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Cloud Strategy Development for Medium and Small Business

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***Abstract* – The authors, within the present research, aim at making more extensive use of ICT by developing a cloud service strategy that will contribute to the dissemination of knowledge and help in deployment. Companies will be able to assess their readiness to implement cloud services, explore the approaches, benefits and disadvantages of cloud services. Cloud services are a solution to most SMEs, regardless of size, activity or existing ICT infrastructure. Smaller companies can implement SaaS-type solutions, but companies with advanced ICT infrastructure can focus on IaaS and PaaS-type solutions.**

***Keywords* – Capability maturity model, change management, computer network virtualization, platform virtualization.**

I. Introduction

The study has been conducted during the COVID-19 pandemic and an emergency state has been declared. The state of emergency applies to all organisations and institutions, so it is required to keep social distancing and preferably stay at home. People are forced to withdraw from services provided by companies, and this situation affects economy and the existence of companies. The above factors have led to an increased need for the deployment of information and communication technologies (hereinafter – ICT) to continue providing services. In this context, companies must be able to work remotely and provide services electronically through the global web. E-commerce and remote operation require adequate infrastructure so it should ensure all functional and non-functional requirements for different tasks, including the establishment of communication, the registration and processing of services or orders, in parallel ensuring safety, accessibility, ease of use and automation. Cloud strategy contains assessment of current situation and provides improvement plan.

II. Analysis of an Existing Situation

Scientific articles forecast widespread use of the Internet [1]. Newer technologies, including cloud services, can be used to perform different tasks, depending on the context and considering diversity of business areas so there is no single *one-fits-all* solution. Needs may vary from size, type of activity, industry, and other factors.

Latvian small and medium enterprises (hereinafter – SME) use 20 % less cloud computing services than large companies (see Table I). This trend is also observed in the reports of the European institutions. Quote from [2]: "The Latvian business sector is still lagging behind the EU average, not only in terms of digital technology integration, but also in terms of human capital. Almost half of the population still lacks basic digital skills and the number of ICT professionals prepared is lagging behind the growing demand in the labour market."

TABLE I
Cloud Computing Usage by Company Size

Enterprises using cloud computing services (as % of the total number of enterprises in the corresponding group) [3]	Cloud computing services	Paid cloud computing services
.. with a number of employees of 10–49	21.9	12.7
.. with a number of employees of 50–249	30.1	20.9
.. with a number of employees of 250 or more	50.5	38.5

In the light of the results outlined above, the authors conclude that the subject of the study is justified. The strategy will be addressed to SMEs in order to promote wider uptake of ICT and raising the knowledge levels for these entrepreneurs.

III. Assessing SME Readiness for Cloud Services

The development of the strategy requires an exploration of an existing SME IT infrastructure. Companies in this group work in a wide variety of sectors, ranging from retail, accommodation or catering services to the electricity, gas, heating and air-conditioning sectors; therefore, the development of overall characteristics is not a trivial task. In order to carry out this task, it is necessary to assess the undertakings in the above sector and to process as much information as possible. Referring to [4], small businesses buy fewer materials and services, and this also covered ICT. With fewer people, the number of decision-makers is declining, and everything depends on a certain level of knowledge of the head of the company [5]. Small businesses have fewer financial resources [6]. Factors influencing the views of businesses in ICT deployment are summarised in Table II. Non-motivating factors become stronger with a reduction in the number of company employees.

The impact of the crisis has narrowed the possibility of obtaining the necessary information or conducting surveys, so the database of the Central Statistical Bureau of Latvia has been chosen as the main source of information. A total of 28 reports have been prepared and used for overview creation and analysis.

