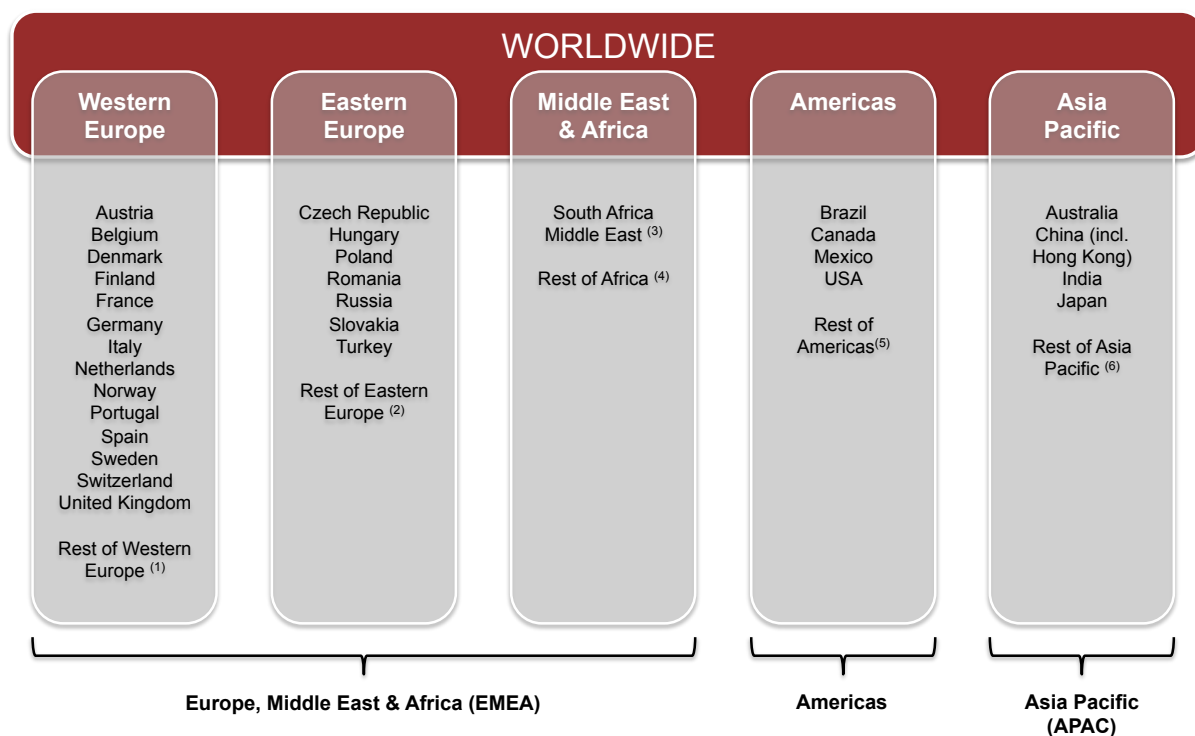


Segmentation

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1. GEOGRAPHICAL MARKET COVERAGE



(1) Rest of Western Europe incl. Greece, Iceland, Ireland, Liechtenstein, Luxembourg, Malta

(2) Rest of Eastern Europe incl. Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Estonia, Georgia, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Serbia, Slovenia, Ukraine

(3) Middle East incl. Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen

(4) Rest of Africa incl. Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Cote d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Republic of Congo, Rwanda, São Tomé und Príncipe, Senegal, Sierra Leone, South Sudan, Sudan, Suriname, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe

(5) Rest of Americas incl. Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, Uruguay, Venezuela

(6) Rest of Asia Pacific incl. Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, Fiji, Indonesia, Kazakhstan, Kiribati, Korea, Kyrgyz Republic, Lao, Macao, Malaysia, Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Palau, Papua New Guinea, Philippines, Samoa, Seychelles, Singapore, Solomon Islands, Sri Lanka, Taiwan, Tajikistan, Thailand, Timor-Leste, Tonga, Turkmenistan, Tuvalu, Uzbekistan, Vanuatu, Vietnam

2. IT EXPENDITURE

IT EXPENDITURE			
Personnel Expenditure	Hardware Expenditure	SITS Expenditure	Miscellaneous Expenditure

Important notes

- **Captive IT activities** include all activities of captive IT suppliers with their parent or sister companies, i.e. internal revenues and revenues with associated companies.
- PAC considers exclusively non-captive revenues in rankings and market figures. Captive revenues are booked as internal IT expenditure (mainly personnel and hardware).

Personnel

It includes all personnel-related costs:

1. IT salaries
2. Other staff costs

Hardware

It refers to all IT equipment (see section “Hardware”) and includes the purchase value.

Software and IT Services (SITS)

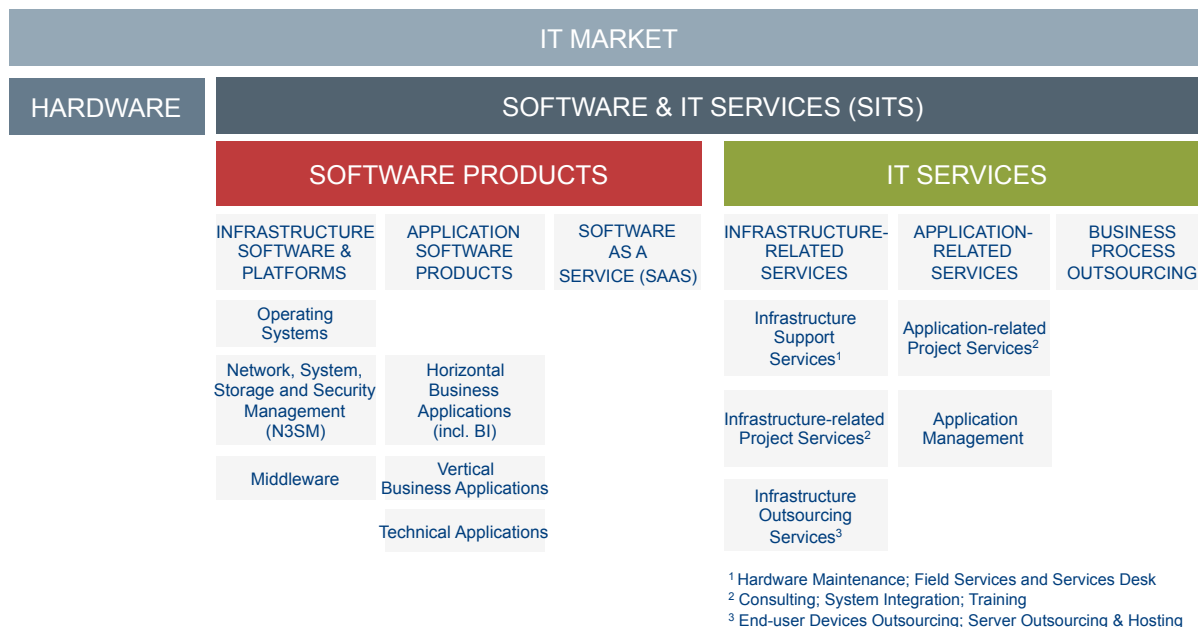
It refers to all Software and IT Services (see following sections) and includes the purchase value.

Miscellaneous

It includes all other costs related to the IT that are not part of the previously mentioned three categories:

- Data-related telecom equipment and services (e.g. routers, leased lines, X25, etc.);
- Consumables, energy, offices, etc.
- Financing costs (for the purchasing of Hardware, Software and IT Services).

3. IT MARKET



HARDWARE

...refers to the purchase value of:

- 1 Mainframes
- 2 Servers
- 3 PCs
- 4 Workstations
- 5 Storage
- 6 Monitors
- 7 Printers
- 8 Other terminals (e.g. ATM's, cash registers)
- 9 Networking equipment (LAN, switches; excl. WAN).

4. SOFTWARE PRODUCTS

SOFTWARE PRODUCTS		
INFRASTRUCTURE SOFTWARE & PLATFORMS	APPLICATION SOFTWARE PRODUCTS	SOFTWARE AS A SERVICE (SAAS)
Operating Systems	Office, Content & Collaboration	
Network, System, Storage and Security Management (N3SM)	Horizontal Business Applications (incl. BI)	
Middleware	Vertical Business Applications	
	Technical Applications	

4.1 Infrastructure Software and Platforms

Important notes

- PAC figures for Infrastructure Software and Platforms include only revenues from licenses and maintenance/ support. All related revenues from **implementation services** (consulting, implementation/ customization, training) are booked as **infrastructure-related services revenues**.
- PAC considers highly industry-specific Infrastructure Software as Application Software Products as they really are at the core of the respective applications. This, for instance, applies to software products dedicated to the telecom sector in areas like billing, telecom network management or platforms for enhanced services. Telecom network management clearly is an application area for a telecom operator, while traditional systems and network management software products are designed to help run an IT system and are as such considered as Infrastructure Software by PAC.

4.1.1 Operating Systems

Operating System (OS)	Product / Supplier Examples
Operating systems & sub-segments	IBM OS (system i, system z), Unix (AIX, HP UX, Sun Solaris), Linux (Red Hat, Novell, Ubuntu), Mac OS X, Windows OS, etc.
Networking software System utilities	IBM, Sun (Oracle), HP, Dell, Fujitsu, EMC, Novell, Red Hat, but also Alcatel, Ericsson, Nokia, Motorola
Virtualization engines & environment	VMware (EMC), Microsoft, Amazon, Google

4.1.2 Network, System, Storage and Security Management (N3SM)

Network, System, Storage & Security Management (N3SM)	Product / Supplier Examples
Network and system management	Tivoli (IBM), CA, Patrol / BSM tools, BMC
Output/input and performance management	HP Software (former OpenView), Microsoft
Incident, problem, change & configuration and release management	LANDesk, Beta Systems, BDNA, ASG Software, NetIQ, Paragent, Hyperic, Rocket Software, Novell, Red Hat, Netgear, Orsyp, Dynatrace
Service level management, financial, capacity, IT continuity, availability management	Nokia, Alcatel, Cisco, etc.
Cloud/laaS platforms	Parallels, Vmware (EMC), Novell, Citrix
Storage management	EMC, Symantec, IBM, Sun (Oracle), HP, Beta Systems, Hitachi, NetApps, etc.
Security & ID management	Symantec, McAfee, Check Point Software, Novell, IBM, Microsoft, CA, Sun (Oracle), Panda Software, Arkoon, OpenTrust, Cryptolog, etc.

