Internal Financial Control Assessment
Applying Multilingual Ontology Framework

Proceedings of the MONTIFIC Project at the Conference of
"The Current Financial Crisis and Competences to
Address Problems on the European Market"

organized by the
Budapest Business School

together with the
European Qualification and Certification Association

Budapest, 30 September - 1 October 2010

Leonardo da Vinci Innovation Transfer Project
Multilingual ONTology for Internal Financial Control (‘MONTIFIC’)
LLP-LDV-TOI-2008-HU-002

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Preface

Dear Reader,

We present this book with a great pleasure as a proceedings material of the closing conference of the MONTIFIC project co-funded by the European Commission between 2008 and 2010. This two-day conference is organized together with the European Certification and Qualification Association (ECQA) in Budapest from 30 September to 1 October 2010 under the title of “The Current Financial Crisis and Competences to Address Problems on the European Market” and hosted by the project leading partner – the Budapest Business School.

The topics of the conference days are going around the relevance of good governance and innovation practices necessary for survival in turbulent economic conditions. The speakers are highly reputed experts from many different domains, representing wide range of organizations from public sector to automotive industry, from large companies to small enterprises. During the conference the attendees receive information about the most recent outcomes of the European funded MONTIFIC and DEUCERT projects supporting European level learning services for increasing human capabilities of innovation and governance. This book contains the MONTIFIC related keynote speeches and 6 relevant articles presenting different aspects of using multilingual ontology for internal financial control such as developing and applying new assessment methodology in governance domains supported by ontology based multilingual terms in training, examination and working environments.

Some words about the MONTIFIC - Multilingual ONTology for Internal Financial Control” (LLP-LDV-TOI-2008-HU-002) EU Leonardo da Vinci innovation transfer project:

Traditional e-learning and knowledge management contents developed by previous EU projects often succeeded in their primary user communities directly influenced by the core development groups, however wider exploitation barriers have been identified, such as lack of terminology based multilingual support and communication gap between the formalized knowledge representations and the external wider users of the information and communication systems implementing this ontology.

The use of terminology and ontology interoperability framework by the multilingual information resources of the “Internal Financial Control Assessor” training, certification and implementation processes ensures that the basic methodology standards concerning information activities are kept in order to achieve re-usability of data and interoperability of data structures in localized professional vocational training and workplace environments.

The added values of this innovation transfer are the wider European language and geographical coverage of information systems supporting the EU Certification processes relevant for Europe-wide approval of the “Internal Financial Control Assessor” diplomas, and the wider number of regional and sectoral communities directly participating in work-place based e-learning and knowledge sharing of internal financial control best practices.
This project was enhancing the “Internal Financial Control Assessor” training programme, which was developed by a previous Leonardo da Vinci pilot project during 2005-2007, by implementing a terminology and ontology interoperability framework for achieving the following specific objectives:

- Facilitating local training providers (trainers) and trainees in using their own languages based on multilingual ontology,
- Involving European Certification and Qualification Association for providing online exams and certification programme in more local languages,
- Supporting certification holders (assessors) and wider potential user communities by utilizing common knowledge (terminology) in different countries and working environments,
- Further developing multilingual e-content tools based on the terminology and ontology interoperability framework (online learning, certification and assessment portals).

The terminology experts analysed the existing training materials at the beginning of the project, and made suggestions of how multilingual learning contents (skill cards, COSO-based process reference model, glossaries, multiple choice questions) should be restructured for implementation into Learning Management System (Moodle) and Self-Assessment and Exam Portal.

The terminology and ontology interoperability model for “Internal Financial Control Assessor” has been implemented by the LMS (Moodle) portal. Ca. 500 terms of financial control assessment and the COSO-based internal control process categories, processes, outcomes and base practices are available in e-learning environment as multilingual (EN, ES, GE, HU and RO) glossary items automatic linked to learning contents with cross-references. Self-assessment and Exam Portal – operated by the ECQA - has been further developed to provide language selection options for the user interface and testing. Language of the multiple choice questions can be changed even during performance of the exam-tests.

Training materials using the multilingual ontology based resources (www.training.ia-manager.org) have been used to perform local trainings, self-assessments and exams by using e-learning and exam portal. Exams have been certified by the European Certification and Qualification Association (www.ecqa.org).

Parallel to the ontology development, the core methodology concept of “Governance Capability” used by the “Internal Financial Control Assessor” trainings were further developed and received international recognition by professional organisations like the Institute of Internal Auditors (IIA) and the Information Systems Audit and Control Association (ISACA).

Hereby we would like to thank to our distinguished guest speakers that they accepted our invitation to the conference and the contributions of our project partners to the success of the MONTIFIC project.

Dr. József Roóz  
rector emeritus  
Budapest Business School  
MONTIFIC Programme Director

János Ivanyos  
managing director  
Memolux Ltd.  
MONTIFIC Project Coordinator
Possibilities, Responsibilities and International Trends of Auditing in Autumn 2010

Keynote Speech of

Prof. Dr. habil. Árpád KOVÁCS, PhD
President of the Hungarian Economic Association

Ladies and Gentlemen,

Dear Colleagues,

I wish to thank you for the invitation to attend this conference, even if I am not the president of the State Audit Office of Hungary anymore. I trust that I deserve the invitation and will be able to contribute to the creative work of your conference by some ideas concerning the wider connections of auditing.

Many identify financial audit with its direct, vulgar – error detecting, correction and sanctioning – goals, although the contextual goal of this work, in a rule of law is far more than this; it certifies, convinces that the financials of a business organization, an entity carrying on budgetary management or even of the government, are in order, are secure, or not, and if it is necessary, are able to generate changes, on the level of the whole system of the state. Moreover, it is also its purpose to predict the risks of the financial management and thus be able to fulfil an early warning function. This has special meaning in light of the worldwide financial crisis of 2008. The early warning function at the same time also presumes that the management has the pretence and the ability to adapt these warnings in its actions.

I mentioned this in anticipation because it is getting more and more obvious that the financial crisis did not start – neither in the world, nor in Hungary - in the fall of 2008, rather this was the date when the building tension exploded like a lightening. In the western world, but especially here, in Hungary the gap between the social-economic output and the public finance expenditures, as the trend of indebtedness indicated, has started much earlier. At the most we ignored the signs and our power often has run only as far as curtailing the expenditures – occasionally even in a self-mutilating way - with delay and out of necessity. Amendments of acts serving „transparency” and „accountability”, the strengthening of the supervision of the financial sector became important only when the „house was already on fire”. It is an empiric fact that all these steps can become conscious, modernizing acts that fit the trend only if they are ensuring the perspectives of the framework of functioning and the stability of the rule of law.
Thus, today we should adequately solve two tasks at the same time:

- To make such damage-mitigating steps that later on fit in, or at least won’t stall progression on the one hand, while creating the conditions of a much more conscious action that would meet the adaptation requirements of an after-the-crisis world, on the other hand;
- To elaborate and adopt an economic policy that would mitigate the losses that had resulted from the financial crisis, in a way that creates a perspective possibility of preventing repetition, of a new decline, as well the possibility of growth.

Constraints that resulted from globalization and regionalization, the protection of the value of human existence, the cooperation of governmental, municipal organizations and of the private sector, the conglomerate of civic relations, the utilization of supports of international sources has established the tissue of risk-communities, spanning borders, ownership forms and, first of all, social strata. I believe that the society – and I would emphasize all over the world – accepts more and more that it is not only the „national” purse that is important, but its interests would demand that this would be valid everywhere; that both public and ‘private funds’ were spent as efficiently as possible, as – and we have witnessed this – the stumbling of the private sector is also able to demolish the solid positions of the public sector. It is also natural that the need for new economics, a governmental attitude that would be able to integrate the efficient operation of the public finance, of the real economy, crisis management and prevention, sustainable development, as one of the most significant challenges of our era, and social responsibility was also born.

The want of common security and the character of the difficulties that can be overcome only by international cooperation have resulted in having a certification issued by independent – federal or EU level – control bodies in respect of the payments of the member-states, of the accountings within the Union, as well as of the regular and efficient utilization of the common resources and, additionally, that the international financial institutions would continuously get an idea about the trend of the processes. Without these the functioning of the correction mechanisms, the handling of problems that aligns to the new „situation” and the prevention of the escalation of local troubles would be unimaginable.

Ladies and Gentlemen,

Fulfilling the above requirements is influencing the conception of the ‘mission’ of the public financial control system. Namely, it is obvious that handling the dilemmas that resulted from the crisis, the quick and occasionally panic reactions, the disrupted decision-making levels or their respective teetering, that are attached to handling the difficulties or that are referring to them, even themselves are not favourable for the well balanced organizations operation. They are raising the chances of committing errors, omissions. Laying out that very important line that is related to revealing and fixing the deeper reasons would become more difficult. In other words, the importance (as well as the difficulty) of identifying: what is originating from lack of abilities, from trepidation that can be traced back to the pressures of the „situation”, from failing to recognize the „bad” and the „worse”, or – in the field of experienced facts – what is that can be traced back to sinful omission, to the using the situation for proving self-interest or possible corruption, to conscious misuse. Under these circumstances, the appropriate interpretation and the enforcement of „austerity” are especially important and belong to the essence of the rule of law. This should not mean anything else then the consequent prevailing of the law, of social interests. And when there is a discrepancy, then rapid correction and the initiation of sanctions proportionate to the offence and – especially the consistent enforcement thereof - are necessary.

Such changes should be enforced in the way audit organizations organize their work, in capacity investment and in a given situation also in strengthening the questioning character of their work. I emphasize that this is not about the enforcement of „austerity” that is subjective and erodes objectivity, rather about the fact that the intensifying disorder of the socio-economic functions requires changing the work concept of the audit organization. In other words: „maintaining order” demands more force and is necessary.
Keynote 1: Possibilities, Responsibilities and International Trends of Auditing in Autumn 2010

Namely, under the circumstances of economic crisis the tasks of the state are becoming wider, not only because it needs to manage its operation, aligned with the new, changing circumstances, economically, by causing the least social and provision losses; it also has to mitigate the economic effects of the crisis as well. The regulatory and economy organizing role of the state gets reinforced.

Under the circumstances of lack of resources the fact that the functioning of organizations is marked out for providing the society, reacts to the output of the market sector and their economic and efficient financing frees resources for the economy is becoming a fact of specific interest. The governance, directing, jurisdictional, information and economic management mechanisms, institutions (public fund managements) that fulfil a decisive role in shaping the potentials of the economy are functioning within public finance. The state is exercising its economy influencing (crisis mitigating) function also when it directly orders various goods, services from the private sector, with the purpose of contributing to its sponsored developments, investments, thus its orders usually get reflected also in the trends of the GDP. Nowadays the use of public funds has no boundaries – in more than one sense. This calls for the audit of the total procedure of the utilization, independently also from the fact, who is technically responsible for the development, for the service, because the responsibility for the provision, for the functioning of the financial-economic operation always remains the responsibility of the state. Attention should be paid to ensuring that the lines between the public and private sectors should not be permeable one way, namely only in the direction of the „public”.

Under the circumstances of the crisis it is an especially valid theorem that the condition of staying in competition – of survival – is the ability to conform, the right reaction to the new challenges. The international requirements concerning financial audit, the reality of transparency and accountability that is spanning borders requires more in a world fighting the difficulties of the changing paradigms than the mere development of audit techniques and on this basis the even more consistent, very significant „direct setting of things right”: revealing, correcting and sanctioning errors. It is becoming more and more a basic requirement that it should transcend regularity and efficiency audits and those, focusing on a single institution; that it should move, to a greater extent, in the direction of audits analyzing the output of big systems. All this would also mean that the evaluation of the governance and control systems, control mechanisms themselves and the development of related audit techniques will gain special importance. The development of innovative abilities, more specifically the utilization of resources applied for innovations and the monitoring of the performance manifested in this are also important, new fields of the audit.

Ladies and Gentlemen,

I could go on listing the fields where the changes in our days, the new requirements, the exceeding of traditional solutions and retracing the former borders of auditing are requisites.

However, the essence is that such changes should also mean the protection of values and the audit should be able to offer a picture on the efficiency of the individual, complex field of social task provision as well as the influencing factors, the connections in the background, the security risks of the functioning, for example, the effectiveness of the problem-handling of fiscal governance-management and the level of the utilization of financial resources used for this purpose. Based on its extensive and institutionalized experience, it should be able to carry on risk analyses regarding all the factors that might be threatening the achievement of both the revenue and expenditure sides of public finance. It should participate in developing the harmonization of problem-handling and the efficiency of the financial management. Certain decision making, management and control functions are being shifted above the level of nation states and this is getting institutionalized in respect of cooperation fulfilment criteria, tasks and organizations alike. In the political system of nation states belonging to a given block, the common substantial and formal traits get in the foreground, occasionally by prescribing the employment of procedural standards and those related to the sphere of authority, and thus derogating certain elements, of the national sovereignty.

As a consequence of the standardization processes that can be expected to gain momentum in the word, basically two development tendencies are emerging in the field of financial audit that are showing phasing tendencies:
Keynote 1: Possibilities, Responsibilities and International Trends of Auditing in Autumn 2010

- on the one hand, the role of the so-called supranational financial control organizations has been growing. These organizations carry on activities similar to the national financial control entities, only on global level;

- on the other hand, national financial audit systems keep undergoing significant changes both in the field of organization and in regard of the goals and methods of the audits.

Dear Colleagues,

We could witness that the basic processes of our era have deeply concerned the whole of the audit profession. While the differences regarding competences and tasks remain also typical, the need for basic standardization – the approaching of major goals, principles, standards and techniques - and the systemic approach of superimposition is emerging more and more emphatically.

I am convinced that the socio-economic goals and processes for all of us determine the tasks we should perform on organizational, national and international levels, in order to identify the strategy, the identity and mission concept of the financial audit organizations.

The competitiveness of a country can be measured only in the context of the development of the rest of the countries and the performance of the public sector – and within this that of the financial audit – can be interpreted only in such comparison. Exploiting the advantages that can be reached through globalization and regionalization, the socio-economic development, the bridging of the gap specifically to the developed nations is unimaginable in a duality where real economy is flourishing, while state governance, public administration – the public sector and public finance – are functioning stodgily, their performance is low and public life is frustrated. In a market economy, no matter how desirable the principle of the independence of the entrepreneurial sector, its own assumption of risk, its limits are basically determined by public governance and regulation; in other words the comprehensive control system of the state. The results and errors of the functioning of the state organization are directly and immediately reacting to the real economy while indirect effects characteristically emerge in the long run, in fields where it is even less possible to measure by parameters. Such is, for example, the trust of the citizens that means mobilizing force, the sense of security, the ability to become one with the goals, the increase of the number of children, the longer and healthier human lifespan and knowledge that as a result of their synergy, finally and repeatedly get reflected in the bigger and more competitive performance of the business sector.

In the course of the past decade, in the developed world we have witnessed the so far unprecedented renaissance of the state as an actor, of the emergence of the cooperating state. Naturally, financing public finance has also undergone a transformation and this requires that the responsible management modernized the governance and regulatory, as well as the control mechanisms, not only in respect of the public sector and of the public finance but also in respect of the private sector.

