

IT GOVERNANCE IN DIGITAL TRANSFORMATION

A COBIT 5 overview according IDC Maturityscape

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Dissertation as requirement for obtaining the Master's
degree in Information Management

NOVA Information Management School
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ABSTRACT

We live in an era where digital transformation is highly increasing, gaining a new importance to the company's business. This digital transformation introduces an all new paradigm where companies have to adapt to be more competitive, more costumer related, allowing them to present new solutions and new business models.

When implementing this kind of changes, companies must pay attention to the IT Governance to help them align the IT strategy with the company and the stakeholder's strategy and goals.

The motivation and objective of this thesis is to understand how COBIT5 can help to achieve a higher digital transformation maturity .

This study presents a matrix of the different dimensions of the IDC digital transformation maturity matrix and relate them with the COBIT5 procedures, helping the organizations achieve a better maturity in a certain dimension.

This matrix can be used as a guide for organizations dealing with digital transformation, that after understanding their maturity level on a specific dimension, search assistance to understand what changes to implement to achieve a higher maturity level.

KEYWORDS

Company strategy, New IT, Governance frameworks, best practices, maturity matix, procedures.

Index

1.1. Background.....	1
1.2. Motivation, objectives and study relevance	2
2. Literature Review	4
2.1. IT Governance.....	4
2.1.1. Concepts	4
2.1.2. Benefits.....	4
2.1.3. Frameworks	5
2.1.4. COBIT 5	6
2.2. Digital Transformation.....	22
2.2.1. Concepts	22
2.2.2. Main Areas.....	23
2.2.3. IT Governance in Digital transformation	24
2.3. IDC Maturity Matrix.....	25
2.3.1. Concept.....	25
2.3.2. Maturity Scape Stages	26
2.3.3. Maturity Scape dimensions	26
3. Methodology	30
3.1. Design Science Research	30
3.2. Investigation Strategy.....	31
4. Building a Framework.....	32
4.1. Assumptions	32
4.2. Framework.....	33
4.3. Discussion and analysis	46
5. Conclusion.....	50
5.1. Summary of the developed work	50
5.2. Limitations	50
5.3. Future Work.....	51
References.....	52

LIST OF ABBREVIATIONS AND ACRONYMS

DSR	Design Science Research
IDC	International Data Corporation
IS	Information Systems
IT	Information technology
ITDG	IT demand governance
ITG	IT Governance
ITRG	IT-Related Goals
ROI	Return on investment

FIGURES

Figure 1 - IT Governance Frameworks (Larsen & Andersen, 2006)	5
Figure 2 - COBIT 5 - Principles (ISACA, 2012b)	6
Figure 3 - COBIT 5 - Circle of life of the implementation (ISACA, 2012b)	8
Figure 4 - COBIT 5 - Processes of Governance of Enterprise IT (ISACA, 2012b).....	9
Figure 5 - COBIT 5 - IT Processes objectives (ISACA, 2012a)	12
Figure 6 - Evolution of digital transformation (Tannou & Westerman, 2017).....	22
Figure 7 - 3rd Platform of Digital Transformation (Magee, 2016)	23
Figure 8 - IDC MaturityScape stages (Holly Muscolino, 2017)	26

TABLES

Table 1 - IT Related Goal and Metrics provided by COBIT5 (ISACA, 2012a)	11
Table 2 - COBIT 5 ITRG relation to the IDC matrix dimensions	33
Table 3 - COBIT 5 governance practices to suport the digital transformation - Leadership ...	35
Table 4 - COBIT 5 governance practices to suport the digital transformation – Omni- experience	38
Table 5 - COBIT 5 governance practices to suport the digital transformation – Talent Hiring	40
Table 6 - COBIT 5 governance practices to suport the digital transformation – Operational Model	42
Table 7 - COBIT 5 governance practices to suport the digital transformation – Information	45

INTRODUCTION

1.1. BACKGROUND

In the last few years there was a great change in the Information Systems. With the quick evolution of the new technologies it is imperative that organizations adapt in order to be competitive. Subjects like cloud, mobility, artificial intelligence come directly in to our lives. With the unlimited access to the internet and, as a result the access to an enormous amount of information, clients gain a new freedom and knowledge that was not possible before, this makes them the most exigent clients till now (Vey, n.d.). They also have access to new ways of making business (consumer to consumer) and have access to all the organization offers anytime anywhere.

Those changes in society forces the organizations to stay competitive by adapting to the new technologies, not just using them as a performance improvement, but also using them as keys to business, resolving problems, creating value and act like innovation tools, disrupting the system, (Westerman, Calm  jane, Bonnet, Ferraris, & McAfee, 2011) which lead to the 4th industrial revolution (Vey, n.d.).

This transformation that is happening is called the digital transformation, where companies use technology as leverage to create value and as a disrupt agent for business.

But to grow in terms of digital transformation it is not just to implement concepts like cloud, internet of things or artificial intelligence, it is not technology for technology, but technology as a part of the company strategy oriented to the business (Hess, Benlian, Matt, & Wiesb  ck, 2016).

In addition to these trends there are others uprising so IT governance must quickly adapt to all of those changes.

Although it's very important that organizations enter in this digital transformation, for reasons like costs, time and lack of knowledge this change is not universal.

Each company has its own level of digital transformation and this level can be analysed using a maturity level matrix.

There is a great quantity of matrixes to evaluate a company level (for example CCMI, SPICE, etc) (Proen  a & Borbinha, 2016) but most of them are process oriented.

Nevertheless, there are new concepts of matrixes that are digital transformation oriented like ICD maturity escape.

According to ICD (Magee, 2016), this matrix evaluates the organizations from a vast number of questions answered according to the actual performance of the company in terms of digital transformation framing the company in one of the 5 matrix levels: AD HOD – Digital resister, Opportunistic – Digital Explorer, Repeatable – Digital Player, Managed – Digital transformer and Optimized – Digital disruptor.

To align this implementation with the company strategy it is vital to use Information Technology governance. Although IT governance has its own characteristics it has to be applied as part of the corporate governance since the final objective is always the company (Zhu & Li, 2014).

According to National Computing Centre, the IT governance has to guarantee: strategic alignment with the company, value delivery, risk management, resource management, performance measurement, return on investment, opportunities and partnership, performance improvement and external compliance, so it is important that organizations have to know how they can improve those aspects (National Computing Centre, 2005).

Back in the days, organizations tend to standardize and homogenise the IT in order to reduce complexity, reduce risks and reduce costs, but today with the current disruption of the business and IT, it is impossible to continue in the same path. Those new trends impact on how governance has to be managed, resulting in new frameworks , standards, processes and strategic planning (Smith, 2013).

1.2. MOTIVATION, OBJECTIVES AND STUDY RELEVANCE

The digital transformation requires a set of great changes to implement in a company, so it is necessary to understand how to implement it as an asset to the company strategy.

It can be taken as an example a context where data analysis, now days, is one of the most important assets. Companies do not just use data for a specific information, but as a way to find patterns that can be used to generate new business models, based on the client's preferences. This new way of thinking require that governance have new preoccupations that weren't needed before (Hess, Benlian, Matt, & Wiesböck, 2016).

The aim of this study is to understand the main concerns to have in mind when implementing governance in a digital transformation and how they are treated by frameworks like COBIT5.

The main question to answer is “What are the key dimensions to follow when implementing governance in digital transformation, according to IDC maturityscape, and how are they are managed by COBIT5” which will lead to the main objective of creating a comparison matrix between those two frameworks, that can be used as a support guide for companies to have in mind what processes of COBIT5 can help when achieving a higher level of digital transformation maturity.

This object will be constructed based on the following sub-objectives that respond to specific questions:

How to implement IT governance? Comprehend the concept of governance applied to IT and how it is implemented.

What are the most important dimensions to follow according to the maturity scape? Understand how the matrix is organized and what are the dimensions to follow to achieve the maximum level of the matrix.

Is COBIT5 prepared for the digital transformation according to the maturityscape? Understand the principles of COBIT5 and if they are aligned with the new changes.

What dimensions do the frameworks follow when dealing with digital transformation? How COBIT5 anticipate the needs and what do they suggest when dealing with digital transformation.

Organizations can use this matrix after analysing the maturity level in digital transformation, searching for the best practices that can leverage the company to grow in terms of maturity.

2. LITERATURE REVIEW

2.1. IT GOVERNANCE

2.1.1. Concepts

According to Gartner *“IT governance (ITG) is defined as the processes that ensure the effective and efficient use of IT in enabling an organization to achieve its goals. IT demand governance (ITDG—what IT should work on) is the process by which organizations ensure the effective evaluation, selection, prioritization, and funding of competing IT investments”* (Gartner, 2017).

The IT Governance main areas are (National Computing Centre, 2005): Alignment between IT and Business, IT value delivery, Risk Management, Resource Management.

Governance is extremely important to organizations because: sometimes it is verified a general lack of responsibility and clarity of responsibilities within the projects; there are some major communication failures between clients and suppliers; there are a lot of gaps between what the clients require and the IT can deliver; organizations don't have the perception of what value IT can bring; it is necessary to measure the risks of IT implementations; IT is very complex and it is always changing so it is needed a better management and control (National Computing Centre, 2005). To prevent all of those points IT Governance provides a framework that offers a path to follow.

2.1.2. Benefits

Governance brings many benefits to the organizations when well implemented, providing a greater transparency and accountability for costs, processes and decision making, guaranteeing a Return on Investment (ROI) and value for the Stakeholders (understanding the best practices to apply IT according the strategy and objectives of the company allowing the stakeholders to understand the risks and returns that IT can bring), creating new opportunities and partnership (enabling contacts between companies improving the response to market challenges), creating external compliance like integrating laws, regulations and requisites, Providing a better performance by using the IT not just as a support mas as additional value, leading to better practices and avoiding unnecessary costs (National Computing Centre, 2005).

2.1.3. Frameworks

To help the Governance implementation, there are a set of tools that are available as starting points for it governance model development.

As it can be seen from the following table there are a lot of frameworks that can be used by companies in order to achieve the best practices in Governance(Larsen & Andersen, 2006).

Information Technology Infrastructure Library ITIL	ITIL provides a comprehensive, consistent volume of best practices drawn from the collective experience of thousands of IT practitioners around the world. ITIL focuses on critical business processes and disciplines needed for delivering high-quality services. Out of the ITIL framework, the British Standard BS15000 has emerged. BS15000 is the world's first standard for managing IT services. All activity is classified under two broad umbrellas, i.e. Service Management and Service Delivery. This approach defines IT quality as the level of alignment between IT services and actual business needs. As a result, organizations can mature their best practices without regard to specific technologies.
Control Objectives for Information and Related Technology COBIT	Has been developed as a generally applicable and accepted standard for good Information Technology (IT) security and control practices (Lainhart 2000). The tools include: (1) Performance Measurement elements, i.e. outcome measures and performance drivers for all IT processes; (2) A list of Critical Success Factors (CSF) that provides succinct, non-technical best practices for each IT process; (3) Maturity Models to assist in benchmarking and decision-making for capability improvements.
Application Services Library ASL	A collection of best practice guidance for managing application development and maintenance. It is the public domain standard for application management, separate from the IT Infrastructure Library (ITIL), but linked to it in terms of adherence to standards for managing processes and providing a coherent, rigorous, public domain set of guidance. ASL is a part of the ITService Management (ITSM) Library. ASL recognises three types of control, i.e. functional application and technical control. Where Information Technology Infrastructure Library (ITIL) is a generally accepted standard for organizing technical management, the Application Services Library (ASL) offers a framework for the organization of application management
The Capability Maturity Model CMMI	A methodology used to develop and refine an organization's software development process. The model describes a five-level evolutionary path of increasingly organized and systematically more mature processes. CMM was developed and is promoted by the Software Engineering Institute (SEI), a research and development center sponsored by the U.S. Department of Defense (DoD). The CMM suggests 5 Maturity Levels of Software Processes, i.e. the initial, repeatable, defined, managed and optimizing level. CMM is through the years developed further integrating the different activities, i.e. CMM Integration (CMMI). Whereas CMM is based on the classical waterfall model, CMMI is addressing iterative development and is being more result oriented.
Six Standard Deviations Six sigma	Provides the techniques and tools to improve the capability and reduce the defects in any process. The Six Sigma methodology improves any existing business process by constantly reviewing and retuning the process. To achieve this, Six Sigma uses a methodology known as DMAIC (Define opportunities, Measure performance, Analyze opportunity, Improve performance, Control performance). Customer requirements, design quality, metrics and measures, employee involvement and continuous improvement are main elements of Six Sigma Process Improvement.

Figure 1 - IT Governance Frameworks (Larsen & Andersen, 2006)

Each framework provides a guide to follow with the best practices that an organization can follow to implement, manage and monitor IT governance, providing guidelines and measures to effectively utilize IT resources and processes within an organization (Business, On, & Change, 2005).

Most of the frameworks are complementary with strengths in different areas but all of them are based on: the organization Structure, the decision process and communication (Business et al., 2005).

2.1.4. COBIT 5

The business orientation of COBIT consists of linking business goals to IT goals, providing metrics and maturity models to measure their achievement, and identifying the associated responsibilities of business and IT process owners (ISACA, 2012b).