4.1.3 Middleware

Middleware	Product / Supplier Examples
Data engines and databases	Oracle 11g, DB2 (IBM), SQL Server (Microsoft), Sybase, Adabas (Software AG), Teradata, Tamino (Software AG), Caché (Intersystems), Sun (MySQL)
Information integration tools: extract, transform, load (ETL) engines, product information management (PIM), master data management (MDM) and enterprise information integration (EII)	IBM, Informatica, Oracle, SAP, Talend, Teradata, Fair Isaac, Composite Software, Orchestra Networks, Tibco, Sybase, ASG, etc.
Enterprise architecture tools Analysis, modeling & design	IBM, Microsoft, Sybase, MEGA, IDS Scheer (Software AG), Casewise
Portals	Autonomy, IBM, BEA, Liferay, Microsoft SharePoint
Rich Internet platforms	Google, BlueWiki, Adobe's Flex, Microsoft's Silverlight, Adobe AIR, Autonomy
Message-oriented middleware	IBM, Tibco, Progress, Microsoft
Software engineering tools & environments (incl. 3GL, 4GL, RAD, OO, etc.) Code and application generators	Microsoft, IBM, Oracle, Sybase, Progress, Magic Software, Eclipse, NetBeans, 4D, Netfactive, Serena, Micro Focus

Middleware (continued)	Product / Supplier Examples (continued)
Rules engines	Fair Isaac, Corticon, Pegasystems, IBM, Tibco
Migration tools	Micro Focus, MetaWare, Ateras, Mia-Software
Automated software quality, test tools and configuration management	IBM, Serena, HP, ASG, Compuware, CA, Micro Focus, Perforce Software, Axios Systems, McCabe Software
Portfolio and IT project management tools and platforms	Microsoft, IBM, CA, HP, Planview, Oracle
BPM (business process management) / BAM (business activity monitoring) engines	BEA, IBM, Tibco, Software AG, Intalio, Inubit, Pegasystems, Systar, SAP, Metastorm
Application servers	IBM WebSphere, Oracle, Tomcat, Red Hat, SAP
Software & SOA components management tools	Oracle, SOA Software, IBM, Software AG, HP
Connectors, EAI, ESB	IBM, Tibco, Software AG, PolarLake, Vitria, Axway, Red Hat, Progress, Information Builders, Fiorano Software, MuleSource, Microsoft, Oracle, SAP
Transaction engines: EDI, FTP, distributed transaction processing middleware, business-specific products, etc.	BEA, IBM, Axway, Sterling Commerce, Seeburger, Edicom, Indra, Trading Metrics, Aneo, Cisco, Reuters

4.2 Application Software Products

Important notes

- Application software products can be either out-of-the-box solutions, such as most productivity software products and business applications for the small office/ home office market, or more complex/ process-oriented solutions that require implementation and customizing services, such as business applications for the mid-market and for large enterprises.
- Application software products are often sold as packaged solutions including hardware and services, e.g. implementation services. The value of the hardware and services resold is excluded if it can be determined.
- PAC's figures for Application Software Products include only revenues from licenses and maintenance/ support. All related revenues from **implementation services** (consulting, implementation/ customization, training) are booked as **application-related services revenues**.
- PAC considers highly industry-specific Infrastructure Software as Application Software Products as they really are at the core of the respective applications. This, for instance, applies to software products dedicated to the telecom sector in areas like billing, telecom network management or platforms for enhanced services. Telecom network management clearly is an application area for a telecom operator, while traditional systems and network management software products are designed to help run an IT system and are as such considered as Infrastructure Software by PAC.
- PAC does not consider gaming/ entertainment software as part of Application Software Products.
- SaaS (Software as a Service) revenues such as those from providers like Salesforce.com, NetSuite, and Workday are not included in PAC's application software products segmentation as these companies sell much more than the mere application software: the subscription fee refers to both the software maintenance / license AND the hosting of the application. It means the fee also refers to the underlying hardware & (infrastructure) software AND to the operational costs (operation/ monitoring, energy, premises...).

4.2.1 Office, Content and Collaboration

Office Automation includes software like word-processing, data spreadsheet, and/or presentation software;

Content includes Document management, Web content management, Archiving (documents, e-mails, ERP/FI data), Digital asset management, Document-based workflow;

Collaboration includes messaging and groupware systems, platform-independent UC applications and software to enhance and connect VoIP and UC platforms via telephony systems and groupware specialists.

Office Automation	Product / Supplier Examples
Office automation	Microsoft, Corel, iWorks (Apple)

Content	Product / Supplier Examples
Document management / document workflow	Documentum (EMC), FileNet (IBM), Lotus Domino (IBM), Microsoft, W4, Global 360, Savvion, iflow (Fujitsu), OpenText, Docubase, Doc@post, Docuware, etc.
Web content management	Thomson Reuters Phoenix Platform, vBulletin, Adobe Scene7, Adobe CQ, etc.

Collaboration	Product / Supplier Examples
Messaging and groupware systems	Microsoft, Novell, IBM
Platform-independent UC applications	Esnatech, Estos

4.2.2 Horizontal Business Applications (incl. BI)

Horizontal Business Applications includes Accounting & Finance, Supply Chain Management, Distribution & Purchasing, Human Resources Management, CRM / Sales Management / Sales Force Automation, Supplier Relationship Management, Procurement, Product Lifecycle Management, Enterprise Asset Management.

Business Intelligence (BI) includes software tools for reporting, analytical applications, corporate performance management and GRC (Governance, Risk and Compliance); some of the core functions of BI solutions include: Reporting & query, Analysis, Balanced Scorecards, Dashboards, Planning, Budgeting and Forecasting.

Horizontal Business Applications	Product / Supplier Examples
Accounting & finance	SAP, Oracle, Sage, Microsoft, Infor
Human resources management	SAP, Oracle, Sage, Meta4
CRM / sales management / sales force automation	Oracle, SAP
Supplier relationship management, procurement	SAP, Oracle

Business Intelligence (BI)	Product / Supplier Examples
Multi-dimensional analysis, statistics and technical data analysis tools, data mining	Oracle, SAP, SAS, IBM, Microsoft, Informatica, Information Builders, Fair Isaac, Tibco, JasperSoft, Pentaho, SpagoBI, etc.
BI reporting and decisional tools (front-end)	SAS, IBM/Cognos, SAP/BusinessObjects, Oracle/Hyperion

4.2.3 Vertical Business Applications

This includes specific Vertical Business Applications, such as:

- **Manufacturing:** Material Resource Planning (MRP), Quality Mgmt., Manuf. Execution Systems, Supply Chain Mgmt. (SCM), Logistics, Distribution & Purchasing, Product Lifecycle Management (PLM)
- **Banking:** Account Management, Payment Transactions, Credit Management Systems
- **Insurance:** Policy and Product Management, Claims Mgmt., Commissions and Partner Mgmt.
- **Public Sector:** Tax & Revenue Management, Grant Mgmt., Clinical, Patient Mgmt.
- **Telecom/Utilities:** Billing/Metering, Network Maintenance Mgmt.
- **Retail & Wholesale:** Point of Sales, Merchandising, Supply Chain Mgmt. (SCM), Logistics, Distribution & Purchasing
- **Services:** Services Automation
- **Transport:** Booking Systems, Traffic Control Systems, Supply Chain Mgmt. (SCM), Logistics, Distribution & Purchasing

Vertical Business Applications	Product / Supplier Examples
Supply chain management, logistics, distribution & purchasing	SAP, Oracle, Infor Global Solutions, Manhattan Associates, i2
Material resources planning	SAP, Oracle, Infor Global Solutions, QAD
Product lifecycle management	Siemens/UGS, SAP, Dassault, PTC
Process manufacturing	SAP, Aspen Tech
Discrete manufacturing	SAP, Infor Global Solutions, Oracle, QAD
Banking	Sungard, Oracle, S1, FIS, Temenos
Insurance	Misys, Tieto
Healthcare	Siemens Medical, Cerner, McKesson, Allscripts
Government	SAP, Oracle, local players
Telecom	Amdocs (Cramer), Convergys, Oracle (Portal Software), Comverse, HP, LHS
Utilities	SAP, Oracle, local players
Retail & wholesale	SAP, Oracle, Aldata, Wincor Nixdorf, JDA
Transport	Amadeus, local players

4.2.4 Technical Applications

This includes technical and graphical software, incl. CAD, GIS, command control and SCADA (e.g., plant management in manufacturing or utilities, network management in telecom, utilities or transport, C3I in defense...).

Technical Applications	Product / Supplier Examples
CAD / CAM	Dassault, Siemens/UGS, PTC, Autodesk
GIS	Aspen Tech, ESRI
Network control systems	Siemens, ABB, PSI
Visualization and simulation systems	MSC, Thales
Graphical software	Adobe, Quark

4.3 Software as a Service (SaaS)

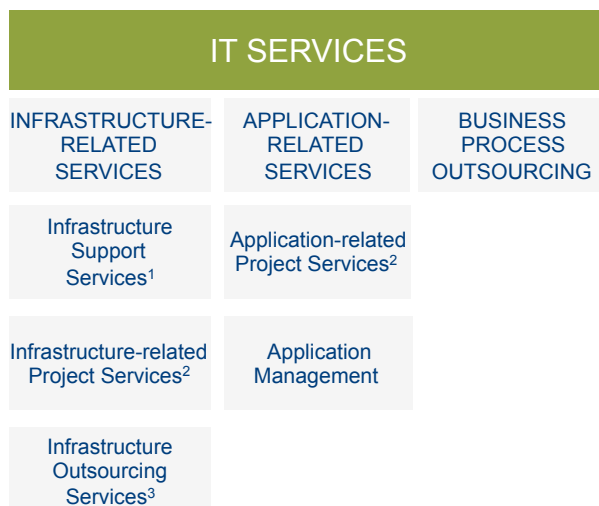
Software as a Service (SaaS) includes Network, System, Storage and Security Management (N3SM), middleware, as well as applications (e.g. business applications, BI, office, content and collaboration, etc.) sold “as a service”.

Important note

- PAC figures for SaaS include the Software part (licenses and maintenance), as well as the hosting part (operation of the solution and related infrastructure) of a SaaS agreement.

SaaS Software	Product / Supplier Examples
N3SM and Middleware	Oracle, IBM, ServiceNow, BMC, CA, HP
Office, content & collaboration	Office365 (Microsoft), Google Apps, BlueKiwi (Atos), IBM
Front office: sales, service and marketing	Salesforce.com, Microsoft CRM, SugarCRM, Oracle CRM on demand, RightNow
Back office: finance, accounting, HR, procurement and SCM	SuccessFactors (SAP), SilkRoad, oneSCM.com (TAKE Solutions)

5. IT SERVICES



¹ Hardware Maintenance; Field Services and Services Desk

² Consulting; System Integration; Training

³ End-user Devices Outsourcing; Server Outsourcing & Hosting

5.1 Infrastructure-related Services

In terms of technology, infrastructure-related services relate to:

- Infrastructure Software & Platforms: Operating Systems, N3SM, Middleware;
- Hardware products and IT equipment.