TABLE II
FACTORS AFFECTING ICT DEPLOYMENT

Opinion	**Motivating**	**Non-motivating**
Infrastructure and its components are ageing and require renewal		x
The transfer of ICT support functions to the external service provider contributes to the dependency on the external service provider		x
Preference for ICT processes that improve efficiency and increase returns than add value to existing processes		x
Companies introduce ICT motivated by mandatory national requirements	x	
Owners and managers do not have the expertise to understand the potential benefits of ICT investment		x
Lack of information on support mechanisms from national and regional authorities		x
Not enough knowledge and time for ICT assessment		x
Not enough knowledge and time for ICT deployment		x
Insufficient free financial resources		x
If owners and managers are not involved and there is no understanding of ICT for the company, the professional competencies of external consultants have a high impact/importance		x
Traditional ICT service management processes are based on a standardised and ad-hoc approach		x
Outsourcing providers cannot provide full support for ICT infrastructure because they are familiar with one specialised service		x
High implementation costs		x
Disproportionate return requirements		x
Fear of potential disclosure of business secrets		x
Restrictions on existing ICT solutions		x
Purchased applications are ageing and do not introduce new functions and do not support compatibility with other solutions		x
Improved operational efficiency	x	
Improved customer service	x	
Competition with other companies	x	
Improving employee satisfaction	x	
Improving communication with suppliers	x	
Promoting cooperation in companies	x	
Customer-requested services	x	
The nature of the business is linked to the use of ICT	x	
Changes in industry contribute to the need to implement ICT	x	
ICT outsourcing providers and cloud solutions offer a chance to try prepayment	x	
Global digitization contributes to communication and availability through the Internet	x	
Companies with advanced maturity and Internet presence are better prepared for the implementation and development of new processes	x	
Reducing ICT costs	x	
Improved service range and quality	x	
Decreased service delivery time	x	
ICT provides opportunities to find suppliers	x	
Gaining insight through ICT solutions	x	

Based on the report analysis and the above findings, different levels of infrastructure complexity can be identified. In order to address the recommendations for improvement and ICT deployment, it is necessary to merge companies into sub-groups with similar infrastructure.

2.1. ICT by Size

ICT is applied more along with an increase in the number of physical devices in the company. Enterprise devices and their operating systems, applications and application platforms, as well as a network that combines all infrastructure in one must be maintained, secured and backed up.

Large business structures tend to be complex, and training of young employees to carry out job responsibilities involves the presence and maintenance of training materials. Apart from training materials, the undertaking must ensure the circulation of working instructions, internal documents and financial reports.

An analysis of company size indicates that there is a relationship between the size of the company and IT infrastructure, but it is not obvious. It is not possible to identify a set of solutions that are specific to company by matter of size.

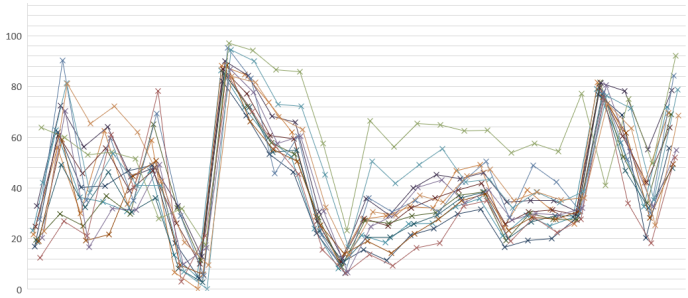

Fig. 1. ICT adoption by industry. Each line represents industry and enterprises using specific ICT (as % of the total number of enterprises in the corresponding group). ICT used in the analysis is the ICT listed by the Central Statistical Bureau of Latvia [3].

IV. ICT BY INDUSTRY

Report analysis allows concluding that, regardless of the sector, businesses use ICT. The aggregated data on industries and technologies are available in Fig. 1. Intersection and concentration of curves mean a similar percentage distribution.

The study shows that universal use is limited to the Internet, e-mail and office software, but common trends are only observed for companies in "old" industries. These companies are subject to national regulatory rules. Other SMEs do not use strategic or tactical management applications [7]. Similar results are also shown by central statistical management data (see Fig. 1).

An analysis of the business sector leads to the conclusion that the relationship between the sector and the technologies applied is not apparent. To address problems and offer cloud solutions, it is necessary to divide companies into groups with similar infrastructure. The authors propose classifying companies according to the infrastructure elements applied.