Information is fundamental for all the organizations, and technology have an important part in the company's business. To use technology as a value to the company it is important improve and maintain high quality information to support business decisions, use IT effectively to achieve business goals, use technology to promote operational excellence, ensure IT risk is managed effectively, ensure organizations realize the value of their investments in IT, achieve compliance with laws, regulations and contractual agreements (ISACA, 2012b).

In order to achieve those values, COBIT 5 is based on five principles:

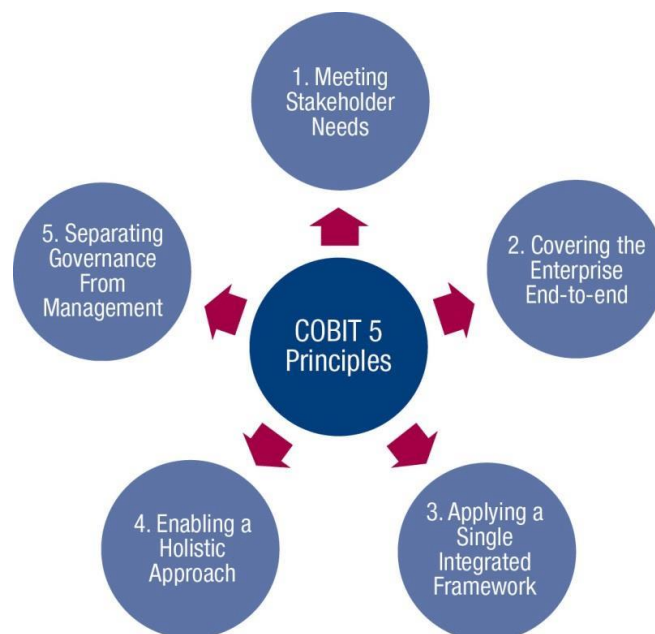


Figure 2 - COBIT 5 - Principles (ISACA, 2012b)

The first principle, *Meeting the stakeholders needs* it is focused on bring value to all the organization's parts, balancing the benefits with risks and resources. These parts have different interests, and priorities, so it is necessary to achieve a middle term to achieve the corporation objectives, the IT objectives and the people objectives (ISACA, 2012b).

The second principle, *Covering the enterprise end-to-end* means that COBIT 5 tries to integrate the IT governance in the corporation governance and tries to cover all functions and processes and all the people intern and externs that are important for the organization. To achieve this principle, it is necessary to have in mind the governance enablers (resources, models, principles, processes and practices) the governance scope, the roles, the activities and relationships to comprehend the organization as a single organism (ISACA, 2012b).

The third principle, *applying a single integrated framework*, intend to use COBIT 5 as a unique model of governance and management instead of using different frameworks for different topics. It creates a standard language not technical that can be applied easily by its own or easily integrated with other frameworks (ISACA, 2012b).

The fourth principle, *enabling a Holistic approach*, divide the organization in seven enablers with different objectives connected between them. Those enablers are: principles, politics and models; processes; organizational structures; culture, etic and behaviours; information; services, infrastructures and applications, people, skills and competences (ISACA, 2012b).

The fifth principle, *separating Governance from management*, require a separation between the governance and management activities because they attend to different purposes. Nevertheless, it is important that those areas keep interacting (ISACA, 2012b).

To implement the COBIT 5 model it was created a life cycle that should be followed to achieve the changes through their complexity in a more structured way (ISACA, 2012b).

This model is structured in three main components programme management, change enablement, and continual improvement life cycle that are incorporated in seven different phases (ISACA, 2012b).

It starts with the recognition and acceptance of the need of an implementation, it identifies the actual weaknesses and creates a desire of change, then it passes by the scope definition, for a target definition making and exhaustive analyses to identify possible flaws and possible solutions giving priorities, then it is the phase of planning practical solutions assuring that the benefits can be identified and measured. On the fifth phase it is time to implement, measure and monitor the changes, so that in the next phase it is possible to understand if the benefits were achieved. On the

last phase the success of the implementation it is analysed, and new requisites are identifying for a need of continual improvement (ISACA, 2012b).

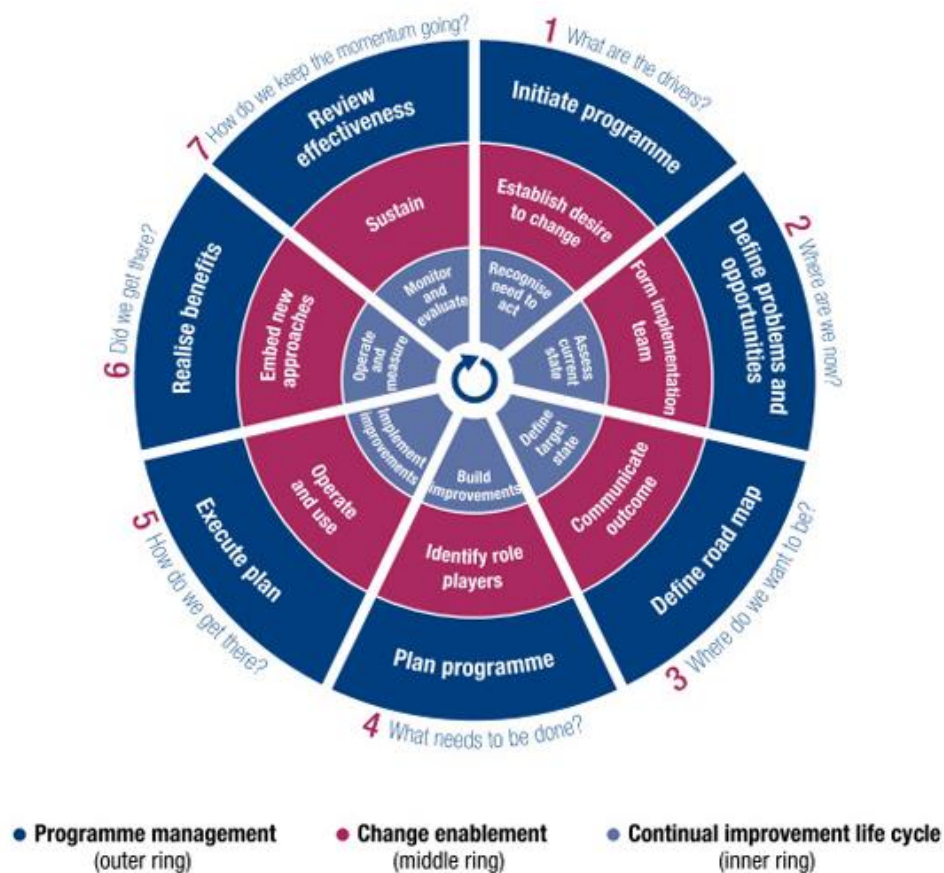


Figure 3 - COBIT 5 - Circle of life of the implementation (ISACA, 2012b)

The process focus of COBIT 5 is illustrated by a process model that subdivides IT into four domains: Align, Plan and Organize, Build, Acquire and Implement, Deliver Service and Support, Monitor Evaluate and Assess (ISACA, 2012b).

For those domains, the COBIT5 has built a reference model that defines and describes a list of processes of governance and management usually related to the IT activities (ISACA, 2012b).

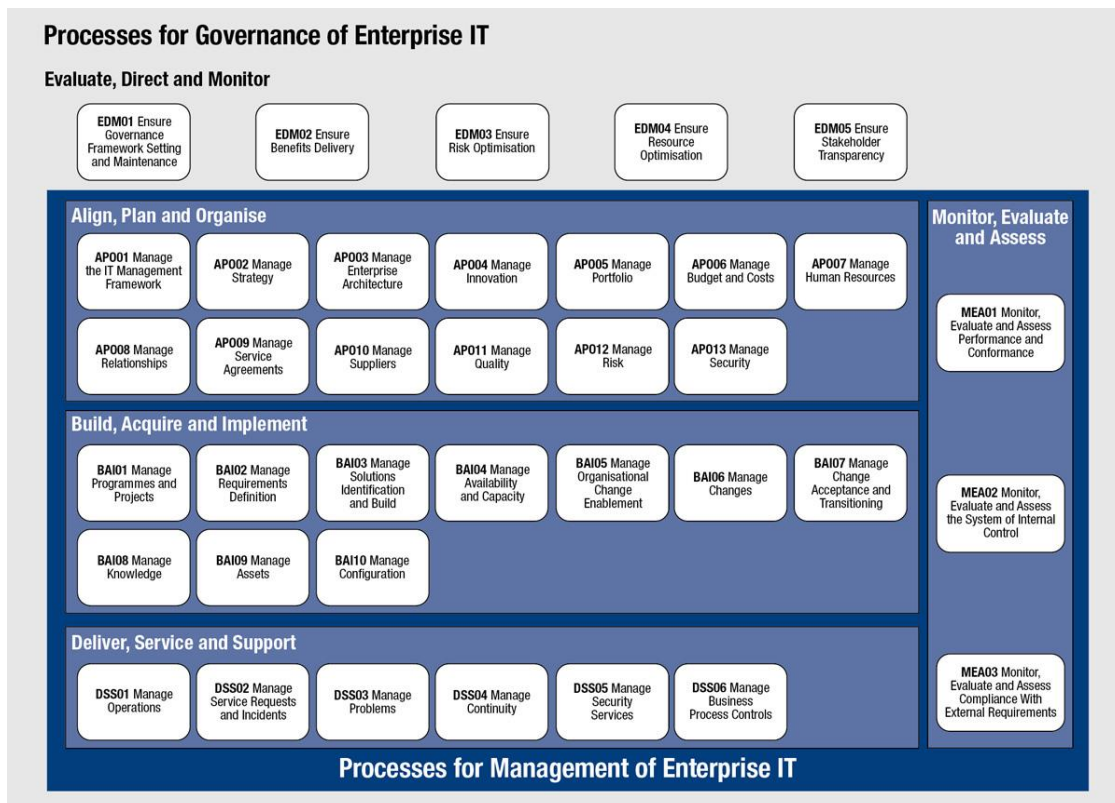


Figure 4 - COBIT 5 - Processes of Governance of Enterprise IT (ISACA, 2012b)

To implement this framework in the first place it is necessary to understand the organization context, the etc, the culture, laws and regulations, missions, vision and values, politics and practices, business plan and strategic intentions, operational model, maturity levels, management style, risk capacity, resources and industry practices. Each one of these components will influence on what models and best practices should be used (ISACA, 2012b).

For this particular study these processes will be evaluated to understand if they are engaged in accomplish the maturityscape objectives.

COBIT 5 have an IT-Related Goal (ITRG) approach where it tries to identify the most important objectives to accomplish in order to achieve the enterprise objectives (ISACA, 2012b).

The ITRG are seventeen goals divided in four categories: Financial, Customer, Internal and Learning and Growth. To accomplish the goals there are several metrics to be achieved as it is described in the following table (ISACA, 2012a).

Category	IT related Goal	Metric
Financial	1. Stakeholder value of business investments	• Percent of investments where value delivered meets stakeholder expectations • Percent of products and services where expected benefits are realised • Percent of investments where claimed benefits are met or exceeded
	2. Portfolio of competitive products and services	• Percent of products and services that meet or exceed targets in revenues and/or market share • Ratio of products and services per life cycle phase • Percent of products and services that meet or exceed customer satisfaction targets • Percent of products and services that provide competitive advantage
	3. Managed business risk (safeguarding of assets)	• Percent of critical business objectives and services covered by risk assessment • Ratio of significant incidents that were not identified in risk assessments vs. total incidents • Frequency of update of risk profile
	4. Compliance with external laws and regulations	• Cost of regulatory non-compliance, including settlements and fines • Number of regulatory non-compliance issues causing public comment or negative publicity • Number of regulatory non-compliance issues relating to contractual agreements with business partners
	5. Financial transparency	• Percent of investment business cases with clearly defined and approved expected costs and benefits • Percent of products and services with defined and approved operational costs and expected benefits • Satisfaction survey of key stakeholders regarding the transparency, understanding and accuracy of enterprise financial information • Percent of service cost that can be allocated to users
Customer	6. Customer-oriented service culture	• Number of customer service disruptions due to IT service-related incidents (reliability) • Percent of business stakeholders satisfied that customer service delivery meets agreed-on levels • Number of customer complaints • Trend of customer satisfaction survey results
	7. Business service continuity and availability	• Number of customer service interruptions causing significant incidents • Business cost of incidents • Number of business processing hours lost due to unplanned service interruptions • Percent of complaints as a function of committed service availability targets
	8. Agile responses to a changing business environment	• Level of board satisfaction with enterprise responsiveness to new requirements • Number of critical products and services supported by up-to-date business processes • Average time to turn strategic enterprise objectives into an agreed-on and

		approved initiative
	9. Information-based strategic decision making	• Degree of board and executive management satisfaction with decision making • Number of incidents caused by incorrect business decisions based on inaccurate information • Time to provide supporting information to enable effective business decisions
	10. Optimisation of service delivery costs	• Frequency of service delivery cost optimisation assessments • Trend of cost assessment vs. service level results • Satisfaction levels of board and executive management with service delivery costs
Internal	11. Optimisation of business process functionality	• Frequency of business process capability maturity assessments • Trend of assessment results • Satisfaction levels of board and executives with business process capabilities
	12. Optimisation of business process costs	• Frequency of business process cost optimisation assessments • Trend of cost assessment vs. service level results • Satisfaction levels of board and executive management with business processing costs
	13. Managed business change programmes	• Number of programmes on time and within budget • Percent of stakeholders satisfied with programme delivery • Level of awareness of business change induced by IT-enabled business initiatives
	14. Operational and staff productivity	• Number of programmes/projects on time and within budget • Cost and staffing levels compared to benchmarks
	15. Compliance with internal policies	• Number of incidents related to non-compliance to policy • Percent of stakeholders who understand policies • Percent of policies supported by effective standards and working practices
Learning and Growth	16. Skilled and motivated people	• Level of stakeholder satisfaction with staff expertise and skills • Percent of staff whose skills are insufficient for the competency required for their role • Percent of satisfied staff
	17. Product and business innovation culture	• Level of awareness and understanding of business innovation opportunities • Stakeholder satisfaction with levels of product and innovation expertise and ideas • Number of approved product and service initiatives resulting from innovative ideas