One of the starting points of the contemporary approach of auditing is that let it be either the realm of the entrepreneurs or that of the state activities, errors, and irregularities, weak performance, finally can be traced back to the deficiencies of internal control. Thus, the substance, the focal points of the control system are following the new and newer economic and social challenges. The eternal question is: what should we focus on; the relatively easy to identify institutional errors or the weaknesses of the professional preparation of governmental or municipal decisions and the revealing of the subsequent risks. When the system of goals of governance, the experiences concerning the self-assurance, the consistency, the general financial security are encouraging, the control obviously should be focusing, first of all, on revealing and preventing internal anomalies of the institutional system, of financial management. If this is not the case and the security of the financial matters are threatened by the functioning of the macro economy and the zigzags of governance and, if the mandated auditing organization would not focus on the weaknesses of the preparation of governmental, municipal professional decision-making and the revealing of the ensuing risks, it would mean the averting of the responsibility for the society. This would be the case even if it is obvious that the political preparation of choosing of scripts for governance actions, but especially the direct establishment of the related decisions and
governmental measures, fall outside the sphere of authority of a supreme audit institution. However – on the basis of its experiences – it is already the responsibility of the given SAI to tell what kind of risks it has detected, where it deems it necessary to introduce corrections. It should be able to offer a picture of the factors that influence the efficiency of the individual, complex fields of social provision, of the relations in the background, for example the effectiveness of the fiscal management-governance regarding problem-solving and about the effectiveness of the utilization of financial resources used for this purpose. It should make risk analyses concerning all the factors representing danger for the realization of the revenues’ and expenditures’ sides of public finance; it should participate in the development of the harmonization of problem handling and of the efficiency of financial management.

The leading financial audit institutions of the world are fit not only to „keep order” and initiate corrections for the audited entities, rather give signs concerning the whole of public finance about the security of finances and of the economy, or just about the involved risks but, because of their reliable, well balanced functioning they are also qualified for becoming means of creating public trust and stabilizing forces of the society. Thus, the activities of the auditing organizations represent a significant stabilizing force, not merely within the borders of the given country but also in international relations that prove the effectiveness of the fiscus and the credibility of the activities carried out there. On the one hand, they are competing directly with each other, as the good reputation of the given institute; its qualifications and sovereignty are tools of enforcing their respective interests. On the other hand, indirectly, because their work is part of all the success and difficulties any given country can show up.

When looking at the main trends and directions of the development in more detail we can see that at the fora of INTOSAI and EUROSAI, that both rally supreme audit institutions, or even at the fora of the International Federation of Accountants or the Institute of Internal Auditors, the professional opinion leaders are looking for answers to the question, what are the tasks, the needs that demand development of faculties in respect of all the elements of the audit system, as a result of the changes going on in the world and within this the global economic crisis, the climate change, the aging of the society, the risks in the field of finances threatening security at the level of households and – last but not least – the changes within the EU, the trends of EU policies and the development in the field of IT.

The articulate division of the spheres of authority, the clear division of labor, the coordination of the work, the development and harmonization of the procedural methods of the territorial (regional, provincial, etc. depending on the state organization), national and international (federal) audit institutions by making these methods portable, are becoming a requirement. The so-called „joint” audits, as well as the „parallel” audits on the basis of the same audit program but carried out separately, on bilateral or multilateral basis, between national SAIs respectively the European Court of Auditors, serve the purpose of cooperation, „synchronization”, transparency and creation of trust.

Nevertheless, practically the whole of the methodology gets arranged anew. In essence financial-regularity audit is switching over to the employing of the international accounting standards that has been adapted to the public sector. While contemporary financial-regularity audits certifying the reliability and the credibility of the accounting, performance audits should become suitable for providing economic evaluations that are employing ever more complicated, scientific research, prognoses, even ethical qualifications when monitoring the performance of big systems. The so far bipolar system is expanding and the type of the so-called compliance audit also emerges. The need to step up against factors that might hinder the observance of the law and legal security, thus fighting corruption get in the foreground with special emphasis.

I would stress that even the cooperating state requires the technical, methodological convergence of auditing, let it be the internal control of the organizations of public finance or of private enterprises, the audit of private ventures, or the audits and advisory role of the supreme audit institution of the public sector. Thus, with a little exaggeration, developments targeted to audit techniques and responding to the question „how”, are pointing in the direction of uniformity in respect of comparability and „portability”.
Contrarily, answers that could be given to the question „what” that would be referring to the subject, the range and internal contents of the audit, should reflect the variety created by the peculiarities of the given country, its social structure, the operational mechanisms of the state organization, its topical problems.

The strategies are alloying this duality and in this dimension the emerging successes or failures are influencing the position, the transmission potential and the state of acceptance of the individual elements and of the whole system itself. Eventually, that to what extent can it be of use for the given country.

Namely, the performance of the audit system, in a wider sense, serves „good governance”, the basis for what is governance on the basis of the law, public administration the well-known pillars of what are reliability-legal security, transparency and openness, accountability and efficiency. Moral issues and following ethical values are closely related, so it is not by chance that there is need for supervising the ethical character of finances that does not work without social, civilian participation and abilities to cooperate. The creative support of international professional communities, the fora offered by workshops connected to audit institutions with a variety of spheres of authority, professional associations and workshops related to higher education institutes or those working outside this circle – like the present conference – cannot be over-estimated and are especially important also from such aspect.

Thank you for your attention.
Governance Practices of Supporting Innovation

Keynote Speech of

Mr. Zsolt MONSZPART
General Deputy President of the Hungarian Association for Innovation

Mr Chairman, dear Guests,

It is a great honour for me to address the Montific-ECQA conference on behalf of the Hungarian Association for Innovation.

We heard recently from professor Árpád Kovács about the role, extended responsibility of government in the global financial & economic crises. How the government is expected to change the attitude. What is the proper way of stimulating the economic growth of a country.

The mission of the Hungarian Association for Innovation is to support companies – including members of global, multinational companies and as well SME-s – in realizing economic growth through innovation. We firmly believe innovation is “The Motor” of economic growth.

In my presentation I will focus on corporate governance and the role of government. I will stage positive and practical examples from Hungary – supporting corporate governance with direct and indirect methods in order to strengthen innovation.

Corporate governance depends on - first of all

1. The culture and practice of the companies. But there are a lot of other determining factors influencing the current performance of a company.

And the other major factors influencing the company’s performance are the

2. government and the financial and regulatory system in a country, stability and transparency, accountability of the regulatory system, such as taxes, availability of funds, supports, subsidies, flexibility / rigidity of administration, - what are the bureaucratic barriers to be overcome –

3. legal framework (such as how to protect IPR, register patents, etc). Intellectual property rights provide an important incentive to invest in innovation by enabling firms to recover their investment costs. IPRs should be well protected and appropriately enforced. They contribute to the creation of innovation and are important for diffusing knowledge and creating value.
Keynote 2: Governance Practices of Supporting Innovation

4. output of the education system (schools, universities)

5. spirit / approach of innovation – innovation is a way of thinking, it is an approach of management, attitude,

6. role of media – what examples are broadcasted in TV, radio, what stories / examples are discussed in the electronic media, internet, blogs, chats, etc.

Let us talk about the corporate governance at first. What does it mean? Responsibility of management - definition started from the stock exchange registered companies. Purpose: provide information to shareholders, describe the responsibility of directorate and the operative management, internal control processes, plan the incentive system of the top guys, etc. In the definition I would like o lift in company culture and ethic.

OECD & EU guidelines have been started to be elaborated in early 2000, after – among others - the Enron scandal.


Laws on anti-money laundering, rules on cross-border mergers, recommendations on remuneration issues were formulated by the best financial experts and managerial gurus. We have seen the funding of European Corporate Governance Forum.

All the major global players started to change the internal control systems / processes. It became obvious, that the ISO, Props, TQM, benchmarking, International Financial Reporting Standards (IFRS) and other buzz words were not sufficiently protecting the interest of shareholders, were inefficient in providing real time information and indicating economic / financial threats and risks. Plenty of consulting companies made an outstanding business in advising and guiding corporate top managements in formulating new ways of managing financial risks, controlling processes, validating figures in monthly reports etc.

Hundreds of millions of USD-s have been spent on software and trainings globally at corporate headquarters and local rep offices. CEO-s and managing directors learned which bottom to push at the end of the month. Have been real value added delivered? The capability to control processes has been really increased? Can we calculate the ROI of these investments? Is there a correlation between the price and value delivered? It is very difficult to judge. Nevertheless without these reactions the vulnerability of the companies would be definitely much higher during the recent crises.

Do not forget the additional effect: after the Sarbanes-Oxley law, we have seen new business moral was born. One could see new Code of business ethics everywhere signed by each and every employee, trainings about business ethics, management workshops aiming better awareness of business ethic. That is why we state the corporate governance is much more than pure process regulation. There is a lot of value added.

Without going into details I underline such new rules as the members of the board of directors should be independent from the stake owners. What are the pros and contras of such a regulation? Definitely a professional manager group serves better the shareholders interest in case they are independent and are allowed to be outspoken. This is the long term interest of the shareholders as well.

The Goal of corporate governance is to increase the efficiency by applying not only the laws and regulation, but the spirit of the regulation, the long term interest of owners.
Due to Globalization:

- Different actors with different national, cultural & religious background fight for their own identity. The economic decisions are firmly influenced by cultural & religious effects.
- The variety and number of different stakeholders is increasing, their interest is differentiated and expectations to be met are high.
- New institutions of governance ought to support the increased efficiency demand.
- The decision makers have to respect business ethic.
- Corporate social responsibility is not only „slide-ware” but one of the major components of governance.

I would like to talk about the role of government in formulating the economic regulatory system of a country and its effect on the corporate governance.

Entrepreneurial activity and innovation tend to be closely connected with each other, innovation driving firm creation and firm expansion, while entrepreneurial dynamism fosters market, product, process, and organizational innovations. In case of Hungary, the link between these two co-dependent variables is surprisingly asymmetrical. Vibrant firm creation has co-existed with a low level of innovative activity as measured by standard indicators such as patents, publication counts and in-house product and process innovations. Innovations based on own R&D efforts are low. At 1% of GDP, R&D intensity is low by international standards. Experience in other countries has shown that the capacity to absorb foreign best-practice technology and organization not only depends on FDI, but also upon the scale of domestic R&D intensity. Moreover, Hungary’s R&D spending is highly skewed, private R&D efforts being strongly concentrated in rich regions where large enterprises are located such as Budapest. In contrast, innovative medium-sized firms are virtually non-existent.

Lifting “excluded” firms in the lower-tier economy out of economic inefficiency requires a broad set of framework conditions to be established. These include transportation facilities, education and training opportunities as well as a network of standardized business development centres specialized in giving business advice to small and micro firms. Non-R&D based innovations (wider ICT diffusion and larger supplies of collateral-free micro finance) are known to be efficient in stimulating firm creation and firm expansion in the lower-tier economy.

The upper-tier economy requires collaborative solutions of a different kind, favouring R&D based innovations through intense interactions between research and business communities. The strategy of collective efficiency views social capital as a vital innovation asset, improving SME access to financial resources, infrastructure and knowledge services. This approach emphasizes the use of externalities and joint action by ministries, public institutions, social partners, groups of firms, universities and research institutions in the domain of local business programmes. Technological co-operation between large firms is quite advanced, knowledge transfers between enterprises and universities are sparse due to limited mobility between academia and industry. The innovative momentum depends very much upon the interaction between research institutions, universities and the business community. The regulatory system should encourage the economic actors for cooperation.

The Hungarian Association for Innovation made a survey among the biggest companies and one of the most important outcome of the survey was: the accountability of the regulatory system (tax climate) is more important for a company than the decrease of taxes. An other complain of the actors of the Hungarian economy is the level of bureaucracy and the time consuming character of the public administration. Before July the 1st 2010 there have been more than 50 different taxes, duties and levies to be paid by an SME in Hungary. A lot of administration increased the costs of a company, hundreds of statistical reports, data are to send each and every month to the authorities. In case of public procurement much more documents and stamps from “notarius publicus” are needed in Hungary than in Austria or Germany. The burden of bureaucracy is tremendous and the SME-s are suffering a lot. The new government promised to decrease this
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kind of administration. The government should rather support the increase of the value added activity of a company instead of demanding unnecessary bureaucracy.

The legal framework (among others IPR) is also very important from the view point of the spirit of innovation. In case there is a lot of additional cost and administration to be managed in the patent registration process, it is decreasing the speed of innovation. In Hungary the patent registration process has got a user-friendly character and I am glad to report you a very positive change compared to the situation 10 years ago. There is still plenty place for improvement among SME-s to give enough focus on patenting and registering IPR-s.

The Hungarian school and education system used to have an outstanding performance a couple of decades ago. Today the situation is a bit different. The speed of change in the industry is much higher than the change in the output of the education system. The industry is not satisfied neither with the structure, nor the quality of the competence level of the recently released students. Since 10 years there is a tremendous lack of engineers, IT experts and teachers of natural sciences.

Hungarian Association for Innovation was funded 20 years ago. Today we have more than 400 members. The government and state agencies are inviting the leaders of the Association for discussions about planned changes in the regulatory system. We are very proud about our status and we work with our experts in order to support the legislative work of the government and raise the professionalism of the new regulation, governmental decrees.

Our mission is to create a more innovation-friendly regulatory system, where the enterprises face less barriers during the innovation processes and can afford to think long term and invest in innovative solutions.

What are the major achievements of the dialog with the government? One of the most prestige full achievements is the Innovation Contest and the Innovation Award handed over in an esteemed ceremony in the beautiful building of the Parliament every year. The winner delivers the greatest economic value (increased sales) and the most innovative product according to the evaluation of a respectful jury.

There is a law (Nu 40) accepted by the Parliament in 2003 about the Innovation and on other one about the financing of the Innovation Fund. Each and every company employing more than 50 persons ought to pay 0.3 % of the net income into the Innovation Fund. The government is duplicating the Fund with the same amount (as the total payment of the companies in a given year) from the state budget. The Innovation Fund is the financial bases of tenders and applications promoting the innovation activity in the country. There are different goals and purposes to be reached and different terms and conditions in the application system. There are some changes after the evaluation of the system every year.

Hungarian Association for Innovation has got a country-wide network. Our experts provide different services to the member companies. We arrange competitions, enhance applications for entrepreneurs, involve young students, we do everything in order to make the spirit of innovation more well-spread and encourage innovation.

Summary:

Innovation is increasingly needed to drive growth, employment and improve living standards. Innovation is a way to enhance competitiveness, diversify the economy and move towards more high value added activities. The crisis has only served to underscore the need for innovation as a way to provide new solutions. While expenditure cuts are needed, governments must continue to invest in future sources of growth, such as education, infrastructure and research. Cutting back public investment in support of innovation may provide short-term fiscal relief, but will damage the foundations of long-term growth. Public investment in basic research, in particular, provides the seeds for future innovation. There is considerable scope to improve the efficiency of the Hungarian government spending and innovate in the delivery of public services. Reforms of education and training systems and public research institutions can help increase returns from public
investment in innovation. Moreover, many policy actions that can help strengthen innovation do not require additional or significant public investment. Structural policy reforms of the framework conditions that support innovation, such as the removal of regulatory barriers to innovation and entrepreneurship, including administrative regulations, as well pro-growth tax reforms, can do much to strengthen innovation and growth. Human capital is the essence of innovation. Empowering people to innovate relies on broad and relevant education.
Chapter 1: Governance Capability Assessment: Using ISO/IEC 15504 for Internal Financial Controls and IT Management

Governance Capability Assessment: Using ISO/IEC 15504 for Internal Financial Controls and IT Management

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Abstract: Internal and external audit standards (like IIA and ISA) recommend system based evaluation of existing internal controls against internationally recognized control frameworks like COSO (Internal Control – Integrated Framework) [3] and COBIT (Control Objectives for Information and related Technology) [4]. The contents of these frameworks are applicable to set up Process Reference Models in compliance with ISO/IEC 15504-2 requirements.

The COSO and COBIT based Process Reference Models associated with the process attributes defined in ISO/IEC 15504-2 provide a common basis for performing assessments of process capability regarding internal controls and reporting of results by using a common rating scale. ISO/IEC 15504 offers not only transparent method for assessing performance of relevant internal control processes, but also tools for assessing control risk areas based on the gaps between target and assessed capability profiles.