A. Infrastructure Building Blocks

With the increase in the number of employees, the number and complexity of technological solutions contributing to the expansion of infrastructure also increase. Infrastructure is all the hardware, software, networks, equipment, etc. needed to develop, shift, monitor, control or support IT services (ITILv3). The infrastructure is hidden from end users, a technological infrastructure covers the invisible protocol, network and programs that combine the enterprise's computing capabilities and provide efficient data flows (Technology Governance Board Definition of Information Technology Infrastructure). The infrastructure components are compiled in the form of a dime approach from EA building practices and listed in Table III. In the cloud, it is possible to deploy previously mentioned infrastructure components with some restrictions [8].

TABLE III
ICT INFRASTRUCTURE [13], [14], [15]

Business process and information	Software	Application platform	Infrastructure
Basic business functions Profit-making processes and functions Support functions and processes needed to provide basic business processes For example, accounting, business planning, personnel management, customer support	Typical apps used on computers. For example, a web browser, word processing programs. Applications hosted on servers, and most of the companies use them. For example, e-mail apps, portals, collaboration tools. Business-specific applications are apps that are tailored specifically. For example, Customer Relationship Management Programs (CRM), Enterprise Resource Planning (ERP).	Front-end servers are usually web servers. Enable interaction with applications by presenting application screens in web browsers. For example, an Apache HTTP server, Microsoft Information Services – IIS. Application servers act as containers running an actual program. For example, Java or .NET servers for application systems. WebSphere, Apache Tomcat, Red Hat JBoss. Connection servers. Include FTP servers, ETL, ESB. For example, MS BizTalk, TIBCO service bus, IBM MQ, SAP NetWeaver PI. Databases, also known as database management systems (DBMS), allow storing and retrieving structured data. For example, Oracle RDBMS, IBM DB2, MS SQL Server, Postgree, MySQL.	End-user devices used by users to work with applications. For example, PCs, laptops, thin customers, mobile devices and printers. Operator systems are a set of programs that manage the internal operation of a computer: its memory, processors, devices, and file system. Computing capabilities are physical and virtual computers in a data centre called servers. Storage is a system where data are stored. For example, hard drives, tapes, direct-attached storage (DAS), networked storage (NAS) and storage area networks (SAN). Networking connects all components. This block will include routers, switches, firewalls, WAN, LAN, VPN, network applications. Data centres are places where most infrastructure hardware is housed. These include equipment such as UPS, heating, ventilation and air conditioning (HVAC).

V. CLOUD SERVICES

The main motivation for the use of cloud services is efficient costs, more efficient memory use, scalability, resistance to errors, data security, frugal management, mobility, emergency recovery, control, and competitiveness [9], [10]. Research shows that SMEs are the most suited for SaaS cloud services with a public cloud. Of course, before the implementation, changes to the software and network structure are required [11].

The SaaS concept provides independent functioning of software and components that can be identically achieved with service-oriented architecture and micro-service architecture [12]. Research shows that SaaS is more reliable in terms of security than locally deployed infrastructure [9]. The advantages and disadvantages of SaaS and the use of ERP systems for SMEs are described in [9].The company may choose software and migrate it to the cloud (SaaS), but if the developer does not foresee such functionality, it will be necessary to rebuild it.

The deployment of cloud services plays a major role in cooperation with service providers. Each of them has its own platform-specific protocols, standards and tools that inevitably lead to deep integration and an inability to easily opt out or change the service (vendor lock-in), which is also a perceived concern in the deployment of cloud services [17]. The selection criteria for a public cloud service provider are explained in [18], [17]. Concerning an inability to find an appropriate public cloud service provider, the solution would be to implement a private cloud [19].

VI. Migration Approaches

ICT solutions can be replaced by one or more components of cloud services, partially migrated one or more layers of application, or a set of architectural components, or migrating the entire service infrastructure (application encapsulated VM and launched on cloud service) and converting to cloud-based services (complete processing of an application using cloud services) [20]. In the case of cloud service implementation, the cloud service model, IaaS, PaaS or SaaS, should be identified depending on the technology deployed. There are wide-ranging models in the literature that help each of the models mentioned above in migration. Cloud providers are trying to ease migration and develop special tools and approaches. Microsoft offers four typical scenarios in operating system or software applications for migration such as rehost, revise, refactor and replace\retire.