5.1.1 Infrastructure Support Services

Hardware Maintenance - Repair and support, for all types of hardware (from mainframe to PC) and related system software (proprietary or open systems).

Field Services and Service Desk - Field Services (installation, configuration and roll out of infrastructure, operational support; on customer's site) and (stand alone) Service Desk

Important note

- PAC figures for Infrastructure Support Services do not include maintenance, field services and service desk that are embedded into an outsourcing agreement.

5.1.2 Infrastructure-related Project Services

5.1.2.1 Infrastructure-related Consulting

In terms of services, infrastructure-related IT consulting includes:

- Consulting on the architecture of information systems: all services related to the architecture of equipment, systems, networks, and, more generally, the technological design of information

systems;

- Consulting on the selection/ implementation of technology and technical packages: All services (selection of solutions, design, implementation, benchmarking, evaluation, preliminary studies, audits, etc.) related to the preparation and implementation of Infrastructure Software & Platforms, such as OS, middleware technologies, etc;
- Consulting on technical and miscellaneous project management: services for managing and supporting infrastructure-related projects;
- Also includes infrastructure-related consulting services related to industrial information systems, control/ command/ supervision, simulation, and embedded software in the areas of defense, transport, energy, telecommunications etc.

5.1.2.2 Infrastructure-related SI

SI includes both types of IT services invoiced on a time & material (also known as T&M, contract staff, staff augmentation, body shopping, etc.) basis as well as fixed-time/fixed-price basis.

In terms of services, infrastructure-related system integration includes:

- Assistance regarding the architecture of information systems;
- Assistance in the selection/ implementation of IT equipment, Infrastructure Software & Platforms;
- Deployment and integration of distributed systems (workstations, PCs, LANs);
- Fixed-price support services for computer operations and users;
- Integration of telecom networks and systems;
- Integration of corporate networks and systems;
- Integration/ projects for the design/ development/ deployment of infrastructures;
- Also includes infrastructure-related system integration services related to industrial information systems, control/ command/ supervision, simulation, and embedded software in the areas of defense, transport, energy, telecommunications etc.

5.1.2.3 Infrastructure-related ITT

Infrastructure-related IT training can focus on either end users or IT professionals, and includes two types of delivery:

- Standard infrastructure-related IT training, including all multi-customer seminars;
- Customized infrastructure-related IT training, including on a one-on-one basis.

The infrastructure-related IT training market is broken down into two segments:

- Technical infrastructure-related IT training;
- Professional infrastructure-related IT training.

5.1.3 Infrastructure Outsourcing Services

According to PAC's segmentation, outsourcing is characterized by:

- Long-term contracts (3 to 10 years or even more);
- Often takeover of the outsourcing customer's assets (human resources and/or infrastructure) by the outsourcer;
- Takeover of responsibility by the supplier: performance of defined services, fulfillment of defined service level agreements – not only provision of staff and/or infrastructure;
- Payment: still very often on a fixed-price basis, but modular in order to respond to the changes in customers' requirements. Payment conditions are increasingly variable, e.g. dependent on the degree of utilization (keyword: "outsourcing on demand"). Additionally, the price may also be based on non-IT measurements ("business metrics").

Infrastructure refers to any type of hardware (servers, desktops, storage, printers, ATMs, POS...) and related software (infrastructure software & platforms)

5.1.3.1 End User Devices Outsourcing

In terms of services, this outsourcing segment includes:

- Outsourcing of mostly large PC installations and PC networks, as well of other end user devices; incl. operation, help desk, software distribution, etc.

This also includes the operation of decentralized infrastructure like ATM/ cash dispensers and POS/ point of sales.

5.1.3.2 Server Outsourcing & Hosting

In terms of services, this outsourcing segment includes:

- Outsourcing of the data center (in mainframe environment and/or in client/server environment), most of the time including the transfer of both human resources and infrastructure assets;
- Hosting of an application, including server / mainframe and basic system operation, but excluding application management;
- Web hosting - hosting of a customer's web site
- Managed Services: (Remote) Managed Services for IT on client's premises and/or third-party cloud services
- Legacy & Hosted Private Cloud: Traditional outsourcing/hosting services (legacy or private cloud)
- Public IaaS/PaaS: Resources (infrastructure and/or platform) based on a Cloud architecture are hosted by a provider and made available to several customers ("one-to-many" model) over the Internet.

-

Backup/ disaster recovery services on a stand-alone basis will be booked as Data Center Outsourcing. Managed Security Services on a stand-alone basis will be booked as Hosting. However most often these services are embedded in a more comprehensive outsourcing agreement.

5.2 Application-related Services

In terms of technology, application-related services relate to:

- Application software (custom development or packaged software);
- Any application: office/ collaboration/ ECM, BI, Horizontal Business Applications, Vertical Business Applications, Technical Applications.

5.2.1 Application-related Project Services

5.2.1.1 Process & Application-related Consulting

In terms of services, process & application-related consulting includes:

- Process definition, design, assessment, improvement or re-engineering as well as process/ IT alignment;
- Consulting on the organization of information systems: all preliminary services, such as studies prior to the development and/or implementation of new applications, overhaul of processes and procedures involving information technology, preparation of changes in application systems, etc;
- Consulting on the selection/ implementation of application software and packages: it covers consulting on application software products, such as enterprise resource planning (ERP), customer relationship management (CRM), supply chain management (SCM), human resources management (HRM), point of sales, core banking systems, etc;
- We consider both commercial and administrative processes and related applications, such as ERP, CRM, SCM, HRM, point of sales, core banking systems, as well as technical processes and related applications, such as industrial information systems, control/ command/ supervision (SCADA), simulation, and embedded systems

5.2.1.2 Application-related SI

SI includes both types of IT services invoiced on a time & material (also known as T&M, contract staff, staff augmentation, body shopping, etc.) basis as well as fixed-time/fixed-price basis.

In terms of services, application-related system integration includes:

- Design/ development of customized management information systems or applications;
- Design/ development/ implementation of packaged-based information systems or applications (ERP, CRM, etc.);

- Maintenance of applications (customized or package-based) on time & material contracts;
- Integration projects for customized and package-based applications;
- Also includes application-related system integration services related to industrial information systems, control/ command/ supervision, simulation, and embedded software in the areas of defense, transport, energy, telecommunications etc.

5.2.1.3 Application-related ITT

Application-related IT training can focus on either end users or IT professionals, and includes two types of delivery:

- Standard application-related IT training, including all multi-customer seminars;
- Customized application-related IT training, including on a one-on-one basis.

The application-related IT training market is broken down into two segments:

- Technical application-related IT training;
- Professional application-related IT training.

5.2.2 Application Management

According to PAC's segmentation, Application management (AM) is characterized by:

- The maintenance and enhancement of existing applications (custom development and/or customized software products), sometimes even their initial development
- Long-term (multi-year) contract with a commitment to fulfilling pre-defined service level agreements (SLAs) on a fixed-price basis.
- Often, specialized IT staff is transferred.

Important note

- PAC figures include both "stand alone AM" (dedicated AM contracts) and "embedded AM" (AM embedded in comprehensive outsourcing contracts).

5.3 Business Process Outsourcing (BPO)

According to PAC's segmentation, **Business Process Outsourcing (BPO)** is characterized by:

- The takeover of responsibility for an entire business process (or parts of it)
- The transfer of the specialized administrators besides the related infrastructure and application management.

Important notes

- BPO also includes processing services such as payroll, card or transaction processing.
- PAC only considers processes that are to a significant degree supported by IT (e.g. accounting, human resources, logistics, billing, card processing, etc.).

Process cluster	Process	IT share	To be considered
HR	Payroll	70% - 90%	Yes
	Travel expense accounting	20% - 30%	No
	Recruiting, separation/compensation, training	80% - 90%	Yes
	Benefits administration	80% - 90%	Yes
Sales/ CRM/ billing	Billing/invoicing	70% - 90%	Yes
	Loyalty card processing	80% - 90%	Yes
	Clearing	70% - 80%	Yes
	Call center	20% - 30%	No
	Customer care	30% - 80%	Case by case
Financial accounting	Purchase-to-pay (incl. accounts payable)	80% - 90%	Yes
	Order-to-cash (incl. accounts receivable)	60% - 70%	Yes
	Record-to-report (incl. general ledger, fixed assets, reconciliations, inter-company accounts)	60% - 70%	Yes
	Revenue collections (3rd-party collections)	20% - 30%	No
	Fin. planning and analysis (incl. performance analysis, internal audit, treasury and risk management)	50% - 60%	Yes
Logistics / SCM/ procurement	Procurement (incl. sourcing, catalog management, indirect procurement administration)	60% - 70%	Yes
	Inventory planning & management	80% - 90%	Yes
	Supply chain BPO (incl. order management, transportation management fulfillment, A/R)	20% - 80%	Case by case
	Logistics execution (incl. transport)	10% - 20%	Yes
Document management	Inbound print/ mailing services	70% - 100%	Yes
	Outbound print/ mailing services	70% - 100%	Yes
Financial processing	Check processing	80% - 90%	Yes
	Payment & credit card processing	80% - 90%	Yes
	Transaction processing/ credit & loans & mortgages	60% - 80%	In most cases
	Transaction processing/ securities (excl. bank-to-bank services)	70% - 80%	Yes
	Claims processing	50% - 70%	Case by case
	Policy management	70% - 80%	Yes
Other verticals	R&D	10% - 20%	No (if SW engineering, then ITO!)
	Manufacturing	0% - 10%	No
	E-government	30% - 70%	Case by case
	Road charging	50% - 80%	In most cases
	Billing (for telecoms, utilities)	50% - 90%	Yes
	Information brokerage	10% - 70%	Case by case
	Reservation services (platform, excl. call centers)	50% - 90%	Case by case
	Passenger revenue accounting for airlines	50% - 90%	Yes
	Fleet management	20% - 30%	No
	Facility management, security, catering, cleaning etc.	0% - 20%	No
	Smart metering	60% - 80%	Yes
	Pharmacovigilance	50% - 90%	Yes
	Clinical data management	60% - 90%	Yes

Note: We exclude intra-industry BPO (e.g., bank-to-bank payment operated by a bank for another bank).