Audit standards define assurance and consulting engagement types of audit work similarly to the process capability determination and process improvement contexts of ISO/IEC 15504 process assessment. Using COSO or COBIT descriptions for process dimension and ISO/IEC 15504 measurement framework for capability dimension provides common methodology for all parties responsible for implementing and monitoring internal controls even at different operational units of an organization. Mapping target capability profiles to business objectives also helps to put internal controls into the perspectives of Enterprise Risk Management (ERM).

1. Evaluating Internal Controls against Governance Frameworks

Corporate Governance is the totality of principles aligned with the shareholders’ interests, which strive for transparency and a well-balanced ratio between leadership and control, whilst retaining decision-making ability and efficiency at the highest level of the company. Internal control system integrated with enterprise risk management includes the policies, procedures, practices and organisational structures, designed to provide reasonable assurance that business objectives will be achieved and that undesired events will be prevented or detected and corrected.
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Regulatory requirements like the Sarbanes-Oxley Act for US SEC registrants and their affiliates (all over the world), the Basel II framework, the Company Law in the EU, the European and national directives for governmental and public sector organizations, etc. require not just the implementation of risk management and internal control systems based on internationally recognized frameworks, but also the periodic disclosure of effectiveness conclusion performed by the executive management. However some of these regulations are still limited to financial reporting, the global crisis showed that wider focus of risk management and internal controls has real business value. In the past 5 years many-many thousands of such periodic assessments were performed worldwide in industry, financial and governmental sectors and the regulators are keen to further develop mandatory rules and guidelines increasing stakeholder’s benefit from disclosures.

The global crisis also reminds that many former periodic assessments concluding positive opinion on effectiveness of internal controls were failed at those companies, where the insularly used economic models for risk assessment were not aligned with the time horizon of the strategic business objectives. Accountability of executive management and oversight boards should be established and supported by using integrated assessment models applicable for both operational and financial processes. Those assessment models which can cover the most activity areas relevant for strategic objectives have added value to line managers, executive management, internal and external auditors and oversight bodies, as they help to optimize monitoring efforts of different operations based on common measurement of achieving objectives.

Major governance scandals, independently from the recent global financial and economic crisis, call the attention that not only the basic business operations (production, sales, supply chain, etc.) need to be assessed, audited or certified to the conformance with specific standards, but all the governance related processes. The Satyam case shows that even those big IT companies, which are committed to quality and process improvement issues, can fail to avoid governance breakdowns such as fraudulent financial reporting.

Taking a more in depth look into the reasons as to why corporate governance has failed in recent years, it can be concluded that these are primarily due to shortcomings in risk management and internal control. Within the context of corporate governance, management therefore needs to concentrate above all on the optimisation of operational processes by improving monitoring and controls.

Risk management and control frameworks contribute to improve corporate governance by principles-based reference models, good practices and evaluation methods.

Process capability and organizational maturity issues have come into the view of the management as the huge cost of regulatory compliance activities request consideration of sustainability and added business value of such efforts. This challenge has been answered by utilizing the ISO/IEC 15504 process assessment standard (also called as SPICE) [1] and its evaluation model concept applicable for the executive managers, the boards of directors, the audit committees, the internal and external auditors and the supervisory bodies for assessing the effectiveness of internal controls even in different business units and activities, IT management and financial reporting processes.

The term of “Governance SPICE” refers to the assessment of Governance, Risk Management and Internal Control processes and is based on different concepts:

- Corporate Governance Principles (OECD)
- Recognized Control Frameworks (COSO & COBIT)
- Risk Tolerance and Risk Appetite (as of COSO ERM)
- Performance Measurement (as of COBIT)
- Organizational Maturity (ISO/IEC TR 15504-7:2008)
Internal and external audit standards (like IIA and ISA) recommend system based evaluation of existing internal controls against internationally recognized control frameworks like COSO (Internal Control – Integrated Framework) [2] and COBIT (Control Objectives for Information and related Technology) [3]. The contents of these frameworks are applicable to set up Process Reference Models in compliance with ISO/IEC 15504-2 requirements.

The COSO and COBIT based Process Reference Models associated with the process attributes defined in ISO/IEC 15504-2 provide a common basis for performing assessments of process capability regarding internal controls and reporting of results by using a common rating scale. ISO/IEC 15504 offers not only transparent method for assessing performance of relevant internal control processes, but also tools for assessing control risk areas based on the gaps between target and assessed capability profiles.

Audit standards define assurance and consulting engagement types of audit work similarly to the process capability determination and process improvement contexts of ISO/IEC 15504 process assessment. Using COSO or COBIT descriptions for process dimension and ISO/IEC 15504 measurement framework for capability dimension provides common methodology for all parties responsible for implementing and monitoring internal controls even at different operational units of an organization. Mapping target capability profiles to business objectives also helps to put internal controls into the perspectives of Enterprise Risk Management (ERM).

Quality requirements of the international internal and external audit standards force to evaluate the assessment skills, procedures and practices of the auditors/audit departments in making opinion about the internal controls of the audited organization. The proposed training scheme of Governance SPICE also offers transparent ways to auditors/audit departments for acquiring relevant skills and knowledge.

2. ISO/IEC 15504 Process Assessment (SPICE)

Process Assessment Model

An integral part of conducting an assessment is to use a Process Assessment Model (PAM) constructed for that purpose, related to Process Reference Model(s) (PRM) and conformant with the requirements defined in ISO/IEC 15504-2. ISO/IEC 15504-2 provides a framework for process assessment and sets out the minimum requirements for performing an assessment in order to ensure consistency and repeatability (objectivity) of the ratings.

ISO/IEC 15504-2 requires that processes included in a Process Reference Model satisfy the following:

"The fundamental elements of a Process Reference Model are the set of descriptions of the processes within the scope of the model. These process descriptions shall meet the following requirements:

a) A process shall be described in terms of its Purpose and Outcomes.

b) In any description the set of process outcomes shall be necessary and sufficient to achieve the purpose of the process.

c) Process descriptions shall be such that no aspects of the measurement framework … beyond level 1 are contained or implied."

The Process Assessment Model expands upon the Process Reference Model by adding the definition and use of assessment indicators. Assessment indicators comprise indicators of process performance and process capability and are defined to support an assessor’s judgement of the performance and capability of an implemented process.
As Figure 1 presents, the Process Assessment Model defines a two-dimensional model of process capability. In one dimension, the process dimension, the processes are defined and classified into process categories. In the other dimension, the capability dimension, a set of process attributes grouped into capability levels is defined. The process attributes provide the measurable characteristics of process capability.

Figure 1: Components of ISO/IEC 15504 Process Assessment

**COSO based Process Reference Model**

The Process Reference Model, directly derived from the COSO 2006 Guidance (Internal Control over Financial Reporting — Guidance for Smaller Public Companies), has been used as the basis for the proposed Internal Financial Control Process Assessment Model.

This COSO based Process Reference Model (PRM) associated with the process attributes defined in ISO/IEC 15504-2, provides a common basis for performing assessments of internal financial control process capability and reporting of results by using a common rating scale.

The COSO 2006 Guidance provides a set of twenty basic Principles representing the fundamental conceptual processes associated with and drawn directly from the five components of the Internal Control - Integrated Framework. Supporting each Principle are Attributes, representing characteristics associated with the Principle.

The guidance says “although each attribute generally is expected to be present within a company, it may be possible to apply a principle without every listed attribute being present”. However, from common internal control assessment perspective we handle the Attributes “as process outcomes … necessary and sufficient to
achieve the purpose of the process” which described by the relevant Principle. During an assessment the assessor can judge whether a specific Attribute handled as necessary and sufficient process outcome in the PRM, is practically assessable within the context of the specific assessment scope (characterized by organization type, size, complexity, etc.)

Figure 2 presents how the content of the COSO 2006 Guidance can be used for mapping with PRM:

**Figure 2: COSO 2006 Guidance as source for the Process Reference Model**

The 20 internal financial control processes derived from the COSO 2006 Guidance that are included in the process dimension of the proposed Internal Financial Control Process Assessment Model, are listed below:

**Control Environment (CE)**

1. Integrity and Ethical Values (IEV). Sound integrity and ethical values, particularly of top management, are developed and understood and set the standard of conduct for financial reporting.
2. Oversight Board (OB). The board of directors and/or audit committee understand and exercise oversight responsibility related to financial reporting and related internal control.
3. Management’s Philosophy and Operating Style (MPO). Management’s philosophy and operating style support achieving effective internal control over financial reporting.
4. Organizational Structure (OS). The entity’s organizational structure supports effective internal control over financial reporting.
5. Financial Reporting Competencies (FRC). The organization retains individuals competent in financial reporting and related oversight roles.
6. Authority and Responsibility (AR). Management and employees are assigned appropriate levels of authority and responsibility to facilitate effective internal control over financial reporting.
7. Human Resources (HR). Human resource policies and practices are designed and implemented to facilitate effective internal control over financial reporting.
Risk Assessment (RA)
1. Financial Reporting Objectives (FRO). Management specifies financial reporting objectives with sufficient clarity and criteria to enable the identification of risks to reliable financial reporting.
2. Financial Reporting Risks (FRR). The organization identifies and analyzes risks to the achievement of financial reporting objectives as a basis for determining how the risks should be managed.
3. Fraud Risk (FR). The potential for material misstatement due to fraud is explicitly considered in assessing risks to the achievement of financial reporting objectives.

Control Activities (CA)
1. Integration with Risk Assessment (IRA). Actions are taken to address risks to the achievement of financial reporting objectives.
2. Selection and Development of Control Activities (SD). Control activities are selected and developed considering their cost and their potential effectiveness in mitigating risks to the achievement of financial reporting objectives.
3. Policies and Procedures (PD). Policies related to reliable financial reporting are established and communicated throughout the organization, with corresponding procedures resulting in management directives being carried out.
4. Information Technology (IT). Information technology controls, where applicable, are designed and implemented to support the achievement of financial reporting objectives.

Information and Communication (IC)
1. Financial Reporting Information (FRI). Pertinent information is identified, captured, used at all levels of the organization, and distributed in a form and timeframe that supports the achievement of financial reporting objectives.
2. Internal Control Information (ICI). Information used to execute other control components is identified, captured, and distributed in a form and timeframe that enables personnel to carry out their internal control responsibilities.
3. Internal Communication (IC). Communications enable and support understanding and execution of internal control objectives, processes, and individual responsibilities at all levels of the organization.
4. External Communication (EC). Matters affecting the achievement of financial reporting objectives are communicated with outside parties.

Monitoring (MO)
1. Ongoing and Separate Evaluations (OSE). Ongoing and/or separate evaluations enable management to determine whether internal control over financial reporting is present and functioning.
2. Reporting Deficiencies (RD). Internal control deficiencies are identified and communicated in a timely manner to those parties responsible for taking corrective action, and to management and the board as appropriate.

For the process dimension of the proposed Internal Financial Control Process Assessment Model, all the 20 internal control processes referred as Principles in the COSO 2006 Guidance, are included.

COBIT based Process Reference Model

The COBIT 4.1 definition of control processes is in compliance with the PRM requirements of the ISO/IEC 15504-2 as shown in Figure 3:
The proposed Process Reference Model includes processes, which are grouped in four process categories, identical to the control domains as defined in the COBIT framework. The processes included in the same category contribute to a complementary area. This categorization can also help assessors in defining the assessment scope in terms of process selection.

The 34 IT control processes derived from COBIT 4.1 are listed below:

**Plan and Organize (PO)**
- PO1 Define a Strategic IT Plan
- PO2 Define the Information Architecture
- PO3 Determine Technological Direction
- PO4 Define the IT Processes, Organisation and Relationships
- PO5 Manage the IT Investment
- PO6 Communicate Management Aims and Direction
- PO7 Manage IT Human Resources
- PO8 Manage Quality
- PO9 Assess and Manage IT Risks
- PO10 Manage Projects

**Acquire and Implement (AI)**
- AI1 Identify Automated Solutions
- AI2 Acquire and Maintain Application Software
- AI3 Acquire and Maintain Technology Infrastructure
AI4 Enable Operation and Use
AI5 Procure IT Resources
AI6 Manage Changes
AI7 Install and Accredit Solutions and Changes

**Deliver and Support (DS)**
- DS1 Define and Manage Service Levels
- DS2 Manage Third-party Services
- DS3 Manage Performance and Capacity
- DS4 Ensure Continuous Service
- DS5 Ensure Systems Security
- DS6 Identify and Allocate Costs
- DS7 Educate and Train Users
- DS8 Manage Service Desk and Incidents
- DS9 Manage the Configuration
- DS10 Manage Problems
- DS11 Manage Data
- DS12 Manage the Physical Environment
- DS13 Manage Operations

**Monitor and Evaluate (MO)**
- ME1 Monitor and Evaluate IT Performance
- ME2 Monitor and Evaluate Internal Control
- ME3 Ensure Compliance With External Requirements
- ME4 Provide IT Governance

For the *process dimension* of the proposed IT Control Process Assessment Model, all the 34 IT control processes referred by COBIT 4.1, are included. Each process in the Process Assessment Model is described in terms of a purpose statement. These statements contain the unique functional objectives of the process when performed in a particular environment. A list of specific outcomes is associated with each of the process purpose statements, as a list of expected positive results of the process performance.
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Capability Dimension of the Process Assessment Model

Figure 4 shows the relationship between the general structure of the ISO/IEC 15504-2 conformant Process Assessment Model and the COSO control processes (grouped into the 5 components).

Each process in the Process Assessment Model is described in terms of a purpose statement. These statements contain the unique functional objectives of the process when performed in a particular environment. A list of specific outcomes is associated with each of the process purpose statements, as a list of expected positive results of the process performance.

Satisfying the purpose statements of a process represents the first step in building a level 1 process capability where the expected outcomes are observable.

A capability level is a set of process attribute(s) that work together to provide a major enhancement in the capability to perform a process. Each level provides a major enhancement of capability in the performance of a process. The levels constitute a rational way of progressing through improvement of the capability of any process and are defined in ISO/IEC 15504-2.

Within a Process Assessment Model, the measure of capability is based upon the nine process attributes (PA) defined in ISO/IEC 15504-2. Process attributes are used to determine whether a process has reached a given
capability. Each attribute measures a particular aspect of the process capability. At each level there is no ordering between the process attributes; each attribute addresses a specific aspect of the capability level.

Figure 5: Process Attributes by capability levels

The process attributes are evaluated on a four point ordinal scale of achievement, as defined in ISO/IEC 15504-2. They provide insight into the specific aspects of process capability required to support process improvement and capability determination.

Figure 6: Four point ordinal scale for evaluating the achievement of process attribute

The Process Assessment Model is based on the principle that the capability of a process can be assessed by demonstrating the achievement of process attributes on the basis of evidences related to assessment indicators. There are two types of assessment indicators: process capability (generic) indicators, which apply to capability levels 1 to 5 and process performance (specific) indicators, which apply exclusively to capability level 1. The process attributes in the capability dimension have a set of process capability indicators that provide an indication of the extent of achievement of the attribute in the instantiated process. These indicators concern significant activities, resources or results associated with the achievement of the attribute purpose by a process.
Assessment indicators are used to confirm that certain practices were performed, as shown by observable evidence collected during an assessment. All such evidences come either from the examination of work products of the processes assessed, or from statements made by the performers and managers of the processes.

**Figure 7: Assessment indicators of ISO/IEC 15504**

### 3. Implementing Measurement Framework

**COBIT Performance Measurement**

Goals and metrics are defined in COBIT at three levels:

- **IT goals and metrics** that define what the business expects from IT and how to measure it
- **Process goals and metrics** that define what the IT process must deliver to support IT’s objectives and how to measure it
- **Activity goals and metrics** that establish what needs to happen inside the process to achieve the required performance and how to measure it

Figure 8 shows how COBIT links different level goals and metrics to support entity (or operational unit) level business goals, as outcome measures become performance drivers of upper level goals:
Setting Objectives: Risk Appetite and Risk Tolerance

In Enterprise Risk Management (ERM) terminology, the management considers risks strategy in the setting of objectives, such as:

- **Risk Appetite** of the entity - a high-level view of how much risk the management and the board are willing to accept.
- **Risk Tolerance** - the acceptable level of variation around objectives - is aligned with risk appetite.