A senior cloud service market participant, Amazon offers a broader migration breakdown called the Six "R" approach (6 Strategies for Migrating Applications to the Cloud / AWS [21].

The developers of the paid software are keeping pace with trends and offer their own solutions and tools for cloud migration. Without major cloud service providers and software developers, the tools for facilitating migration are also developed by scientists [20]. The following tools for scientific development have been found in the literature:

- automated migration tool with artificial intelligence [22];
- application software migration guide describing risks in deployment [23];
- application evaluation tools [24];
- assessment of the migration readiness of cloud service providers and software has developed a decision support system for the migration of cloud services. Cloud decision support framework, CloudDSF [21];
- cloud orchestration solutions [25];
- automated migration of virtual machines from local to cloud environment [26];
- HM migration, security context, assessment framework [27];
- a study on problems and solutions for determining HM addictions [19];
- real-time VM migration solution [17];
- real-time migration solution for reduced virtual machines or without maintenance time [28];
- web tool for migration of 3-D database [29].

Successful deployment of technology requires appropriate business processes. Without application, network, security and memory reconfiguration, it is not possible to achieve interaction among components. The company must be ready for service-oriented or microservice architecture [11], [18], [30]–[32].

The interaction among the various infrastructure components requires the implementation of a company service bus [33].

Cloud services also include the use of other technologies: a connectivity service proxy or connection service adapter [34], an identity and access management system [35], an interface API, load balancers and gateways [36].

Summarising all the above, it can be concluded that cloud services can replace an existing infrastructure component, which exactly should be assessed during functional or non-functional requirement review.

VII. Assessing ICT Maturity Level of SMEs

The implementation of e-commerce is critical to businesses. The stages of the e-commerce deployment are discussed in [37]. In scientific literature and practice, the capability maturity model (hereinafter referred to as CMM) is used to determine the level of technological maturity of a software development company [38]. With reference to the material described above, the authors propose a new method for assessing the maturity level of companies, available in Table IV and based on [38], [39], [37], [40], [41].

The changes in the table do not only affect IT infrastructure, but also the interaction among processes or services. A scenario where a change in service interaction was not predicted could lead to a system unavailability or limited functionality. Successful technology implementation requires a structured approach. A structured approach to the introduction of information systems is called change management.

VIII. Change Management

Given the development of a strategy for ICT deployment during the study, it is necessary to apply a change management approach. The term of Information Technology Management includes international standards like ITIL, COBIT, Val-IT, CMM, ISO/IEC 27001 and others [42], [43], [44].

The authors' standard selection for change management is based on the ability to apply re-usable building blocks. Re-usable blocks should display information on ICT solutions without going into related business processes, as business processes tend to differ considering SME business area diversity. EA has a comprehensive approach to harmonizing and reflecting company processes, strategy and IT [45]. The enterprise architecture management standards are described in TOGAF and ISO 42010 [46], [43]. TOGAF is the global standard for the enterprise architecture. It explains very well what EA should be and what it should do [47]. Thus, the view of the Technology Architecture (hereinafter "TA") should be defined as a cross-layered view, which includes elements from all layers of architecture. Since a strategy is addressed to a large group of companies, abstract references to AA and TA models are offered. Viewpoints and views are suitable for this purpose [48]. The viewpoints are based on ISO/IEC 42010: 2007, ISO Standard Reference Model for Open Distributed Processing (RM-ODP), TOGAF [49].