6. VERTICAL SECTORS

VERTICAL SECTORS								
Manu- facturing	Banking	Insurance	Public Sector	Telecom	Utilities	Retail & Wholesale	Services & Consumers	Transport

PAC provides market figures for each of the above mentioned nine vertical sectors, for the following 18 IT Expenditure and IT Market segments:

IT EXPENDITURE						
Personnel Expenditure				Miscellaneous Expenditure		
HARDWARE	SOFTWARE & IT SERVICES (SITS)					
	SOFTWARE PRODUCTS			IT SERVICES		
	INFRASTRUCTURE SOFTWARE & PLATFORMS	APPLICATION SOFTWARE PRODUCTS	SOFTWARE AS A SERVICE (SAAS)	INFRASTRUCTURE-RELATED SERVICES	APPLICATION RELATED SERVICES	BUSINESS PROCESS OUTSOURCING
				Infrastructure Support Services ¹	Application-related Project Services ²	
				Infrastructure-related Project Services ²	Application Management	
			Infrastructure Outsourcing Services ³			

¹ Hardware Maintenance; Field Services and Service Desk

² Consulting; System Integration; Training

³ End-user Devices Outsourcing; Server Outsourcing & Hosting

To download an Excel document matching the NACE 2.0 classification with PAC's vertical segmentation, please click [here](#).

Manufacturing

- Automotive & Discrete Manufacturing incl.
 - Aerospace & Defense
 - Electrical Engineering & High Tech
 - Mechanical & Plant Engineering
 - Construction
- Process Manufacturing incl.
 - Metal
 - Chemicals
 - Pharmaceuticals
 - Oil, Gas & Mining
 - Food & Beverages, Tobacco
 - Textile, Paper, Others

Banking

- Retail Banking
- Wholesale/Corporate Banking
- Investment Banking
- Private Banking

Insurance

- Life & Pension
- Property & Casualty

- Private Health
- Reinsurance

Public Sector

- Government (incl. federal, regional, and local administration, education, etc.)
- Health and Social Services (incl. payers and providers)
- Defense

Telecommunications

- Fixed carriers
- Mobile carriers
- Virtual Network Operators (VNO)
- Internet Service Providers

Utilities

- Electricity
- Water
- Gas
- Waste disposal
- Heat

Retail & Wholesale

- Wholesale
- Retail (food)
- Retail (non-food)

Services & Consumers

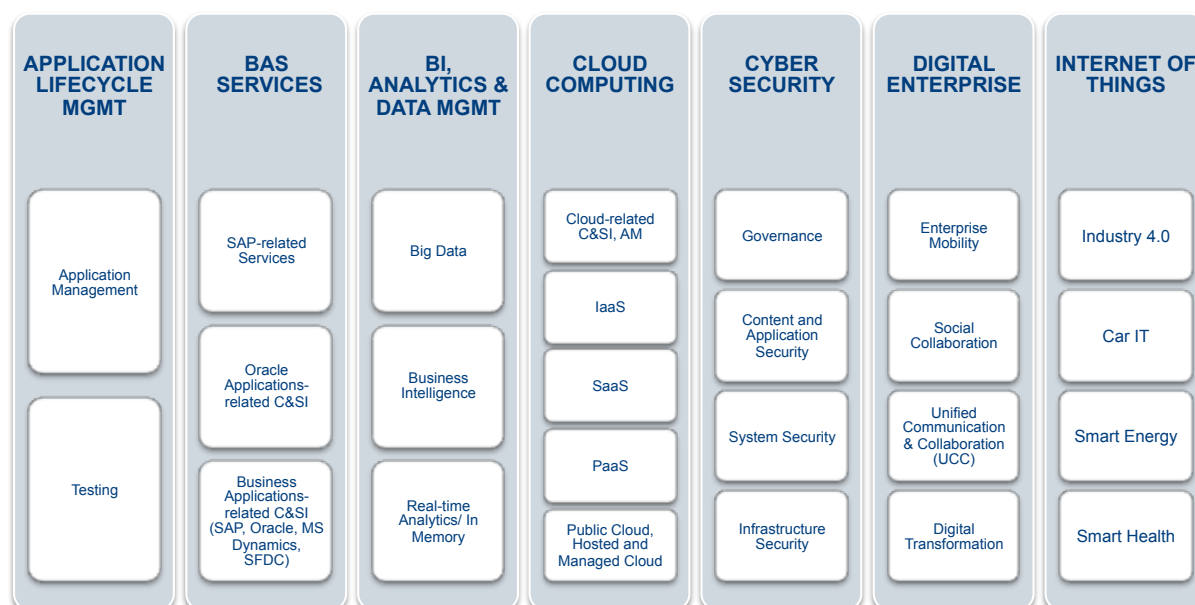
- Media
- Professional Services
- Facility Management
- Tourism

The **Consumers** segment refers to the use of IT in households. It covers individual consumers, usually in a multi-person environment (e.g. a family), with a possibly differentiated use of IT products and services.

Transport

- Rail and Public Transport
- Freight
- Aviation
- Postal Services

7. TOPICS



7.1 Application Lifecycle Management

Application Management (AM)

Application Management (AM) describes the maintenance and enhancement of existing applications (custom development and/or customized software products), sometimes even their initial development, under a long-term (multi-year) contract with a commitment to fulfilling predefined service level agreements (SLAs) on a fixed-price basis.

For this report PAC considers “stand-alone application management” (also “dedicated AM contracts”) as well as “embedded application management” in complete or application outsourcing deals.

Testing

Testing can be performed throughout the application development lifecycle, but in reality is often performed at the conclusion of the development phases, prior to go-live.

Organizations are increasingly aware that in order to deliver truly effective testing, it needs to be considered at the very start of development in order to ensure that the systems is tested in a way that truly meets the business requirements.

As in other areas of the IT services market, buyers are increasingly looking to contract out testing as a separate service ‘tower.’ PAC makes a distinction between testing that is performed as part of a broader externalized application development project (‘embedded testing’), and testing that is delivered by a third party supplier as a discrete service (‘stand alone testing’). This latter area is emerging as the fastest growing area of the testing market as clients look for a best-of-breed service.

7.2 Business Applications Software (BAS)-related Services

Includes Consulting and System Integration (C&SI) revenue related to the implementation, customization, integration and evolution of:

- **Oracle Applications including**
 - Agile
 - ATG Web Commerce
 - Auto Vue
 - Eloqua
 - Endeca
 - Haley
 - Hyperion
 - InQuira
 - JD Edwards
 - MetaSolv Software
 - Oracle CRM on Demand
 - Oracle E-Business Suite
 - Oracle Fusion Applications
 - Phase Forward
 - Portal Software
 - Primavera
 - PeopleSoft
 - RightNow
 - Siebel
 - Taleo
 - iFlex
 - Retek
 - Vitruve
 - WebCenter
- **Microsoft Dynamics including:**
 - Microsoft Dynamics CRM
 - Microsoft Social Listening (Netbreeze)
 - Microsoft Dynamics Marketing
 - Microsoft Dynamics AX (Axapta)
 - Microsoft Dynamics GP (Great Plains)
 - Microsoft Dynamics NAV (Navision)
 - Microsoft Dynamics SL (Solomon Software)
 - Parature
- **SAP including**
 - SAP Business Suite
 - SAP Business All In One
 - SAP Business One
 - SAP Business ByDesign
 - SAP Business Objects
 - SAP InfiniteInsight (KXEN)
 - SuccessFactors
 - Ariba
 - Fieldglass
 - Hybris
 - Camillion
 - JAM
- **Salesforce.com including**
 - Sales Cloud
 - Service Cloud
 - Marketing Cloud
 - Work.com
 - ExactTarget Marketing Cloud
 - Community Cloud
 - Salesforce Chatter

...as well as upcoming acquisitions and brands.

SAP-related Services

Cloud and HANA Segmentation

SaaS-related

Related to the implementation, customization and integration of SAP's SaaS solutions (e.g. SuccessFactors, Ariba, Cloud for Customer, Concur, ByD, etc).

IaaS-related

Related to the migration of on-premise SAP solutions to run in an IaaS model (hosted private and/ or public IaaS)

HANA-related

Related to the implementation, customization and integration of SAP's HANA solutions and platforms.

- **HANA Platform-related:** C&SI Services related to the implementation of the HANA platform and custom development on the HANA platform.
- **HANA Applications-related (SoH & S/4):** C&SI Services related to the implementation of Suite on HANA (SoH) and S/4 HANA (S/4).

Topic Segmentation – SAP Topics

for more details please go to the SAP solution explorer on <http://sap.com>

Financials: Financial and Management Accounting, Financial Supply Chain Management, Treasury Applications, GRC (Governance, Risk, and Compliance).

HCM = Human Capital Management: Workforce Analytics, Talent Management, Workforce Process Management, Workforce Deployment, End-User Service Delivery

CRM = Customer Relationship Management: Marketing, Sales, Service, Partner Channel Management, Interaction Center, Web Channel, Business Communications Management, Real-time Offer Management

SRM = Supplier Relationship Management: Procure To Pay, Catalog Management, Centralized Sourcing, Centralized Contract Management, Supplier Collaboration, Supplier Evaluation"

Analytics: Analytic applications, business intelligence, data warehousing, enterprise information management, enterprise performance management, governance, risk, and compliance

Database & Technology: Application foundation & security, business process management & integration, content and collaboration (portals), database (including Sybase ASE, Sybase Anywhere, Sybase IQ), in-memory computing (Hana), etc.

Mobility: mobile applications, mobile analytics, mobile platform (Sybase unwired platform, Afaria, Sybase 365)

Cloud: SAP's SaaS solutions (Business ByDesign, CRM on demand, SuccessFactors, Ariba, etc.)

ISS Manufacturing: Manufacturing resource planning (production planning, production control, material management), supply chain management, manufacturing execution systems, quality management, dispensing management, recipe management, laboratory information management, dangerous goods management, production data acquisition, batch management, product lifecycle management (life-cycle data management, program and project management, life-cycle collaboration, quality management, enterprise asset management, environment, health and safety), etc.

ISS Banking: Risk control, payment transactions, processing, account management; credit loans, mortgages; securities, corporate finance, insurance, deposits, risk management, treasury management; mobile-, Internet-, self-service banking; branch banking

ISS Insurance: Collection & disbursement, risk management, policy management, product management, claim management, asset management, management of provisionary systems, customer data management.

ISS Utilities: Energy trade, energy data management, billing, supply chain management.

ISS Telecom: billing, network lifecycle management, service fulfillment, supply chain management.

ISS Public: E-government, education, healthcare systems, supply chain management.

