g., temperature sensitivity)
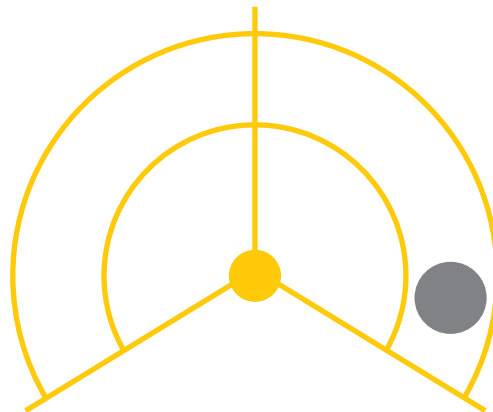
Relevant in: < 5 years
Impact: Medium

DEEP DIVE: SUPERGRID LOGISTICS

The Logistics Trend Radar also provides a multiple-page insight into a major logistics trend. In this first version of the tool, there is a deep dive into the topic of supergrid logistics.

From LaaS to supergrid
Based on modular, flexible and configurable logistics services, the concept of service-oriented logistics will introduce a new generation of business models, changing the entire logistics market.

Each complex step from logistics-as-a-service (LaaS) to supergrid will offer specific benefits to logistics providers and their customers (see Figure 5).

For logistics providers:
• Commodity services will be replaced with reusable cloud services; this reduces development costs, scalability, flexibility
• Buying non-profitable (e.g., physical) logistics services as a part of complex supply chains out of the mall will save cost and enable asset-reduced or even asset-free logistics business, with focus on supply-chain orchestration and complexity management

• Access to global markets and supergrids will be improved; logistics services with local relevance can be published in a global logistics mall
• Publishing and re-selling of internally used, best-practice, complex, high-value services will provide additional profit, and the chance to become a service specialist dominating the market

For their customers:
• Access to logistics malls, so customers can build their own "supply chains on demand", independent from any contracted provider
• Benefit from the enhanced competency of global supergrid providers who can design and manage the customer's entire value chain, dynamically integrating and orchestrating logistics and non-logistics services

Different levels and roles
Different levels of implementation, integration and management of logistics services can fit the scope of different types of logistics business models (see Figure 6).