In ISO/IEC 15504 terminology, the set of target process profiles expresses the target capability (measured via ratings of the process attributes), which the sponsor judges to be adequate to the organization’s business risk appetite and tolerance.

Entity or operational unit level objectives with their acceptable variations should be defined by using adequate metrics (indicators). Normally this is not difficult as business objectives of any organization or operational processes represent - easily quantifiable - value creation or protection.

However the quantification of risk appetite (crucial for risk management) is not evidential. The importance of the problem is derived from that risk appetite is the base for ranking risks during risk assessment for supporting the decision on selecting of the potential risk responses. If there are no objectively applicable
indicators of risk appetite for neither entity nor operational levels, then the next steps of risk management will be processed based on incidental, subjective decisions.

Enterprise Risk Management (like in the case of COSO ERM model) sets objective categories. The *strategic, operations, reporting (reliability) and compliance* objectives should be investigated through the achievement of business goals concerning either the organization (in ERM), or the operational units and processes (in case of integrated control systems, like COBIT or COSO). Though different (performance, IT or financial, compliance, etc.) audit types can be defined based on the objective categories, it is evident that these categories can exist only in interconnection. Next Figure presents how the interconnection of these objective categories can be underlined by ISO/IEC 15504 capability levels using the “outcome measures - performance drivers” relations from COBIT performance measurement concept.

![Figure 9: Measurement of COSO objectives by ISO/IEC 15504 capability levels](image)

One potential approach is that these objective categories are building on each other. Achievement of compliance objectives at operational (business) process level ensures that business activities are performed according to the prescribed or selected requirements of internal or IT controls. Objectives of reliable operation – like achieving goals of reliable reporting or IT operation - presume the fulfilment of the compliance requirements, so the entity’s risk appetite related to the operational (business) processes can be defined by using of the indicators of the compliance requirements.

The objectives of the effective and efficient operations *related to operational units* (achieving business goals) presume the fulfilment of reliable reporting and compliance requirements. At this level, the entity’s risk appetite can be prescribed by using the indicators of reliable reporting and compliance requirements.
Regarding the whole organization, the strategic objectives - broken down into defined business goals at operational unit levels – presume the fulfilment of effective and efficient operations, reliability and compliance requirements. For the whole organization, the entity’s risk appetite can be described by using the indicators of the prescribed effectiveness, reliability and compliance requirements for operational units, processes and business activities.

Notice the consequence of adapting risk management on internal or IT control system of the organization concerning the organization-level risk tolerance (acceptable level of variation around entity’s control objectives) and risk appetite: The risk appetite for organizational risk strategy can be described by using the indicators of the overall internal or IT control system requirements. So the consistent enterprise risk management presumes that the operation of internal or IT control system of the organization is measurable by adequate indicators. These indicators play roles in setting objectives regarding internal or IT control systems, as they are applicable for describing risk tolerances at defined levels. The indicators used for setting risk tolerance of lower level objective categories can be applied to define risk appetite of the next objective category level.

COBIT performance measurement also refers to the above approach as the outcome measure represents a performance indicator driving the higher-level business, IT function or IT process goal as shown on Figure 8.

In case of enterprise operation at less risk-awareness level, the strategic and business objectives are linked directly to business activities. In this case, there is no objectives (requirements) setting for the internal or IT control system, so not only the consequent adaptation of control and risk management frameworks become unrealistic, but the withdrawal of using objectively applicable risk appetite of the organization causes incidental and subjective decisions in ranking of risks related to business activities.

Applying the COBIT performance measurement concept to the ERM objective categories helps us to understand how the capability dimension of the ISO/IEC 15504 measurement framework is adaptable. The capability dimension provides guidance to set target capability profiles by the assessment sponsor, and gives effective tool to the management to identify, understand and manage control risk areas. Figure 10 identifies the applicability of the capability levels for the assessment of the COBIT-based IT control systems:

![Figure 10: ISO/IEC 15504 capability levels for assessing COBIT-based IT control systems](image-url)
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COBIT provides metrics only up to the IT goals. While they are also performance indicators for the business goals for IT, COBIT does not provide business goal outcome measures. That is one cause why applying the ISO/IEC 15504 capability dimension expands over the usability of COBIT maturity concept.

In COBIT, a generic definition is provided for the COBIT maturity scale rated from non-existent (0) to optimised (5), but interpreted for the nature of COBIT’s IT control processes, so a specific model is provided from the generic scale for each of the 34 processes. The achievement of the process attributes of ISO/IEC 15504 capability levels are measured by generic indicators from level 2, and those are independent from the nature of the assessed process. By this way the control processes from different domains specified by more than one Process Reference Models can be integrated into one Process Assessment Model. For example IT controls and financial controls can be evaluated together based on the same measurement framework of ISO/IEC 15504.

Governance Context of Capability based on COSO Frameworks

The 0-2 capability level attributes are focusing on the instance or activity views of the process (even if it operates at entity level), while from level 3 the attributes are focusing on the corporate entity aspects. This observation also helps to understand how the COSO Internal Control and Enterprise Risk Management (ERM) frameworks fit into the capability assessment model. As shown in Figure 11, the third dimension of the Internal Control framework is the Unit/Activity, while in ERM this is expanded into the corporate structure.

Figure 11: Activity (Instance) and Entity (Corporate) views within the dimensions of the COSO frameworks

Figure 12 shows that while the COSO Internal Control components are formulating the process dimension of the ISO/IEC 15504 conformant Process Reference Model, the ERM principles contribute to the set-up and usage of the assessment indicators measuring the achievement of the COSO objective categories through the ISO/IEC 15504 capability levels.
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Figure 12: ISO/IEC 15504 process assessment and the COSO frameworks

Mapping and applying the main objective categories of the COSO Internal Control and ERM frameworks into the capability dimension of the ISO/IEC 15504 measurement model provide guidance to set target capability profiles by the assessment sponsor, give effective tool to the management to identify, understand and manage control risk areas.

Figure 13 identifies the applicability of the capability levels to the COSO main objective categories:

Figure 13: Mapping ISO/IEC 15504 capability levels to COSO objective categories

Figure 14 presents the general concept of how the ISO/IEC 15504 capability measurement is applicable for assessing governance systems implementing the most acknowledged control frameworks such as COSO and COBIT. The presented 3 dimensions are those derived from the COSO enterprise risk management and internal control models:

- Management supervision and control of business processes and activities
- Governance processes supporting the design and operation of internal control system
- Objective categories measuring achievement of entity-level and operational goals
Achieving “Compliance” Objective at Performed Process (Level 1)

The achievement of the process performance attributes represents that the management has good understanding of the basics of the control requirements and the business activities are managed by keeping in mind the selected control framework(s) in an ad hoc base. There are evidences of achieving control process purpose, however not in a managed way.

At level 1 the internal control process exists and provides reasonable assurance to the achievement of all defined outcomes complying with the relevant external and internal regulations. At level 1 the (financial reporting) activities should be investigated, whether they proof the fulfilment of purpose and existence of the outcomes of the internal financial control process contributing to the compliance objectives of financial reporting (activities and controls).

Compliance objectives may refer to internal and external regulations or requirements. The description of internal financial control process - by the purpose statement and the outcomes - sets criteria for compliance with the relevant internal control framework (COSO) and contribute to the compliance with the regulatory requirements for internal controls over financial reporting (if applicable, like SOX or Basel II).

The level 1 assessment results are mainly usable in further process improvement context. Achieving Compliance objectives of all (relevant) control processes from the COSO based Process Reference Model provides good image and reputation of the management in both internal and external environments. However
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external bodies having wider scope than just verifying compliance of financial activities cannot utilize these results. For example: a chain of control/audit procedures cannot reuse the level 1 assessment results at different management levels, like in the case of complex organizational or operational structures.

Achieving “Reliable Reporting” Objective at Managed Process (Level 2)

This level represents that the Performed control process (already achieving compliance to COSO process requirements at level 1) is implemented in a managed fashion (planned, monitored and adjusted) and its work products are appropriately established, controlled and maintained. This level means that the achievement of the relevant goals of reliable reporting is evidenced in a traceable way (evidences are sufficient and suitable for external bodies).

Besides Level 1 achievements, the internal control process is managed and provides reasonable assurance to the achievement of the reliable reporting objectives. At level 2 the (financial reporting) activities should be investigated, whether the performance management and work product management indicators related to the internal financial control process are assessable as outcome measures of the reliability objectives of financial reporting (activities and controls).

Management of internal financial controls might be additionally evaluated by considering other relevant sources (like Corporate Governance Codes, Audit Standards, Recommendations and Guidelines).

At this level, the business activities are not only supported by comprehensive entity-level controls (as already resulted by level 1 achievements of the full set of COSO control processes). Moreover, the performance and work products of the financial control processes are appropriately managed even at process levels; also providing reusable evidences for wider scoped external or supervisory investigations. The lower control risk level resulted by level 2 achievements provides higher credibility of the results of all finance related business activities.

Complex institutional structures and business or programme/project activities in all sectors require Managed process capability level, which in case of financial controls contribute to the reliability of operations in such circumstances.

Achieving “Effective and Efficient Operation” Objective at Established Process (Level 3)

At this level the Managed process (already achieving compliance and reliable operation objectives at level 2) is implemented by using a defined process capable of achieving its process outcomes and the relevant business goals.

Besides Level 1 and 2 achievements, the internal control process is built into the operational processes and provides reasonable assurance to the achievement of the objectives of “Effectiveness and efficiency of operations”.

At level 3 the (financial reporting) activities should be investigated together with the organizational/entity level policies and procedures; whether the process definition and process deployment indicators are assessable as outcome measures of the operational effectiveness and efficiency objectives of financial reporting (at corporate levels).

Standardization is necessary for supporting measurement of operational effectiveness and efficiency, when evaluation is based on predefined comparable information.

The internal financial control process will better support the achievement of effectiveness and efficiency goals of operational units (effecting financial reporting objectives), if its design is based on Policies and Procedures consistent with the corporate structure and the entity’s risk appetite.
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The related business activities can be grouped into an optional process category to be assessed against the attributes of the Managed process level in advance. Without adding specific business context to the process dimension, level 3 type assessment of the full set of financial control processes has only limited additional value in comparison to level 2 achievements. As presented later, adding key controls to the process dimension represents specific implementation scope of the policies and procedures.

Setting different target levels for a subset of the processes from the COSO based Process Reference Model(s) can be also reasonable. Fulfilling level 3 process attribute targets at those processes which are not (necessarily) embedded into other business activities, together with level 2 results at some other control processes provides more reasonable assurance regarding the achievement of compliance (to COSO process requirements) and reliable reporting objectives. For example level 3 monitoring processes enhancing internal audit functions have real additional value for any type of organizations targeting lower capability levels for other financial control processes.

Level 3 achievements have some significant consequences. Firstly, this is the level where the process capability determination aspects of the ISO/IEC 15504 conformant assessment can be widely utilised by external parties for assurance purposes. Normally the standard policies and procedures at entity level are not divided or separated into different application areas; so different assurance activities (e.g. internal control, quality management, information system management, etc.) can apply for the same set of standards within an organization.

Secondly, this is the level where entity/organization level performance of the Related Business Activities can be assessed. It is a very important issue to define adequately the scope and coverage of standard processes, and how they facilitate embedding the outcomes of financial control processes into operational processes. Too complex scope and excrecent coverage can result too much cost of controls, high bureaucracy, inefficient usage of resources. If the scope and coverage is too narrow (e.g. limited to financial administration activities), the level 3 advantages do not fully prevail.

Thirdly, level 3 achievements represent the base for applying ERM principles. In this context, the range of the key control processes also influences the minimum scope and coverage of level 3 standardization. In context of ERM, the key controls are all those processes, which are necessary and sufficient for keeping business performance within a tolerable variance from business objectives. Key controls are either selected control processes from the basic set of the Process Reference Model or a subset of the relevant business processes operating at entity or even activity levels, with which the process dimension of the assessment model is necessarily extended.

Achieving “Strategic” Objective at Predictable Process (Level 4)

At this level the Established process (already achieving compliance; reliability; and effective and efficient operation objectives at level 3) operates within defined limits to achieve its process outcomes.

Besides Level 1, 2 and 3 achievements, the internal control process is incorporated into the enterprise risk management system and provides reasonable assurance to the achievement of the strategic objectives relating to high-level goals, aligned with and supporting the entity’s mission.

At level 4 the key controls should be investigated as an entity level key control (how applied in strategy setting and across the enterprise) within the entity level risk management, whether the process measurement and process control indicators are assessable as outcome measures of assurance regarding the entity’s strategic objectives of financial reporting.

Setting of level 4 target capability presumes that the concerning financial control process and/or the related business processes, where control outcomes are built in, comprise key control.
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“Key controls are those significant controls within our business processes, which if operating correctly will both ensure and give assurance that the organization is achieving its key business objectives” [4]

By customising the control objectives linked directly or indirectly to specific business objectives, the management will be able to adequately react to external and internal events representing inherent risks to finance related operation.

A key control exception can happen at any time (e.g. automated process is not working, inadequate segregation of duties is identified or loss contingency is realized, etc.). Achieving level 4 process attributes indicates that exceptions are handled within the accepted deviation (risk tolerance) at the settled risk levels (risk appetite) of the desired business objective. Financial impact shall be reasonably estimated and the resolution to the control exception shall be identified, scheduled and followed.

Evaluating Key Controls through the Supporting Internal Financial Control Processes

In case of extending the process dimension of the Process Assessment Model (based on the ISO/IEC 15504 requirements) by key controls as referred in context of the level 3 process capability, more practical advantages of applying ISO/IEC 15504 appear.

The key controls operating at entity, intermediate or activity levels having either direct or indirect relationship to the risk of material misstatement (as presented by the related IIA professional guidance [5]) can be described by purpose and outcome statements of conformant process definitions. Outcomes should be identical and unique for all processes, which help avoiding unnecessary overlaps of key controls’ objectives (in their documentation and test procedures). Outcomes (key control objectives) can be identified by the relevant financial assertions connected either to the significant accounts or to the material transactions flowing into the significant accounts.

Implementing a comprehensive set of internal financial control processes from the COSO based Process Reference Model contributes to the achievement of all process attributes up to level 4 at an entity level key control. The process performance (level 1) indicators, such as base practices and work products of the supporting internal financial control processes provide persuasive information for level 4 assessment of the key control processes.

4. Evaluating Control Process related Risk

The Control Risk Assessment performed on ISO/IEC 15504 conformant process assessment results, provides feedback to the management whether the existing gaps between the target and assessed capability profiles represent acceptable control risk level for the sponsor (“the individual or entity, internal or external to the organizational unit being assessed, who requires the assessment to be performed, and provides financial or other resources to carry it out” - ISO/IEC 15504-1, 3.13).

This approach provides more flexible and customisable method to evaluate the system of internal controls, necessary to define the coverage of the substantive examinations of the economy, efficiency and/or effectiveness of the organizations, activities, programmes or functions concerned.

ISO/IEC 15504 standard provides guidance on how to utilise a conformant process assessment within a process improvement programme or for process capability determination.
### Setting Target Capability

The sponsor should determine which processes from the selected Process Reference Model(s) are (most) important for the pre-defined requirements (Process Capability Determination) or business goals (Process Improvement). Also the sponsor should specify a target process profile, showing which process attributes are required for each selected process. Also the necessary rating for each process attribute should be given. Only ratings of “Fully achieved” or “Largely achieved” should be set. “Partially achieved” rating has no meaning to set, as this would indicate that the achievement would be unpredictable in some aspects. “Not required” should be noted for a process attribute taken to be unnecessary.