TABLE IV
ICT MATURITY LEVEL ASSESSMENT

Evolutionary levels		
Single user technology usage		Organisation ICT integration
Technology control		
1. Initial The quality of work depends on the skills of the PC user. The quality of work is unpredictable.	**2. Disciplined** Control of basic software management. Software usage standards are defined and met. Software functionality and costs are tracked and monitored.	**3. Defined standard** Standard software management processes are documented and integrated. Appropriate training programmes for employees to use software.
Employees with a separate computer and productivity software. One can use a private computer for business purposes. One has the Internet connection and a private e-mail account.	Organisations with their own business card type homepage or social network profile. The company respects security measures and regularly updates the software to the latest version. All software is licensed and regularly restored. The company defines programs that are available to employees. Employees' computers have strict passwords.	Computers are joined into the network. Security standards are defined. Employees work together using applications and data hosted on the network. Possible use of an intranet. Workers are trained to work with ICT solutions.

Revolution levels			
Business process adjustment	Business network adjustment		Redefined business scope
Data control			
1. Managed and predictable Performance and quality standards are assessed for all important activities in all services. Organisation-wide process database is used to collect, store and analyse service information. Quantitative measurement standards are available to evaluate business processes and services. Serious differences in process performance can be distinguished from random variations.		**2. Continuous improvement** Focus on improving the organisation-wide continuous process. There are available means to proactively identify and strengthen process gaps. Software engineering innovations are identified and accepted by all organisational units.	
An organisation with a home page that provides a two-way flow of information. The data used in the application or home page are stored in a structured way and available with structured queries. Configuration provides an application platform hosted on servers. The company is high-speed connected to the Internet.	The organisation uses unified application software that supports a variety of business processes, including purchase, sale, accounting, production, etc., thereby promoting the integration of information and division within the company.	The organisation provides a secure network and web server that supports financial transactions and the processing of payment data.	The organisation ensures that all business processes involve the storage of information.

IX. CLASSIFICATION AND DESCRIPTION OF VIEWPOINTS

The authors' viewpoint taxonomy is based on the United States EA Model (FEAF) for Application Taxonomy (Federal Enterprise Architecture Framework Version 2, 2013). For technology architecture, open group EA TRM, Application Platform Taxonomy has been chosen (Foundation Architecture: Technical Reference Model, 2006). The selection of these taxonomies is based on their ability to display ICT mentioned in the previous sections.

This viewpoint is used at the beginning of the design creation to present the common idea. This will display attributes from BA, AA, TA levels. In EA's standard and ArchiMate notation,

it is called a multi-layered view [48]. It is designed for software engineers, process owners and employees.

The infrastructure viewpoint is used to display cloud service place in the enterprise infrastructure. View allows reflecting local infrastructure components that can be replaced by cloud services.

The above information provides an opportunity to group SMEs based on the ICT used and to reflect common components. Companies will be merged according to the classification in Table IV. Using the TOGAF standard and ArchiMate modelling language, the results of the classification are reflected.

A. Group – Original

The group foresees a minimal use of computer and technology. Possible job scenarios include occasional computer use. The restriction of the first group is the absence of safety management principles. Companies in this group do not update the software version and do not use strict passwords that also distinguish these companies from Group 2 members. Undertakings which do not meet the criteria of Group 2 shall be members of Group 1.

This view (see Fig. 2) involves the use of the following software services:

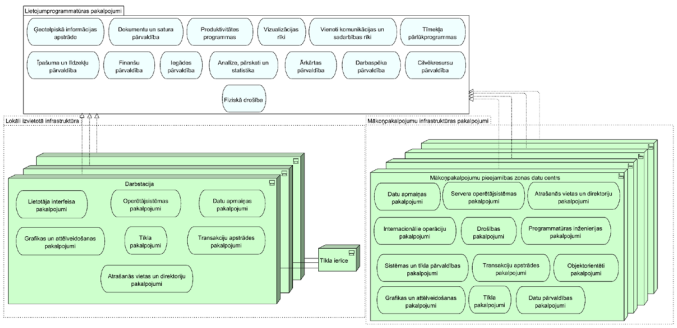

Fig. 2. Application and technology architecture viewpoint of Group A. Application service and technology service taxonomies are based on FEAF and TA TRM.

geospatial information processing, document and content management, productivity applications, visualization tools, common communication and cooperation tools, web browsers, property management, financial management, purchase management, analysis, reporting and statistics, emergency management, labour management, human resources management, physical security.