Supergrid logistics will bring up a new generation of logistics companies whose primary focus is the orchestration of global supply-chain networks that integrate production enterprises and logistics providers. Many will be able to profit from new business opportunities – 4PL providers, companies with special expertise in complex or special services, and even small local logistics providers.
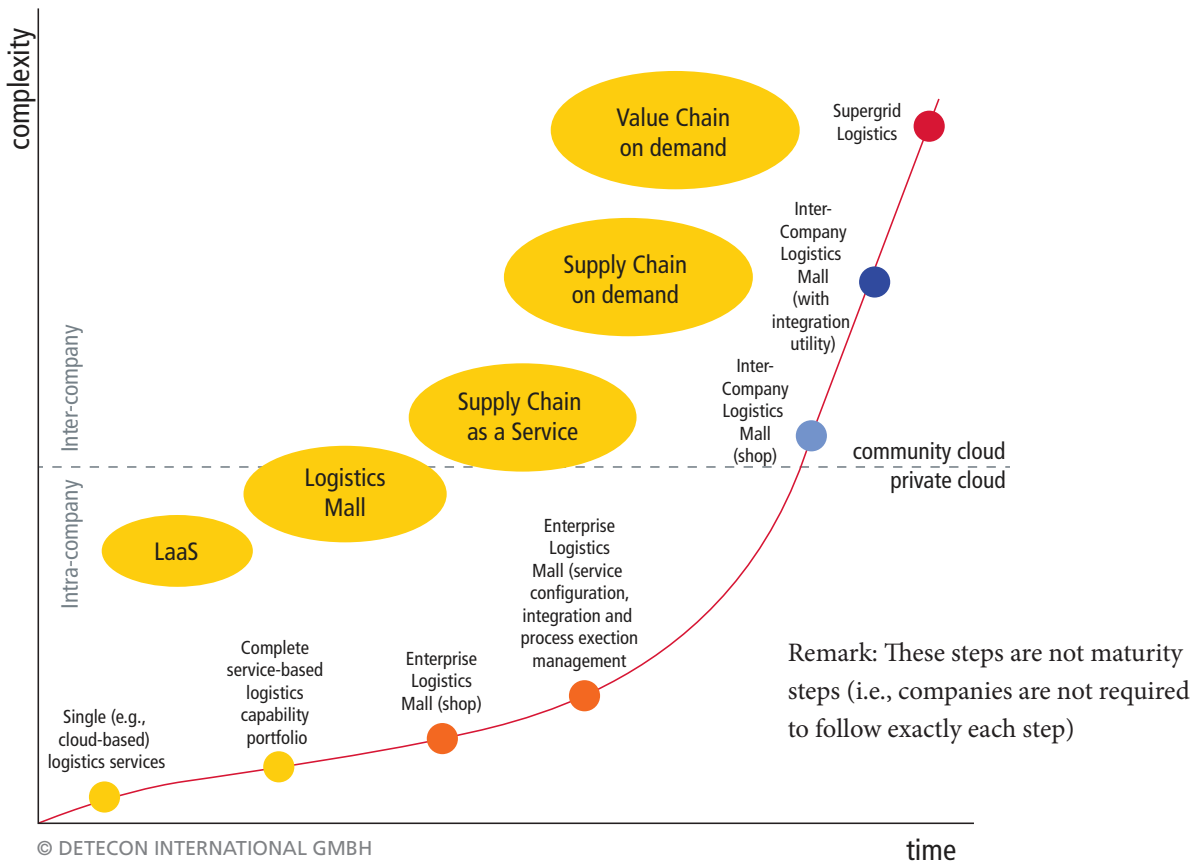
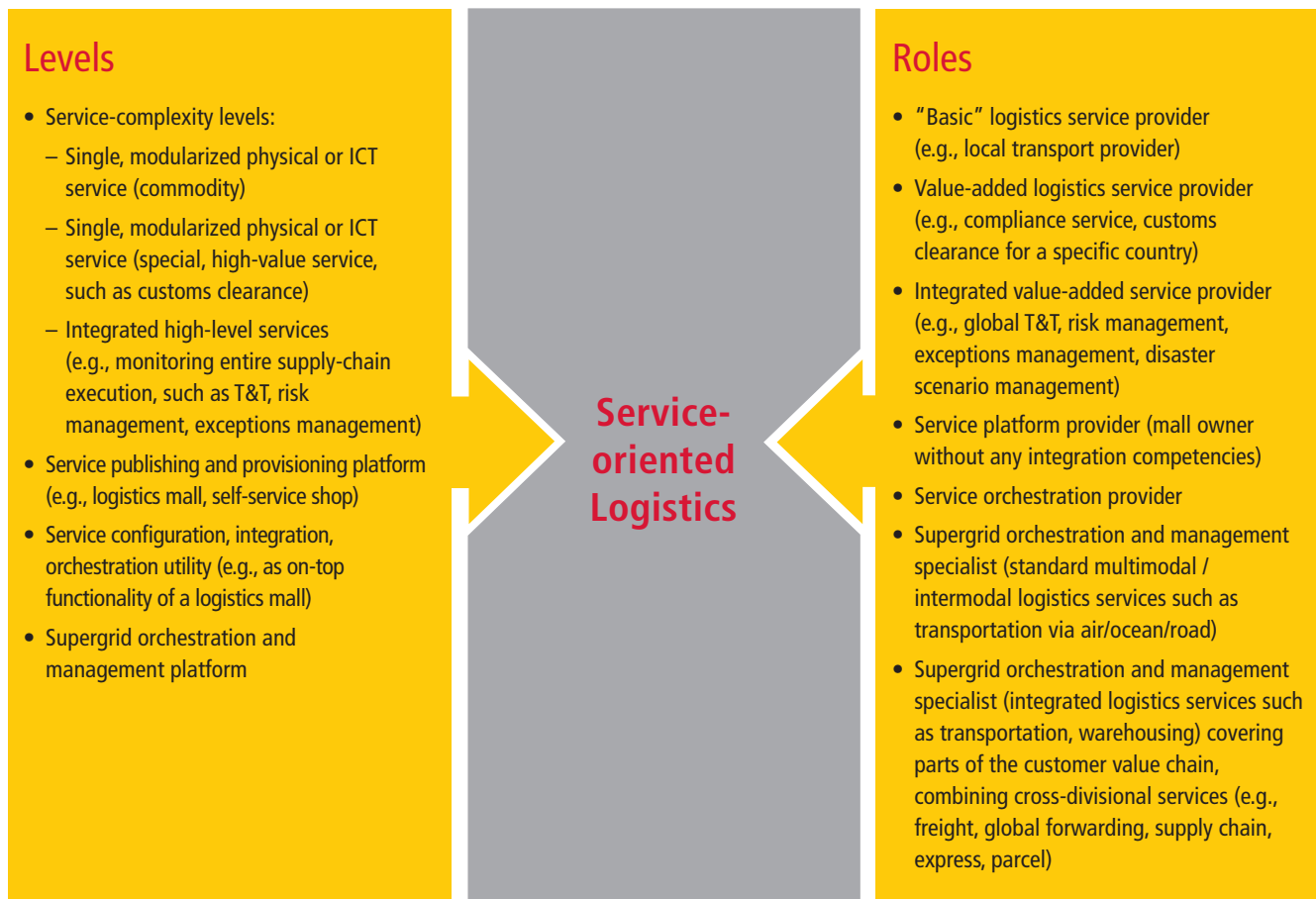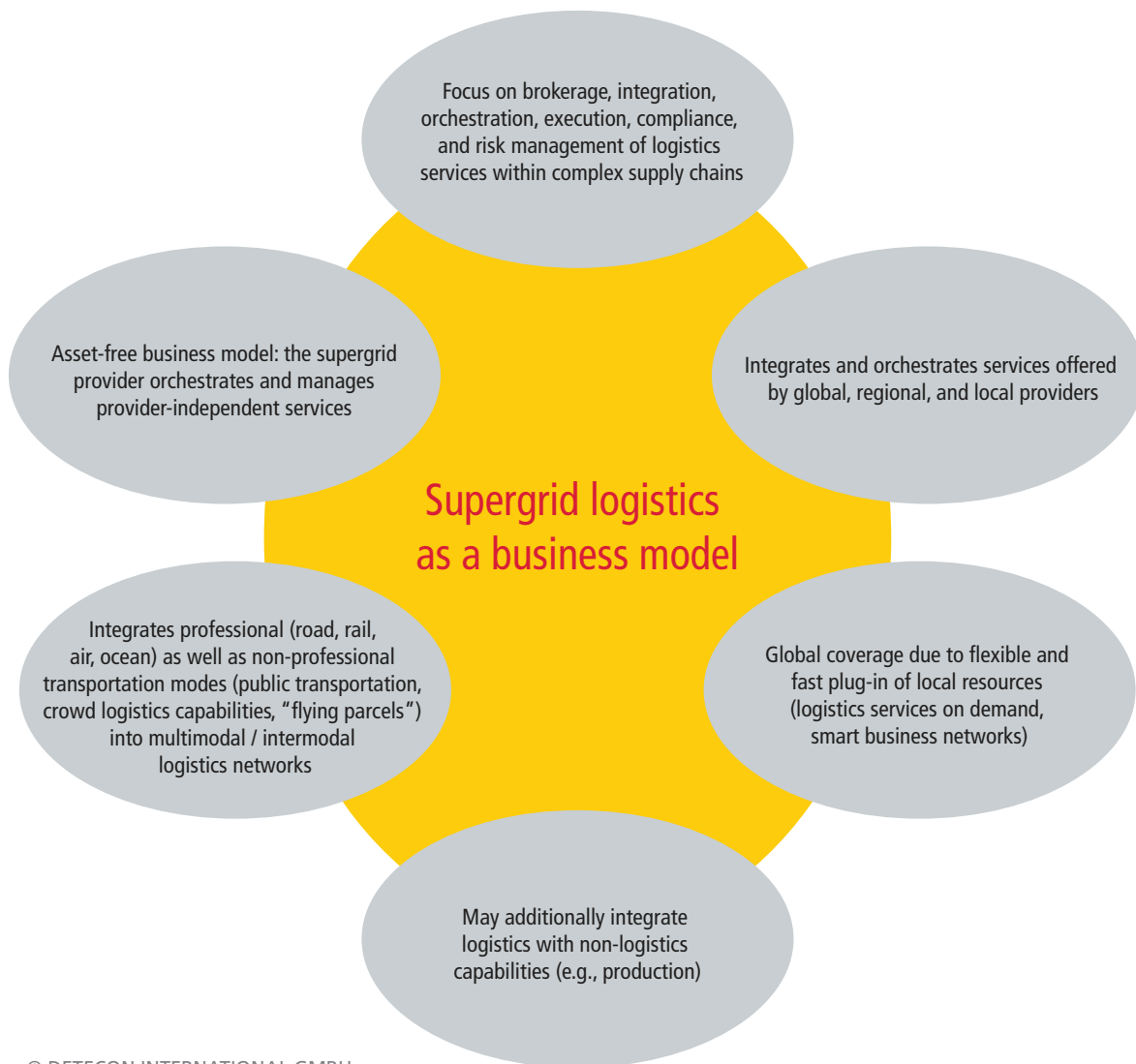Figure 5: The benefits of moving from LaaS to supergrid.