The set of target process profiles expresses the target capability, which the sponsor judges to be adequate (to the organization’s business risk appetite and tolerance). Table 1 presents example target and assessed process profiles for 5 selected sample Internal Financial Control processes:

<table>
<thead>
<tr>
<th>Process</th>
<th>Process Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Performed Managed</td>
</tr>
<tr>
<td></td>
<td>PA 1.1 PA 2.1 PA 2.2 PA 3.1 PA 3.2 PA 4.1 PA 4.2 PA 5.1 PA 5.2</td>
</tr>
<tr>
<td><strong>IFC.CE.IEV Integrity and Ethical Values</strong></td>
<td></td>
</tr>
<tr>
<td>Target</td>
<td>F L L</td>
</tr>
<tr>
<td>Assessed</td>
<td>F F L</td>
</tr>
<tr>
<td><strong>IFC.RA.FRO Financial Reporting Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>Target</td>
<td>F F F F F L L</td>
</tr>
<tr>
<td>Assessed</td>
<td>F F F L L L</td>
</tr>
<tr>
<td><strong>IFC.CA.PP Policies and Procedures</strong></td>
<td></td>
</tr>
<tr>
<td>Target</td>
<td>F F F L L</td>
</tr>
<tr>
<td>Assessed</td>
<td>F P L F L</td>
</tr>
<tr>
<td><strong>IFC.JC.IC Internal Communication</strong></td>
<td></td>
</tr>
<tr>
<td>Target</td>
<td>F F F F F</td>
</tr>
<tr>
<td>Assessed</td>
<td>P H H H H</td>
</tr>
<tr>
<td><strong>IFC.MO.RD Reporting Deficiencies</strong></td>
<td></td>
</tr>
<tr>
<td>Target</td>
<td>F F L L L</td>
</tr>
<tr>
<td>Assessed</td>
<td>L L L L L</td>
</tr>
</tbody>
</table>

**Keys**
- **F** Fully achieved
- **L** Largely achieved
- **P** Partially achieved
- **H** Not achieved
- Not required/assessed

*Table 1: Example target and assessed process profiles*
Gap Assessment

Process-related risk can be inferred from the existence of gaps between the target and the assessed process profiles.

The potential consequence of a gap depends on the capability level and the process attributes where the gap identified. Some Internal Financial Control related considerations and examples (by using the above example process profiles) are presented as follows:

Typical consequence of the gap at level 1 PA 1.1 Process performance attribute is that not all of the relevant process outcomes (Attributes of COSO Principles) are achieved, and no recoverable documentation exists to track the necessary control. E.g. Management communication to personnel in roles affecting financial reporting is not adequately documented, so updates on internal or external finance matters are not taken into consideration.

At level 2 PA 2.1 Performance management gap, the typical consequences are the missing deadlines, lack or inefficient use of resources, unclear responsibilities, uncontrolled decisions, etc. E.g. Management communication with oversight board or personnel is not planned or scheduled; the related management does not do deficiency disclosure in time; unauthorized decisions are done at period closing; policies and procedures are not under revision on a timely base.

At level 2 PA 2.2. Work product management attribute, the gap can cause unpredictable quality of reports, parallel entries and inconsistent documentation, increased rework cost, consolidation problems. E.g. Old versions of policies and procedures are also in use; identified exceptions are not communicated; internal communication is not filed in a systematic way.

At level 3 PA 3.1 Process definition gap, the consequences are that best practices and learnt lessons are not taken into account during revision of policies and procedures or the outcomes of the related control processes are not identical in the operational procedures. E.g. Missing or just formal description of internal communication procedures withhold staff members to use alternative reporting lines informing oversight board about material weaknesses or improvement suggestions.

At level 3, the PA 3.2 Process deployment gap can cause inconsistent applications of financial controls built into the operational procedures. Identified opportunities are lost due to inefficient deployment effort. E.g. The oversight board does not take the internal auditor’s consultative role and efforts seriously; the financial statement assertions are not properly linked to the business processes during risk assessment; information technology controls do not reflect adequately to the complexity of the IT environment.

At level 4 PA 4.1 Process measurement gap, the consequences are that the key controls are not properly identified, designed or operating in order to achieve process performance objectives and business goals or detect performance problems early. E.g. the resolution of key control exceptions is not covered in risk assessment.

At level 4 PA 4.2 Process control gap, the consequences are that the quantitative performance objectives and the defined business goals do not meet. E.g. Short monthly/yearly closing deadline can cause unpredictable materiality of accruals, management estimates and reserves.
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**Analysing Control Process related Risk based on Gap Assessment**

Annex A of ISO/IEC 15504-4 presents an example approach summarized below.

Process-related risk can be inferred from the existence of gaps between the target and the assessed process profiles. The potential consequence of a gap depends on the capability level and the process attributes where the gap identified.

The process attribute gap can be categorized into “None”, “Minor” and “Major” categories based on the distance of target and assessed ratings. E.g. one-step gap is evaluated as minor, two or more steps distance deems major gap in case of “Fully achieved” attribute target. At “Largely achieved” target even the one step distance (“Partially achieved”) means major gap.

The *probability* of problem occurrence is derived from the extent of process attribute gaps and from the capability level where they occur. Capability level gaps are categorized as follows:

<table>
<thead>
<tr>
<th>None</th>
<th>- No major or minor gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slight</td>
<td>- No gap at level 1, and only minor gaps at higher levels</td>
</tr>
<tr>
<td>Significant</td>
<td>- A minor gap at level 1, or a single major gap above</td>
</tr>
<tr>
<td>Substantial</td>
<td>- A major gap at level 1, or more than one major gap above</td>
</tr>
</tbody>
</table>

The process related risk depends on both the *probability* of problem arising from the identified gap and the potential *consequence*. In general the consequences depend on the capability levels where the gaps occur.

As it is shown in Table 2, the high risk arises from a major gap at lower capability levels.

<table>
<thead>
<tr>
<th>Consequence Indicated by capability level where gap occurs</th>
<th>Probability Indicated by extent of capability level gap</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Slight</td>
</tr>
<tr>
<td>5 - Optimizing</td>
<td>Low Risk</td>
</tr>
<tr>
<td>4 - Predictable</td>
<td>Low Risk</td>
</tr>
<tr>
<td>3 - Established</td>
<td>Low Risk</td>
</tr>
<tr>
<td>2 - Managed</td>
<td>Medium Risk</td>
</tr>
<tr>
<td>1 - Performed</td>
<td>Medium Risk</td>
</tr>
</tbody>
</table>

**Table 2: Risks associated with capability levels**

If risks are identified at more capability levels, then the highest risk measure shall be considered as the process related risk. Based on the presented approach risk analysis shall determine which process or processes represent the greatest degree of risk.
While the gaps between target and assessed profiles indicate the effectiveness of control design, the control process related risk measures the effectiveness of control operation, as shows the extent of risk that material loss or deviation from business objectives cannot be prevented or detected in time by the normal operation. Audit literature identifies ranking of control deficiencies concerning their business impact:

- **Control Deficiency**: Controls are not in place, or inadequate, or not being used
- **Significant Deficiency**: Deficiency in a significant control, or aggregation of deficiencies that could result consequential impact
- **Material Weakness**: Significant deficiency or an aggregation of significant deficiencies that preclude the entity’s internal control from providing reasonable assurance that material misstatements or any major “loss” will be prevented or detected on a timely basis by employees in the normal course of performing their assigned functions

High risk measure of internal control process represents reportable Material Weakness of the control system.

Based on the presented approach risk analysis shall determine which process or processes represent the greatest degree of risk. Tables 3-5 present examples of Internal Financial Control related risk assessment using example process profiles from Table 1, where the process profiles showed gap at 3 internal financial control processes:

- **IFC.RA.FRO** - Financial Reporting Objectives;
- **IFC.CA.PP** - Policies and Procedures; and
- **IFC.IC.IC** - Internal Communication

### IFC.RA.FRO - Financial Reporting Objectives

<table>
<thead>
<tr>
<th></th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 1.1</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>L</td>
</tr>
<tr>
<td>PA 2.1</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>L</td>
</tr>
<tr>
<td>PA 2.2</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>L</td>
</tr>
<tr>
<td>PA 3.1</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>L</td>
</tr>
<tr>
<td>PA 3.2</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>PA 4.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA 4.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Process attribute gap**: minor
- **Capability level gap**: slight
- **Capability level risk**: low
- **Process related risk**: low

*Table 3: Internal Financial Control related risk assessment example - 1*
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### Table 4: Internal Financial Control related risk assessment example - 2

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 1.1</td>
<td>PA 2.1</td>
<td>PA 2.2</td>
<td>PA 3.1</td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>F</td>
<td>L</td>
</tr>
<tr>
<td>Assessed profile</td>
<td>P</td>
<td>L</td>
<td>F</td>
</tr>
<tr>
<td>Process attribute gap</td>
<td>-</td>
<td>major</td>
<td>minor</td>
</tr>
<tr>
<td>Capability level gap</td>
<td>-</td>
<td>significant</td>
<td>-</td>
</tr>
<tr>
<td>Capability level risk</td>
<td>-</td>
<td>medium</td>
<td>-</td>
</tr>
<tr>
<td>Process related risk</td>
<td>medium</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 5: Internal Financial Control related risk assessment example - 3

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 1.1</td>
<td>PA 2.1</td>
<td>PA 2.2</td>
<td>PA 3.1</td>
</tr>
<tr>
<td>Target profile</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Assessed profile</td>
<td>P</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Process attribute gap</td>
<td>major</td>
<td>major</td>
<td>major</td>
</tr>
<tr>
<td>Capability level gap</td>
<td>subst.</td>
<td>substantial</td>
<td>substantial</td>
</tr>
<tr>
<td>Capability level risk</td>
<td>high</td>
<td>high</td>
<td>medium</td>
</tr>
<tr>
<td>Process related risk</td>
<td>high</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COBIT maturity model also allows benchmarking and gap assessment on control deficiencies. However the specific nature of maturity levels of each IT control processes doesn’t allow risk ranking of control deficiencies based on a generic model as of ISO/IEC 15504.

As presented in the previous part, internal control process related risk evaluation is based on the gaps between the target and the assessed process attribute ratings. Setting lower target capability for financial control processes is theoretically explainable if the inherent risk of the financial reporting activities with their related business processes is measured at very low level or the inherent risk is acceptable to fulfil regulatory compliance requirements. Otherwise level 2 capability target is the adequate requirement to assess control procedures against reliability objectives.
In more complex environment (featured by business type, size, sectoral regulations, etc.) the continual improvement of the governance and business administration processes is desirable. Assessing the integration of internal controls with business operations is necessary, when not only the reliability, accuracy and availability of the (e.g. financial) information are critical, but the effectiveness conclusion on the related operational processes or activities is also required. Assessing internal controls, together with the business processes where they are embedded, against up to level 3 process attributes is reasonable for the complex or multinational organizations, publicly listed companies under SOX regulation, financial institutes, and specific public service companies managing public funds.

5. Benefiting ISO/IEC 15504 Assessment Results

Process Capability Determination

The purpose of process capability determination (PCD) is to identify the strengths, weaknesses and process related risks associated with selected processes with respect to a particular specified requirement.

The terminology of “particular specified requirement” originally meant the supplier selection criteria. However the ISO/IEC 15504 standard approach is more generalized. The PCD assessment is somehow an extended compliance audit or review, where the specified compliance criteria are translated into target capability profiles of the selected processes. The difference from process improvement (PI) approach is that the PCD main goal is to identify the alterations and to determine the potential risks coming from alteration comparing to the pre-defined requirements.

Hereby some practical examples of different PCD sponsorship cases:

1. **Financial Statement Audit.** External financial auditor can use PCD results as sufficient competent evidential matter to design the nature and timing of the necessary substantive tests. Also the Audit Committee, which is responsible to engage and determine compensation of the external audit firm, can utilize PCD results to effectively negotiate the necessary audit effort and fee.

2. **SAS 70 Audit:** A SAS 70 audit or service auditor’s examination is widely recognized, because it represents that a service organization has been through an in-depth audit of their control activities, which generally include controls over information technology and related processes. In today’s global economy, service organizations or service providers must demonstrate that they have adequate controls and safeguards when they host or process data belonging to their customers. In addition, the requirements of SOX make SAS 70 audit reports even more important to the process of reporting on effective internal controls at service organizations.

3. **Evaluation of Internal Control Systems By Bank Supervisory Authorities.** State Supervisory Authorities responsible for finance sector has to set up evaluation methods applicable for different types of banking organizations.

4. **Managing and Monitoring EU Structural Funds.** Although the Structural Funds are part of the Community budget, the way in which they are spent is based on a system of shared responsibility between the European Commission and Member State governments. Verification of (operational and financial) control systems can be done by the Commission and/or by the State. PCD concept is applicable for both.
5. “Single Audit Model”. The single audit approach is based on sharing results and prioritising cost-benefit principles in order to minimise the duplication of control work, and maximise the level of control, which can be achieved with a given level of resources. Sharing well-defined and documented control information can permit reliance on controls at each level in the chain. A formalised assessment of costs and benefits at each level will enable the demonstration that the controls in place have optimised the residual risk of error in the underlying transactions.

Impact on Internal Audit Assignments

The IIA’s definition of internal auditing refers to "...bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes." This definition incorporates the broad advisory and assurance role that internal auditing can have regarding an organization's governance processes. Aspects of internal auditing’s role in governance are addressed in performance standard 2110 of the International Standards for the Professional Practice of Internal Auditing [6]:

The common interpretation of ISO/IEC 15504 capability levels and COSO objectives showed in Figure 13 provides an innovative method for internal auditors to implement the 2110: Governance standard. The Process Capability Determination (PCD) and Process Improvement (PI) context of ISO/IEC 15504 provides the effective tool for internal auditing having the following significant responsibilities in corporate governance activities:

- Performing assessments to provide assurance that governance structures and processes are properly designed and operating effectively.
- Providing advice on potential improvements to governance structures and processes.

Relevant guidance of internal audit engagements can be found in the The IIA’s International Professional Practices Framework [7].

Monitoring Internal Controls

As the COSO materials refer to the fifth component: internal control systems are monitored to assess the quality of the system’s performance over time. Monitoring is designed to ensure that internal control continues to operate effectively.

Using ISO/IEC 15504 process assessment principles and techniques contributes to the development of innovative approaches in monitoring the effectiveness of internal controls in the following aspects:

- Providing Assessment Model for internal control components and key controls by using the COSO based Process Reference Model.
- Offering tools for internal control risk assessment supporting the communication of internal control weaknesses and the considerations of necessary corrective actions.
- Focusing on specific and generic assessment indicators applicable for compliance, reliable reporting, operational effectiveness and strategic objectives.
- Applying assessment indicators for collecting evidences from business activities and entity/corporate levels, as well.
- Differentiating “internal controls” as a system from the underlying “control activities” as the object of monitoring.
- Linking operational effectiveness considerations of business processes to the achievement of internal control and risk management objectives.
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The outcomes (Attributes) of the “Financial Reporting Information” and “Internal Control Information” processes (Principles) of the Information and Communication component ensure that the suitable and sufficient information are available as persuasive evidences for concluding on effectiveness of internal controls.

Systems based Audit Approach

Traditional interpretation of systems based auditing is driven by the actual systems in place and controls are related to these. It assumes that the systems in place cover all risks and frequently relies on “internal control questionnaires”, that is standard documents used every time an audit is carried out. Risk based auditing experts call the attention of the dangers of these questionnaires comparing them to risk based approach [8]:

- The questionnaires can be incomplete. In particular, they might not check the management of all significant risks.
- Since many are not linked to risks, there is no indication as to the importance of the test and the consequence if the control tested is found to be ineffective.
- They can lead to a ‘box ticking’ exercise by staff anxious to hit the budgeted time, without gaining an understanding of what they are doing. In this way, major risks, which are not being managed properly, may be missed.
- They don’t encourage management to identify and control their risks.