Infrastructure services use services such as: operating system services, data exchange services, network services, user interface services, graphics and imaging services, location sites and directory services.

The enterprise infrastructure consists mainly of workstations; therefore, only infrastructure services are available to companies in this group, which can be provided through a desktop operating system or services from cloud service providers.

Cloud services are fully available but given that companies in this group have low levels of digital skills, SaaS-type solutions are mainly used. Cloud services are available to the company's users through the Internet. All resources are hosted in the cloud provider's data centre.

All organisations that do not qualify for Groups 2, 3, 4 or 5 shall be members of this group. These companies are advised to carry out migration to classification groups 2 or 3.

B. Group – Disciple Use of ICT

Possible job scenarios do not include regular computer use. The company has an independent Internet connection. The group is characterised by regular software and operating system renewal and overall maintenance. Organisation's computers have organised user authorization. Users use strict passwords. The company works with fee applications or purchase licenses. The company foresees a specific application software for relevant business processes. Companies in this group are characterised using an individual computer. The company does not organise network access control and network access rights. The company does not have sufficient infrastructure to maintain the application platform. SaaS-type cloud services may be in use. The company has a business card type home page or profile on social networks. Employees have a low level of digital skills. IT duties may be carried out by the company's employees or an outsourcing provider.

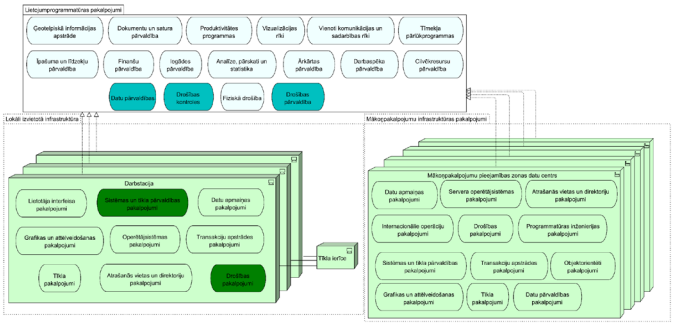

Fig. 3. Application and technology architecture viewpoint of Group B. Application service and technology service taxonomies are based on FEAF and TA TRM.

This view (see Fig. 3) involves the use of the following software services: geospatial information processing, document and content management, productivity applications, visualization tools, common communication and cooperation tools, web browsers, management of property assets, financial management, purchase management, analysis, reporting and statistics, emergency management, labour management, human resources management, physical security and data management.

Infrastructure services use services such as: operating system services, data exchange services, network services, user interface services, graphics and imaging services, location and directory services, systems and network management services, security services.

The enterprise infrastructure consists mainly of workstations; therefore, only infrastructure services are available to companies in this group, which can be provided through a desktop operating system or services from cloud service providers.

Cloud services are fully available but given that companies in this group have a low level of digital skills, SaaS-type solutions are mainly used. Cloud services are available to the company's users through the Internet. All resources are hosted in the cloud provider's data centre.

All organisations which for some reason do not qualify for Groups 3, 4 or 5 should be members of this group. These companies are advised to carry out migration to classification groups 3 or 4.

C. Group – Defined Standards

The company has an independent Internet connection. Computers are connected to the network. The group is characterised by regular software and operating system renewal and overall maintenance. The company organises the control of user rights. Control of network access is ensured. Users use strict passwords. The company works with freeware software or purchases licenses. The company foresees specific application usage for relevant business processes. Companies in this group are characterised by the shared use of applications. People can work together using applications hosted on the network. Computer is used for manual and automated tasks. The company has sufficient infrastructure to maintain the application platform. Cloud services of type IaaS, PaaS, SaaS may be used. The company has a business card type home page or profile on social networks. Training in ICT use and performance of job responsibilities is provided to the employees of the company. Employees may be able to work from home.