Levels

- Service-complexity levels:
  - Single, modularized physical or ICT service (commodity)
  - Single, modularized physical or ICT service (special, high-value service, such as customs clearance)
  - Integrated high-level services (e.g., monitoring entire supply-chain execution, such as T&T, risk management, exceptions management)
- Service publishing and provisioning platform (e.g., logistics mall, self-service shop)
- Service configuration, integration, orchestration utility (e.g., as on-top functionality of a logistics mall)
- Supergrid orchestration and management platform

Service-oriented Logistics

Roles

- "Basic" logistics service provider (e.g., local transport provider)
- Value-added logistics service provider (e.g., compliance service, customs clearance for a specific country)
- Integrated value-added service provider (e.g., global T&T, risk management, exceptions management, disaster scenario management)
- Service platform provider (mall owner without any integration competencies)
- Service orchestration provider
- Supergrid orchestration and management specialist (standard multimodal / intermodal logistics services such as transportation via air/ocean/road)
- Supergrid orchestration and management specialist (integrated logistics services such as transportation, warehousing) covering parts of the customer value chain, combining cross-divisional services (e.g., freight, global forwarding, supply chain, express, parcel)

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Figure 6: Levels and roles in service-oriented logistics.

Integrating end-to-end logistics services

A supergrid is a logistics network integrating co-operators along the entire range of end-to-end logistics services, including all available types of transportation all around the globe (see Figure 7).

Focus on brokerage, integration, orchestration, execution, compliance, and risk management of logistics services within complex supply chains

Asset-free business model: the supergrid provider orchestrates and manages provider-independent services

Supergrid logistics as a business model

Integrates and orchestrates services offered by global, regional, and local providers

Integrates professional (road, rail, air, ocean) as well as non-professional transportation modes (public transportation, crowd logistics capabilities, "flying parcels") into multimodal / intermodal logistics networks

Global coverage due to flexible and fast plug-in of local resources (logistics services on demand, smart business networks)

May additionally integrate logistics with non-logistics capabilities (e.g., production)

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Figure 7: Business model considerations in supergrid logistics.

Service information

The supergrid collects the information about services that can be delivered by suppliers.
This information is then offered to customers according their needs (see Figure 8).
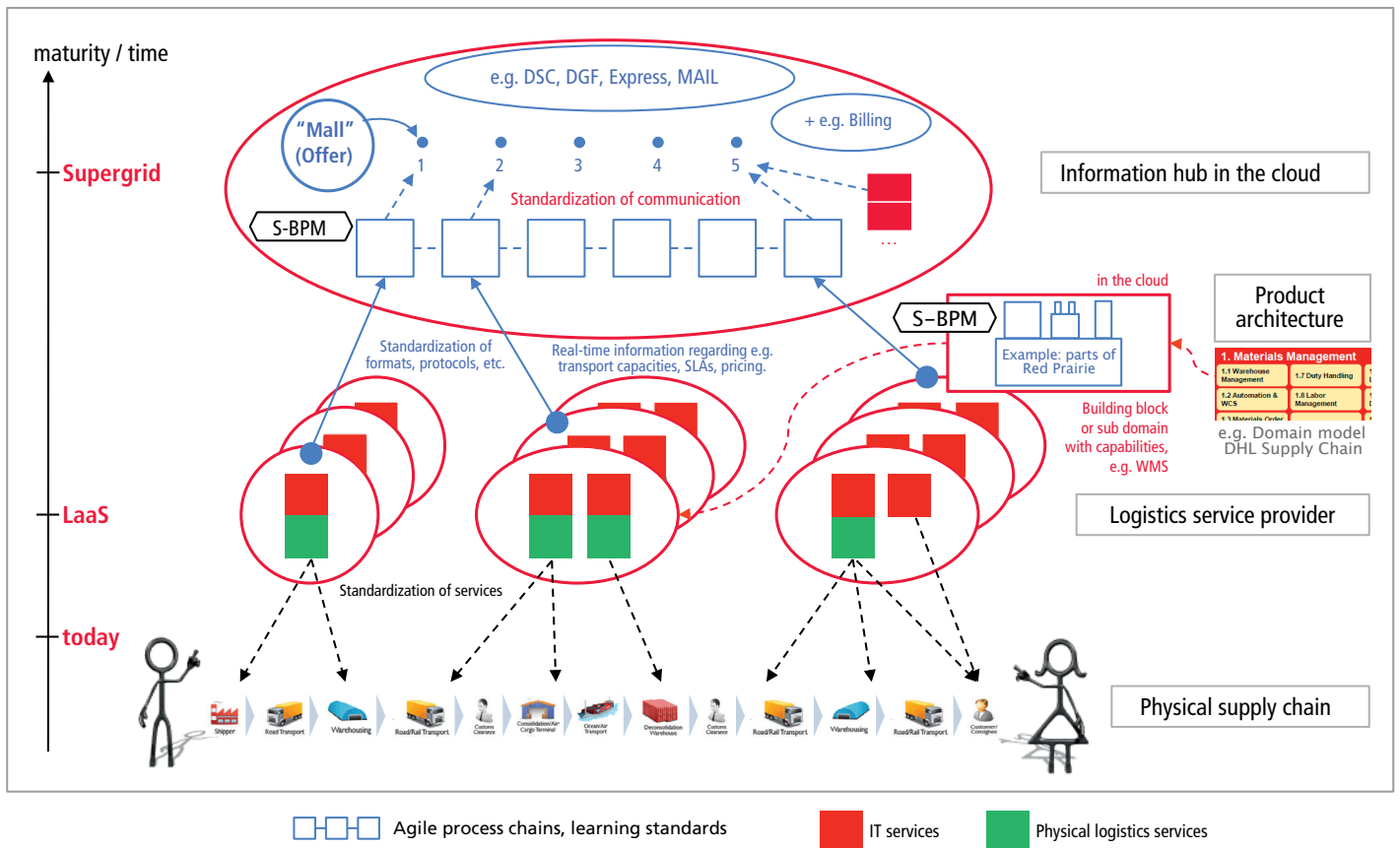
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Figure 8: Communicating information in the supergrid.

Re-envisioning strategy

The big players in the logistics industry can secure cutting-edge positioning by re-envisioning their strategy and business operating models, based on the concept of service-oriented logistics (SOL) (see Figure 9).