Table 1 - IT Related Goal and Metrics provided by COBIT5 (ISACA, 2012a)

All of this ITRG can be achieved thru the implementation of several processes, where COBIT 5 has the following mapping:

Figure 23—Mapping COBIT 5 IT-related Goals to Processes																																				
			IT-related Goal																																	
			Alignment of IT and business strategy		IT compliance and support for business compliance with external laws and regulations		Commitment of executive management for making IT-related decisions		Managed IT-related business risk		Realised benefits from IT-enabled investments and services portfolio		Transparency of IT costs, benefits and risk		Delivery of IT services in line with business requirements		Adequate use of applications, information and technology solutions		IT agility		Security of information, processing infrastructure and applications		Optimisation of IT assets, resources and capabilities		Enablement and support of business processes by integrating applications and technology into business processes		Delivery of programmes delivering benefits, on time, on budget, and meeting requirements and quality standards		Availability of reliable and useful information for decision making		IT compliance with internal policies		Competent and motivated business and IT personnel		Knowledge, expertise and initiatives for business innovation	
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17																				
COBIT 5 Process			Financial						Customer		Internal								Learning and Growth																	
Evaluate, Direct and Monitor	EDM01	Ensure Governance Framework Setting and Maintenance	P	S	P	S	S	S	P		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S					
	EDM02	Ensure Benefits Delivery	P		S		P	P	P	S			S	S	S	S	S		S	P					S	S	S	S	S	S	P					
	EDM03	Ensure Risk Optimisation	S	S	S	P		P	S	S		P				S	S	P	S	S											S	S				
	EDM04	Ensure Resource Optimisation	S		S	S	S	S	S	S	P		P			S			P	S											P	S				
	EDM05	Ensure Stakeholder Transparency	S	S	P			P	P							S	S	S														S				
Align, Plan and Organise	APO01	Manage the IT Management Framework	P	P	S	S		S		P	S	P	S	S	S	S	S	P	P	P												P	P			
	APO02	Manage Strategy	P		S	S	S		P	S	S		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	P				
	APO03	Manage Enterprise Architecture	P		S	S	S	S	S	S	P	S	P	S			S															S				
	APO04	Manage Innovation	S			S	P			P	P		P	S			S															P				
	APO05	Manage Portfolio	P		S	S	P	S	S	S	S		S			P																S				
	APO06	Manage Budget and Costs	S		S	S	P	P	S	S			S			S																				
	APO07	Manage Human Resources	P	S	S	S			S		S	S	P			P			S	P	P									S	P	P				
	APO08	Manage Relationships	P		S	S	S	S	P	S			S	P		S			S	S	P									S	S	P				
	APO09	Manage Service Agreements	S			S	S	S	P	S	S	S	S	S		S	P	S																		
	APO10	Manage Suppliers		S		P	S	S	P	S	P	S	S	S		S	S	S														S				
	APO11	Manage Quality	S	S		S	P		P	S	S		S			P	S	S	S	S	S											S				
	APO12	Manage Risk		P		P		P	S	S	S	P				P	S	S	S	S	S											S				
	APO13	Manage Security		P		P		P	S	S		P				P																				
Build, Acquire and Implement	BAI01	Manage Programmes and Projects	P		S	P	P	S	S	S			S		P															S	S					
	BAI02	Manage Requirements Definition	P	S	S	S	S		P	S	S	S	S	P	S	S																S				
	BAI03	Manage Solutions Identification and Build	S			S	S		P	S			S	S	S	S	S															S				
	BAI04	Manage Availability and Capacity				S	S		P	S	S		P			S	P															S				
	BAI05	Manage Organisational Change Enablement	S		S		S		S	P	S		S	S	P																	P				
	BAI06	Manage Changes			S	P	S		P	S	S	P	S	S	S	S	S	S	S	S												S				
	BAI07	Manage Change Acceptance and Transitioning				S	S		S	P	S				P	S	S	S														S				
	BAI08	Manage Knowledge	S				S		S	S	P	S	S	S																S	P					
	BAI09	Manage Assets		S		S		P	S		S	S	P																							
	BAI10	Manage Configuration		P		S		S		S	S	S	P				P	S																		
Deliver, Service and Support	DSS01	Manage Operations		S		P	S		P	S	S	S	P				S	S	S	S												S				
	DSS02	Manage Service Requests and Incidents				P			P	S		S					S	S														S				
	DSS03	Manage Problems		S		P	S		P	S	S		P	S			P	S														S				
	DSS04	Manage Continuity	S	S		P	S		P	S	S	S	S	S			P	S	S	S												S				
	DSS05	Manage Security Services	S	P		P			S	S			S	S			S	S																		
	DSS06	Manage Business Process Controls		S		P			P	S		S	S	S			S	S														S				
Monitor, Evaluate and Assess	MEA01	Monitor, Evaluate and Assess Performance and Conformance	S	S	S	P	S	S	P	S	S	S	P			S	S	P	S	S												S				
	MEA02	Monitor, Evaluate and Assess the System of Internal Control		P		P		S	S	S		S					S	P														S				
	MEA03	Monitor, Evaluate and Assess Compliance With External Requirements		P		P	S		S			S																				S				

The COBIT processes are divided in five main areas: Evaluate, direct and monitor (EDM), Align, Plan and organize (APO), Build, Acquire and Implement (BAI), Deliver, Service and Support (DSS) and Monitor, Evaluate and Assess (MEA).

EVALUATE, DIRECT AND MONITOR (EDM) (ISACA, 2012a)

The first group of processes it is directly related with governance and establish actions for the evaluation, direction a monitorization of IT, in order to guarantee its value for the company. It is mainly directed to the leadership and helps to define responsibilities, risk and resource optimization, and ensure the transparency for the stakeholders.

EDM01 - ENSURE GOVERNANCE FRAMEWORK SETTING AND MAINTENANCE

Articulate and analyze the IT governance requirements and implement and maintain effective structures, principles processes and practices with a clear view of the responsibilities and authority to achieve the company's mission, goals and objectives

Provide an integrated and consistent approach, aligned with the enterprise governance, assuring that the IT decisions are in line with the company strategy and objectives, analyzing them thru effective and transparent methods and guaranteeing compliance with legal and regulatory requirements.

Identify and interact recurrently with the stakeholders, understand and document the requirements and analyse the current and the future design of the IT governance.

Provide information to the leaders and work with them with their support and commitment. Guide the practices, processes and structures according the governance alignment principles, decision making models and authority levels. Define what information is important for the decision-making process.

Monitor the IT governance effectiveness and performance, evaluate id the structures, principles and processes are operating effectively.

EDM02 - ENSURE BENEFITS DELIVERY

Optimize the business processes, IT services, and IT assets as a contribution for the business value at acceptable costs.

Create an accurate picture of costs and benefits to understand if the IT value is achieved for the company with a cost-efficiency and evaluate them frequently maximizing the value.

Monitor the main goals and metrics to understand if the business is gaining the expected value and if there are benefits from the IT investments. Identify the problems and consider corrective actions.

EDM03 - ENSURE RISK OPTIMIZATION

Understand and identify the risks that the organizations are willing to take and ensure that they are articulated with the IT value. It is important that the risk do not exceed the IT value, always trying to minimise the failures.

Always maintain the examination and the risk judgment in the present and future and keep a continuous evaluation and monitorization of the goals and metrics and if the risks are worth it according to the IT value that will be brought.

EDM04 - ENSURE RESOURCE OPTIMIZATION

Ensure that there are enough resources that can support the objectives in an efficient way and at an optimal cost, always ensuring the resources needs through the full economic lifecycle, monitoring the main goals and metrics for the resource management and understand how the problems can be identified, followed and remediated.

EDM05 - ENSURE STAKEHOLDER TRANSPARENCY.

Ensure that every information related to the IT is transparent and follows the metrics previously defined by the stakeholders.

Ensure an effective and qualified communication and reporting that follows pre-defined principles to promote a better performance aligning the objectives with the company strategy. Those principles must be revised, and the effectiveness of the communication should also be monitored to ensure they are still a value for the strategy alignment.

ALIGN, PLAN AND ORGANISE (APO) (ISACA, 2012a)

This group intend to identify how the IT can contribute to the organization objectives in terms of IT strategy, IT architecture, innovation and portfolio management. It also provides actions to manage the IT development flow focusing on points like budget, costs, human resources, services, suppliers, risks, quality and security.

APO01 - MANAGE THE IT MANAGEMENT FRAMEWORK

It is imperative to clarify and maintain the IT governance vision and mission, and how the IT is coordinated with the organization strategy, for that it is important to implement mechanisms to manage the IT thru principles and policies that cover all the processes, structures, roles and responsibilities to improve the decision making.

It is necessary to identify what the organisations already have and if it is necessary to continuously improve or create new organisational structures, establish roles, responsibilities and Information ownership, attribute authority and responsibilities, define the enablers to promote compliance, improvement, and handle process deviations. Everyone must know their part and understand the IT objectives and directions.

APO02 - MANAGE STRATEGY

Align, identify and define the IT strategy in order to be integrated with the business objectives. To proceed with this alignment, it is necessary to understand the enterprise environment, objectives, strategy and business processes and also to identify the main problems capabilities and performance to understand how it can be improved.

Create a strategic plan and road maps to achieve the companies' goals and objectives and communicate it to the appropriate stakeholders and users.

APO03 - MANAGE ENTERPRISE ARCHITECTURE

Create a common architecture that integrate processes, business, information, data and applications, in order to create effectiveness, efficiency, agility and quality.

Understand the gaps and the opportunities that can come from a good architecture implementation and create a plan to implement the architectures or to modify the existing ones in order to achieve value. Those implementations should be monitored along the time.

APO04 - MANAGE INNOVATION

Use innovations as a value to the business needs, analyse the trends, the opportunities and how new technologies can be an adjuvant for the company in order to achieve competitive advantage, and improve the efficiency and effective of the IT.

To use innovation as a benefit, the culture of the company must be innovation oriented creating methods for new ideas to grow.

New methodologies, technology, ideas and their implementation, must be studied, and monitored to gain the approval and support of the stakeholders and to guarantee the real value of the innovation.

APO05 - MANAGE PORTFOLIO

It is important for the organizations to set a direction for the investments based on the costs, expected Return on Investment, risks and benefits, aligned the strategic objectives, enterprise worth and risks. To manage those investments organizations can create, monitor and manage portfolios in order to evaluate, prioritise and balance the programmes and services.

It is also important to determine the availability of sources and funds to allocate them according to the prioritization of the programmes.

APO06 - MANAGE BUDGET AND COSTS

The organizations must have a method to manage the IT activities costs and budget. The financial costs must be allocated according to the programmes priorities and risks and the stakeholders vision of what are the benefits for the company. This information must be transparent.

The Costs and budget must always be monitored to understand if there are deviations and if other actions are needed to revert the situation.

APO07 - MANAGE HUMAN RESOURCES

Organizations must ensure the management of the human resources aligning the enterprise objectives with the objectives, motivation and learning and growing plans.

The company must have the resources needed to support the goals, their skills must be identified to understand the best allocation and management.

It is also important that exists a culture of sharing the knowledge and continuous learning. The job performance must be timely evaluated to understand not only the gaps, but also the increasing value of the people.

APO08 - MANAGE RELATIONSHIPS

The relation between IT and the business should be a cooperative relation and must be formalised and transparent in order to achieve all the goals and objectives. Improve the company value thru the IT.

It necessary to have a continuously evaluation, a good definition and the approval of the business requirements, identifying also the risks and opportunities. All this information should be passed to all the stakeholders in a clear and understandable way.

APO09 - MANAGE SERVICE AGREEMENTS

When the organizations work with services it is necessary to deal with service levels so that the service goes to meet the needs and goals. Some indicators should be created for areas like identification, specification, design, publishing, agreement, and monitoring. Thru the evaluation of the service levels it is possible to ensure quality, costs and risks control and an optimization of the performance.