ISS Retail: Merchandise management, supply chain management, trade management, risk management.

ISS Services: Project management, supply chain management, partner management, facility management, media systems.

7.3 BI, Analytics & Data Management

Big Data

Defining Big Data

One of the thorniest problems with this market is actually defining it. When does a large dataset become “big data”? Most people indistinctively “know it when they see it” but pinning down a definition is something that the industry has been arguing for over some time.

So, most people plump for some variant of the “three ‘V’s| definition originally suggested about a decade ago in a somewhat different context: i.e. that Big Data is a data se with **Volume**, **Variety** and **Velocity**. Others add a fourth ‘V’. even a fifth, with a number of suggestions for what those should be. PAC believes the best definition uses four ‘V’s, where the fourth characteristic is “**Value**”.

The Volume part of the definition is self-explanatory, although putting a precise figure on it is difficult: Big Data starts with terabytes and stretches up to petabytes – and beyond. What makes it Big Data is the combination with **Variety**, we (and others) are referring to its structure: Big Data problems generally relate to the data with freeform text, photos or other media where the structure is loosely defined and likely to change. **Velocity** means the speed of data generation and thus processing speed – this is particularly an issue with machine-generated data (like commodity trades and prices); but where millions of users are concerned, they also generate large data volumes at high velocity. Often, techniques for pre-filtering and discarding unwanted data without storing unnecessarily large quantities are needed or desirable. And the **Value** characteristic is an essential part of defining the new market. Big Data is all about providing *cost-effective* solutions to big data problems using tools and techniques different from the those that have been developed over the last 20-30 years for analyzing the highly-structured, aggregated and generally numeric data relating to business operations.

So to be more precise, we see the Big Data market as comprising ***“solutions for problems where the volume of data, and its variety OR volume means that they cannot be cost-effectively managed and analyzed with traditional database tools and techniques.”***

Most often, Big Data solutions start with the data storage in non-relational databases, commonly using Apache Hadoop tools, the open source data storage solution derived from work at Yahoo, Google and others. Several alternatives to this approach are also in use, and indeed many of them are more mature, robust and usable by the average nosiness than the Hadoop-based solutions. These often start from a more traditional, but massively parallel database – such as EMC-Greenplum or Teradata’s Aster Data.

Market Segments

We segment the Big Data software market into:

1. data infrastructure that is concerned with collecting, storing and retrieving the data. Many of these are open source tools based around the Hadoop dataset, but increasingly these are

being bundled in commercial offerings alongside storage, integration and other facilities from large and small vendors

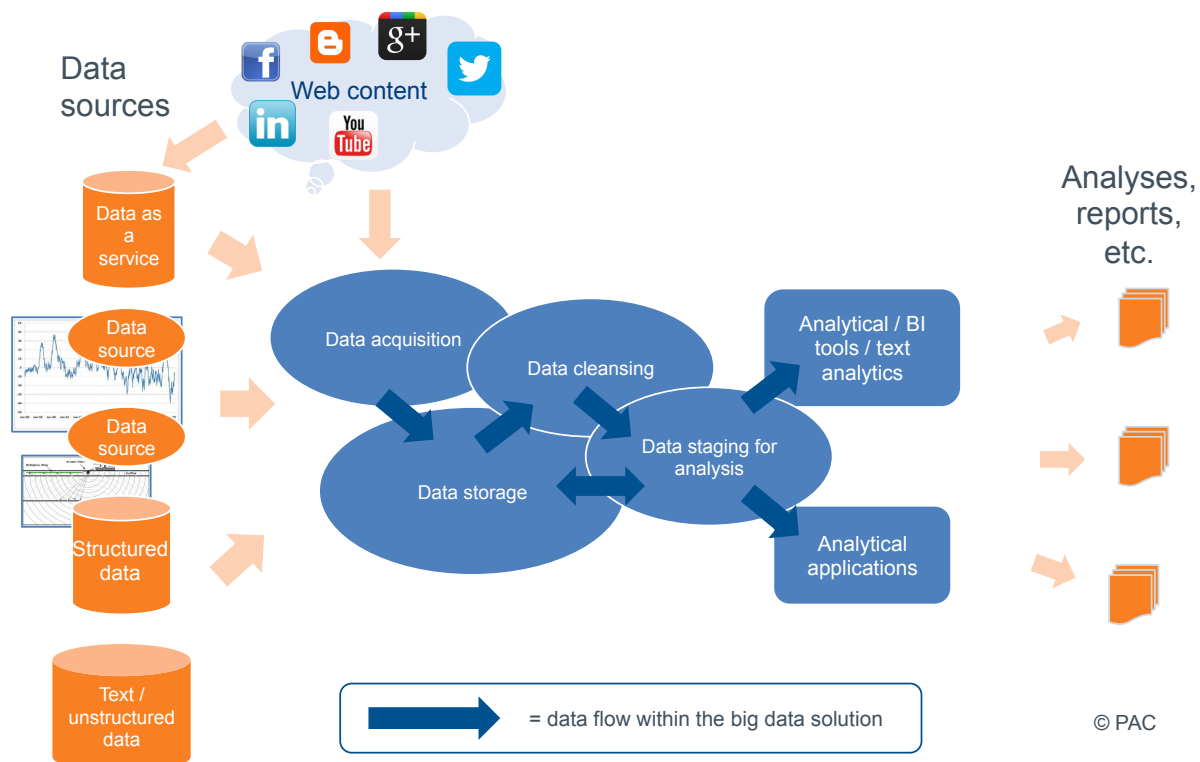
2. applications & analytics – these are the tools to make use of the big data, which range from established business intelligence tools to dedicated applications for retrieving and analyzing data in proprietary social media sets, such as Twitter “firehose”.

Note: we consider Software as a Service (SaaS) in our software figures.

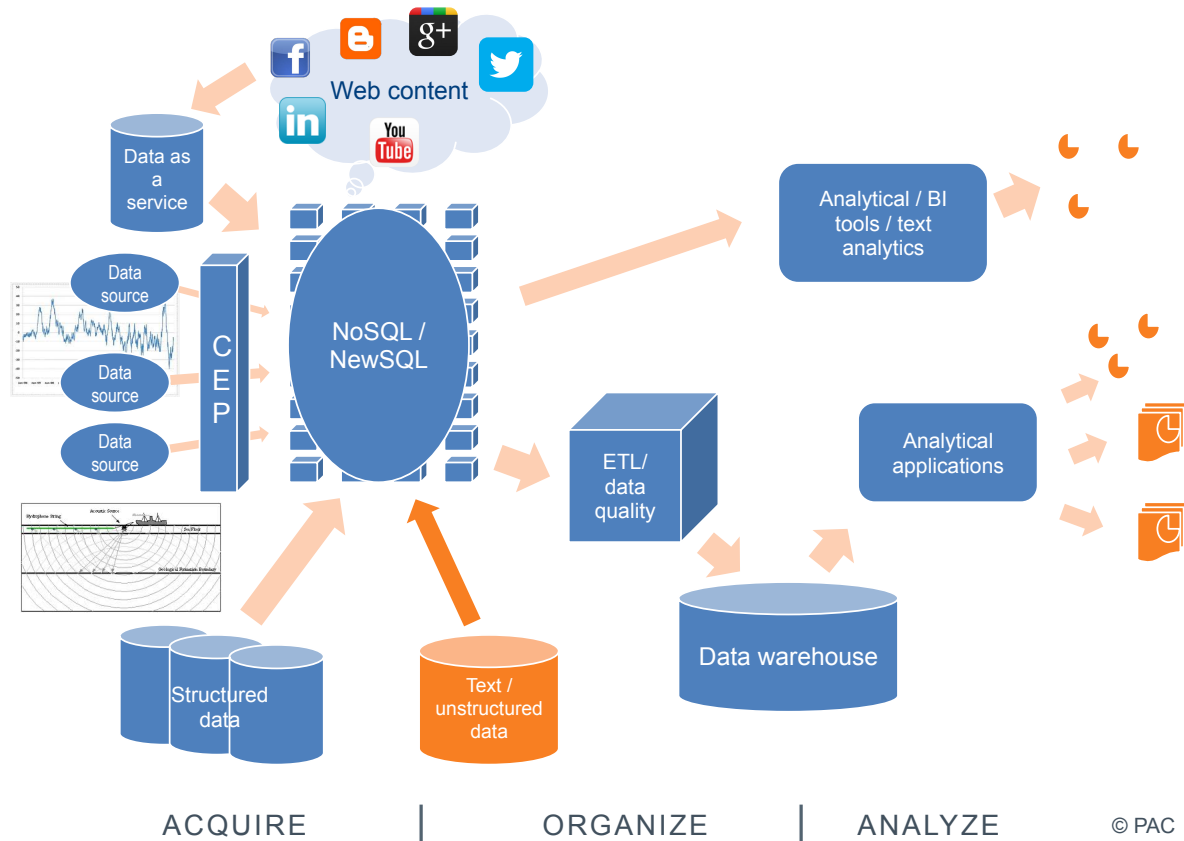
We segment Big Data Services market into:

1. Consulting, Systems Integration, Training and Application Management related to data infrastructure software; it includes services relate to the selection, implementation, customization and integration of standard software as well as to the development, implementation, integration and maintenance of custom software
2. Consulting, System Integration, Training and Application Management related to applications & analytics software; it includes services relate to the selection, implementation, customization and integration of standard software as well as to the development, implementation, integration and maintenance of custom software
3. Hosting and Support: Hosting of Big Data solutions, selection, deployment, integration and maintenance of the related servers and storage.

Big data supplier landscape – functional view



The big data landscape – process view



Business Intelligence (BI)

From the software point of view, BI is a generic term that embraces a large variety of software tools for reporting, analytical applications, corporate performance management and GRC (Governance, Risk and Compliance). In addition, a number of infrastructure components belong to BI, including data management systems (data integration, data quality and data governance), databases and data warehouses.

BI solutions are often offered as part of a BI suite. But, there are many specialized tools available for specific functions, such as reporting or data integration. In addition, many business applications suites include BI functions – also referred to as ‘embedded for BI’. For instance, there is almost no solution for customer relationship management (CRM) that does not include reporting.