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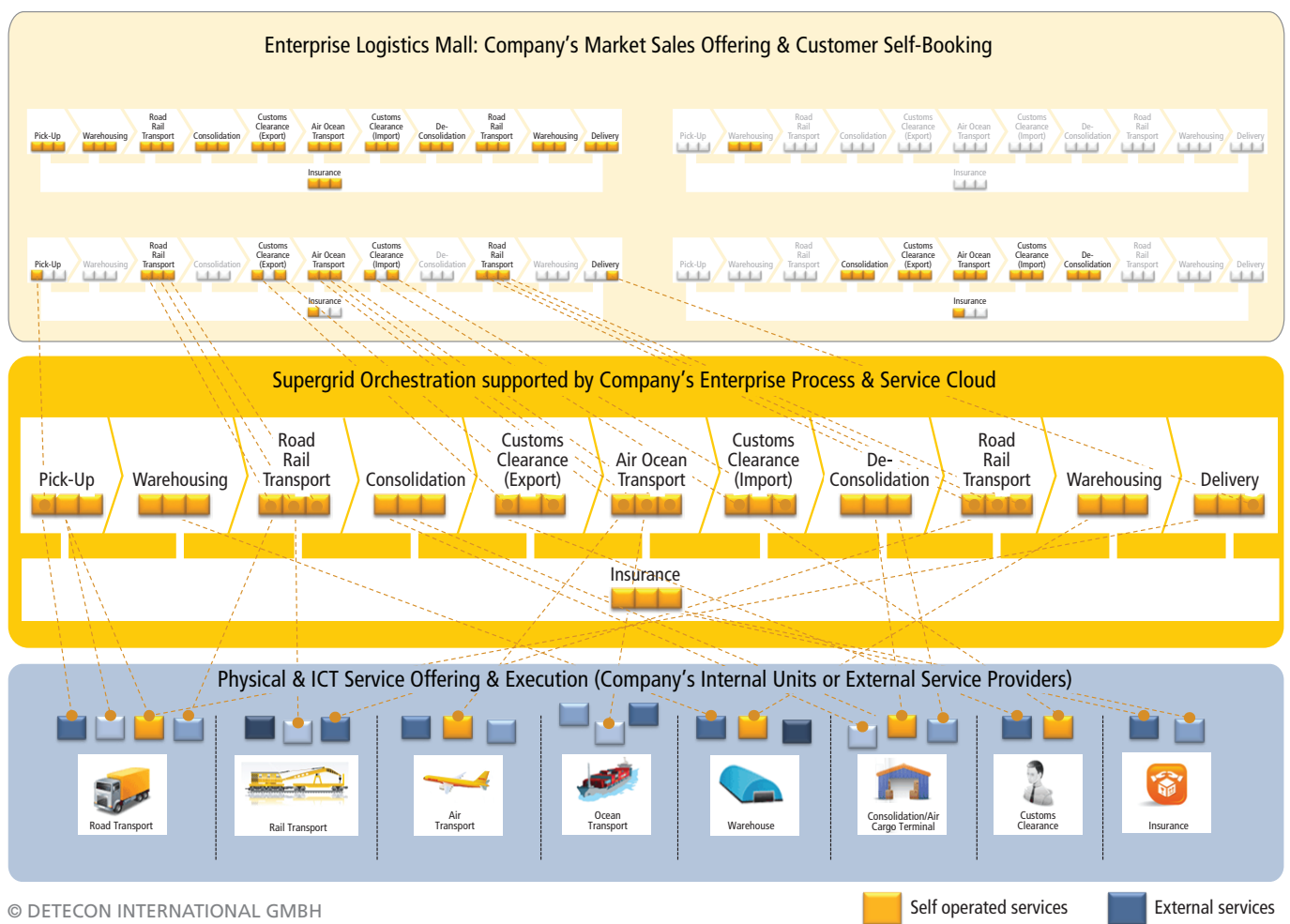
Figure 9: Opportunities to re-envision strategy and business operating models.

On-demand services

Supergrid logistics is based on a well-structured reference product and service portfolio. Per service module, internal and external services can be selected, orchestrated, and executed "on demand" (see Figure 10).
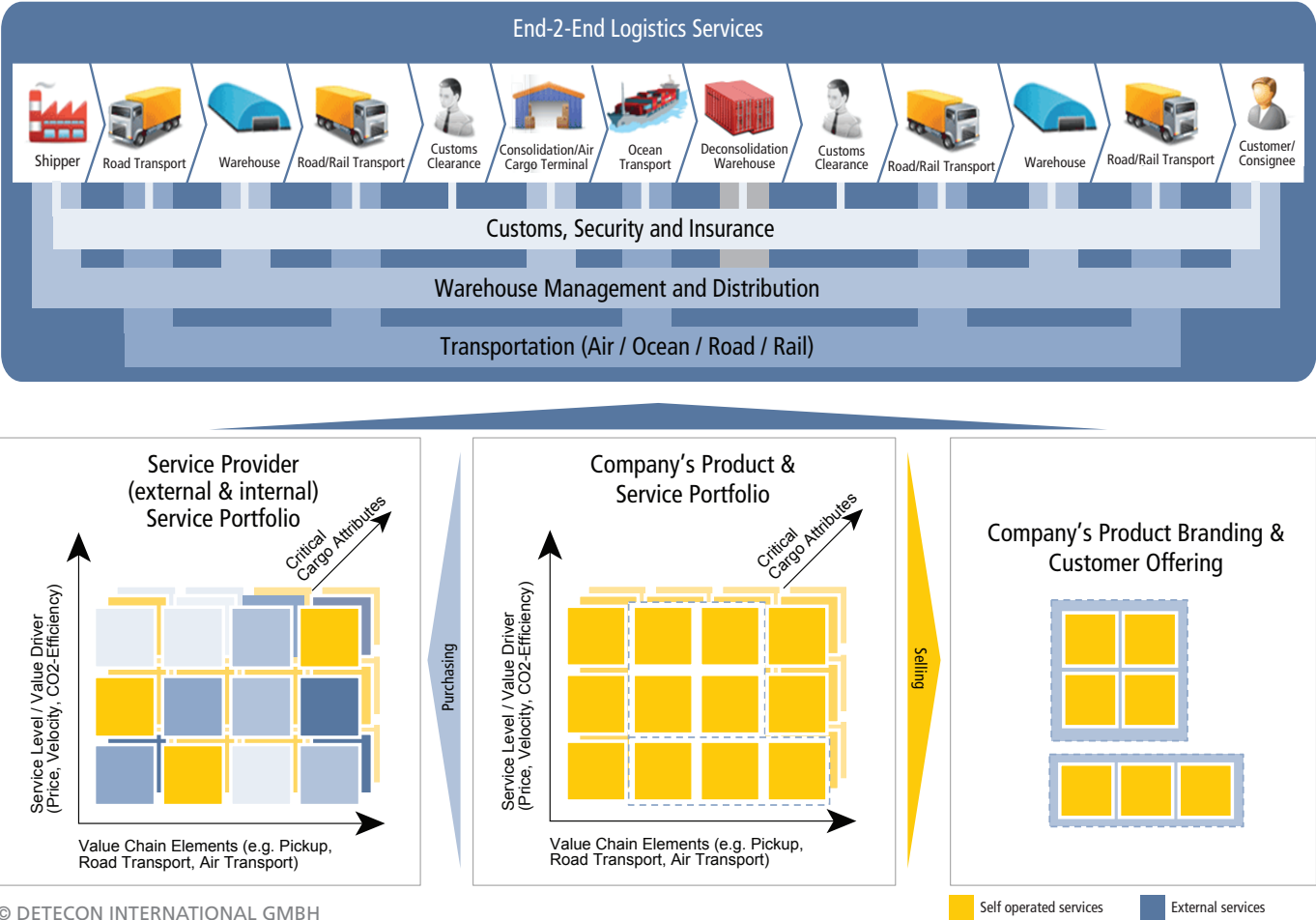
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Figure 10: Supergrid-enabled on-demand services.