Mapping and applying the COSO IC and ERM main objective categories into the capability dimension of the measurement framework can avoid these potential drawbacks. Targeting capability profiles by the assessment sponsor gives effective tool to the management to identify, understand and manage control risk areas. By achieving level 4 attributes for selected internal control processes and key controls, management can implement risk management principles in a cost effective way.

The proposed assessment model, consisting both process and capability dimensions, enforces not only the simple usage of the “internal control questionnaires” and checklists, but also considering the relevant set of the assessment indicators. Keeping the standard requirements of the ISO/IEC 15504 conformant assessment process helps to implement this advanced measurement concept into the internal and external audit procedures standardized by different ways in different sectors. The control risk assessment method derived from ISO/IEC 15504 provides an adequate tool for avoiding traditional drawbacks of systems based auditing.

Applying Organizational Maturity Model for Internal Controls

Organizational maturity is the extent to which an organization consistently implements processes within a defined scope – derived from the specified Process Assessment Model(s) - that contributes to the achievement of its business goals. The new part of the ISO/IEC 15504 standard defines a measurement framework for the assessment of organizational maturity. Within this measurement framework, each level of organizational maturity is characterised by the demonstration of achievement of specified levels of process capability in process sets drawn from the specified Process Assessment Model.

In case of completing the basic process set of the Internal Financial Control Process Assessment Model (based on the ISO/IEC 15504 requirements) by key controls more practical advantages of applying ISO/IEC 15504 appear.

The key controls operating at entity, intermediate or activity levels having either direct or indirect relationship to the risk of material misstatement) can be described by purpose and outcome statements of conformant process definitions. Outcomes should be identical and unique for all processes, which help avoiding unnecessary overlaps of key controls’ objectives (in their documentation and test procedures). Outcomes (key
control objectives) can be identified for example by the relevant financial assertions connected either to the significant accounts or to the material transactions flowing into the significant accounts.

The key control processes - defined based on the ISO/IEC 15504-2 requirements - can be added to the basic process set for the organizational maturity model ensuring the achievement of level 1 (basic) maturity. The basic process set should include a minimum set of key control processes, together with additional and optional processes determined by the organizational context for the assessment.

The new organizational maturity concept can be used for further developing internal control evaluation tools, for example defining element(s) of the extended process set ensuring the achievement of the level 4 (predictable) organizational maturity in order to establish and maintain the quantitative understanding of the performance of the organization’s key control processes through measurement and the use of appropriate quantitative techniques to ensure that performance of the organization’s implemented key control processes support the achievement of the organization’s relevant business goals.

The organizational maturity concept with its customization options such as definition of basic and extended process-sets including the minimum, additional and optional categories determined by the organizational context for the assessment, provides wider applicability of the ISO/IEC 15504 standard in new domains, such as IT management, internal controls and enterprise risk management, where relevant processes are assessed through different governance views or dimensions.

Evaluating Effectiveness of Internal Controls

Effectiveness conclusion is based on whether the implemented key controls (together) provide reasonable assurance that the organization achieves its business objectives within tolerable limits. The level of assurance depends on the risk-taking philosophy of the organization, however in case of internal controls over financial reporting, the regulatory and accounting requirements force executive and financial management minimizing those risks that may cause material misstatements in financial reports and other disclosures. The accounting and auditing literature provides detailed guidance on materiality issues, however materiality can be easily understood by simply applying the risk tolerance terminology of risk management: any deviation exceeding the pre-set tolerable limits regarding objectives should be considered as material.

Developing and assessing the necessary and sufficient set of key controls should follow risk-based and top-down approach. Effective design and operation of the internal control system presume that all risks, which can have material (more than significant) effect on business objectives, are responded in a cost effective way, so the applied set of key controls ensures that the probability of a material deviation from objectives (like misstatement in financial report) is remote or the consequence of a control deficiency (even considered its cumulative effect) remains within tolerable limits.

The key controls are operating at entity, intermediate or activity levels, and can have either direct or indirect relationship to the risk of material error. The outcomes of the 20 internal financial control processes of the COSO based Process Reference Model provide evidences that key controls are designed by applying risk management and internal control principles and also indicate that key controls are operating at predictable (level 4) capability. Furthermore, some of the 20 internal financial control processes can be also implemented as entity-level key controls based on circumstances.

ISO/IEC 15504 conformant process assessment includes not only traditional testing of key controls, such as walkthroughs confirming adequacy of documentation and design, examination of related documents confirming consistent performance, etc., but it results in inputs for effectiveness considerations. The Process Assessment Profiles are used for making opinion about the effectiveness of control design, namely in what extent the design of controls meets the organizational risk appetite represented by the target control process capability profiles. Additionally the proposed ISO/IEC 15504 based Control Risk Assessment provides
practical tool for judgement about the effectiveness of control operation, whether the assessed process capability profiles of the key controls constitute reasonable assurance concerning achievement of related business objectives, such as the (low) control process related risk levels represent remote likelihood that material errors in financial statements and disclosures will not be prevented or detected on a timely basis.

The proposed Process Assessment Model is directed at assessment sponsors (executive managers) and competent assessors (auditors) who wish to select and implement a model, and associated documented process method, for assessment for either capability determination (assurance audit engagements) or process improvement (consulting audit engagements). Additionally it may be of use to developers of assessment models in the construction of their own model, by providing examples of good control and management practices.

In this context the different terminologies used for compliance (or regulatory), financial and performance audits can be mapped to the capability dimension of the COSO based Process Assessment Model. In some regulatory circumstances compliance requirements measured at level 1 also enforce fulfilment of level 3 (operational) process attributes for a well-defined set of processes from control activities. The nature of similar overlaps in objectives of different audit types can be explained and understood by using ISO/IEC 15504 process assessment principles and techniques.

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ISO/IEC 15504-2:2003/Cor 1:2004

- Internal Control — Integrated Framework (1992)

[3] COBIT - Control Objectives for Information and related Technology,
COBIT 4.1 © 2007 IT Governance Institute. www.itgi.org


The COSO based process assessment principles presented in this paper were used for development of the integrated “Governance SPICE Assessor” and “Internal Financial Control Assessor” Skill Cards and the related training materials of the “Certified European Internal Financial Control Assessor” programme including adaptation of the Principles, Attributes and Approaches of the COSO 2006 Guidance as agreed with the COSO Board for Spanish, German, Romanian and Hungarian translations.

During the Montific project the LMS (Moodle) portal has been restructured based on the learning ontology for the “Internal Financial Control Assessor” Skill Card (integrated with the “Governance Capability/SPICE Assessor” Skill Card). Ca. 500 terms of financial control assessment and the COSO-based process categories, processes, outcomes and base practices are available as multilingual (EN, ES, GE, HU and RO) glossary items by automatic linking to learning contents with cross-references. Self-assessment and Exam Portal operated by the European Certification and Qualification Association (ECQA) was further developed to provide language selection option for the user interface and testing. Language of the multiple choice questions can be changed even during performance of the tests.

See more details at http://www.training.ia-manager.org/ or contact to ivanyos@memolux.hu.
Chapter 2: Added Value of a Multilingual Internal Financial Control Ontology for Accounting Profession

Added Value of a Multilingual Internal Financial Control Ontology for Accounting Profession

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Abstract: Internal Financial Control is essential for effective corporate governance in public or private sector. Accounting profession represented by international and national organisations of CFOs, controllers, public internal auditors, companies internal auditors, companies financial auditors, public sector financial auditors, from different points of view is paying attention to internal financial control. Each organisation developed owns guidance and standards, but all practitioners and tiers involved in corporate governance, in supervising the capital market, or in public sector financial management agree with the idea that there is a need for a Multilingual Ontologies for Internal Financial Control. Our paper aim is to identify the users of it and the benefits brings by using and accepting it. By our project results we hope to contribute to the effective sharing of internal financial control knowledge across Europe.

1. Introduction – the importance of internal control

In accounting and auditing, internal control is defined as a process performed by an organization's structure, work and authority flows, people and management information systems, designed to help the organization accomplish specific goals or objectives¹.

COSO states that this process is designed to provide reasonable assurance regarding the achievement of objectives in effectiveness and efficiency of operations, reliability of financial reporting, and compliance with applicable laws and regulations.

Internal financial control represents a set of essential checks and procedures that help organisation trustees: to meet their legal duties to safeguard the organisation's assets; to administer the organisation's finances and assets in a way that identifies and manages risk; and to ensure the quality of financial reporting, by keeping adequate accounting records and preparing timely and relevant financial information.

The very high importance of internal financial control is the same for private and public sector. At the European level, in developing its current Internal Control Framework², the European Commission has used as a basis the COSO framework of internal control. The COSO framework was also the basis for the INTOSAI

guidelines for internal control standards for the public sector, published in 2004\(^3\). The COSO model is well adaptable for each sector and each level and size of organizations.

The main problem detected analysing the different accounting profession organisation is that the internal financial control concept, elements, assessment and interest on it vary more or less significantly from organisation to organisation.

Another detected problem is related to the language. International accounting profession organisations for private or public sector publish those documents, guidelines, standards and other type of publications in English, and at the national level are translated in the national language. Also international organisations like OECD in the domain of corporate governance, SEC from US in the domain of listed companies, Basel Committee in the domain of banks, and others provide publications mainly in English language.

In this context we consider a stringent necessity to develop a common content for all tiers involved in creating, perform and asses the internal financial control both in public and private sector, for all size of entities and from all around the world.

Internal financial control ontology may enable accounting professionals/academics to address internal financial control knowledge management issues. This study’s objective is to identify/analyze the potential benefits of applying an ontology framework to the internal financial control.

The objective of this paper is to set out the user’s requirements for a multilingual ontology for internal financial control and the benefits bring by it. The paper starts of with a formulation of the internal financial control problem and defines the parameters of the research. Section 2 provides the methodology used section 3 describes the conceptual framework of our study, section 4 present the multilingual ontology development, section 5 specifies the user requirements and the benefits bring by it and section 6 concludes.

### 2. Methodology

The research is conducted using constructive research approach. The constructive approach\(^4\) refers to problem solving via construction of models, diagrams, plans, organizations or other constructs. Constructive research\(^5\) binds together the problem and its solution with additional theoretical knowledge. Key elements of a constructive approach are the novelty and actual functioning of the solution as well. Kasanen et al. (1993) present a set of phases that are characteristic for a constructive research (Table 1).

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Phase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Finding a problem</td>
<td>Find a practically relevant problem which also has research potential</td>
</tr>
<tr>
<td>2</td>
<td>Gaining understanding</td>
<td>Obtain a general and comprehensive understanding of the topics</td>
</tr>
<tr>
<td>3</td>
<td>Constructing a solution</td>
<td>Innovate i.e. construct a solution idea</td>
</tr>
<tr>
<td>4</td>
<td>Demonstrating the solution</td>
<td>Demonstrate that the solution works</td>
</tr>
<tr>
<td>5</td>
<td>Connecting solution to theory</td>
<td>Show the theoretical connections and research contributions to the solution concept</td>
</tr>
<tr>
<td>6</td>
<td>Examining the applicability</td>
<td>Examine the scope of applicability of the solution</td>
</tr>
</tbody>
</table>

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\(^3\)INTOSAI: Guidelines for Internal Control Standards for the Public Sector, 2004
http://www.intosai.org/Level3/Guidelines/3_InternalContrStand/3_GuICS_PubSec_e.pdf


\(^5\)Tuomo M et. all - Towards a Financial Ontology – A Comparison of e-Business Process Standards, Special Course in Information Systems integration, HUT, Finland
In context of this research, our intention is to find evidence for some of these phases. Practical usefulness is the primary criterion to evaluate the results of applied studies. The usefulness of a construction cannot be proven until it is exposed to a practical test.

3. Conceptual framework for multilingual ontologies

Ontology definition and role

There are numerous definitions for the term ontology. The term is originally used in philosophy, and definition differences exist for instance between its use in computer science and information systems research. According to one of the most cited definitions, ontology is an explicit specification of a conceptualization.

Ontologies provide the ability to organise knowledge, an agreement on the ontological concepts used for communication. In this way, they provide vocabulary, definitions and taxonomies for those concepts.

It has been stated by Uschold, M. and Gruninger, M. and also by Fensel, D. that ontologies improve the communication among humans or machines since they provide a shared understanding of a domain. This makes that ontologies are very useful for companies. For instance they can help to improve the communication between employees and to integrate different information systems in the case of a company, and in the case of a multinational company or group of companies the ontology is mandatory to be multilingual.

Ontology is a representation of knowledge, generally of a particular domain, written with a standardized, structured syntax, contains concepts, also called resources, that serve to characterize the domain and can relate resources to other resources, either internally or in other ontologies. The information from different sources can be integrated according to a shared ontology. The ontology will allow for more efficient integration, sharing, exchange of information and knowledge and give the common interpretation of underlying data.

Some reasons to develop and to use ontologies are presented by N.F. Noy, D.L. McGuiness:

- sharing common understanding of the structure of information among people or software,
- reusing the domain knowledge, i.e. using the same specification means in different projects and deriving its new variants from the previously defined ones;
- making explicit assumptions for a domain; it concerns predefined parameters and predefined mapping relations between specification items;
- separating the domain knowledge, expressed by the specification means as a whole, from the operational knowledge allowing to use these means to compose the ST of the given IT products or systems;
- providing the domain knowledge analyses concerning: variants, semantics, risk, relationships of the developed specification means, etc.

Multilingual characteristic

Rozic-Hristovski et al. say that multilingual means being able to select a web portal interface language. From that perspective, multilingual is almost reduced to a presentation issue. At the other hand, not only the interface but also the resources are available in multiple languages and the links to those resources are

multilingual. For example, for Peters and Sheridan\textsuperscript{13} multilingual refers to “…accessing, querying and retrieving information from collections in any language ….” In this latter case, multilingual generally refers to content and information about the content, and connecting the user with specific aspects of the content.

As part of the user interface\textsuperscript{14}, multilingual also can refer to the language used to do general communication with the user of a knowledge management system, as part of multilingual presentation.

4. **Multilingual ontology build up**

Since the ontology will be built up from components for the different subdomains (evidence, internal audit, external audit, public sector and finance) the issue of scalability for ontology modelling will be encountered in each of these dimensions separately as well as across different domains when these sub-domains are aligned and/or merged to create the financial forensics ontology.

The steps performed to build the ontology depend on what kind of information we want to represent. The ontologies are created to capture understanding of a domain. These ontologies relate the different concepts in the domain to each other. Such relationships describe how the domain concepts relate to each other, and make it possible for automated systems to chain those relationships together.

The ontologies primarily serve to give each concept a unique reference on the web, so that other ontologies can specify those concepts in their own relationships. The term ontologies can capture any auxiliary information the user wants to associate with the term, for example a definition (almost always essential in a good term ontology), or a comment.

Ontology creation\textsuperscript{15} is a creative process: there is no single correct way to build one. However Noy and McGuiness identify certain fundamental guidelines for ontology creation:

1. Instead of one single best practice for modelling a domain, there are viable alternatives and the best solution depends on the objective.
2. Ontology creation is an iterative process.
3. Concepts of the ontology should be close to real world objects (physical or logical) and relationships in the chosen domain.

There are also guidelines or criteria to design consistent and effective ontologies. Gruber\textsuperscript{16} presents criteria for ontologies that aim at knowledge sharing and interoperability among programs that are based on shared conceptualization:

- **Clarity:** Ontology should define terms objectively and completely to communicate the meaning of concepts effectively.
- **Coherence:** Ontology should sanction inferences that are consistent with the definitions.
- **Extendibility:** Ontology should be designed so that it could be expanded with new terms without a need to revise the original definitions.
- **Minimal encoding bias:** Conceptualization should be independent from the particular system-level encoding and defined on knowledge level instead.