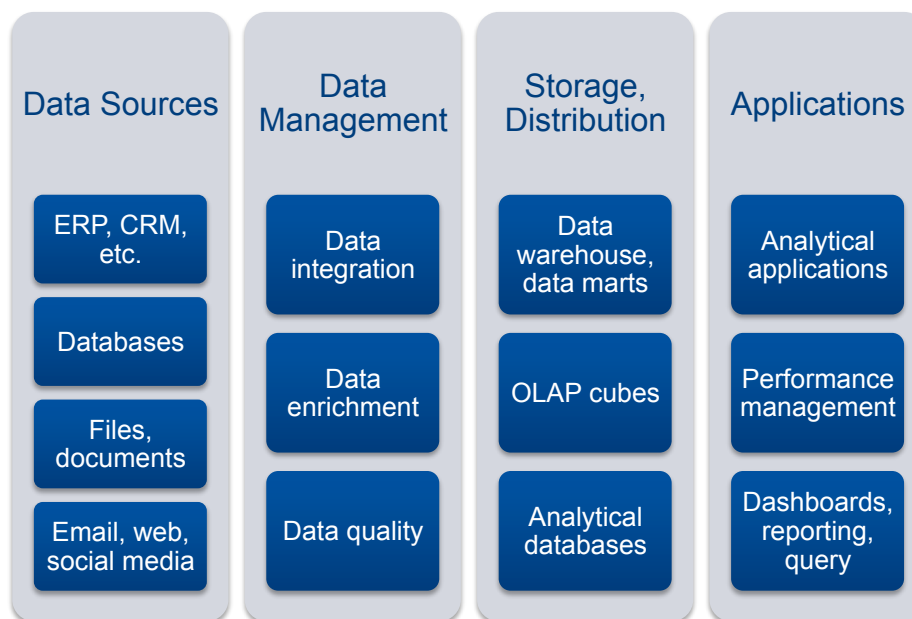
Some of the core functions of BI solutions include:

- Reporting & query
- Analysis
- Balanced Scorecards
- Dashboards
- Planning, Budgeting and Forecasting

More specific feature includes:

- Statistics
- Predictive analysis
- Optimization
- Complex Event Processing
- Text-mining and sentiment analysis

BI key components are:



© PAC

- Data Warehouse (DWH) = Data Warehouse Systems
- Analytical DB = Analytical Databases such as HP Vertica, Teradata, Oracle Exalytics, SAP HANA or IBM Netezza
- Data Management (DM) = Data Integration, Data Quality and Master Data Management
- Reporting = Reporting, Ad-hoc Reporting
- Analysis and Advanced Analysis = Among other things Data Mining, Text Analysis, Predictive Analytics
- Planning & CPM = Planning Systems, CPM, Consolidation, GRC

7.4 Cloud Computing

Cloud computing refers to the operation of a virtualized, automated, and service-oriented IT infrastructure that allows the flexible provision and usage-based invoicing of resources, services, and applications via a network or the internet.

The cloud-computing concept means a way of provisioning and using technology, not a technology in and of itself, i.e. it generally does not refer to a specific technology, but rather to a set of combined technologies and concepts. That is why there are still many different definitions of cloud services in the market.

Moreover, the cloud concept is not entirely new. It rather combines a number of IT trends from the past, such as automation, centralization, shared services, service orientation (SOA), virtualization, and externalization (outsourcing, managed services).

However, cloud computing has particular characteristics that distinguish it from classic IT resource and service provisioning – or that are at least commonly associated with cloud services, even if most of the following characteristics are only 100% true for a few public cloud offerings.

Most existing cloud offerings include the following aspects – to a greater or lesser degree:

- Massive scalability
- Shift of costs from CAPEX to OPEX
- Per usage pricing (per user and/or per volume/transaction)
- No long-term commitments
- Self-service-based (normally realized within public clouds, partly still restricted within private clouds)
- Service-oriented (reusable services are loosely coupled and orchestrated as required)
- Multi-tenant architectures (normally the basis for public clouds, but not always provided within private clouds)
- Virtualized infrastructures
- Rapid provisioning (normally realized within public clouds, partly still restricted within private clouds)
- Shared single instance (not in the sense of one single data center but one application instance/release, centralized support, further development, management, etc.)
- Standardized
- Easy-to-use/easy-to-consume, leveraging B2C concepts (B2C/ B2B convergence)

In this document, cloud services will be considered in a broader sense (i.e. not necessarily multi-tenant), ranging from widely dedicated single-tenant architectures (a dedicated database, middleware, one single application instance) to multi-tenant architectures (a core SaaS model with a shared infrastructure, one single application instance). There are also a multitude of mixed architectures (e.g. a dedicated application instance and database, running on a virtual server).

Private vs. public cloud

In-house private cloud: Implementation and operation of a cloud architecture within a company or organization.

Hosted private cloud: Operation and provision of a cloud architecture by an external provider, specifically for one customer. This cloud model is very close to traditional hosting concepts but based on a cloud architecture. An external provider is in charge of managing and running the customer's private cloud (normally built by the provider in charge of operation). The cloud is basically dedicated ('private') but the provider, nevertheless, has the possibility to share resources like staff or facilities across several customers.

Public cloud: Resources based on a cloud architecture are hosted by a provider and made available to several customers ('one-to-many' model) over the internet.

Managed cloud: Managed services for in-house private clouds, and/or (third-party) public, or hosted private cloud solutions (IaaS, PaaS, or SaaS). The provider typically takes over responsibility for ongoing services around automation, integration, governance, and security, identity and access management (IAM), etc. for one or several cloud solutions (but not for the operation of the cloud solutions themselves in the case of third-party cloud solutions).

Cloud computing services (public cloud and hosted private cloud)

IaaS (infrastructure as a service): This is the basis of the cloud architecture. It is the dynamic provisioning of computing, storage, and network resources. IaaS users, in particular system administrators and IT architects, can access these infrastructure resources as required.

Cloud computing provides access to computational resources, e.g. CPUs. So far, such low-level resources cannot really be exploited on their own so they are typically offered as part of a 'virtualized environment' (not to be confused with PaaS below), e.g. hypervisors. Cloud-computing providers, therefore, typically provide their customers with computing resources (i.e. raw access to resources, unlike PaaS that offers full software stacks to develop and build applications), typically virtualized, in which to execute cloud services and applications. IaaS (infrastructure as a service) offers additional capabilities over a simple computing service.

Data & storage clouds deal with reliable access to data of potentially dynamic size, weighing resource usage against access requirements and/or quality definitions.

PaaS (platform as a service): PaaS is at the top of the IaaS architecture and comprises the middleware and/or development platform, which enables IaaS users, in particular application developers and IT architects, to develop applications within the cloud and/or operate them.

It provides computational resources via a platform upon which applications and services can be developed and hosted. PaaS typically makes use of dedicated APIs to control the behavior of a server-hosting engine that executes and replicates the execution according to user requests (e.g. access rate). As each provider exposes their own API according to the respective key capabilities, applications developed for one specific cloud provider cannot be moved to another cloud host – there are, however, attempts to extend generic programming models with cloud capabilities (e.g. MS Azure).

SaaS (software as a service): SaaS includes Network, System, Storage and Security Management (N3SM), middleware, as well as applications (e.g. business applications, BI, office, content and collaboration, etc.) sold “as a service”.

Note: PAC figures for SaaS include the Software part (licenses and maintenance), as well as the hosting part (operation of the solution and related infrastructure) of a SaaS agreement.

BaaS (business process as a service): BaaS going beyond the traditional IT cloud architecture. Also known as platform-based business process outsourcing (BPO), it offers an externally provisioned service for managing an entire business process, such as claims processing, expense management, or procurement (internet-enabled). Unlike traditional BPO, which often requires the service provider to take over an existing software installation, the ‘process cloud’ uses a SaaS platform to automate highly standardized processes.

It differs from SaaS in that it provides end-to-end process support, covering not just software but also processes supported by people, such as contact centers. These processes are typically priced on a per-transaction rather than per-seat basis.


Cloud-related C&SI

Cloud-related C&SI		
Segment	Cloud deployment	Description
SaaS-related	Total cloud-related C&SI	Implementation (including data migration), customizing, orchestration and integration of SaaS solutions
Infrastructure transformation	Public & hosted private cloud-related	Implementation, orchestration, and integration of IaaS services (public & hosted private)
Infrastructure transformation	In-house private cloud-related	Implementation, orchestration and integration of in-house private cloud infrastructure; including infrastructure deployment
Application transformation	Public & hosted private cloud-related	Migration of on-premise applications (custom software as well as standard software like SAP or Oracle Applications), their implementation, customizing, and integration to run on IaaS services (public & hosted private)
Application transformation	In-house private cloud-related	Migration of on-premise applications (custom software as well as standard software like SAP or Oracle Applications), their implementation, customizing, and integration to run on in-house private cloud infrastructure

7.5 Cyber Security

	Governance		Content and application
	Systems		Infrastructure

Cyber security: broad segmentation of products, technologies and services

Cyber security products/solutions		Sub-segments
	Governance, risk management and compliance	<ul style="list-style-type: none"> Information security management systems SIEMS: Security information and event management
	Identity and access management (system)	<ul style="list-style-type: none"> Electronic access control (identification and authentication), SSO, Tokens systems for ICT hardware, systems and networks
	Data (content) security	<ul style="list-style-type: none"> Encryption, cryptography and digital signature solutions Public key infrastructure solutions Digital rights management solutions Content filtering and anti-spam Data loss/leak prevention, secure data deletion, secure archiving, data recovery solutions
	Applications security	<ul style="list-style-type: none"> Application security, design, coding development and testing
	Infrastructure (network) security	<ul style="list-style-type: none"> System and network security software (firewalls, anti-virus, intrusion detection, tracking and tracing) Terminal security (fixed or mobile) solutions and endpoint hardening solutions Vulnerability scanners Secure communications: email, phone, video-conferencing and messaging systems
	Hardware infrastructure (device/endpoint) security <i>Not considered in our cyber security scope</i>	<ul style="list-style-type: none"> Secure personal portable devices and identity documents Hardware security modules Enrolment and issuance systems (for access control and identity management) Biometrics systems Network cryptologic systems, special casings etc. for IT hardware
Cyber security services		
	Auditing, consulting planning and advisory services	<ul style="list-style-type: none"> Security audit, vulnerability and intrusion testing, and risk and threat assessment Security strategy, planning and management advice Security certification and conformity/compliance assessment Digital forensics: post-event (incident/intrusion) analysis, investigation and proof preservation
	System integration and implementation	<ul style="list-style-type: none"> Security engineering, design and architecture development Implementation and integration, interoperability testing Implementation support (technical assistance/expert support services)
	Management and operations services	<ul style="list-style-type: none"> Operational support (technical assistance/expert support services) Managed security services, security system management and operations Secure outsourcing Continuity and recovery management Trusted third party, e-content and e-reputation services
	Security training	<ul style="list-style-type: none"> IT/cyber security education and training

SITSI Cyber Security segmentation by type of cyber security

Please note that:

- The segmentation is based on products and solutions. Thus services are segmented only by type of services.
- SITSI figures do not include hardware figures for Cyber security.
- C&SI figures do not include services related to the hardware part of Cyber security.