Enterprise logistics mall

An enterprise logistics mall (ELM) is designed as a private cloud with division-specific sub-clouds. The relationships with strategic partners and external service providers are managed via a community cloud (see Figure 11).

ELM levels of integration

Designing the enterprise business to include an enterprise logistics mall requires strategic decisions emphasizing the company's business operating model:

- Referring to the complete range of services offered by the company:

    - which services should be executed by the company itself?

    - which services should be provided by strategic partners (service specialists for real-time tracking solutions, compliance, direct marketing, etc.)?

    - which services should be provided by external service providers (local / regional pickup and delivery services, etc.)?

- Which are the best-practice services that differentiate the company's expertise from the competition? Can these services be branded and re-sold to partners or even competitors in the context of an external community or hybrid logistics malls?

- Which self-operated services with low maturity or high costs can be replaced by standard services out of the cloud?

- Which services are being developed, implemented, and maintained redundantly by different business units / divisions? Which unit / division could be a "best-practice service specialist" and a candidate for in-sourcing?
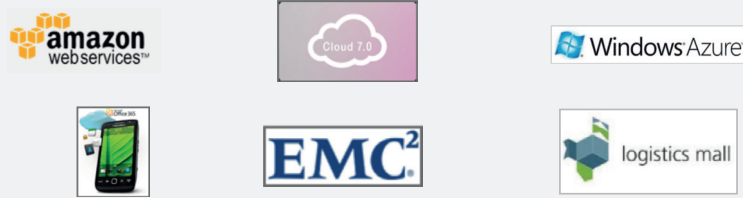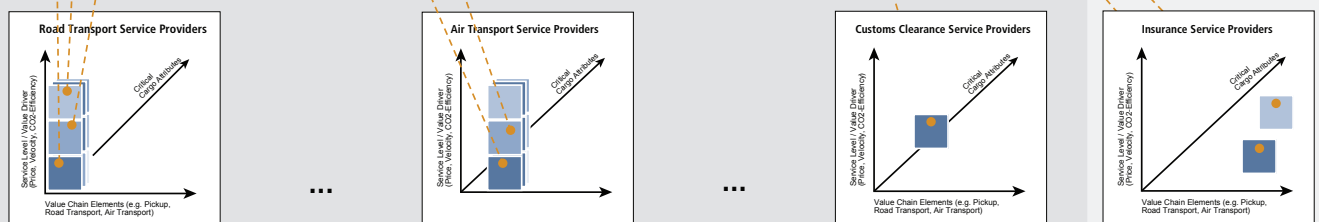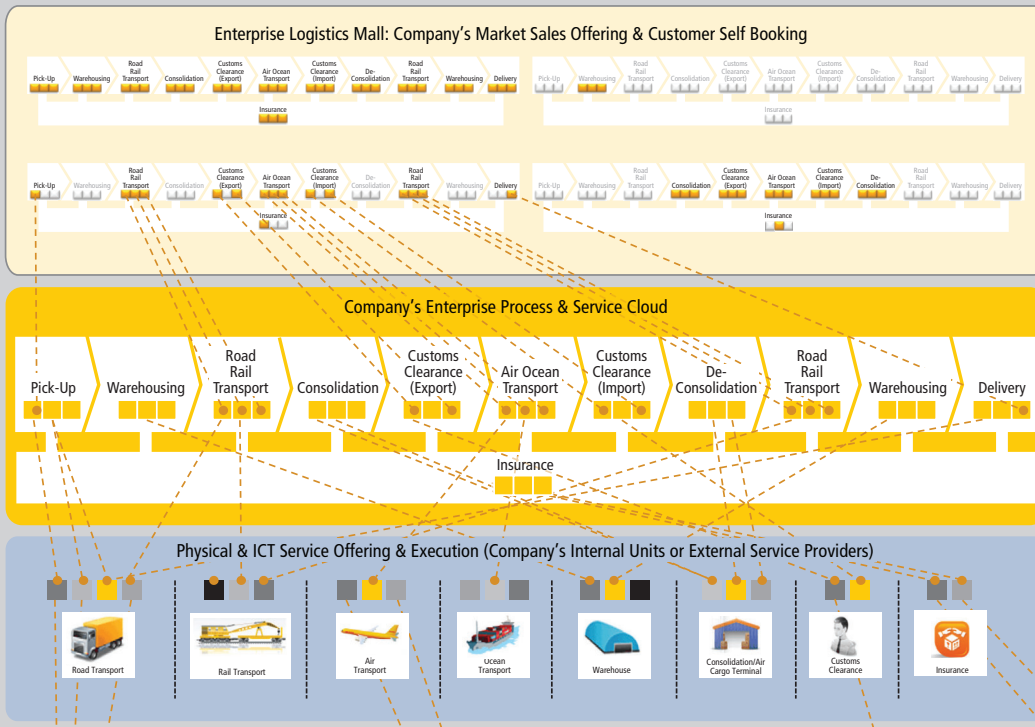
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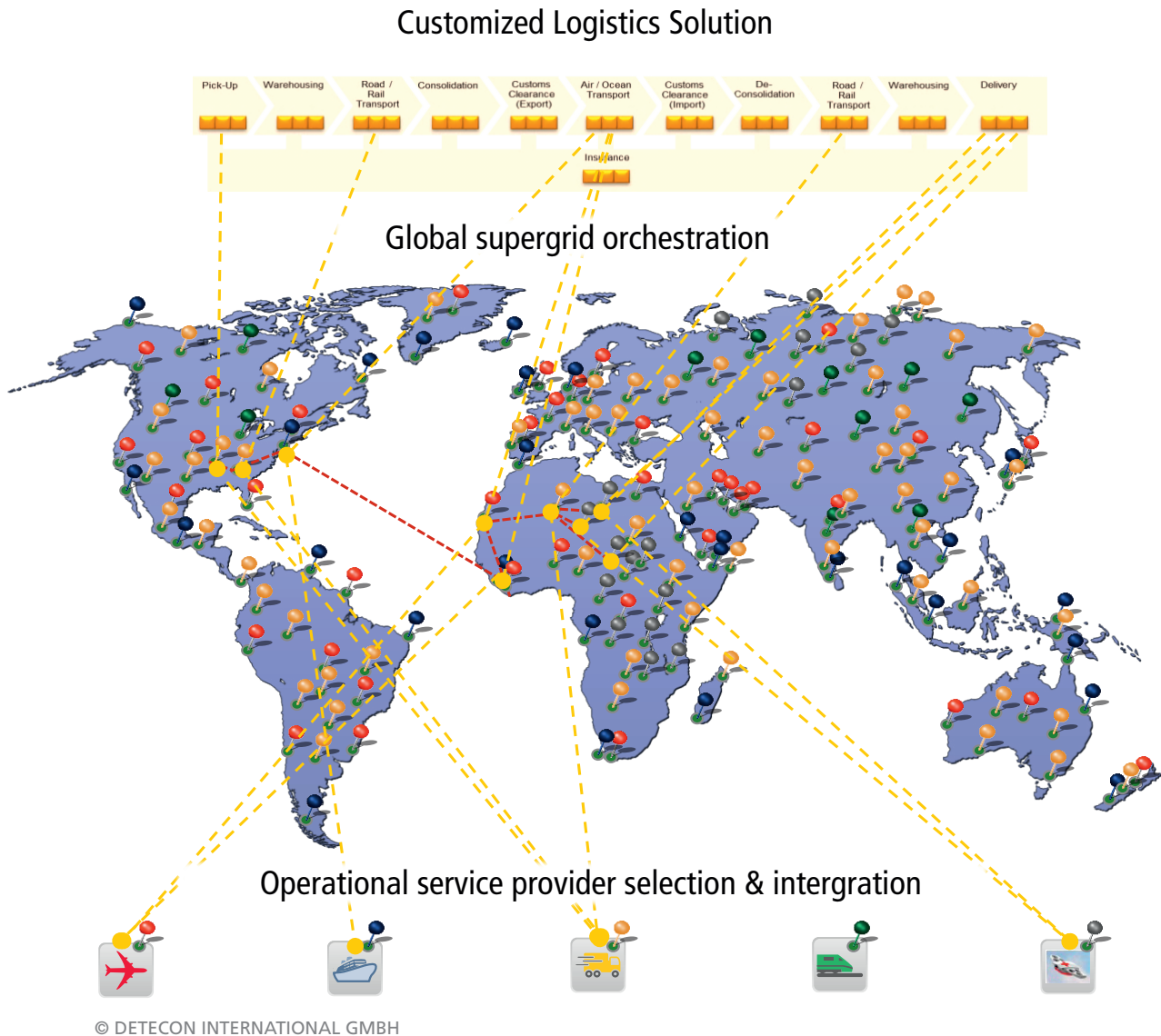
Figure 11: Relationships in the cloud.