APO10 - MANAGE SUPPLIERS

The management of the suppliers is also an important point for the organizations to have in mind, not only in the supplier intervention thru the meeting of the organization needs, but in the supplier evaluation, selection, contract management, monitoring and compliance. This will ensure quality with low risks at a competitive price.

APO11 - MANAGE QUALITY

Define the quality requirements for all the processes and its controls and monitorization to achieve the organization goals thru a quality management system that provides the standards for the requirements, practices and the procedures, development and service delivery.

Perform a continuous quality monitoring, control and create reviews of the customer satisfaction as well as the value of the quality management implementation.

APO12 - MANAGE RISK

Manage the IT risks thru the identification, evaluation, analysis and reporting of the risks, so that the information can act like a help to the decision-making process. Create a risk portfolio with defined profiles to understand the best way to manage them according to the needs, goals and magnitude of the risk.

APO13 - MANAGE SECURITY

Define or improve a IT security management system continuously monitored and reviewed in order to minimize the risks and security incidents that may occur aligned with the organization policies.

BUILD, ACQUIRE AND IMPLEMENT (BAI) (ISACA, 2012a)

The BAI group focus on the management of IT programmes and projects, aligning the IT strategy with the organization strategy. It also helps manage the capacity, manage the organizational and IT change, and manage the assets and knowledge.

BAI01 - MANAGE PROGRAMMES AND PROJECTS

Manage projects and programmes of the investment portfolio aligning the priorities according to the organization objectives trying to minimize risks reducing costs and ensuring value the quality of the implementations.

Validate the programmes conditions (plans, costs, authorization, sponsorship, stakeholders expectations and engagement) and continually review, monitor and control if the evolution is aligned with the objectives and if the projects are implemented with quality.

Create a Lifecycle for the programmes and for the projects that are created within, with a start and ends in order to follow a development path that should be monitored and controlled all the way.

BAI02 - MANAGE REQUIREMENTS DEFINITION

When defining the IT requirements, it is important to guarantee that they are aligned with the strategic requirements understanding and managing the cost benefits and risk for the proposed solutions.

Always define the functional and technical requirements covering the scope and study the all the possible solutions that can be performed to achieve the objectives. A Stakeholders approval should always be acquired.

BAI03 - MANAGE SOLUTIONS IDENTIFICATION AND BUILD

Create or improve the management of the implementation lifecycle from the design, development, procurement, test in order to support the objectives with quality assured.

This management should be based in documentation created from the detailed analysis of the information and always approved by the stakeholders. With this method the risks and costs are fewer and the probability of rework or misunderstandings decrease.

To help the monitorizations and the quality assurance it is possible to create SLA's, implement security control and auditable measures.

BAI04 - MANAGE AVAILABILITY AND CAPACITY

To create a sustainable resource capacity, it is necessary to understand the needs for availability and the best way to optimisation of the system performance predicting the capacity requirements.

Create or improve the baseline of resources to ensure a capacity to support the business needs and plan the work according to the priorities and the capacity. Monitor, analyse, measure, report and review availability performance and capacity to identify the gaps and deviations, improving when needed.

BAI05 - MANAGE ORGANISATIONAL CHANGE ENABLEMENT

Create an organizational culture oriented to change. Implement a change management that focus on quick changes in the complete lifecycle with the minimum risk. Prepare the stakeholders and the users to embrace the change communicating in the clearest way the path to follow identifying the wins.

BAI06 - MANAGE CHANGES

Create or improve the change management enabling a fast and reliable delivery of change to the business, mitigating the risks.

Identify and evaluate the changes in order to prioritise them and be prepared for emergency changes. Document track and close the changes that occur.

BAI07 - MANAGE CHANGE ACCEPTANCE AND TRANSITIONING

Create conditions to safely implement the IT developments creating an implementation planning that ensure acceptance tests, audit, communication, the preparation of releases, monitor and support the post-implementation understanding the results, outcomes and lessons learned.

BAI08 - MANAGE KNOWLEDGE

Create and improve the knowledge sharing culture to facilitate the knowledge flow supporting the staff, the processes and the facilitation of the decision making.

Identify the sources of information and create methods and standards to gather the knowledge in an easy and accessible way. Enforce the transformation of information into knowledge.

BAI09 - MANAGE ASSETS

Manage the IT assets guaranteeing that they are operating, reliable and available when needed. Identify the existing assets, what assets are needs, understand the critical ones in other to maximize their use. Ensure the maximum value effectiveness and efficiency thru all the lifecycle.

BAI10 - MANAGE CONFIGURATION

Create or improve a configuration model to maintain a logical model of the services, assets and infrastructure. Establish a configuration repository and a baseline.

Review and control the configuration repository to verify completeness and correctness

DELIVER, SERVICE AND SUPPORT (DSS) (ISACA, 2012a)

The DSS group refers the IT services that are necessary to attend the tactical plans and strategies essentially when it comes to manage the operations and problems that may occur guaranteeing the quality of the processes.

DSS01 - MANAGE OPERATIONS

Coordinate, manage and monitor the operational activities, infrastructures and facilities thru standard operating procedures. Deliver IT operational service outcomes as planned.

DSS02 - MANAGE SERVICE REQUESTS AND INCIDENTS

Create or improve a management process for incident resolution and user request response with a resolution plan that implies a record, investigations, classification, diagnose, track, escalation, resolution and definition of priorities achieving high performance and productivity.

DSS03 - MANAGE PROBLEMS

Identify, classify, diagnose and prioritize problems and understand their root causes and in consequence resolve and prevent recurring problems, improving the service levels, reducing costs and increasing the customer satisfaction.

DSS04 - MANAGE CONTINUITY

After an IT implementation is necessary to provide and effective support to respond to incidents and disruptions. For that it is necessary to define the continuity strategy, policies and its scope to ensure an effective recovery of the company.

Create, review or improve continuously a business continuity plan based on the company strategy and ensure the plan is correctly communicated and executed.

DSS05 - MANAGE SECURITY SERVICES

Create, improve and monitor security measures to protect the organization Information minimizing risks and avoiding vulnerabilities and incidents. Define security roles and users access privilege.

Create measures like malware protection, networks connectivity security, information encryption and protection, user access security and validations not only for the IT but for the infrastructures.

DSS06 - MANAGE BUSINESS PROCESS CONTROLS

Define or improve business process controls to ensure the reliability, traceability and integrity and security of the information and that information satisfy the requirements.

MONITOR, EVALUATE AND ASSESS (MEA) (ISACA, 2012a)

The last group it is focus on the monitorization and evaluation of the objectives achievement, of the gaps and inefficiencies and the assurance of the organization compliance.

MEA01 - MONITOR, EVALUATE AND ASSESS PERFORMANCE AND CONFORMANCE

Continuously evaluate and monitor the IT process goals and metrics. Engage the stakeholders to establish and maintain a monitoring approach to define objectives, scope and methods to measure the relation between the solutions and the objectives. Periodically review and report performance.

MEA02 - MONITOR, EVALUATE AND ASSESS THE SYSTEM OF INTERNAL CONTROL

Monitor and evaluate the control environment to understand the major gaps and inefficiencies. Create transparent methods and standards to create a cohesive control management in order to achieve the organization objectives.

MEA03 - MONITOR, EVALUATE AND ASSESS COMPLIANCE WITH EXTERNAL REQUIREMENTS

Ensure laws, regulations and contractual requirements compliance of the IT processes.

Identify and monitor the requirements for changes in the laws or regulations and adjust the policies, standards and methodologies to optimize the compliance.

2.2. DIGITAL TRANSFORMATION

2.2.1. Concepts

Today, the growth of new technologies is exponential, every development and discovery leads to new and better ideas, creating a world with a constant disruption and innovation (Cockburn & S. Jahdi, 2015).

As it is possible to see in the following figure, the digitalization had its first main leap in the late 90's with the digitization of music, films and with the beginning of the immense use of computers and cell phones. In 2000 with the massive use of the internet the markets start to shift with new business models like the e-commerce and businesses for consumer to consumer. But since 2010 with the digital transformation, it occurred not just a change in the IT but also in the society because the digital is now part of people's life.

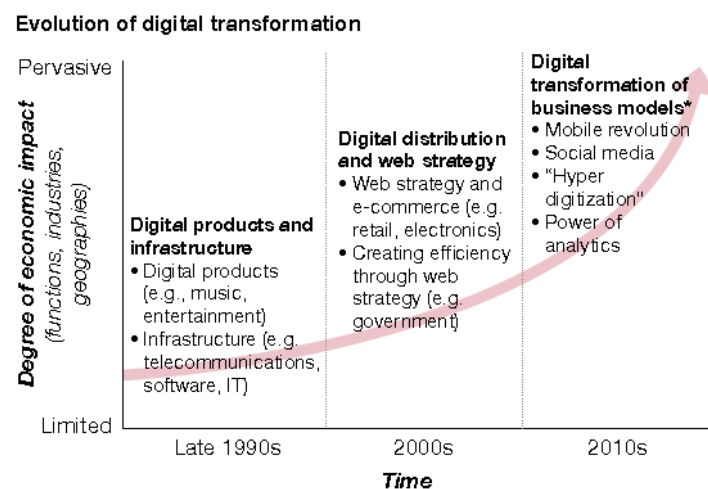


Figure 6 - Evolution of digital transformation (Tannou & Westerman, 2017)

The client's expectations have also changed, they want better products, better services appearing and improving faster and faster. Those expectations forces the organizations to be is constant shifting, putting pressure to develop new products and services(Cockburn & S. Jahdi, 2015).

To enter in this digital transformations there are three paths that can be followed (Berman & Bell, 2011): Improve and reorg the clients value proposal with digital contents and more commitment, enhance or reshape the value proposition with digital content , and build new capabilities around the client.

These changes to the consumer can occur at the service level or as a commitment to the client, using new capabilities such as mobility, interactivity and access to information, improving the quality of service, reducing waiting times generating the best possible experience to the consumer.

Costumers expect good and reliable services delivered at a high speed with improved user experience, personalized according to their tastes and at a low cost (Cockburn & S. Jahdi, 2015).

Although the user now has a great role in digital transformation, companies must also adapt to their workers, creating a knowledge-sharing environment, streamlining processes, building innovation capacity and creating the best possible experience (Berman & Bell).

Digital transformation is part of a whole set of possibilities created by the development of information technologies, which have changed not only the companies in terms of operations but also the mentality of the society (Berman & Bell).

2.2.2. Main Areas

According to IDC – International Data Corporation the world is experiencing the third platform of digital transformation(Gens, 2013). It started with the first platform with mainframe and terminals services and passed thru the second platform with the use of LAN/ Internet and Client/server (Smith, 2013):

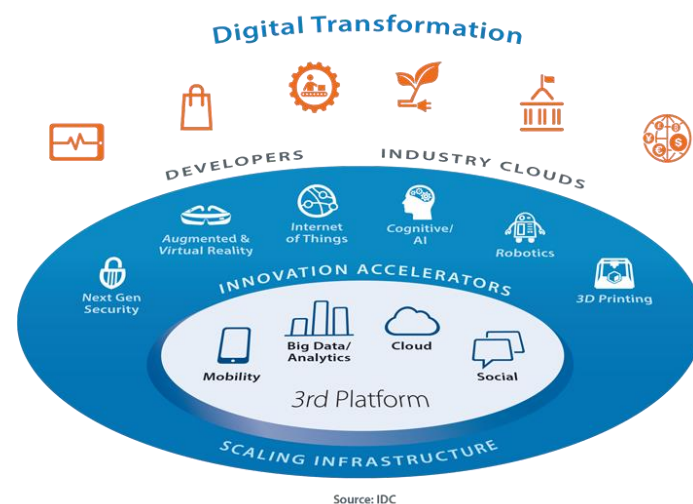


Figure 7 - 3rd Platform of Digital Transformation (Magee, 2016)

Nowadays we are living in what is called the third platform where the four main pillars are mobility, big data/analytics, the cloud, and social media.

Mobility is the use of mobile devices that are radically changing standards and the way that organizations deal with customers and employees. People just do not have one device, they have

multiple devices, in different formats which changes the software distribution creating complexity. Organizations have to deal with multiple operating systems and consequently with security risks and concerns like viruses, data loss and theft (IDC, n.d.)

Data is one of most valuable assets that a company can have so the Big data treatment can be a major asset to the companies. With data it is possible to analyse, predict and identify client's needs and movements of the competition. But to have valuable information it is needed to capture data from different platforms. Big data allows the organizations to analyse a large volume of data with a great variety at a high-speed input without be certain of its content (IDC, n.d.).

Cloud services are growing exponentially, this allows companies to reduce costs in infrastructure and on in the implementations of solutions that already exists. Nevertheless, implementing this solutions leads to a heterogeneous environment, more complex and partially out of control because it depends on another entity. This paradigm creates for example needs like new IT standards, security and information protection (because another entity is responsible for the databases, servers and disks), and also the application of Service Level Agreements to guaranty a good service and support (IDC, n.d.).