7.6 Digital Enterprise

Enterprise Mobility

In PAC's definition, enterprise mobility includes all technology solutions used to optimize internal and external business processes including communication and collaboration, as well as to provide customer-facing mobile applications. In the market analysis at hand, we considered software, project services, outsourcing as well as hardware related to enterprise mobility solutions.

We do not consider market segments and revenues related to mobile network provisioning, connectivity, and mobile voice and data access services.

The enterprise mobility market as defined by PAC includes:

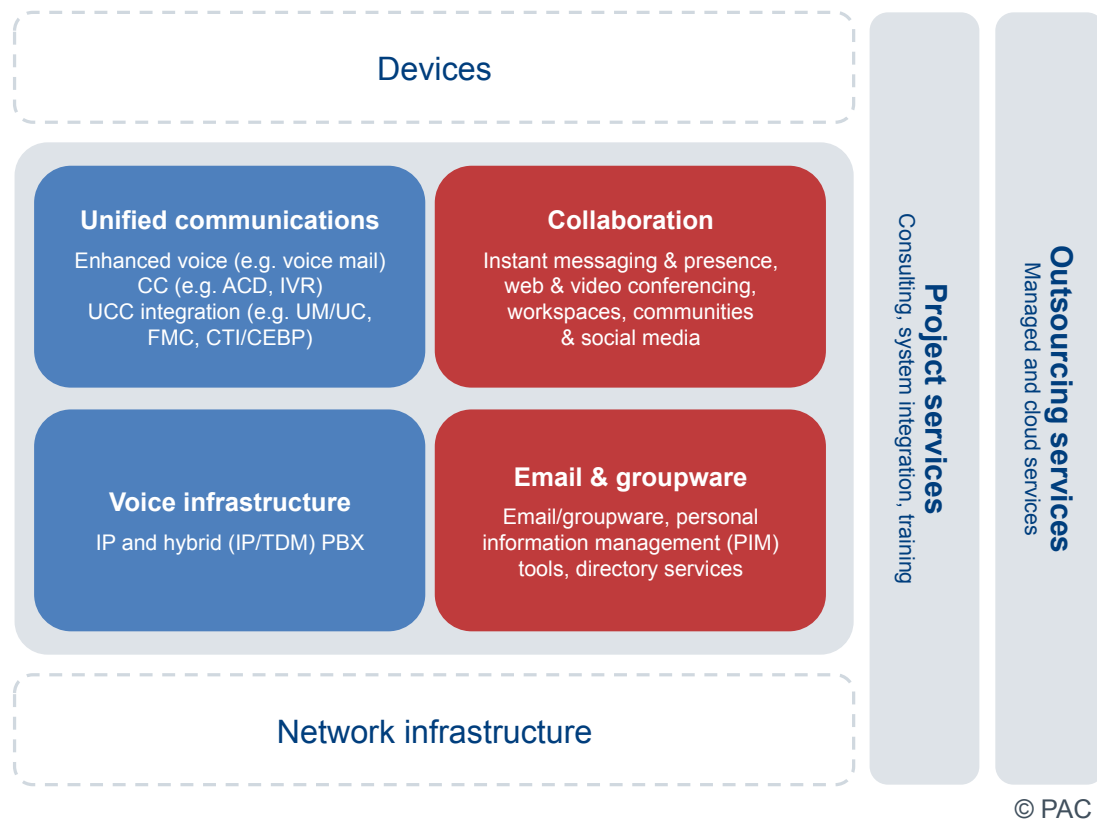
- Mobile enterprise process applications: e.g. mobile ERP, CRM, SCM or BI, including mobile app development, provisioning and integration platforms and technologies with respective building blocks, middleware and security components.
- Mobile customer-facing applications: i.e. the development and provisioning of mobile customer apps (e.g. mobile commerce, payment, marketing, customer interaction etc.), including mobile app development, provisioning and integration platforms and technologies with respective building blocks, middleware and security components.
- Mobile device, application and content management (also Enterprise Mobility or Unified Endpoint Management): including middleware for remote management and security of mobile devices, and applications and content, including respective assets and security management functions needed for a unified endpoint management.

Unified Communications & Collaboration (UCC)

Generally, UCC software, project services and outsourcing as defined by PAC refer to the following technology segments:

- Voice infrastructure, including:
 - IP PBX and
 - Hybrid IP/TDM PBX
- Unified communication, including
 - Enhanced voice applications (e.g. audio conferencing, softphones)
 - Contact center applications (e.g. ACD, IVR)
 - UCC integration (e.g. UC/UM server; CTI, FMC, integration, multi-directory services)
- E-mail & groupware infrastructure, including
 - E-mail/groupware server and clients, including mobile mail access
 - Personal information management (PIM) tools (e.g. calendar)
 - Directory Services
- Collaboration tools and applications, including
 - Instant messaging and presence (online)
 - Web and videoconferencing

- Workspaces, communities and social media (e.g. portals for document sharing, wikis and [micro]blogs)



Digital Customer Experience

Digital Customer Experience Segmentation	
1. Software Products (topic view)	
1.1. Digital Content & Applications	Development & delivery platforms Website development platforms Cloud & Mobile Apps Development platforms WCM (web content management) solutions Product Information Management (PIM) – Catalog Management Digital / Media asset management solutions (MAM)
1.2. Digital Sales & Commerce	Multi-channel commerce platforms & suites (Social, mobile, web, POS) Omni-channel commerce platforms & suites (web, mobile, social, POS) Order Management & fulfillment solutions, digital payment solutions Analytics and reporting related to sales & commerce

1.3. Digital Marketing	Digital marketing platforms & suites Digital marketing platforms & suites Multi-channel campaign management Marketing automation & marketing process management Social media analytics, customer & marketing analytics
1.4. Digital Customer Experience & Service	Customer experience platforms & suites Customer experience platforms & suites Social customer experience Multi-channel contact center & customer service Customer portals & community management solutions
2. Services (topic view)	
2.1. Digital Content & Applications	Services related to development & delivery platforms
2.2. Digital Sales & Commerce	Services related to multi-channel commerce platforms & suites (social media, mobile, web, POS)
2.3. Digital Marketing	Services related to digital marketing platforms & suites
2.4. Digital Customer Experience & Service	Services related to customer experience platforms & suites
3. Services (services view)	
3.1. Digital Consulting	Technology and business consulting related to digital projects Digital strategy consulting Digital technology consulting Organizational transformation
3.2. Digital Technology Implementation	Technology sourcing or development and implementation related to digital projects Technology selection Solutions design and development Front office implementation
3.3. Digital Technology Integration	Integration with existing systems of technologies related to digital projects Backend integration of marketing and commerce platforms Data integration Content management integration
3.4. Digital Operations & Management	Operations and management of digital infrastructure and applications Digital solutions hosting & managed services Infrastructure support services & application management Business process outsourcing

7.7 Internet of Things

Industrial IoT

Usage of IoT-related technologies in order to increase the efficiency and quality of manufacturing production processes

Includes the following use cases:

Use case	Description
Predictive maintenance	Predictive maintenance comprises the entry, processing, and storage of machine and device data to predict downtimes, identify quality and process-related issues, and control maintenance and repair work in a cost-optimized way.
Cloud-based control technology	Centralized & scalable computing power for connected industrial machines & shop floor management.
Optimized machine set up	Location-based service in order to enable just-in-time provision of production means
Advanced personnel planning in production	Self-service personnel planning with mobile devices

Use case	Description
Flexible assembly lines	Components and machines act autonomously in the production line; enabling a flexible organization of production processes for each product
Remote machine management	Remote machine management by manufacturer; machinery remains asset of manufacturer; customers acquire machinery service
Augmented reality-based field services	Support of field service staff by intelligent devices (e.g. wearables) and augmented-reality technologies in order to enable maintenance and repair tasks for all types of equipment regardless of staff qualification
Advanced documentation for quality assurance	Gesture/voice-based documentation technologies for quality control processes

Connected Car

Integration of information technology, computing resources and external, data-based services in vehicles (private, commercial)

Includes, among others, the following use cases:

Use case	Description
Infotainment	Entertainment and office functionalities provided over-the-air in the vehicle
Remote access	External access to basic car management functionalities (lock, window, heater) by mobile device
Concierge	Vehicle reacts on voice-based commands from driver and performs basic services, such as reservations, info, search
Health monitoring	Monitoring of driver & vehicle condition in order to prevent critical traffic situations & vehicle breakdowns

Use case	Description
Car-to-X communication	Communication of vehicles with environment (other vehicles, third parties) for distance control, breaking support, exchange of traffic information
Connected ADAS	Advanced warning systems, information exchange on infrastructure conditions, live HD mapping
Pay-as-you-drive	Car insurance programs that can be booked ad hoc and remain valid only whilst driving
Autonomous driving	Vehicles driving autonomously without human interaction

Smart Energy

Usage of embedded systems and artificial network utilization analytics in order to develop an efficient end-to-end energy management system

Includes, among others, the following use cases:

Use case	Description
Load forecasting	Calculation models in order to determine energy load forecasting, and to determine usage based on weather conditions
Smart metering	Energy management as a service for industrial customers and public organizations

Use case	Description
Smart home	Intelligent and remote energy management for private households
Smart grids	Provision, management and operation of intelligent energy grids that balance energy usage over time and space (cross-border)

Smart Healthcare

Usage of IoT-related technologies in order to make healthcare equipment, devices, facilities and processes more accurate, reliable and efficient for medical and private users

Includes, among others, the following use cases:

Use case	Description
Telemedicine	Connecting entities in medical processes (such as patients, doctors, laboratories, etc.); exchange of medical data and video-based consultancy/collaboration
Personal health	Wearable devices that collect personal health data and enable monitoring of health status/improvement process

Use case	Description
Smart medical devices	Medical devices (in-body, out-of-body) equipped with intelligence & communication technology in order to enable remote control and autonomous reaction on health conditions
Home assisted living	Private homes equipped with sensors and communication technology in order to monitor emergency situations