Figure 12: Relationships on a global scale.

Networks around the globe

Supergrid logistics will bring up global logistics providers – they will orchestrate supply chains comprising global swarms of production enterprises and logistics service providers (see Figure 12).

Supergrid logistics

For global logistics companies, the design of global networks and the orchestration of coopetition partners (each of them covering specific geographical or functional areas of logistics competency) will increasingly replace immediate service provision based on owned assets. Intermodality and multimodality will become more and more important.

The following IT technologies will significantly support supergrid federations:

- Smart business network integration methods like LaaS, logistics mall, and supply chain on demand will enable the smart and seamless integration of global and local business partners into the global supergrid

- Big data supports real-time business processes and event management by enabling quick analytics of globally distributed geographical, transactional, and master data from different internal and external sources

- Federated enterprise architecture builds the foundation for globally operated supergrids, and defines the levels of standardization of processes, data, and applications, steering and integration principles, and service relationships between coopetition partners

Subject-oriented BPM

Subject-oriented BPM (S-BPM) enables the flexible management of processes within a company on global, regional, and local levels as well as process integration with external partners within a smart business network (see Figure 13).

Strategic Vision:
The ideal IT landscape delivering the best support for the company's business

Process & Data Cloud:
Corporate standards for processes, data, capabilities, applications

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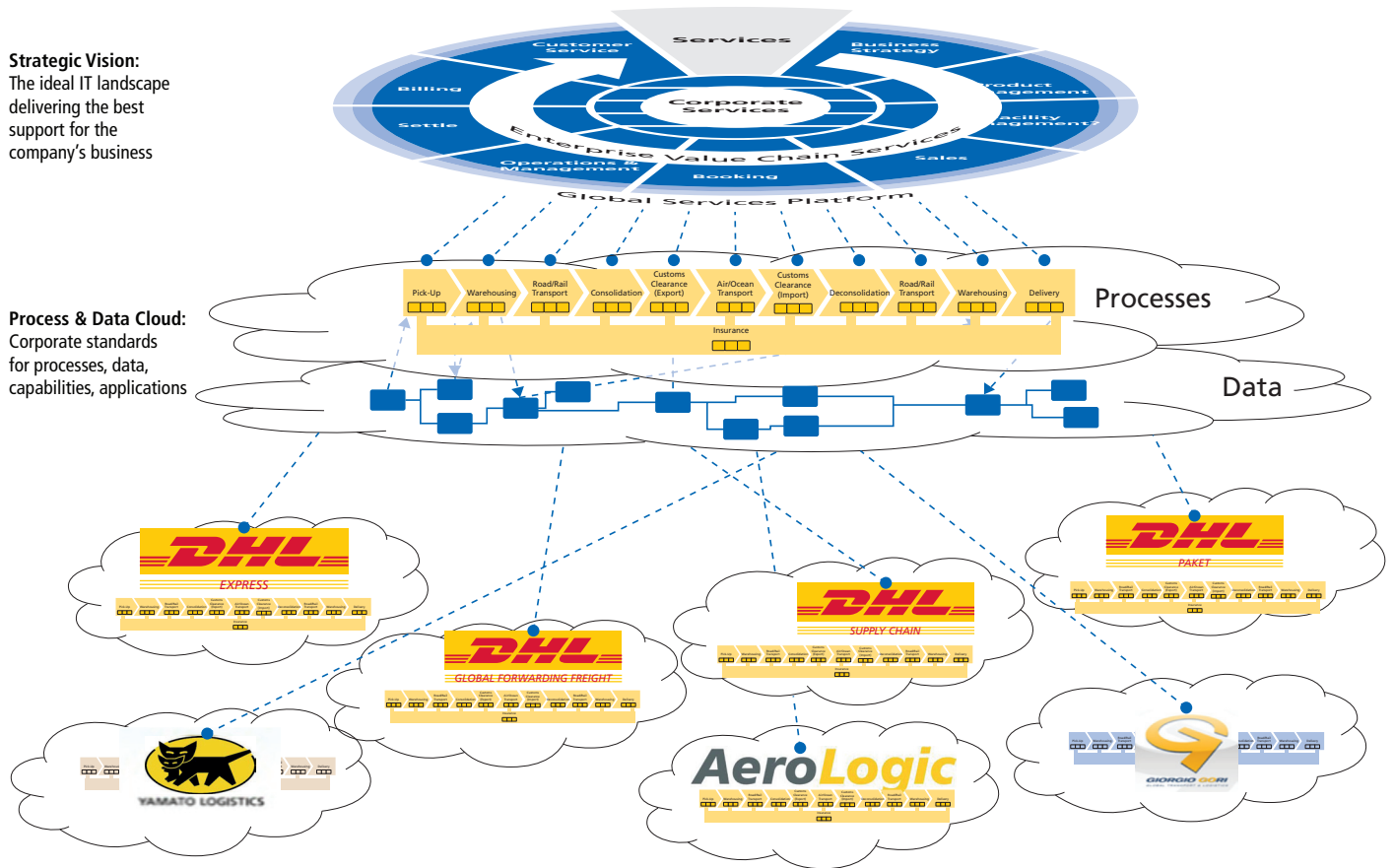
As-is implementation:
"Real-life" (existing) processes & data
(company divisions & partners)