Social Media is a growing tool for companies. The information is available for everyone anytime, so besides the marketing of the company, it is also possible know and to understand the costumers, the employees and the competitors. But social media can also be a danger for the organizations and this control is part of the governance responsibility. As well as it might be an employee productivity reducer, it can also be a way to leak information or to launch a phishing attack (IDC, n.d.).

2.2.3. IT Governance in Digital transformation

With the constant growth and changes in the organizations, the IT gain risks that did not existed before. The systems are more complex and uncertain and the implementations have to be fast and continuous (Cockburn & S. Jahdi, 2015).

The concept of digital transformation lead to some new risks (Tannou & Westerman, 2017):

- **Brand Exposure in Social Media** – Social media is a great tool to promote the company near the costumers, but a simple post on Facebook or Twitter can receive global attention in minutes, sometimes ruining the company's reputation.
- **Confidentiality and Regulatory Breaches** – When employees are able to have access to the company thru a laptop, phone or tablet, the information inside those equipments, is not

secure, not just by hacker's attacks but also for lost material. Employees can also post public information online leading to confidentiality breaches.

- **Increased Demand for Cross-Silo Capabilities** – New technologies demand to break out of the old silo based operations to integrate all the areas and technologies so that is possibly to analyse (for example) the information as one single piece.
- **Integrated Data** - Customers demand an integrated experience, and for that, analytics have to have more data integrated and unified. Companies have to deal with information from multiple platforms.
- **Employee Collaboration** – The necessity to become more global is a challenge for the companies. Employees have to be able to comprehend all the regions and to share and collaborate in an effective way across the globe.

To prevent those risks, and to make the IT a value to the company strategy, IT Governance can be a great ally for the organizations.

2.3. IDC MATURITY MATRIX

2.3.1. Concept

There are different types of matrix, however for this study, the matrix that is used is the Maturityscape from IDC.

The maturity matrixes exist as an evaluation form for processes, services or companies to understand in what level they are depending on what it is studied.

The IDC Maturityscape pretend to evaluate the level where the companies are in terms of digital transformation maturity. This matrix is applied essentially to the 3rd platform which includes topics like social media, cloud mobility and Big Data and analytics, because those are the most used technologies to create a company and business disruption (Coimbra, 2016).

This matrix does not intend to give an answer to any CIO question or show the direct way to implement digital transformation, but to identify the gaps that could exist and where the company is comparing to its competitors (Coimbra, 2016).

2.3.2. Maturity Scape Stages

For each company there are 5 dimensions that are evaluated (Coimbra, 2016): Intent: strategy, sponsorship and justification, Data- relevance, quality and availability, Technology - adoption, performance, and functionality, People - skills, culture and organizational structure, Process - tracking, analysis a decisioning

The evaluation of the company begins with an enquiry where are evaluated themes like leadership, omni-experience, talent hiring, operational model and information.

After this evaluation, the company will be assigned with one of 5 levels.

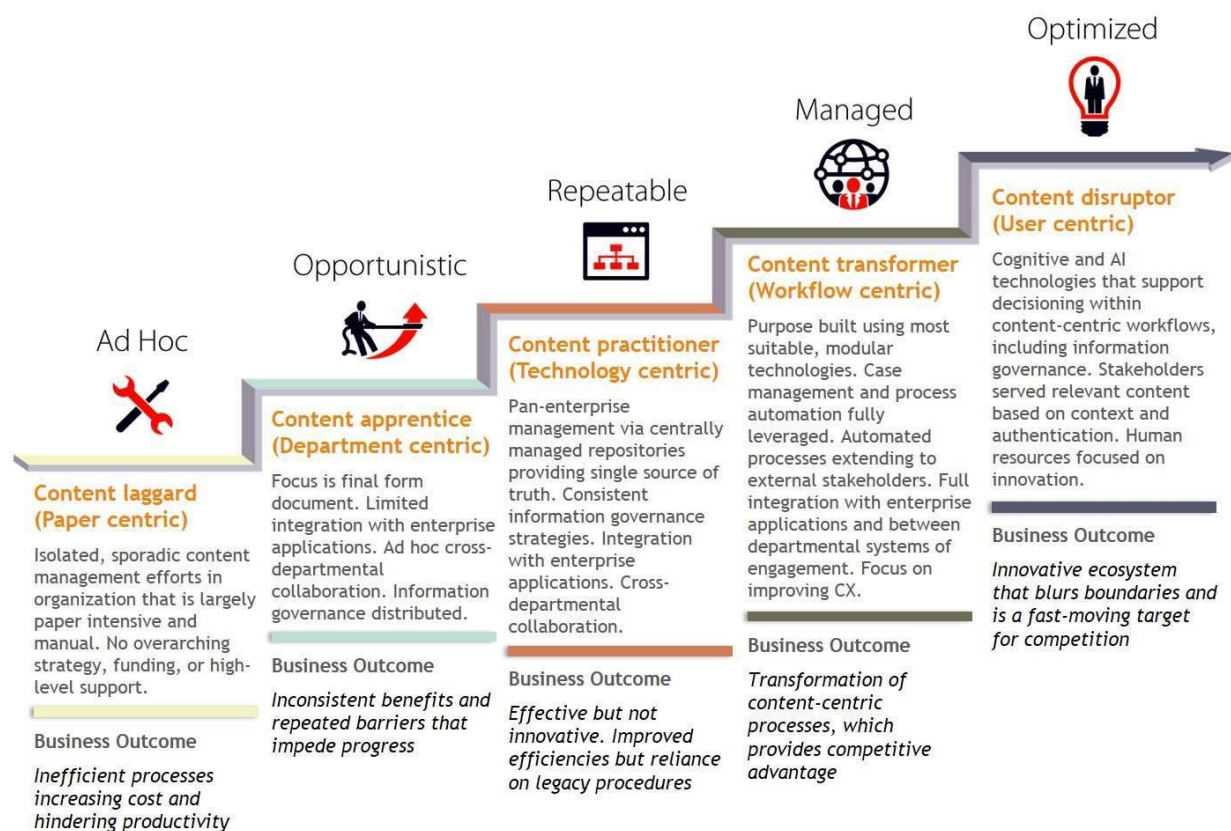


Figure 8 - IDC MaturityScape stages (Holly Muscolino, 2017)

2.3.3. Maturity Scape dimensions

In order to understand the level of digital transformation The IDC maturitätscape study the following dimensions (Coimbra, 2016):

a) Leadership

The main goal of this dimension is to help companies develop a vision for the digital transformation, evaluate the leadership capacity, stimulate the dialog between the business and the technology about the objectives, challenges and necessary actions to an effective leadership, identify areas and approaches that need to be perfected, and define rules and approaches to develop the leadership skills.

1. Consciousness and Ecosystem understanding - create a bidirectional flux of continuous information between the digital and the business ecosystem. The management should use this information to create innovation.
2. Innovation on the business model - Create a disruptive leadership that can use new technologies and new business models to influence the market.
3. Disruption in the organizations and in the organization company - The leadership and corporate vision are integrated in the organization. The organizational culture can automatically adapt to changes in the ecosystem.
4. Agility in planning and governance - Give strategic importance to digital initiatives, applying agile methodologies to optimize the performance of the talent, technology, business models and the ecosystem.
5. Economic and financial Leverage - The financing of digital initiatives includes strategic acquisition in the business ecosystem and consider their disruptive potential.

b) Omni-Experience

Omni-experience is defined by IDC as the capacity to attract and increase the loyalty of clients, partners and collaborators thru the creation of interactive experiences. Therefore this dimension describes an omnipresent and multidimensional approach to the ecosystem of the organizations to amplify the product and services experience.

Thru this dimension it is possible to instigate the dialog between the business and technology about the objectives and necessary actions to create an omni-experience thru all the ecosystem, identify the digital transformations areas that need to be upgraded and establish norms to proceed with the initiatives and efforts to implement the omni-experience transformation.

1. Ecosystem experience - To create consistent and innovative experiences to all the ecosystem (clients, partners, suppliers and collaborators).

2. Continuous innovation - to implement a continuous innovation that responds quickly and effectively to the intern and extern necessities.
3. Service platform - Use technologies and services in a disruptive way to improve the experience of all the elements of the business ecosystem.
4. Integrated Marketing - to create a multidimensional and multidirectional marketing in an innovative way using digital connection, influence capacity and experience creation.

a) Talent hiring

This dimension covers the evolution of how the company can achieve its business objectives thru hiring, implementation and integration on intern (employees) and extern resources (contracts, partners, freelancers). It can help companies to evaluate the talent management, the talent hiring, the work optimization, the creation of a digital mentality.

1. Talent management - manage the talent as a competitive advantage. Imply that the talent management systems and the human resources are completely integrated.
2. Talent Acquisition - Acquire the best talent, regardless the organization bond. The implementation of strong networking systems that contribute to identify the talent.
3. Work optimization - Integrate deeply in the business processes the email and messaging. Unified conference technologies and social networks support the specialist net in the organization.
4. Digital transformation Mentality - Create quickly and frequent changes. The teams must reorganize to achieve the organizational success.

b) Operational model

This dimension describes the capacity to execute operations in a more agile and effective way, helping not only the product and services development, but also the people and digital partners.

The operational model defines how the work is executed in terms of digital transformation. Through this dimension, organizations can enable the dialog between business and technology about the objectives and initiatives, identify where the operational model should be reinforced, and establish norms for the digital transformation initiatives.

1. Product and services connectivity - To implement services and product in digital platforms that generate additional incoming.

2. Active connectivity - To connect the actives with intelligence allowing them to adapt quickly to the operational circumstances.
3. Process coactivity - To normalize the processes with flexible and adaptable support systems.
4. Decision making - Create an integrated decision-making process supported by cognitive and analytic models.
5. Organization structure - To create an independent area focused on the investment and implementation of digital transformation

c) Information

The information is an approach focused on the extraction and creation of value of information about clients, markets, transactions, services, products and goods. The information should be valuable. This dimension can evaluate the maturity of the information, identify and compered the challenges and opportunities related with information value, identify areas that need to be improved, develop a roadmap to information in the digital transformation.

1. Data discovery: Collection and data process - To have a real-time data discovery of information of all the resources including data, tools and competences.
2. Value development: transformation of data into value - the information must be a differentiating factor being able to suggest decision options using prescriptive analytics.
3. Value realization: monetization of data and information - Understand and measure the value of the information
4. Collaboration and knowledge sharing - Implement the collaboration a knowledge sharing in real-time
5. Information architecture - The information architecture sustains the digital transformation supporting a vast set of dynamic functionalities of volume, velocity and variety.

3. METHODOLOGY

3.1. DESIGN SCIENCE RESEARCH

As a result of this investigation, an artefact will be created, so the adequate methodology for this is the DSR or Design Science Research.

This methodology is frequently used in the study of themes related to Information Systems like decision making support, modulation tools, governance strategies, evaluation methods in IS, and it allows a structured form of achieving the study's results (March & Storey, 2008).

This specific method has a sequential structure that should be followed to understand the study object. In the first place, the problem is defined and then starts a phase of search that will provide the information to make the analysis which will create a line of thinking that would lead to the final results (March & Storey, 2008).

To create a study based on DSR it is essential to have defined the following structure (Gregor & Hevner, 2013):

- Introduction – with the problem definition, motivation, objectives, and used methods: In this study it will be identified the state of art of governance, and digital transformation and how they are connected, what are the main objectives and the research question, why it is important to create the final artefact and how can it help companies dealing with digital transformation.
- Literature review – search for information that will help to construct a line of thinking: The base for the study will be achieved by reading papers, articles, books and other documents to construct the theory behind the creation of the artefact.
- Methodology used – the DSR methodology: This methodology will be used to construct an artefact based on the literature review that will be revised.
- Artefact description – description of what is the study about: The artefact created will be a framework of evaluation of COBIT 5 in terms of digital transformation according to the IDC maturity matrix.
- Discussion and analysis – Explain the artefact utility and interpret the results: Understand if the framework is a valid artefact and if it responds to the main objectives