\textsuperscript{14} O'Leary D E- Multilingual Knowledge Management, Journal of Knowledge Management Practice, Vol. 11, No. 1, March 2010
\textsuperscript{15} Noy & McGuinness, 2001 Ontology Development 101: A Guide to Creating Your First Ontology
\textsuperscript{16} Gruber, T., “A translational approach to portable ontologies,” Knowledge Acquisition Volume 5, Number 2, 1993, pp. 199–220
Chapter 2: Added Value of a Multilingual Internal Financial Control Ontology for Accounting Profession

In MONTIFIC project LLP-LDV-TOI-2008-HU-002, the partners developed a domain ontology for internal financial control with the major support of one partner, a specialist that has some experience developing this kind of information resource because only a such an ontology specialist can provide critical guidance and technical support throughout the process.

The Multilingual Ontology for Internal Financial Control\textsuperscript{17} was developed in the form of a Moodle Glossary and based on the terms of the COSO reference model and providing structured contents for all IFCA elements. This module provides ontology-based (thus semantics and knowledge oriented) access to the specific knowledge structure of COSO.

The construction of the Internal Financial control ontology was the follows:

\textbf{a. Capture Concepts of Interest}
As a first step in the process, were figure out the key concepts in the domain. Techniques used include literature surveys and searches, use case identification and documentation, and analyzing data sets and brainstorming among members of the team.

\textbf{b. Organize Concepts}
For ontology building, it is important to capture not just hierarchies, but meaningful relationships between the different concepts. Using a general tool for organizing concepts, the terms were presented in a diagram and link them to each other with relationships, creating a large set of linked terms.

\textbf{c. Formalize Relationships, Classes, Properties and Instances, and Subclass Relations}
Some relations were apparent in almost any concept diagram from the previous step: one thing "is a" thing of some other type; this thing "has" those things. Key to an effective ontology were to identify which terms are really properties of another and which are general concepts as opposed to instances. At the same time, were identified the key relationships that are necessary to create the ontology, and defining them in terms other semantic tools can use (is it a transitive relationship? is it symmetric?), will also be necessary.

\textbf{d. Capturing the Information in a Knowledge Model}
Depending on the situation, the discussions in the last section can take place on a white board, in a drawing or concept mapping tool, or in an ontology-building application such as the ontology editors Protégé or TopBraid. The final step in the initial process, at least until iteration begins, is to capture the discussions as thoroughly and accurately as possible using an ontology editor. This process will either strengthen, or question the knowledge model realized in the ontology. These discussions can be represented as additional relationships, which add inferences into the model. The added relationships and inferences will either support the consistency and usefulness of the ontology, or identify problems that need to be resolved.

\textbf{e. Iterations}
As new information is added to the existing model, or the existing model and its inferences are reviewed and used by other systems, discrepancies and issues inevitably arise. A process is necessary by which the model owner (individual or community) can review the work and update it. This can be expected to continue indefinitely for more complex models, and even more so for those that represent cutting-edge research. Getting the knowledge in ontology "just right" is usually not a goal for the short term, but with increasing maturity and feedback the ontology can become increasingly consistent, powerful, and reusable.

\textsuperscript{17} http://training.ia-manager.org/mod/glossary/view.php?id=4665
5. User’s requirements analysis

In this section we try to answer at the following question: What key features and requirements of the internal financial control ontology are important from the user’s point of view?

Requirements gathering can be done using a number of different methods separately or in combination. We decided to organise the activities along three lines. First, we consulted the literature on internal financial control. To complement the literature review of the internal financial control problem to include the practice of internal control and the assessment of internal control by internal auditors and financial auditors from public and private sector, a number of structured interviews were conducted with representatives from several institutions. Also authors’ expertise was used to establish the user group and the requirements.

According to the COSO Framework, everyone in an organization has responsibility for internal control to some extent and each major entity in corporate governance has a particular role to play.

The financial managers are responsible to establish a system of internal control and to review its effectiveness. They have overall responsibility for designing and implementing effective internal control system. Such a system is designed to provide the directors with reasonable assurance that problems are identified on a timely basis and dealt with appropriately. Internal controls help ensure that processes operate as designed and that risk responses (risk treatments) in risk management are carried out. In addition, there needs to be in place circumstances ensuring that the aforementioned procedures will be performed as intended: right attitudes, integrity and competence, and monitoring by managers.

The auditors of the organisation (internal and external) also measure the effectiveness of internal control through their efforts. They assess whether the controls are properly designed, implemented and working effectively, and make recommendations on how to improve internal control. They may also review information technology controls, which relate to the IT systems of the organization.

Internal and external auditors have mutual interests regarding the effectiveness of internal financial controls. Both professions adhere to codes of ethics and professional standards set by their respective professional associations. There are, however, major differences with regard to their relationships to the organization, and to their scope of work and objectives.

The internal auditors' are part of the organization. Their objectives are determined by professional standards, the board, and management. Their primary clients are management and the board. External auditors are not part of the organization, but are engaged by it. Their objectives are set primarily by statute and their primary client - the board of directors.

The internal auditor’s scope of work is comprehensive. It serves the organization by helping it accomplish its objectives, and improving operations, risk management, internal controls, and governance processes. Concerned with all aspects of the organization - both financial and non-financial - the internal auditors focus on future events as a result of their continuous review and evaluation of controls and processes. They also are concerned with the prevention of fraud in any form.

The primary mission of the external auditors is to provide an independent opinion on the organization's financial statements, annually. Their approach is historical in nature, as they assess whether the statements conform to generally accepted accounting principles, whether they fairly present the financial position of the organization, whether the results of operations for a given period of time are accurately represented, and whether the financial statements have been materially affected.

The internal and external auditors should meet periodically to discuss common interests; benefit from their complementary skills, areas of expertise, and perspectives; gain understanding of each other's scope of work and methods; discuss audit coverage and scheduling to minimize redundancies; provide access to reports,
programs and working papers; and jointly assess areas of risk. In fulfilling its oversight responsibilities for assurance, the board should require coordination of internal and external audit work to increase economy, efficiency, and effectiveness of the overall audit process.

The Audit Committee reviews reports from management, the internal audit department and the external auditors to provide reasonable assurance those internal control procedures are in place and are being followed. The audit committee ensures the integrity of integrated reporting and internal financial controls. In addition, the audit committee should have oversight of financial reporting risks.

The significance of the contribution of internal auditors to financial audits was dramatically increased with the passage of the Sarbanes-Oxley Act of 2002. That act made wide-spread changes in the responsibility of the parties involved in the financial reporting process.

One change that has enhanced the role of the internal auditor is the requirement in Section 302 of Sarbanes-Oxley that a firm's certifying officers (typically the chief executive officer and chief financial officer) must state that they are responsible for establishing and maintaining internal controls over financial reporting. As part of this certification, they must also indicate that the internal controls were designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements in accordance with generally accepted accounting principles in the United States. These Section 302 certifications are required to be included with the firm's annual financial statements. Most firms will rely extensively on the work of their internal auditors to provide the justification for the Section 302 certifications.

Section 404 of the Sarbanes-Oxley act also increased the responsibilities of internal auditors. This section requires that management include, in the firm's annual financial statements, a report on internal controls. The report must indicate that management is responsible for establishing and maintaining internal controls over financial reporting, and management's conclusions regarding the effectiveness of those internal controls. In most companies, the internal auditors will provide the documentation and testing of internal controls that will be necessary for management to make that report.

Other categories of users who should be interested to use the Multilingual Internal Financial Control Ontology are:

- Bank Supervisory Authorities which evaluate the Banks Internal Control Systems.
- State Supervisory Authorities responsible for finance sector has to set up evaluation methods applicable for different types of banking organizations.
- European Community which manage and monitor EU Structural Funds, part of the Community budget, the way in which they are spent
- Member State governments which share the responsibility with European Commission for the way in which EU Funds are spent.
- European Court of Auditors and INTOSAI members which play external audit roles on public expenditures.

6. Conclusions

As we presented in the introductory part of our paper, the Internal Financial Control is essential for effective corporate governance in public or private sector. Being involved in organise and assess the internal financial control, accounting profession is one which should benefit first of all by the advantages of a multilingual ontology for internal financial control.

Using this innovative tool, CFOs, controllers, public internal auditors, company’s internal auditors, company’s financial auditors, public sector financial auditors, should communicate more easies without linguistic barriers and maybe in the near future the “Single audit model” will become a reality. The single audit approach is based on sharing results and prioritising cost benefit principles in order to minimise the
duplication of control work, and maximise the level of control, which can be achieved with a given level of resources. Sharing well-defined and documented control information can permit reliance on controls at each level in the chain. A formalised assessment of costs and benefits at each level will enable the demonstration that the controls in place have optimised the residual risk of error in the underlying transactions.

Also other interested parties involved in corporate governance, in supervising the capital market, or in public sector financial management should earn a lot of benefits using and accepting the idea of a Multilingual Ontology for Internal Financial Control.

The use of terminology and ontology interoperability framework for the multilingual information resources of the internal financial control ensures that the basic methodology standards concerning information activities will be observed by terminology and ontology experts in order to achieve re-usability of data and interoperability of data structures in both professional vocational training and workplace environments.

In conclusion, the ontology should at least be useful to three different and EU-relevant types of user communities:
- Financial professionals: banks, insurance agencies, government departments, regulators and financial experts
- Police and other law enforcement agencies
- Investigative and monitoring bodies
- Multinational companies and groups of companies
- Professional bodies

By our project results we hope to contribute to the effective sharing of internal financial control knowledge across Europe.

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Chapter 2: Added Value of a Multilingual Internal Financial Control Ontology for Accounting Profession


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Terminology and Ontology Interoperability Model for Internal Financial Control Assessor Learning Environment

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Abstract: Terminological resources are of a complex nature, thus ergonomic data modelling focusing on leveraging knowledge organization processes in user groups is essential. For this purpose, several international standards co-developed by the principal author of this paper in the context of ISO/TC 37 (International Standards Organisation, Technical Committee No. 37 on Terminology and other language and content resources) are implemented and used in innovative ways in the Montific context, i.e. for the purpose of the design and implementation of multilingual eLearning systems. The terminology and ontology interoperability model developed for Internal Financial Control Assessment and implemented in the LMS is used to maintain multilingual skills-cards, e-learning tools, as well as the self-assessment and exam portal.

1. State-of-the-art and results

In multilingual information systems, and in particular in multilingual eLearning systems, proper management and presentation of terminologies is crucial. This paper describes the contribution by state-of-the-art results of applied terminology studies research activities in the framework of the Montific project.

The following ISO standards are used as direct input to data modelling and implementation steps as subsequently shown:

- ISO 12620 Data categories,
- ISO 16642 Terminology Markup Framework (TMF),
- ISO 12200 Terminology Markup Language,
- The Instance for language industry and terminology management systems: TBX Termbase Exchange Format,
- The instance for lexicography and dictionary publishing: LexML ISO 1951.

The confluence of these standards and the underlying methodology represents an interoperability framework describing and modelling pragmatic, semantic and syntactic interoperability, based on the respective terminological interoperability. The overall methodology includes workflows in different organizational contexts, consistent use of meta-data and of data modelling principles, and management of multilingual content repositories.

The results contain the following content elements, seen and commented from the perspective of multilingual terminologies and ontologies:
A learning portal containing a training programme for financial control assessors with a training and certification programme at European level, currently available in 5 languages

Various background documents on financial control process assessment (COSO, etc.), mostly in English

Learning elements and self-tests of the Internal Financial Control Assessor (IFCA) Skill Card

A multilingual glossary of IFCA terms, in English, with hyperlinks leading from occurrences of terms in other content elements to the respective entry in the glossary

Other materials of the learning portal including help texts and orientation

The goal of the project is to enhance the availability of this content in multiple languages and to extend the glossary functionality in the direction of an ontology. This is supposed to reach a level of semantic interoperability of content elements according to international ISO standards in the field of terminology.

In short, the resulting ontology model developed here is used in the following use cases and with specific functionalities:

- A Multilingual Glossary with terms in the following 3 categories: GRC, Audit, ISO/IEC 15504), enabling students to familiarize themselves with the terms and their definitions in this field of study of financial auditing in several languages
- A Learning Ontology in English appearing on top of the learning platform (Moodle) course pages, enabling students to organize their learning paths and their learning behaviour according to this conceptual structure
- A Multilingual Internal Financial Control Ontology (in the form of a Moodle Glossary and based on the terms of the COSO reference model and providing structured contents for all IFCA elements). This module provides ontology-based (thus semantics and knowledge oriented) access to the specific knowledge structure of COSO. The entries also contain valuable knowledge presentation elements such as diagrams, detailed explanations, etc.
- Automatic glossary-type linking from course content pages to terms contained in the Moodle glossaries. This feature allows users to switch languages but also to complement their lexical knowledge in each of their working languages on domain-specific terms.
- Manually set links between course pages of the Learning Ontology and the individual Learning Elements. This feature enhances the highly hyper-textual nature of the system by another dimension of lexical connections between the concepts of the ontology, i.e. the knowledge organization model and of the textual learning elements.

2. Methodology and implementation process

The point of departure was a glossary with hyperlinks from term occurrences in various learning elements and their texts is a flat (unstructured) hypertext glossary in Moodle.

The following steps were taken in order to turn the flat glossary into a database and into a learners’ ontology:

A) adding a terminology database (implemented in SDL MultiTerm) as a background engine to the learning portal

B) transforming the glossary into an ontology by structuring and explicating the conceptual information in the glossary

C) adding multilingual information to the emerging structures in order to create a multilingual termbase and a multilingual ontology
D) encoding the database with the ontology information according to international ISO standards to guarantee interoperability

E) itemizing the conceptual information into conceptual information units with explicit links between them according to typed conceptual relations and to embed this structure into the whole content of the learning portal so that the knowledge organisation effect for the user of the portal becomes clearly visible.

As mentioned above, a number of international ISO standards were extensively used in an innovative way, never used like this before. Comparing the different relevant reference implementation projects to the Montific project context, it is obvious that in this case the use of semantic technologies will be rather pragmatic in nature.

The methodology of the structuring and explicitating process was in accordance with well established working methods in terminological knowledge engineering:

1. The first step was to convert the glossary into a database. For this purpose a conversion program was used. The database model is a representation of the metadata structure.

2. The second step was to explicitate the conceptual relations that are implicitly contained in the existing glossary. The database structure is designed in such a way that this information is coded in specific fields for recording the type of conceptual relation between two nodes.

3. The third step was to complete the “ontologisation” process in line with the metadata model.

4. The fourth step was to organise the ergonomic and user-oriented access of the data in the context of the learning portal in Moodle.

5. The fifth step was to extend the data model of the terminology database towards a terminological knowledge base and to add multilingual information to the extended database as well as to add additional knowledge text to the database.

6. Finally the presentation format focusing on usability was implemented.

3. Ontology building for learning environment

Existing ontologies in the finance area

As background information some existing financial ontologies are relevant for the Montific project:

A) The Finance Ontology by Top Quadrant

This ontology is available on version 3.0 in OWL/XML format produced by Top Quadrant using their editor Top Braid Composer (Copyright © 2008-2009 Eddy Vanderlinden - All rights reserved).

The Finance Ontology Documentation is available under: http://www.fadyart.com/ontologies/documentation/finance/index.html by Top Quadrant

Each ISO 20022 message will form a separate ontology and play an important role in the processes and procedures class in Finance.owl.
B) Financial Ontology as part of XBRL (eXtensible Business Reporting Language)

It contains a Financial Reporting Taxonomies Architecture that is based on the modelling principles and notation of XBRL.