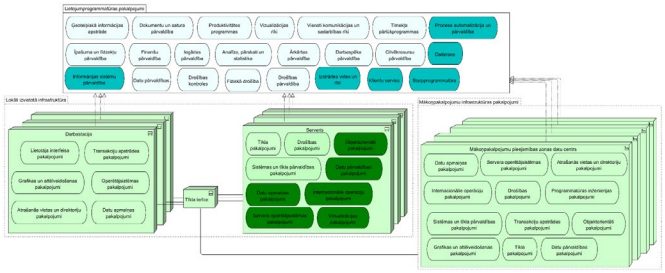

Fig. 4. Application and technology architecture viewpoint of Group C. Application service and technology service taxonomies are based on FEAF and TA TRM.

This view (see Fig. 4) involves the use of the following software services: geospatial information processing, document and content management, productivity software, visualization tools, common communication and cooperation tools, web browsers, management of property assets, financial management, purchase management, analysis, reporting and statistics, emergency management, labour management, human resources management, physical security, data management, process automation and management, data mining, middleware, customer service, development environments and tools, information system management.

Infrastructure services use services such as: operating system services, data exchange services, network services, user interface services, graphics and imaging services, location and directory services, systems and network management services, security services, object-oriented services, data management services, international operations services, virtualization services, data exchange services and server operating system services.

The enterprise infrastructure consists of workstations and servers, so all possible local infrastructure services are available to the companies of this group. Available cloud services can replace any local infrastructure service or service group.

Cloud services, including private, public, hybrid, IaaS, PaaS and SaaS solutions, are fully available and can be used for the benefit of the company, taking into consideration the technological maturity of the company. Resources are hosted in the local office on servers and/or in cloud service provider data centres.

The minimum requirements of this group is the ability to fully maintain the existing IT infrastructure, including the management of user rights, the existence of network access controls, group policies and documentation of all important business processes. If one of the above conditions is not fulfilled, the company is classified as a member of Group 2 or Group 1. All organisations which, for some reason, do not qualify for Group 4 or Group 5 should be the members of this group. These companies are advised to carry out migration to classification groups 4 or 5.

D. Group – Managed Prerequisites

Organisations that have home pages provide a two-way flow of information. The home page must provide the ability to receive an immediate response to structured queries, such as a user-selected, product-specific configuration offer. Another option would be to provide personalised information to registered visitors. This type of home page can be hosted by an internet service provider. This requires a web server and high-speed Internet connection. ITSM, CM tools are in place to allow IT service activities to be evaluated. The companies in this group provide customers and partners with the possibility of purchasing goods or services via the homepage.

The organisation uses unified software that supports a variety of business processes, such as purchase, sale, accounting, production, etc., thereby promoting the sharing of information within the company.

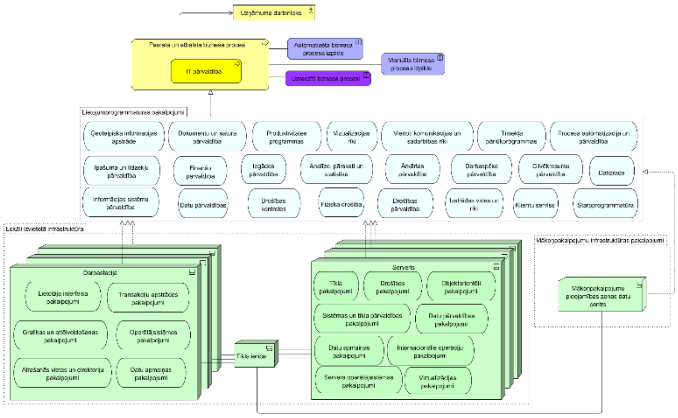

Fig. 5. Application and technology architecture viewpoint of Group D. Application service and technology service taxonomies are based on FEAF and TA TRM.

This view (see Fig. 5) involves the use of the following software services: geospatial information processing, document and content management, productivity software, visualization tools, common communication and cooperation tools, web browsers, management of property assets, financial management, purchase management, analysis, reporting and statistics, emergency management, labour management, human resources management, physical security, data management, process automation and management, data mining, middleware, customer service, development environments and tools, and information system management.