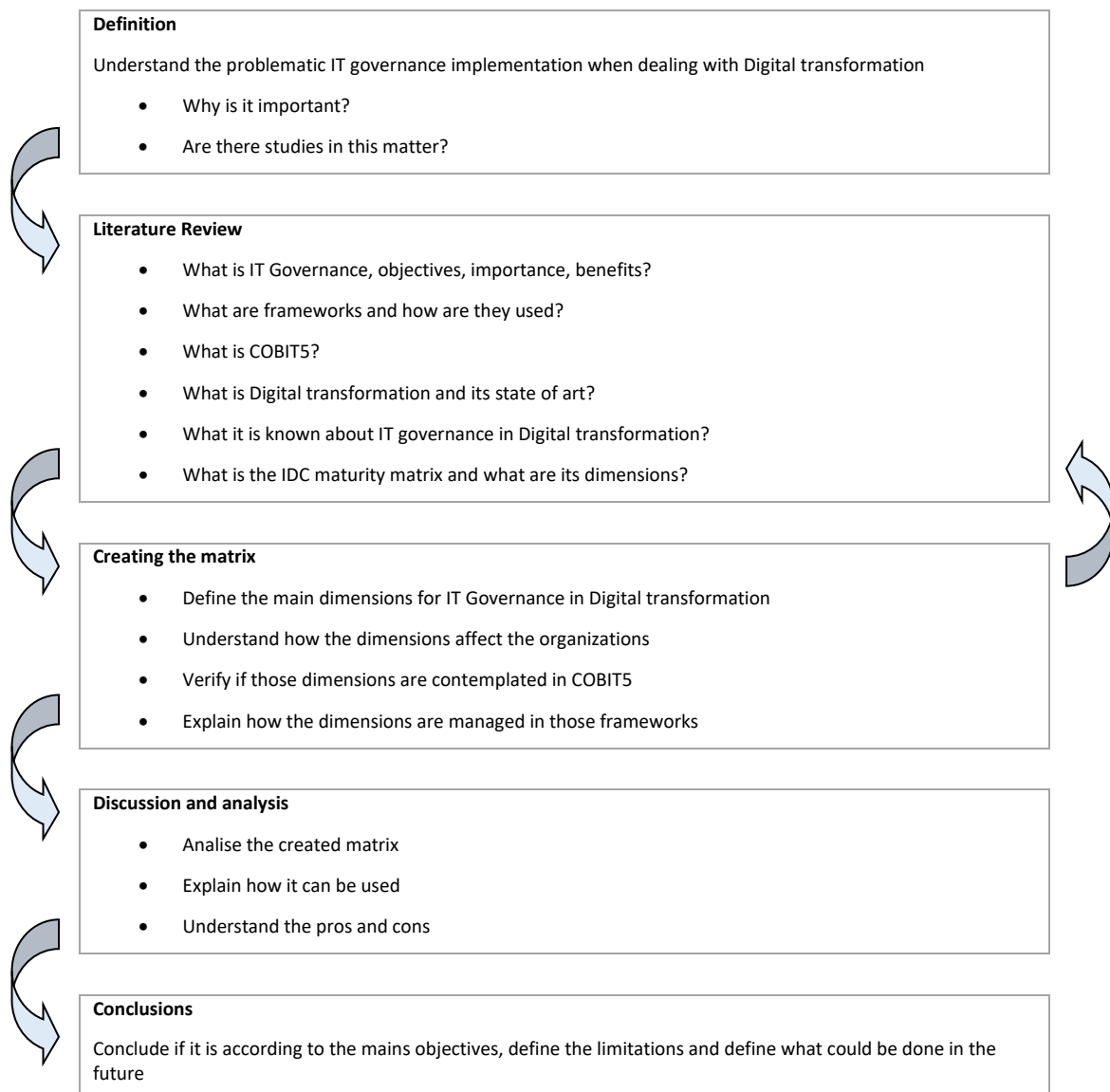
- Conclusion – the most important conclusions achieved by the study: After the study is complete it is necessary to create the conclusions where it will be summed up all the process, the importance of the study and how can it be improved.

In summary this study will have in consideration (March & Storey, 2008):

- The problem - Understanding the problematic of governance implementation when it comes to digital transformation; The IT artefact (Solution) – The analyses of the IDC maturity matrix dimensions and how they are applied in the COBIT 5 in terms of digital transformation ; The Discussion and analysis – The analysis of the matrix and the explanation of its usability

3.2. INVESTIGATION STRATEGY

In order to develop this study, the following steps will be followed:



4. BUILDING A FRAMEWORK

4.1. ASSUMPTIONS

After studying different types of matrixes and governance frameworks, and after deciding that only two different frameworks would be analysed to limit the scope, this study will have as a starting point the IDC maturityscape that will provide the main dimensions to compare with COBIT 5.

When It comes to the IDC maturity matrix is one of the few that is digital transformation related, it is from a great company in the analyses of the IT Business and it is one of the most relevant matrix in terms of implementation.

For this matrix, as it was previously referred it would be analysed the following matrix dimensions:

Leadership: Consciousness and Ecosystem understanding, Innovation on the business model, Disruption in the organizations and in the organization company, Agility in planning and governance, Economic and financial Leverage;

Omni-Experience: Ecosystem experience, Continuous innovation, Service platform, Integrated Marketing;

Talent hiring: Talent management, Talent Acquisition, Work optimization, Digital transformation Mentality;

Operational model: Product and services connectivity, Active connectivity, Process coactivity, Decision making, Organization structure;

Information: Data discovery: Collection and data process, Value development: transformation of data into value, Value realization: monetization of data and information, Collaboration and knowledge sharing, Information architecture.

For each one of these dimensions, COBIT 5 will be examined in order to comprehend if the principle is reflected on the framework, how it is expected to be applied and where is that information presented.

The COBIT5 selection was essentially because it is a very well-structured framework that is quite understandable for everyone dealing with the IT management. When reading the framework, it is possible to see that is also directed to digital transformation, so it would be possible to have a match between the IDC maturity matrix and the COBIT5 processes.

4.2. FRAMEWORK

This framework starts by the analysis of the maturityscope dimensions and tries to identify the COBIT5 ITRG and their principle procedures that guarantee an evolution of the organization in terms of maturity.

To compare the ITRG with the maturityscope matrix it was necessary to understand their concepts and their metrics so it would be achieved the following matrix:

Table 2 - COBIT 5 ITRG relation to the IDC matrix dimensions

	Leadership (L)	Omni-Experience (E)	Talent hiring (T)	Operational model (O)	Information (I)
IT related Goal					
1. Stakeholder value of business investments					
2. Portfolio of competitive products and services					
3. Managed business risk (safeguarding of assets)					
4. Compliance with external laws and regulations					
5. Financial transparency					
6. Customer-oriented service culture					
7. Business service continuity and availability					
8. Agile responses to a changing business environment					
9. Information-based strategic decision making					
10. Optimisation of service delivery costs					
11. Optimisation of business process functionality					
12. Optimisation of business process costs					
13. Managed business change programmes					
14. Operational and staff productivity					
15. Compliance with internal policies					
16. Skilled and motivated people					
17. Product and business innovation culture					

For the Leadership dimension (L), because it is a macro dimension used in all the others, it is possible to assume that all the goals are important to achieve a better performance.

For the Omni-experience (E) the related goals are the ones that provide a better experience for the clients end employees.

When it comes to talent hiring (T) the related goals are specially focuses on the employees, the hiring processes and knowledge sharing.

The operations model (O) relates specially with giving an effective and efficient workflow to the company.

And for the information (I) the most related goals can help to manage, transform and share valuable information to bring value to the company.

After matching the goals with the dimensions, it is possible to reduce the granularity by dividing the dimensions into their main points and compare the procedures that are primary to each ITRG choosing the ones that are the most helpful in growing the maturity in the specific dimension.

When it comes to the leadership dimension it is possible to relate it with the following procedures: EDM01 - ensure governance framework setting and maintenance (ITRG: 01, 03, 07), EDM02 - ensure benefits delivery (ITRG: 01, 05, 06, 07, 17), EDM05 - ensure stakeholder transparency (ITRG: 03, 06, 10, 15), APO02 - manage strategy (ITRG: 01, 07, 17), APO04 - manage innovation (ITRG: 05, 08, 09, 11, 17), APO05 - manage portfolio (ITRG: 01, 05, 13) and APO06 - manage budget and costs (ITRG: 05, 06).

Analysing the Omni-experience dimension it is possible to relate it essentially with the Align, Plan and Organize procedures: APO01 - manage the IT management framework (ITRG: 01, 02, 09, 11, 15, 16, 17), APO02 - manage strategy (ITRG: 01, 07, 17), APO04 - Manage Innovation (ITRG: 05, 08, 09, 11, 17) and APO08 - manage relationships (ITRG: 01, 07, 12, 17).

For the Talent Hiring most related procedures are: *EDM04 - ensure resource optimization* (ITRG: 09, 11, 16), *APO04 - manage innovation* (ITRG: 05, 08, 09, 11, 17) and *APO07 - manage human resources* (ITRG: 01, 11, 13, 16, 17) and *BAI08 - manage knowledge* (ITRG: 09, 17).

For the Operational model COBIT5 provides the following procedures: EDM01 - ensure governance framework setting and maintenance (ITRG: 01, 03, 07), EDM02 - ensure benefits delivery (ITRG: 01, 05, 06, 07, 17), APO01 - manage the IT management framework (ITRG: 01, 02, 09, 11, 15, 16, 17), APO03 - manage enterprise architecture (ITRG: 01, 09, 11), BAI01 - manage programmes and projects (ITRG: 01, 04, 05, 13), BAI09 - manage assets (ITRG: 06, 11), DSS03 - manage problems (ITRG: 04, 07, 11, 14) and DSS04 - manage continuity (ITRG: 04, 07, 14).

For the Information treatment, COBIT5 aligned the following procedures: APO02 - manage strategy (ITRG: 01, 07, 17), APO03 - manage enterprise architecture (ITRG: 01, 09, 11), APO06 - manage budget and costs (ITRG: 05, 06), BAI01 - manage programmes and projects (ITRG: 01, 04, 05, 13), BAI08 - manage knowledge (ITRG: 09, 17) and DSS06 - manage business process controls (ITRG: 03, 06).

To map the dimensions and the COBIT5 processes it was attributed letters and numbers that will match each other where the processes can help achieving a higher level of the dimension.

Follows the matrix divided by dimension and the justification for the match with the processes:

LEADERSHIP

		L - Leadership				
	Maturity Matrix					
		A - Consciousness and Ecosystem understanding	B - Innovation on the business model	C - Disruption in the organizations and in the organization company	D - Agility in planning and governance	E - Economic and financial Leverage
COBIT 5						
EVALUATE, DIRECT AND MONITOR (EDM)						
1 - EDM01 - Ensure governance framework setting and maintenance				LD1		
2 - EDM02 - Ensure benefits delivery		LB2	LC2	LD2		LD2
3 - EDM03 - Ensure risk optimization						
4 - EDM04 - Ensure resource optimization						
5 - EDM05 - Ensure stakeholder transparency.	LA5					
ALIGN, PLAN AND ORGANISE (APO)						
6 - APO01 - Manage the it management framework						
7 - APO02 - Manage strategy	LA7					
8 - APO03 - Manage enterprise architecture						
9 - APO04 - Manage innovation		LB9	LC9			
10 - APO05 - Manage portfolio				LD10	LE10	
11 - APO06 - Manage budget and costs				LD11	LE11	
12 - APO07 - Manage human resources						
13 - APO08 - Manage relationships						
14 - APO09 - Manage service agreements						
15 - APO10 - Manage suppliers						
16 - APO11 - Manage quality						
17 - APO12 - Manage risk						
18 - APO13 - Manage security						
BUILD, ACQUIRE AND IMPLEMENT (BAI)						
19 - BAI01 - Manage programmes and projects						
20 - BAI02 - Manage requirements definition						
21 - BAI03 - Manage solutions identification and build						
22 - BAI04 - Manage availability and capacity						
23 - BAI05 - Manage organisational change enablement						
24 - BAI06 - Manage changes						
25 - BAI07 - Manage change acceptance and transitioning						
26 - BAI08 - Manage knowledge						
27 - BAI09 - Manage assets						
28 - BAI10 - Manage configuration						
DELIVER, SERVICE AND SUPPORT (DSS)						
29 - DSS01 - Manage operations						
30 - DSS02 - Manage service requests and incidents						
31 - DSS03 - Manage problems						
32 - DSS04 - Manage continuity						
33 - DSS05 - Manage security services						
34 - DSS06 - Manage business process controls						
MONITOR, EVALUATE AND ASSESS (MEA)						
35 - MEA01 - Monitor, evaluate and assess performance and conformance						
36 - MEA02 - Monitor, evaluate and assess the system of internal control						
37 - MEA03 - Monitor, evaluate and assess compliance with external requirements						

Table 3 - COBIT 5 governance practices to support the digital transformation - Leadership

Consciousness and Ecosystem - create a bidirectional flux of continuous information between the digital and the business ecosystem:

LA5 - COBIT5 promote a clear communication thru the company from the *EDM05 - ensure stakeholder transparency*, with this point it is guaranteed that the communication is effective and that everyone understand and is engaged with the organization objectives and strategy.

LA7 - From the *APO02 - manage strategy*, it is possible to ensure that the organizational structure reflects the business needs and IT priorities, and that they are correctly communicated and distributed thru roles and responsibilities.

Innovation on the business model - Create a disruptive leadership that can use new technologies and new business models to influence the market:

LB2 - To provide a disruption in the organization, COBIT5 thru the *EDM02 - Ensure Benefits Delivery* recommends creating practices to frequently evaluate and monitor if the enterprise objectives are achieved and if deliverables are a value for the company.

LB9 - COBIT5 has a specific procedure for the innovation management, *APO04 - manage innovation*, where it advises organizations to create an innovation environment, staying ahead when it comes to new technologies and innovative ideas ensuring that they bring value to the organization.

Disruption in the organizations and in the organization company - The leadership and corporate vision are integrated in the organization. The organizational culture can automatically adapt to changes in the ecosystem:

LC2 - From *EDM02- Ensure Benefits Delivery* it is possible to evaluate if the IT developments are achieving the organization objectives, and it recommends analysing new technologies that can bring value and new opportunities. It also recommends the consideration of the innovation so that the organization can be aligned with the competition.