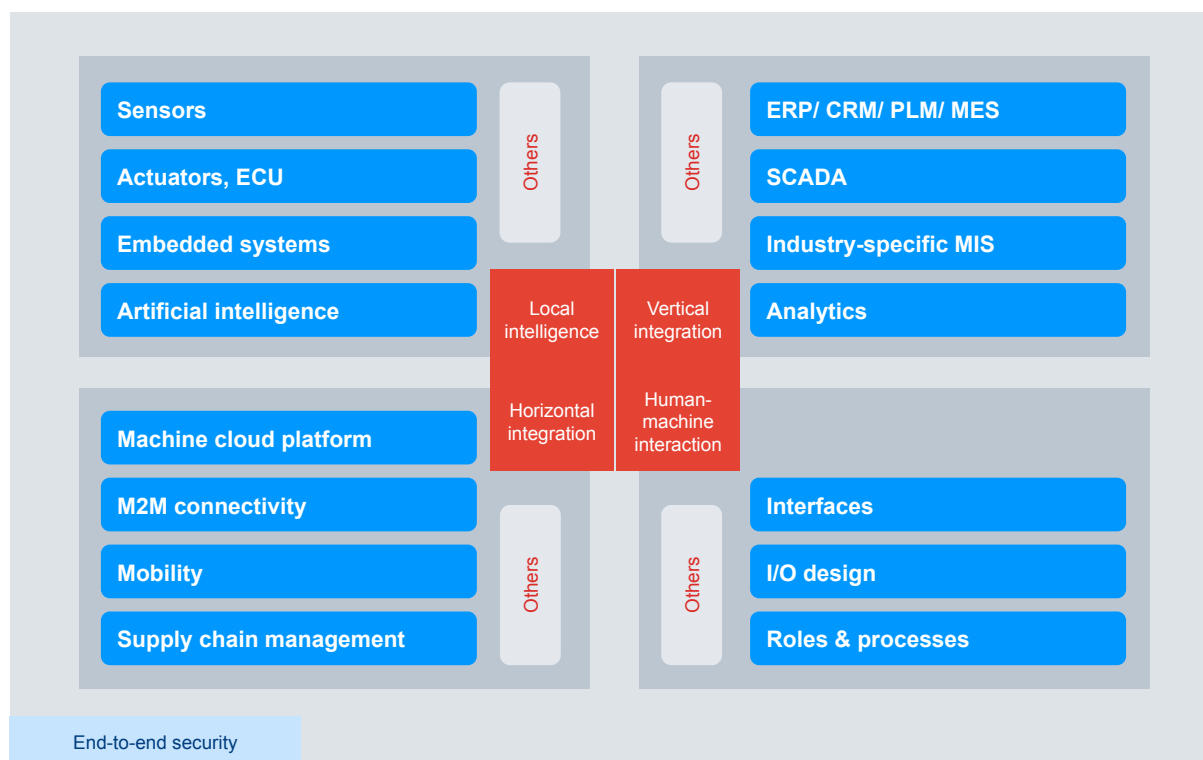
Others

The Internet of Things enables further markets and use cases in other industries such as manufacturing, banking, the public sector, telecom, retail, professional services and transportation. PAC summarizes these use cases under "Others".

Includes, among others, the following use cases:

Sector	Use case
Manufacturing	Smart farming
Manufacturing	Intelligent products & services
Manufacturing	Smart escalators
Manufacturing	Robotics
Banking	Bank of Things
Public sector	Smart city
Public sector	Infrastructure management
Telecom	Telecom grid management

Sector	Use case
Retail	Dash-based shopping
Retail	RFID-based services
Retail	Smart shelves
Professional services	Location-based services
Transport	Vehicle condition monitoring
Transport	Fleet management
Transport	Smart warehouses
Transport	Smart public transportation



Local intelligence

Activities around enabling data capturing, processing and response on local device (things)				
Technology	Description	Hardware	Software	Services
Sensors	Sensors for temperature, pressure, humidity, gas, acceleration, gravity, vibration, sound, electrical fields, GPS	Physical sensors (analog, digital)	Virtual sensors	Infrastructure services
Actuators & chips	Electronic components, integrated circuits or monolithic integrated circuits on small plates of semiconductor material ("chips"), being able to receive and act based on information and commands.	Actuators, integrated circuits (IC), microprocessors, storage, microcontrollers	Software on chip	Infrastructure services
Embedded systems	An embedded computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing requirements.	Chipsets, control units	OS, middleware, tools	Application services, infrastructure services
Artificial intelligence	Artificial intelligence (AI) is the intelligence exhibited by machines or software.	Industrial PCs, IT hardware, appliances	OS, middleware, tools	Application services, infrastructure services

Vertical integration

Activities around connecting intelligent devices to the vertical IT layer (commercial, technical IT back-end systems) within a company; enabling back-end systems to understand machine data				
Technology	Description	Hardware	Software	Services
ERP/ CRM/ PLM	Extending existing ERP/ CRM/ PLM systems or developing new solutions in order to read, store and process machine data within corporate business processes	IT hardware (server, storage, network)	ERP/ CRM/ PLM applications	Application services, infrastructure services
MES	Extending existing MES systems or developing new solutions in order to read, store and process machine data and make this data available for business decisions	IT hardware (server, storage, network)	MES applications	Application services, infrastructure services
SCADA	Custom-specific solutions for automating industrial production processes, energy production and distribution, medical backend systems and transportation	Industrial PCs, IT hardware, appliances	OS, middleware, tools, platforms, horizontal/ vertical business apps	Application services, infrastructure services
Industry-specific MIS	Industry-specific management information systems for dedicated purposes, such as hospital information systems or value-added services (Connected Car)	IT hardware (server, storage, network)	Horizontal business applications/ BI	Application services, infrastructure services
Analytics	Aggregating, storing and analyzing data (from machines, humans, other systems) in order to gain business insights	IT hardware (server, storage, network)	Horizontal business applications/ BI	Application services, infrastructure services

Horizontal integration

Activities around the horizontal integration of local (intelligent) devices and back-end systems within one or multiple organizations				
Technology	Description	Hardware	Software	Services
Machine cloud platform	Providing a cloud-based infrastructure platform between sensors/ embedded systems and back-end systems for connectivity, data integration and storage	IT hardware (server, storage, network)	Virtualization engines & environment, cloud/laaS platforms	Cloud integration, operation
M2M connectivity	Focus on machine-to-machine: connectivity enablement, operation, SIM card integration	IT hardware (server, storage, network), telecom hardware	OS, middleware, tools, platforms	Application services, infrastructure services, telecom service
Mobility	Focus on human-to-machine (or human-to-human): mobile workplace, mobile processes (apps), mobile device & apps management	IT hardware (server, storage, network), telecom hardware	OS, middleware, tools, platforms, mobile business apps	Application services, infrastructure services
SCM	Connecting IT systems/ processes across different stakeholders within a horizontal supply chain including sourcing and trade processes	Industrial PCs, IT hardware, appliances	OS, middleware, tools, platforms, horizontal/ vertical business apps	Application services, infrastructure services
Service integration	IT service/ engineering service orchestration & management including partner management and supplier orchestration	IT hardware (server, storage, network)	OS, middleware, tools, platforms	Application services, infrastructure services

Human-machine interaction

Activities around the definition and development of new human-machine interfaces & interactions				
Technology	Description	Hardware	Software	Services
Interfaces	Design and implementation of human machine interfaces; machine data extraction interfaces	Panels, exchange interfaces	OS, middleware, tools, platforms	Consulting & systems integration
I/O design	Design of new I/O concepts (e.g. augmented reality, cognitive control)	n/a	Tools, platforms	Consulting & systems integration
Roles & processes	Design and implementation of new business processes around IoT technologies / the adjustment of existing business processes to new IoT-based opportunities	n/a	Tools, platforms, applications	Consulting, training

Security

Providing end-to-end security measures for IoT use cases				
Technology	Description	Hardware	Software	Services
Data (content) security	Security measures including encryption, cryptography and digital signature solutions, public key infrastructure solutions, digital rights management solutions, content filtering and anti-spam, data loss/leak prevention, secure data deletion, secure archiving as well as data recovery solutions	IT hardware (server, storage, network)	Middleware, tools, platforms	Application services, infrastructure services
Applications security	Includes application security design, coding development and testing	IT hardware (server, storage, network)	Middleware, tools, platforms	Application services
Infrastructure (network) security	Includes system and network security software (firewalls, antivirus, intrusion detection, tracking and tracing), terminal security (fixed or mobile) solutions and endpoint hardening solutions, vulnerability scanners as well as secure communications: email, phone, video conferencing and messaging systems	IT hardware (server, storage, network), telecom hardware	OS, Middleware, tools, platforms, applications	Application services, infrastructure services

Internet of Things – market segments

IT EXPENDITURE						
Personnel Expenditure		Hardware Expenditure		SITS Expenditure		Miscellaneous Expenditure
IT MARKET						
HARDWARE	SOFTWARE & IT SERVICES (SITS)					
	SOFTWARE PRODUCTS			IT SERVICES		
	INFRASTRUCTURE SOFTWARE & PLATFORMS	APPLICATION SOFTWARE PRODUCTS	SAAS SOFTWARE	INFRASTRUCTURE-RELATED SERVICES	APPLICATION RELATED SERVICES	BUSINESS PROCESS OUTSOURCING
	Operating Systems	Office & Collaboration		Infrastructure Support Services ¹	Application-related Project Services ²	
	Network, System and Storage Management	Enterprise Content Management		Infrastructure Related Project Services ²	Application Management	
	Security	Business Intelligence				
	Middleware	Horizontal Business Applications		Infrastructure Outsourcing Services ³		
	Vertical Business Applications					
	Technical Applications					

¹ Hardware Maintenance; Field Services, Service Desk

² Consulting; System Integration

³ End-user Devices Outsourcing; Server Outsourcing & Hosting

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Please note: IoT is not part of greyed-out market segments.

8. ABOUT PAC

About Pierre Audoin Consultants (PAC)

Founded in 1976, Pierre Audoin Consultants (PAC) is part of CXP Group, the leading independent European research and consulting firm for the software, IT services and digital transformation industry.

CXP Group offers its customers comprehensive support services for the evaluation, selection and optimization of their software solutions and for the evaluation and selection of IT services providers, and accompanies them in optimizing their sourcing and investment strategies. As such, CXP Group supports ICT decision makers in their digital transformation journey.

Further, CXP Group assists software and IT services providers in optimizing their strategies and go-to-market approaches with quantitative and qualitative analyses as well as consulting services. Public organizations and institutions equally base the development of their IT policies on our reports.

Capitalizing on 40 years of experience, based in 8 countries (with 17 offices worldwide) and with 140 employees, CXP Group provides its expertise every year to more than 1,500 ICT decision makers and the operational divisions of large enterprises as well as mid-market companies and their providers. CXP Group consists of three branches: Le CXP, BARC (Business Application Research Center) and Pierre Audoin Consultants (PAC).

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