Infrastructure services use services such as: operating system services, data exchange services, network services, user interface services, graphics and imaging services, location and directory services, systems and network management services, security services, object-oriented services, data management services, international operations services, virtualization services, data exchange services, server operating system services.

View implements a new business principle. The principle requires that business processes are monitored, and IT management is one of the most important business processes.

The minimum requirements of this group are performance and quality standards assessed for all important activities in all services. Organisation-wide process database is used to collect, store and analyse service information. Quantitative measurement is available to evaluate business processes and services.

If one of the above conditions is not fulfilled, the company classified is as a member of Group 3, 2 or 1. All organisations which, for some reason, do not qualify for Group 5 should be the members of this group. These companies are advised to carry out migration to classification group 5.

E. Group – Continuous Improvement

The organisation provides a secure network and web server that support financial transactions and the processing of payment data. The organisation shall ensure that all business processes information is stored. The company complies with relevant global, regional, national and industry safety standards and recommendations.

Companies of this group apply big data analysis and use analytical information to redefine the scope of the business.

Companies of this group offer partners and customers electronic invoices that can be electronically processed.

This view (see Fig. 6) involves the use of the following software services: geospatial information processing, document and content management, productivity software, visualization tools, common communication and cooperation tools, web browsers, management of property assets, financial management, purchase management, analysis, reporting and statistics, emergency management, labour management, human resources management, physical security, data management, process automation and management, data mining, middleware, customer service, development environments and tools, and information system management.

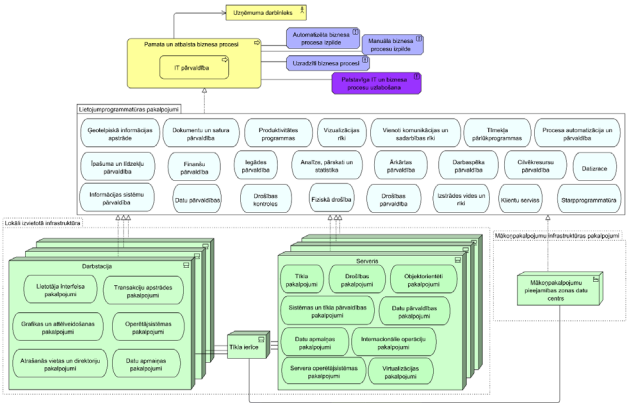

Fig. 6. Application and technology architecture viewpoint of Group E. Application service and technology service taxonomies are based on FEAF and TA TRM.

Infrastructure services use services such as: operating system services, data exchange services, network services, user interface services, graphics and imaging services, location and directory services, systems and network management services, security services, object-oriented services, data management services, international operations services, virtualization services, data exchange services, server operating system services.

The minimum requirements of this group are a focus on continuous improvement of processes. The company complies with various national, industrial, international and security standards. If one of the above conditions is not fulfilled, the company is classified as a member of Group 4, 3, 2 or 1. For the companies of this group, the strategy developed by the authors gives an insight into EA building blocks and their practical application in the EA change management approach, if not in use. Given the diversity of change management standards, this can be helpful for improving an existing approach. Within the scope of this study, the strategy does not provide vertical development scenarios for the members of this group. The strategy creates an opportunity for further research and development to improve it. The strategy may be complemented by technological solutions that may be useful for one of the groups.

X. Conclusion

The aim of the research has been to develop a strategy for the deployment of cloud services. Latvian SMEs are characterised by different degrees of ICT and IT infrastructure complexity. SMEs have been grouped according to the ICT used. The grouping is based on the classification proposed by the authors. The classification consists of five groups, which unite companies with similar infrastructures and offer improvement scenarios. After choosing a scenario, entrepreneurs may use TOGAD ADM as a change management model and architectural viewpoints as a reference model. Viewpoints have been based on EA standard and can therefore be re-used and improved in case of necessity. Architectural building blocks, including architectural viewpoints, allow understanding, learning and adopting technological concepts quickly. Building blocks provide a reduction in the time needed for EA development, which is one of the most important factors influencing SME ICT deployment.

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