LC9 - From *APO04 - manage innovation*, COBIT5 recommends to promotes an innovative environment where everyone understands the challenges and the company strategy.

Agility in planning and governance - Give strategic importance to digital initiatives, applying agile methodologies to optimize the performance of the talent, technology, business models and the ecosystem:

LD1 - The *EDM01 - ensure governance framework setting and maintenance*, ensure that a framework is created, monitored and evaluated to certify that the IT is aligned with the organization strategy and objectives and that it quickly evolve when a change is needed.

LD2 - From *EDM02 - ensure benefits delivery*, it is recommended the agility in planning governance to guarantee economic and financial value for the company.

LD10 - From *APO05 - manage portfolio*, COBIT5 ensure practices to manage the IT value according to the relation between costs and benefits guaranteeing that the IT is value for the company.

LD11 – In order to optimize the technology value, the *APO06 - manage budget and costs*, recommend a transparent and effective cost control and budget control, aligning the prioritization of the developments with the organization needs.

Economic and financial Leverage - The financing of digital initiatives includes strategic acquisition in the business ecosystem and consider their disruptive potential:

LD2 - *EDM02 - ensure benefits delivery*, recommends the IT implementations as a strategic value for the company, so that the investments can have return. For that, the initiatives must be evaluated so that it is possible to understand the costs, the risks and the returns to create IT portfolios that are likely to achieve the organization objectives. Innovation and disruption must be considered for a competitive place in the market.

LE10 - The *APO05 - manage portfolio*, provide recommendations to manage the IT portfolios aligned to the organization objectives, monitoring and optimizing the portfolios to have the higher return possible from the investments.

LE11 - Once more the *APO06 - manage budget and costs*, provides directions to manage the cost and the budget so that it is possible to deliver the maximum value for the company.

OMNI-EXPERIENCE

	Maturity Matrix	E - Omni-experience			
		A - Ecosystem experience	B - Continuous innovation	C - Service platform	D - Integrated Marketing
COBIT 5					
EVALUATE, DIRECT AND MONITOR (EDM)					
1 - EDM01 - Ensure governance framework setting and maintenance					
2 - EDM02 - Ensure benefits delivery					
3 - EDM03 - Ensure risk optimization					
4 - EDM04 - Ensure resource optimization					
5 - EDM05 - Ensure stakeholder transparency.					
ALIGN, PLAN AND ORGANISE (APO)					
6 - APO01 - Manage the it management framework		EA6			
7 - APO02 - Manage strategy		EA7	EB7		
8 - APO03 - Manage enterprise architecture					
9 - APO04 - Manage innovation		EA9	EB9	EC10	
10 - APO05 - Manage portfolio					
11 - APO06 - Manage budget and costs					
12 - APO07 - Manage human resources					
13 - APO08 - Manage relationships		EA13			
14 - APO09 - Manage service agreements					
15 - APO10 - Manage suppliers					
16 - APO11 - Manage quality					
17 - APO12 - Manage risk					
18 - APO13 - Manage security					
BUILD, ACQUIRE AND IMPLEMENT (BAI)					
19 - BAI01 - Manage programmes and projects					
20 - BAI02 - Manage requirements definition					
21 - BAI03 - Manage solutions identification and build					
22 - BAI04 - Manage availability and capacity					
23 - BAI05 - Manage organisational change enablement					
24 - BAI06 - Manage changes					
25 - BAI07 - Manage change acceptance and transitioning					
26 - BAI08 - Manage knowledge					
27 - BAI09 - Manage assets					
28 - BAI10 - Manage configuration					
DELIVER, SERVICE AND SUPPORT (DSS)					
29 - DSS01 - Manage operations					
30 - DSS02 - Manage service requests and incidents					
31 - DSS03 - Manage problems					
32 - DSS04 - Manage continuity					
33 - DSS05 - Manage security services					
34 - DSS06 - Manage business process controls					
MONITOR, EVALUATE AND ASSESS (MEA)					
35 - MEA01 - Monitor, evaluate and assess performance and conformance					
36 - MEA02 - Monitor, evaluate and assess the system of internal control					
37 - MEA03 - Monitor, evaluate and assess compliance with external requirements					

Table 4 - COBIT 5 governance practices to suport the digital transformation – Omni-experience

Ecosystem experience - To create consistent and innovative experiences to all the ecosystem:

EA6 - APO01 - *manage the it management framework* recommends defining the organization structure reflecting the business strategy, where everyone is aware of their responsibilities, and guaranteeing a good communication between all the enablers so that misunderstanding do not occur, creating a consistent environment.

EA7- APO02 - *manage strategy* describes actions where the enterprise environment is aligned with the company's objectives, promoting a fluid communication and an innovative environment shared by all the users.

EA9 - APO04 - *Manage Innovation* provides indications to create an environment focused on innovation, encouraging the innovative ideas from customers, suppliers and partners. It also encourages the search for new technologies and methodologies that can bring value for the organization strategy.

EA13 - APO08 - *manage relationships* refer actions that can benefit the creation of a consistent environment because it promotes the relationship management between all the users.

Continuous Innovation - to implement a continuous innovation that responds quickly and effectively to the internal and external necessities:

EB7 - The procedure EDM02 - *Ensure Benefits Delivery* ensures to evaluate the IT implementations to understand if they are aligned with the strategy, understanding if there is the need of a quick and effective changes in order to achieve the maximum value as soon as possible.

EB9 - Once more the APO04 - *manage innovation* promotes an innovative environment adapting quickly to the market changes and to the competitors.

Service platform - Use technologies and services in a disruptive way to improve the experience of all the elements of the business ecosystem:

EC10 - To guarantee a service platform that use technologies and services in a disruptive way COBIT5 has the APO04 - *manage innovation* where it recommends the organizations to look for new technologies that can bring value to the company in a disruptive way.

Integrated Marketing - to create a multidimensional and multidirectional marketing in an innovative way using digital connection, influence capacity and experience creation

COBIT5 does not have any specific measure for marketing because it is only IT oriented.

TALENT HIRING

	T - Talent Hiring			
	Maturity Matrix			
	A - Talent management	B - Talent Acquisition	C - Work optimization	D - Digital transformation Mentality
COBIT 5				
EVALUATE, DIRECT AND MONITOR (EDM)				
1 - EDM01 - Ensure governance framework setting and maintenance				
2 - EDM02 - Ensure benefits delivery				
3 - EDM03 - Ensure risk optimization				
4 - EDM04 - Ensure resource optimization	TA4	TB4		
5 - EDM05 - Ensure stakeholder transparency.				
ALIGN, PLAN AND ORGANISE (APO)				
6 - APO01 - Manage the it management framework				
7 - APO02 - Manage strategy				
8 - APO03 - Manage enterprise architecture				
9 - APO04 - Manage innovation				TD9
10 - APO05 - Manage portfolio				
11 - APO06 - Manage budget and costs				
12 - APO07 - Manage human resources	TA12	TB12		TD12
13 - APO08 - Manage relationships				
14 - APO09 - Manage service agreements				
15 - APO10 - Manage suppliers				
16 - APO11 - Manage quality				
17 - APO12 - Manage risk				
18 - APO13 - Manage security				
BUILD, ACQUIRE AND IMPLEMENT (BAI)				
19 - BAI01 - Manage programmes and projects				
20 - BAI02 - Manage requirements definition				
21 - BAI03 - Manage solutions identification and build				
22 - BAI04 - Manage availability and capacity				
23 - BAI05 - Manage organisational change enablement				
24 - BAI06 - Manage changes				
25 - BAI07 - Manage change acceptance and transitioning				
26 - BAI08 - Manage knowledge			TC26	
27 - BAI09 - Manage assets				
28 - BAI10 - Manage configuration				
DELIVER, SERVICE AND SUPPORT (DSS)				
29 - DSS01 - Manage operations				
30 - DSS02 - Manage service requests and incidents				
31 - DSS03 - Manage problems				
32 - DSS04 - Manage continuity				
33 - DSS05 - Manage security services				
34 - DSS06 - Manage business process controls				
MONITOR, EVALUATE AND ASSESS (MEA)				
35 - MEA01 - Monitor, evaluate and assess performance and conformance				
36 - MEA02 - Monitor, evaluate and assess the system of internal control				
37 - MEA03 - Monitor, evaluate and assess compliance with external requirements				

Table 5 - COBIT 5 governance practices to support the digital transformation – Talent Hiring

Talent Management - manage the talent as a competitive advantage. Imply that the talent management systems and the human resources are completely integrated:

TA4 - The *EDM04 - ensure resource optimization* identify the necessity of create, evaluate and monitor the resource management, guaranteeing that the organization have the right resources when needed.

TA12 - The *APO07 - manage human resources*, describes necessary activities to create an appropriate staffing, identifying the key personal and their skills, evaluating the employee's performance to understand how they can be developed.

Talent Acquisition - Acquire the best talent, regardless the organization bond. The implementation of strong networking systems that contribute to identify the talent.

TB4 - After analysing the talent needed, the *EDM04 - ensure resource optimization* promotes actions to acquire the best talent corresponding to the business and IT needs.

TB12 - From the *APO07 - manage human resources*, it is possible to understand how to acquire the best talent, from the identification of the gaps in the organization to an effective process of recruitment.

Work optimization - Integrate deeply in the business processes the email and messaging. Unified conference technologies and social networks support the specialist net in the organization:

TC26 - the *BAI08 - manage knowledge* recommends creating an efficient and agile way to transmit important information with the less misunderstanding possible.

Digital Transformation mentality - Create quickly and frequent changes. The teams must reorganize to achieve the organizational success

TD9 - For the digital transformation mentality the *APO04 - manage innovation* is a critical procedure because it creates practices to create and maintain an innovative environment, adapting quickly and effectively to new changes.

TD12 - When managing the human resources, the *APO07 - manage human resources* recommends the evolution of the personnel, keeping a knowledge sharing environment and keeping training programmes so that everyone can follow the digital transformation rhythm.

OPERATIONAL MODEL

	Maturity Matrix	O - Operational Model
		A - Product and services connectivity B - Active connectivity C - Process coactivity D - Decision making E - Organization structure
COBIT 5		
EVALUATE, DIRECT AND MONITOR (EDM)		
1 - EDM01 - Ensure governance framework setting and maintenance		OD1
2 - EDM02 - Ensure benefits delivery	OA2	OD2
3 - EDM03 - Ensure risk optimization		
4 - EDM04 - Ensure resource optimization		
5 - EDM05 - Ensure stakeholder transparency.		
ALIGN, PLAN AND ORGANISE (APO)		
6 - APO01 - Manage the it management framework	OA6	OD6 OEE
7 - APO02 - Manage strategy		
8 - APO03 - Manage enterprise architecture	OB9 OC9	
9 - APO04 - Manage innovation		
10 - APO05 - Manage portfolio		
11 - APO06 - Manage budget and costs		
12 - APO07 - Manage human resources		
13 - APO08 - Manage relationships		
14 - APO09 - Manage service agreements		
15 - APO10 - Manage suppliers		
16 - APO11 - Manage quality		
17 - APO12 - Manage risk		
18 - APO13 - Manage security		
BUILD, ACQUIRE AND IMPLEMENT (BAI)		
19 - BAI01 - Manage programmes and projects	OA19	
20 - BAI02 - Manage requirements definition		
21 - BAI03 - Manage solutions identification and build		
22 - BAI04 - Manage availability and capacity		
23 - BAI05 - Manage organisational change enablement		
24 - BAI06 - Manage changes		
25 - BAI07 - Manage change acceptance and transitioning		
26 - BAI08 - Manage knowledge		
27 - BAI09 - Manage assets		OD27
28 - BAI10 - Manage configuration		
DELIVER, SERVICE AND SUPPORT (DSS)		
29 - DSS01 - Manage operations		
30 - DSS02 - Manage service requests and incidents		
31 - DSS03 - Manage problems		OD31
32 - DSS04 - Manage continuity		OD32
33 - DSS05 - Manage security services		
34 - DSS06 - Manage business process controls		
MONITOR, EVALUATE AND ASSESS (MEA)		
35 - MEA01 - Monitor, evaluate and assess performance and conformance		
36 - MEA02 - Monitor, evaluate and assess the system of internal control		
37 - MEA03 - Monitor, evaluate and assess compliance with external requirements		

Table 6 - COBIT 5 governance practices to support the digital transformation – Operational Model

Product and services connectivity - To implement services and product in digital platforms that generate additional incoming:

OA2 - EDM02 - *ensure benefits delivery* gives directions to use the IT as a value to the company, creating new opportunities and guaranteeing the return on investment for the developments.

OA6 - The APO01 - *manage the it management framework* provides actions to guarantee the optimization of the IT in order to achieve the business objectives and generating revenues.

OA19 - The BAI01 - *manage programmes and projects* process identify activities that focus on planning, develop and monitor IT programmes, so that they can achieve goals in terms of risks costs, schedule and quality.