Figure 13: Process management flexibility and process integration in S-BPM.

LaaS methods

By using logistics-as-a-service (LaaS) methods, smart business networks can be created quickly and cost efficiently. Business partners can be rapidly and smoothly integrated while staying decoupled (see Figure 14).

Figure 14: Creating networks and integrating partners with LaaS methods.

CONCLUSIONS

This white paper has described a new tool enabling the reader to evaluate the latest trends in the logistics industry, and assess their potential impact. The overarching aim of the Logistics Trend Radar is to help change the world of logistics for good.

The reader has been provided with an at-a-glance Logistics Trend Radar graphic, an overview table of the key social and business trends, an overview table of the key technology trends, numerous in-depth trend-specific impact analyses, and a multiple-page deep dive into the major trend of supergrid logistics. For further reference, the reader is directed to the final section of this document for information on use cases, pilots, and the sources used in the preparation of this white paper.

As a comprehensive repository of knowledge, this tool can help to stimulate collaborative discussion throughout DHL's networks and alliances, resulting in innovative projects that can be jointly undertaken.

The reader is reminded that this tool screens and reports on a regular basis. DHL Customer Solutions & Innovations will publish regular updates of this tool in future.

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e-mail: Veronika.Soentgerath@detecon.com

REFERENCES

Use cases & pilots

B01 Supergrid Logistics:

Logistics Mall (Fraunhofer) EU-Projekt LOGICAL
InterLogGrid / D-Grid Smart Port Logistics
pulse.agheera DHL Global Forwarding: Intermodal /
Multimodal Transports

B02 Real-time Services:

DHL: Realtime Solutions, Mobile Services Agheera: agheera.pulse
Real Time Tracking Effizienzcluster LogistikRuhr: TiLO, SmaRTI
Detecon: MyArrival T-Systems: TelematicOne, ConnectedCar
Hamburg Port Authority, Telekom, SAP: SmartPort Logistics
Metro: Future store initiative (future-store.org)
Wal-Mart: Retail Link Private Extranet, JiT-Inventory

B03 Next-generation M2C:

Exclusive M2C Distribution (Pangoo, Dell)
Parallel / Mixed Distribution Structures (B2C and M2C-mix
strategy): Samsung, Sony, HP, IBM
M2C Marketplaces: globalmarket.com, payandpack.com,
asia-shop.dk, ct-direktverkauf.de, chinagadgets.com, alibaba.com
Global to local / local to local food M2C: tee-direktverkauf.de,
teekampagne.de, winzerdirektverkauf.de, chocolatier.de,
lambertz-shop.de, coppeneur.de

B04 Urban Logistics:

Urban Consolidation Centers (UCC): Heathrow, Stockholm,
Dubai, Kuala Lumpur, Istanbul; Integrated Air Cargo Hubs
(IACH) / End-of-Runway Warehouses: DHL HUB Leipzig,
Pudong
Urban Logistics Innovations: SmartTruck, Packstation,
eBase4mobility, ePOD@Home, Urban Business Navigation, Urban
Retail Logistics
Binnenstadservice.nl
Service2City / Eco2City
City-Log.eu / City-Move.eu

B05 Logistics Marketplaces:

B2B: Logistics Mall, Check.cargo.com, Teleroute.com, Opersoft.
com, Movex.co.uk (sector specific logistics marketplace:
automotive)
M2C: MediPx.com: Medical Logistics Marketplace
B2C: Logistics on-demand platforms for private clients:
Klickcouriers.com, Uship.com, Shareload.com, Shiply.com,
Chakkr.com, Parcelbroker.co.uk
C2C: Car sharing and pooling for parcels and goods:
Carpoolcargo.com, Raumobil.de, NochPlatz.de, Monsterzeug.de

B06 "Logsumer":

Personalized logistics services: DHL Paket.de, T-Systems /
Detecon: MyArrival, Shutl: Same day delivery in London
Online Supermarkets: Allyouneed, Gourmondo
"Go Green" delivery of organic products: Fattoria La Viala
Price comparison platforms: Medpreis.de, Idealo.de,
Gutscheinsammler.de, Groupon.de

B07 Crowd Logistics:

Shareconomy-driven C2C services: Polyport Mitbringservices
Zürich: BringBee (IKEA-products), Das Kartoffeltaxi (organic
food from local farmers), craigslist.com, lifecycler.de
Crowdsourcing: DHL: MyWays, microtask.com, brain-sourcer.
com, passbrains.com (on-demand software testing)
Crowdnavigation: Inrix crowd sourced real-time traffic navigation,
TomTom, MDM
Crowdmining: wisdom.com

B08 Fair Logistics:

DHL: Shared value projects
H&M LongLiveFashion & CharityStar Program
European Business School (EBS): Global Sourcing Code
VillageReach: Access to healthcare for inaccessible and isolated
last mile communities around the world
TheLogisticsProject.org: Empowerment of individuals and agencies
to improve logistics across the aid and development sector
Matternet: Flying autonomous delivery system for the developing
world (pilots in e.g., Haiti)

B09 Grey Power Logistics:

Pedestrian Navigation Program (JP)
MV1 / MV1 LX: Vehicle for aged or disabled people with a
side-deployable ramp (VPG, US)
Independent Transportation Network (non-profit, private
transport service for seniors) in Portland Maine (US)
Naturally Occurring Retirement Communities (NORCs),
NYC (US)
The Village Movement / Village-to-Village Network , The
Concierge Cervice and Seniors a Go Go (escorted door-through-
door transportation, provided by ElderHelp, San Diego),
CaringCompanion (US)

B10 Convenience Logistics:

Convenience Logistics Solutions: BioStorage technologies
(biostorage.com)
Flexible Last Mile Solutions: MyWays (DHL), Packstation (DHL),
BufferBox (Google), AmazonLocker (Amazon), BentoBox Berlin
(CityLog), MyArrival (Telekom/Detecon), Shutl.com, Cardrops.
com, sharelog24.com
Online Supermarkets: MyTime.de, Allyouneed.com, foodstore-online.
de, edeka24.de, gourmondo.de, amorebio.de, emma-mobil.de, froodies.
de (Germany), toptomato.in (India), RedMart.com (Singapore),
waitrose.com, sainsburys.com, ocado.com, tesco.com (UK)

B11 Multiple-user Networks:

BMBF: SemProM (Semantic Product Memory – Identification and
Authentication Solution)
DPDHL: Pilot on Convenience Logistics using standard networks
DHL metropolitan parcel ticket (innovation idea, Citylogistics
Idea Contest): Parcel transportation via standard public transport
network
DHL Box for Taxis (innovation idea, Citylogistics Idea Contest):
usage of standard taxi network for parcel delivery
DHL empty backload app (innovation idea, Citylogistics Idea
Contest): real-time tracking and publishing of free capacities
events sent by trucks.

B12 Shareconomy Logistics:

Collaborative Consumption: Sharing: carzapp.net, tamyca.de, getaround.com, car2go.com (cars), Deinbus.de (busses), flinc.org, mitpackgelegenheit.de (private delivery services), foodsharing.de (food), bookelo.com (books), friendsurance.de (insurances); Swapping & Lending: frents.de, kidd-e.com, netcycler.de, lifecycler.de, game-change.de (commodity goods), homeforhome.com, Airbnb.de, homeswopping.de (homes & houses), exchange-me.de, diensttausch.com (services)
Collaborative Business / Co-Working: the-hub.net, betahaus.de, cowobo.de, coworking.de, socialteams.de

B13 Near- & X-shoring:

The Global Intelligence Group: Nearshoring Manufacturing in Mexico
HP IT Support and Development from Mexico
Avnet: Value-added supply-chain operation in Nogales, Mexico, to serve both the United States and Latin America
Agility: Global Integrated Logistics

T01 Big Data / Data-as-a-Service:

DHL: Smart Sensor Platform, SmartTruck
Agheera: pulse.agheera
Hamburg Port Authority, Telekom, SAP: SmartPort Logistics
FedEx: SenseAware
US Navy: NavAir Deckplate
Descartes Systems: Logistics Flow Control
MATERNA, Bundesanstalt für Straßenwesen, Bundesministerium für Verkehr, Bau und Stadtentwicklung: Mobility Data Marketplace

T02 Cloud Computing:

Logistics Mall / LaaS (Fraunhofer Effizienzcluster Logistics Project LOGICAL
InterLogGrid / D-Grid
Westrfracht Spezialverkehre: LaaS (logistics-as-a-service.de)
Metasonic S-BPM
T-City Friedrichshafen
Hamburg Port Authority, Telekom, SAP: SmartPort Logistics
Lessoftware: Supply Chain On Demand / Supply Chain as a Service

T03 Autonomous Logistic:

Autonomous Warehousing Logistics: Effizienzcluster LogistikRuhr / Fraun-hofer IML: Cellular Transport Systems
Autonomous Road Logistics: AutonomosLabs: Brain Driver, Made In Germany, Spirit Of Berlin; Daimler (VaMP, Vita-2); Google; CityMobil; ULTRa PRT; EC EUREKA. Prometheus
Autonomous Air Logistics: Matternet: UAV drones and network; ARIA: Open source autonomous logistics infrastructure; AirShield: Human and environmental protection; Avigle: Avionic Digital Service Platform; cDrones: Autonomous Multi-UAV systems.

T04 3D Printing:

DHL Solutions & Innovation research project "3D Printing"
DirectSpare research project (EU)
Wohlers Associates
Freedom of Creation

T05 Robotics & Automation:

Komplett: AutoStore (Robotics solution based on a three-dimensional grid system); Quiet Logistics, Office Depot: KIVA Automation (robotic mobile fulfillment solution)
ESB-Logistikfabrik: RobLog; SSI SCHAEFER order picking robot (SSI Robo-Pick); Amazon / KIVA: real-time cloud controlled order processing robots
DHL Packstation; AmazonLocker, Google BufferBox; Zalando Fashion Concept Car

T06 Internet of Things:

Internet of Things Europe (internet-of-things.eu)
BMWi project AUTONOMIC: SmartOR (Smart Health: IoT enabled operating theatre), AGILITA (flexible and efficient materials flow system), DyCoNet (autonomous airfreight containers & smart grid)
Smart container chain management (SMART-CM)
SKT (Korea): M2M based IoT platforms for Smart Home, Smart Weather Observatory)

T07 Next-generation Telematics:

Dreyer+Timm: MyTrailerTelematic (truck identification, temperature detection, safe door monitoring), Helpten (Driving habit analysis, vehicle tracking, smartphone app)
WirelessCar, e.g., BMW Connected Drive,
Verizon 4G M2M eco system
DHL Smart truck
Telekom: TelematicOne, ConnectedCar
Hamburg Port Authority, Telekom, SAP: SmartPort Logistics
Vehicle Infrastructure Integration (VII) Initiative (V2V/V2X/V2I supported road safety, US)

T08 Quantum Computing:

Quantum computation products: IQuantum (quantum computer simulation), D-Wave-One quantum computer (D-Wave), IBM QC Pilots, NEC QC Pilots
Quantum cryptography products: IDQ: Cerberis quantum key distribution (qkd) server (idquantique.com), Magiqtech: Q-Box Workbench™ Quantum Key Distribution (QKD) System

T09 Augmented-reality Logistics:

DSC Global IT Strategy & Solutions: AR project Vision Picking – Augmented Reality Solution for Warehouse Operations
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