Active connectivity - To connect the actives with intelligence allowing them to adapt quickly to the operational circumstances:

OB9 - In order to create an active connectivity with flexible and adaptable support systems and to connect the actives with intelligence allowing them to adapt quickly to the operational circumstances, organizations can follow the APO03 - *manage enterprise architecture* to create a structure that standardize the architecture and creates solutions for the optimization of the IT systems.

Process connectivity - To normalize the processes with flexible and adaptable support systems:

OC9 – In order to achieve flexibility and adaptability to the support systems, APO04 - *manage innovation* encourage a quick response to change and a constant monitoring of the technology environment to that it can be easier to understand the gaps and how to prevent and resolve them avoiding obsolete systems.

Decision making - Create an integrated decision-making process supported by cognitive and analytic models:

OD1 - One of the main goals of EDM01 - *ensure governance framework setting and maintenance* is to create a strategic decision-making model for IT that is aligned with the organization strategy. For that it is necessary to guarantee a good communication, monitorization and reporting mechanisms, guarantying effective tools of analysis to help the decision-making.

OD2 - By the constant evaluation of the optimisation referred in EDM02 - *ensure benefits delivery* it is possible to evaluate if the IT portfolio are aligned with the company's objectives and if it delivers

value at a reasonable cost. Analysing those elements, it is possible to generate data reports that could help improving the decision-making.

OD6 - by establishing an organizational structure that reflects the organization objectives, *APO01 - manage the it management framework*, can enable management decision-making in the most effective and efficient manner.

OD27 - The *BAI09 - manage assets* provides actions to identify, manage and optimize the assets in a very effective way so that it can be a support to the IT decision-making process.

OD31 – When dealing with the necessity of a quick decision-making to solve implementation problems, the *DSS03 - manage problems* focus on the identification, diagnosis and resolution of problems, in a proactive way.

OD32 - The *DSS04 - manage continuity process* tries to define a continuity policy and continuity strategy aligned with the organization objectives, so that it is easier to keep the decision-making also aligned with the business objectives throughout the continuity of the processes.

Organization structure - To create an independent area focused on the investment and implementation of digital transformation

OE6 - To create and Organization structure, COBIT5 define the actions in the *APO01 - manage the it management framework* procedure where it advises the creation of and organizational structure that reflects the business needs and priorities.

INFORMATION

		I - Information				
		Maturity Matrix				
		A - Data discovery: Collection and data process	B - Value development: transformation of data into value	C - Value realization: monetization of data and information	D - Collaboration and knowledge sharing	E - Information architecture
COBIT 5						
EVALUATE, DIRECT AND MONITOR (EDM)						
1 - EDM01 - Ensure governance framework setting and maintenance						
2 - EDM02 - Ensure benefits delivery						
3 - EDM03 - Ensure risk optimization						
4 - EDM04 - Ensure resource optimization						
5 - EDM05 - Ensure stakeholder transparency.						
ALIGN, PLAN AND ORGANISE (APO)						
6 - APO01 - Manage the it management framework						
7 - APO02 - Manage strategy						
8 - APO03 - Manage enterprise architecture						
9 - APO04 - Manage innovation						
10 - APO05 - Manage portfolio						
11 - APO06 - Manage budget and costs						
12 - APO07 - Manage human resources						
13 - APO08 - Manage relationships						
14 - APO09 - Manage service agreements						
15 - APO10 - Manage suppliers						
16 - APO11 - Manage quality						
17 - APO12 - Manage risk						
18 - APO13 - Manage security						
BUILD, ACQUIRE AND IMPLEMENT (BAI)						
19 - BAI01 - Manage programmes and projects						
20 - BAI02 - Manage requirements definition						
21 - BAI03 - Manage solutions identification and build						
22 - BAI04 - Manage availability and capacity						
23 - BAI05 - Manage organisational change enablement						
24 - BAI06 - Manage changes						
25 - BAI07 - Manage change acceptance and transitioning						
26 - BAI08 - Manage knowledge						
27 - BAI09 - Manage assets						
28 - BAI10 - Manage configuration						
DELIVER, SERVICE AND SUPPORT (DSS)						
29 - DSS01 - Manage operations						
30 - DSS02 - Manage service requests and incidents						
31 - DSS03 - Manage problems						
32 - DSS04 - Manage continuity						
33 - DSS05 - Manage security services						
34 - DSS06 - Manage business process controls						
MONITOR, EVALUATE AND ASSESS (MEA)						
35 - MEA01 - Monitor, evaluate and assess performance and conformance						
36 - MEA02 - Monitor, evaluate and assess the system of internal control						
37 - MEA03 - Monitor, evaluate and assess compliance with external requirements						

Table 7 - COBIT 5 governance practices to suport the digital transformation – Information

Data discovery: Collection and data process - To have a real-time data discovery of information of all the resources including data, tools and competences:

IA19 - the COBIT5 describes *BAI01 - manage programmes and projects* as a process to manage all the processes, creating programmes and projects structured to create the most valuable way to collect and process data.

Value development: transformation of data into value - the information must be a differentiating factor being able to suggest decision options using prescriptive analytics:

IB7 - to help the transformation of data into value for the business, the *APO02 - manage strategy* guarantee the identification of the strategy objectives and requirements in order to create strategic plans and road maps so that the IT investments ensure a value return.

IB34 - The *DSS06 - Manage Business Process Controls* intends to control the information processing to guarantee that the information is valid, complete, accurate and secure.

Value realization: monetization of data and information - Understand and measure the value of the information:

IC7 - *APO02 - manage strategy*, after understanding the enterpriser direction, recommends to define the IT capabilities defining the IT objectives and creating a strategic plan so that the IT brings return on investment.

IC11 - The *APO06 - manage budget and costs* mention activities that focus on control, monitor and manage the investments, costs and budgets, to bring more profits for the organizations.

Collaboration and knowledge sharing - Implement the collaboration a knowledge sharing in real-time:

ID26 - the procedure *BAI08 - manage knowledge* where it demonstrates the best ways to share the knowledge in as efficient and effective way.

Information architecture - The information architecture sustains the digital transformation supporting a vast set of dynamic functionalities of volume, velocity and variety:

IE8 - The *APO03 Manage Enterprise Architecture* promotes the use of an enterprise architecture covering all the domains and aligned with the business needs. With the creation of this architecture it is possible to define guidelines and standards improving the quality of the information.

4.3. DISCUSSION AND ANALYSIS

As it is possible to see from the matrix created there are several enabling processes from the COBIT5 that can help organisations in terms of digital transformation.

The framework in his study is a guiding object thru the digital transformation when it comes to the maturity level.

A company dealing with this process might need to know its maturity in terms of digital transformation, and for that it can use the IDC maturity matrix.

After analysing the level of maturity of each dimension it is possible to understand the most developed dimensions and the ones with a lower level of maturity.

To increase the level of maturity for a certain area the framework can be used to search in COBIT5 what are the principle procedures that can assure the enhancement of the maturity in a particular dimension.

Taking for example an organization with a level Opportunistic for Leadership, AD-HOD for Talent Hiring, and Managed for Omni experience Operation Model and information, it would be possible to see that the principal focus should be the Leadership and the Talent Hiring, so for that the organization should use the framework in those two dimensions and consult the COBIT5 for the processes referred. For these processes the COBIT 5 define metrics, activities and inputs and outputs that help achieving their purpose.

To increase the maturity of leadership as the matrix refer COBIT5 should be consulted at the procedures EDM01 - ensure governance framework setting and maintenance, EDM02 - ensure benefits delivery, EDM05 - ensure stakeholder transparency, APO02 - manage strategy, APO04 - manage innovation, APO05 - manage portfolio and APO06 - manage budget and costs. For those procedures, COBIT5 define for example activities like: allocate responsibility, authority and accountability (EDM01), Define a balanced set of performance objectives, metrics, targets and benchmarks (EDM05) or establish and maintain practices for financial planning, investment management and decision making (APO06)(ISACA, 2012a).

If a dimension to grow in terms of maturity is the Omni-Experience, the procedures of COBIT5 do follow would be APO01 - manage the it management framework, APO02 - manage strategy, APO04 - Manage Innovation and APO08 - manage relationships where are suggested activities like Create an environment that is conducive to innovation (APO04) or Understand technology trends and new technologies and how these can be applied innovatively to enhance business process performance (APO08) (ISACA, 2012a).

It terms of Talent Hiring the most important procedures to follow according to the matrix are EDM04 - ensure resource optimization, APO04 - manage innovation and APO07 - manage human resources

and BAI08 - manage knowledge where COBIT5 suggests activities like fine the principles for guiding the allocation (EDM04) , define the required and currently available skills of the resources (APO07) or Identify potential knowledge users by knowledge classification (BAI08) (ISACA, 2012a).

If an organization is trying to increase the maturity level of Operational model, some of the procedures to follow are EDM01 - ensure governance framework setting and maintenance , EDM02 - ensure benefits delivery, APO01 - manage the it management framework, APO03 - manage enterprise architecture, BAI01 - manage programmes and projects, BAI09 - manage assets , DSS03 - manage problems and DSS04 - manage continuity implementing activities like Establish the involvement of stakeholders who are critical to decision making (APO01) or Identify internal and outsourced business processes and service activities that are critical to the enterprise operations (DSS04) (ISACA, 2012a).

At least if the lower level of maturity is related to information, the procedures to follow are BAI01 - manage programmes and projects, APO03 - manage enterprise architecture, APO02 - manage strategy and DSS06 - manage business process controls that proposes activities like: maintain an architecture repository containing standards (APO03) or Maintain the integrity and validity of data (DSS06) (ISACA, 2012a).

This framework do not intend to replace the COBIT5 but to be a matching guide to the processes, and for that the actions to take were not mentioned, these are small examples of what COBIT5 may offer to increase the maturity level, nevertheless there was the necessity to refer some of them in order to explain the framework use.

Nevertheless this matrix has some pros and cons. As a benefit is can be used by everyone has a starting point in the governance of the digital transformation because it brings a simple way to understand what to search in COBIT5 to increase a maturity level, in the opposite side, for time issues it was not possible to validate the matrix to see its usability on site, so it is possible to be a start but not the only point to achieve a better level in terms of maturity.

In order to increase the discussion relevance of the created framework it was established some talks with Bruno Horta Soares. Bruno is one of the greatest experts in Governance in Portugal specially in COBIT and IDC Digital Transformation Strategy by working currently as governance advisor in IDC and being the president of ISACA which is direct related to COBIT5 (Soares, 2018).

As it is possible to see by his work, Bruno have knowledge in both studied frameworks and that was the main reason to choose his opinion about this framework.

After a dialog with Bruno Horta Soares about the usability of the matrix it was perceived that this matrix could be a help for companies dealing with digital transformation as a starting point and that it would make sense to compare both of the frameworks, nevertheless it might have some concept issues because the COBIT5 is focused essentially in the information dimension of the maturity matrix and not on the other four dimensions.

However, from the study perspective, to deal with the information management and governance it is important to deal with all the other dimensions along the way, for that, this framework must be analysed by focus on each dimension from the Information governance point of view, and not by the dimensions independently so it may have the correct application.

5. CONCLUSION

5.1. SUMMARY OF THE DEVELOPED WORK

This study attempts to understand what are the principle dimensions for IT governance that IDC maturity matrix for digital transformation have defined and how their high level can be achieved thru the use of the COBIT5 framework.

In the first place it was necessary to understand what IT governance is and how it can help companies to bring the organizations value thru IT implementation and development.

To implement IT governance there are several frameworks that can be studied, but for this specific case there were two main objects that were studied: IDC digital transformation maturity matrix and COBIT5.

For each it was necessary to study what are their concepts and how they can help companies to understand how to deal with IT.

Taking the IDC matrix dimensions (Leadership, Onmi-Experience, Talent Hiring, Operational model and Information) it was created a framework that validates what are the COBIT5 IT related goals and the procedures that help to achieve them, helping an organization to grow in the maturity of a specific dimension.

This, creates a guide that can be used by users dealing with digital transformation as a help to provide a first path to follow after discovering the company maturity level.

5.2. LIMITATIONS

The study of IT governance in digital transformation have an enormous scope, so, for the purpose of this study it was necessary to reduce the scope.

By choosing the maturityscape dimensions and the COBIT 5 framework to compare it is possible to create a guide for companies to see what are the most important procedures to follow in COBIT5, in order to achieve a better digital transformation maturity.

As it was previously referred, this is a guide may have some concept issues because the COBIT5 is mostly focused on the Information dimension. However, it is possible to create a useful matrix when looking to all the dimensions at the information management level.

The framework created was not validated on site because a digital transformation process it is very complex and it occurs itself along the time, so it is not possible to have a defined and exact understanding if following the procedures would increase the maturity of the company ate a high level.

At last it is important to understand that every company has different conditions and environments and for that reason it is impossible to generate a closed and fixed guide.

5.3. FUTURE WORK

As it was possible to see there are several limitations for this study, so the future work should focus especially in closing the limitations gaps.

In terms of scope, it could be analysed more frameworks like ITIL or CCMI to understand the best practices of all, in order to achieve the best level of digital transformation maturity.

When it comes to validation this work should be tested in various companies with different maturity levels in order to understand if it is possible to increase the maturity level following this directions.

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