“This document describes the architecture of financial reporting taxonomies using the eXtensible Business Reporting Language. The recommended architecture establishes rules and conventions that assist in comprehension, usage and performance among different financial reporting taxonomies. “Financial reporting” encompasses disclosures derived from authoritative financial reporting standards and/or applicable generally accepted accounting practice/principles, regulatory reports whose subject matter is primarily financial position and performance including related explanatory disclosures, and data sets used in the collection of financial statistics; it excludes transaction- or journal-level reporting, reports that primarily consist of narrative (for example, internal controls assessments) and non-financial quantitative reports (for example, air pollution measurements). This document assumes use of the XBRL 2.1 Specification”.


Ontology glossary for Montific

The following conclusions result from the analysis of the existing ontologies:

1. The terminology work and the corpus analysis work are essential pre-requisites in order to create an ontology.

2. Looking at existing financial ontologies as used in business reporting, it becomes clear that in the very limited frame of the Montific project it is absolutely impossible to reach the same degree of sophistication and formalization.

3. As a consequence from conclusions 1 and 2, a pragmatic methodology for this Montific ontology glossary was chosen especially with a view to maximum usability for the intended users and the specified purposes, i.e. e-Learning.

Consequently, the first decision was to call the Montific ontology an “ontology glossary”. While this might seem to be an unusual or even strange decision from the standpoint of terminology management and ontology engineering, it makes very much sense for the context of this project, as there is already a contextual glossary in the e-Learning environment implemented in the selected learning portal, Moodle. So priority was given to continuity and simplicity seen from the eyes of the user and not from the ideal world of a developer.

Thus, the ontology glossary has the following properties:

- It is multilingual
- It is conceptually structured
- It has conceptual relations that are typed
- It has keywords that interlink several conceptual spaces to each other
- It is fully embedded in the eLearning environment, i.e. in Moodle, maximising usability and simplicity for the user
- It is contextualised with the learning units of the eLearning content in order to enhance the cognitive orientation (in the sense of a learners’ ontology)
The ontology consists of two parts, a conceptual scheme and the multilingual glossary. Both parts are linked to each other for navigation and orientation for different user groups.

Although it is technically impossible within Moodle to formally represent ontological links among concepts, entries for each concept of the Montific ontology are linked to each other in such a way that the conceptual links are presented to the user and still can be managed in the background engine on XML basis and from there to convert to and from MS Office tools formats such as Excel as well as to XML-based database formats.

**Extending the terminology database into an ontological knowledge base for learning purposes**

The data model of the original terminology database is extended in order to capture crucial knowledge that is critical to the learners and users of the whole system. The data model now also includes figures, an important extension of information to be provided in the terminology database. The data model was also extended towards a more subtle handling of ontological relations.

![Figure 1: New data model]
Chapter 3: Terminology and Ontology Interoperability Model for Internal Financial Control Assessor Learning Environment

Based on this data model all entries were extended accordingly. The conceptual relations of the following learning ontology are implemented in the field of concept relations with the following structure:

**Governance**
- OECD Principles of Corporate Governance
- Lessons from the Financial Crisis
- Risk Management and Control Frameworks
- Enterprise Risk Management
- Internal Control
- Internal Auditing

**SPICE (Process Capability Assessment)**
- Capability Measurement
- Models for Process Assessment
- Performing an Assessment
- Validating Attribute Ratings
- Process-related Risk Assessment

**Governance Capability**
- Compliance – Level 1
- Reporting – Level 2
- Operations – Level 3
- Strategic – Level 4

**Internal Financial Control**
- Control Environment
- Risk Assessment
- Control Activities
- Information and Communication
- Monitoring

**Internal Financial Control Assessment Model**
- COSO-based PRM and Process Performance Indicators
- Governance Capability Indicators
- Effectiveness of Internal Financial Control

**Internal Auditing of Internal Financial Control**
- Internal Audit Process
- Internal Audit Process Performance Indicators
- Using Generic Assessment Indicators

Based on the implemented learning ontology the course structure in Moodle assists trainers and trainees in the learning process by browsing necessary knowledge items. At the top level there are the three core concepts of Governance, SPICE and Governance Capability; the conception of Internal Financial Control based on COSO; the model for Internal Financial Control Assessment; and finally a sample for assessing a governance process called as Internal Auditing of Internal Financial Control. At the next level there are explanatory terms which are linked directly or indirectly to the learning elements of the Governance SPICE Assessor Skill Card and of the Internal Financial Control Assessor Skill Card. Each learning element provides an introduction to the topic and the list of the learning objectives in a form of performance criterion for achieving skill card based certification. The course presentation applies glossaries for automatically linking terms used in the course pages into multilingual contexts.
4. Conclusions

The MONTIFIC learning ontology is implemented in the (Moodle) learning environment not only as a guiding system to access information elements in a meaningful way, but also as a multi-dimensional network of concepts enabling users to do meaning-oriented navigation in the learning environment. Structured information modeling has been used taking into account the learning goals based on concepts that are part of the ontology.

By adding data management and interoperability functionalities between the (SDL MultiTerm) terminology database and the Moodle system including the MySQL back engine, the workflow support is now complete, from data acquisition to integration in the learning environment.

The ISO standards that have been used in the specification and implementation process turned out to be very useful in achieving innovative data models and workflows.

For subsequent work in follow-up projects there is a whole list of desiderata, under the condition of appropriate funding and time budgets:

- Further extending and improving the (SDL MultiTerm) Termbase as a terminological and ontological knowledge base for eLearning purposes
- Adding parallel lexical resources in more languages
- Further refining the typology of conceptual relations
- Refining the ontological formalization
- Further improving the usability of the system in the sense of a learners’ ontology taking into account cognitive science and usability engineering aspects
Chapter 3: Terminology and Ontology Interoperability Model for Internal Financial Control Assessor Learning Environment

- For further purposes, the texts in the learning system could be imported into a translation memory text database with sentences aligned in all language versions for facilitating coordinated and time-consuming updating the whole knowledge base. This would have to be implemented in language pairs with English as the pivot language towards all other languages included.
- The access from Moodle to the (SDL MultiTerm) Termbase will be made easier and more direct (more direct hyperlinks).

References

Chapter 3: Terminology and Ontology Interoperability Model for Internal Financial Control Assessor Learning Environment

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His research interests include cross-cultural knowledge communication and knowledge organization, language engineering, translation technologies, and knowledge engineering, epistemology of eLearning and of collaborative work systems, terminology studies, ontology engineering, EcoInformatics, translation theory, and philosophy of science.

For the last 20 years he has been active in national, European, and international research projects in the areas mentioned above. He has also been co-ordinator of major projects funded by the European Commission in the fields of language and knowledge engineering, eLearning, digital cultural heritage systems, EcoInformatics, etc.

Gerhard Budin is vice-president of the German chapter of the International Society for Knowledge Organization (ISKO), vice-president of the International Institute for Terminology Research, and member of the board of the Karl Popper Institute. He is chair of a technical committee in the International Standards Organization (ISO) focusing on terminology and cultural diversity management (ISO/TC 37/SC 2).

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A pioneer in the field of professional preparation and management of EU funded projects, she acted as consultant to European eContent and 6th Framework Programmes. For the Austrian Standards Institute she is active in several committees as expert in terminology, translation and diversity management.
Gabriele Sauberer designed and performed many projects at European, regional, national and international level and developed trainings and seminars with focus on European and International topics in the field of quality management and linguistic and cultural diversity.

Since 2007, she is teaching project management, intercultural communication and diversity management at the Centre for Translation Studies of the University of Vienna.
Ontology-based Multilingual Access to Financial Reports for Sharing Business Knowledge across Europe

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Abstract: Within the FP7 European project MONNET -- Multilingual Ontologies for Networked Knowledge see http://www.monnet-project.eu/ --, we are specifying and implementing a use case concerning business intelligence on European companies, involving a semantic-level analysis of business reporting in several languages. This use case is building on national and international accounting regulations that are encoded in XBRL taxonomies. XBRL (eXtensible Business Reporting Language) is an XML-based open standard for identifying and communicating complex financial information in corporate business reports.

In Monnet we plan to use an "upgraded" XBRL in form of localized ontologies that support not only the translation of the central elements of business reports (in Dutch, English, German and Spanish), but also the extraction, integration and presentation of financial data available in various types of documents in various languages. With this use case, Monnet hopes to contribute to the effective sharing of financial and business knowledge across Europe.

1. Introduction

A universal response to the current financial crisis was the call for more transparency on the part of banks and investment firms; which are being called upon to disclose more information, and to do so in a form which is more easily sliced and diced by computer. It is the eXtensible Business Reporting Language (XBRL)¹⁸, an XML markup language for financial data, which is seen by many to be the answer to these needs. In a recently published article, XBRL is discovered to be the road to financial recovery, providing radical transparency, and letting Everyman easily ascertain the state of any company, bank or investment firm in the United States.¹⁹

¹⁸ See also http://www.xbrl.org/ for more information. XBRL will be presented below in more details
¹⁹ See http://www.wired.com/print/techbiz/ti/magazine/17-03/wp_reboot (Wired article)
Similarly, in Europe XBRL is seen as a means to prevent the recurrence of financial crises by increasing transparency. There is, however, a very high barrier to transparency, namely, the large number of languages used by the European banks, investment firms and national banking supervisors in each country. Therefore also many international organisations are calling for more performing multilingual information management systems as they have to offer their information in various languages and manage information submitted to them in many different languages.

A project\(^{20}\) to promote the use of XBRL for disclosures made by banks and investment firms is on-going, but all of the materials it has created are only available in English. Until they are translated into the other European languages, transparency cannot be granted. For this reason, it has become urgent to promote competence in all of the modern technologies of translation: terminology, translation memories and machine translation. Real transparency, however, requires more. It requires technologies to extract information from different types of documents, available in different languages, and to combine them with facts from XBRL reports, thus, further increasing the amount and quality of available multilingual information, and to transform this information into language-independent knowledge. It also requires technologies to access the knowledge in whatever language or languages the end user wants to use. The Monnet project\(^{21}\) encompasses all of these technologies, and will promote competence in all of them. In a nutshell, Monnet intends to provide ontology-based multilingual access to financial data for sharing business knowledge across Europe.

In the following sections we present first the motivations and the technological apparatus of the XBRL initiative. After this we describe the general technological architecture and the main components of Monnet before introducing its XBRL-based financial and business use case.

2. XBRL Overview

XBRL, eXtensible Business Reporting Language, is an XML-based mark-up language for the exchange of business information, including financial reporting. Its use is being nowadays mandated by a growing number of regulatory bodies and stock exchanges around the world.

The widespread use of XBRL should allow regulators, analysts and investors to employ computer programs to automatically process reported information for various purposes, for example, to discover discrepancies or investment opportunities. Another important use is to integrate data from disparate accounting or Enterprise Resource Planning (ERP) systems, regardless of whether those systems are external or internal.

XBRL uses XML in a special way in order to specify the semantics of business data, its presentation, its calculation, and associated business rules, which are called formulas. XBRL also has its own special terminology. A set of mark-up tags for a specific purpose is called a taxonomy, and individual tags are called taxonomy elements or, alternatively, concepts. A computer file containing data marked up using a specific taxonomy is called an XBRL instance. For example, each annual report filed by a Belgian company would be an instance, which would be created according to the taxonomy for the Belgian Generally Accepted Accounting Principles (GAAP).

Another special feature of XBRL is that the concepts and related metadata are specified as a flat list of elements, which is separated from other information about presentation, calculation, and business rules (formulas).

An example of a concept is CurrentAssets. Its main associated accounting metadata are:

\(^{20}\) See [http://www.eurofiling.info/corepTaxonomy/taxonomy.htm](http://www.eurofiling.info/corepTaxonomy/taxonomy.htm)

\(^{21}\) MONNET (Multilingual ONtologies for NETworked knowledge) is a FP7 R&D project co-funded by the European Commission with Grant No.: 248458, See also [http://www.monnet-project.eu/](http://www.monnet-project.eu/).
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1. It is measured at a point in time, thus its period type is *instant*, as opposed to *duration*; *duration* is the period type of a concept like *income*, which is measured over a period of time such as a year.

2. It has a balance type of *debit*, which in accounting terms means it is increased by being debited.

3. It is not an abstract concept, which means it can be used to tag items in instances.

4. It has a monetary value.

Expressed as an element in an XML schema file, an *.xsd* file, the concept might look like this (where the prefix “gaap” is used as an anonymized item):

```xml
<element name="CurrentAssets" id="gaap_Current_Assets" periodType="instant" balance="debit" abstract="false" substitutionGroup="item" type="monetaryItemType"/>
```

In an instance document each value, also called a fact, is tagged with a concept as shown next.

```xml
<gaap:CurrentAssets contextRef="FYp0Qp0e" decimals="-6" unitRef="EUR">5255000000</gaap:CurrentAssets>
```

The *decimals* attribute value of ‘-6’ specifies that the value is accurate to the millions. The *unitRef* specifies it is measured in Euros, and the *contextRef* points to an element that specifies the company, or entity, to use XBRL speak, and the time instant.

```xml
<context id="FYp0Qp0e">
  <entity>
    <identifier scheme="http://www.sec.gov/CIK">0000943042</identifier>
  </entity>
  <period>
    <instant>2009-12-31</instant>
  </period>
</context>
```

Additional information about concepts is expressed in *networks*. A network which relates concepts to each other is called a *relation network*. An example is a *presentation network*, which organizes concepts into an ordered tree, which is the basis for creating a report that is easily comprehended by analysts. There are also *resource networks*, which relate concepts to resources. An example of a *resource* is a label for a concept.

Separating the concepts from the labels means that an XBRL-based program can easily become multilingual. It requires only the addition of a network with labels for another language, dialect or idiolect.

Finally, XBRL taxonomies are extensible so that each reporting entity can adjust them to contain the concepts, relations and resources it needs to report on its business. The addition of company-specific product lines, for example, would enable reporting and analysis of sales by those product lines.

The adjustment of a taxonomy is actually called *extension*, even though it may involve removing things. Extension is done without modifying the taxonomy which is being extended. It works by means of a well-defined mechanism for combining extensions with the original taxonomy. Its power is that it confers the ability to modify the conceptual model represented by the original taxonomy without modifying that
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taxonomy. In combination with resource networks for labels, this ability means that both the conceptual model and the associated words can be perfectly tailored to each language community or individual.

3. The Monnet project

Monnet (Multilingual ONtologies for NETworked knowledge) is a recently launched EU-funded project in the field of Language Technologies within the ICT programme. Monnet is working on solutions that aim at facilitating access to on-line information across a range of languages. The initial step for Monnet is to set up infrastructures for extracting, representing and accessing knowledge across languages, using a novel combination of Semantic Web technology and automatic machine translation.

Current approaches to cross-lingual information access provide only partial solutions that address the problem in a restricted way, operating only at the document level without addressing either uniform extraction, representation, integration and querying of information across different languages and heterogeneous (textual, semi-structured, structured) data sources. Hence, the state of the art in machine translation is still far from providing multilingual services in specific domains. A key aspect of the solution Monnet is working on is reflected by the fact that the technologies deployed in the project are dealing with information at the semantic level, i.e. by abstracting away over language(s) and form of the documents, allowing for a more advanced and uniform cycle of information processing (extraction and integration) and presentation of multilingual information.

The project is validating its approach to enabling the multilingual web in the context of two use cases, one in the field of e-Government and one in the field of financial and business information. We concentrate in this paper on the second use case, for which Monnet is very happy to have as one of its member the association XBRL-Europe, which is co-defining the standards for financial and business reporting across Europe. The use case aims at enabling the search and the report creation of financial information and business service descriptions in the language of choice of the users.

Relating language-independent Knowledge Representation and language information, Monnet aims at supporting on-line information access across languages. We take as granted that the relevant information for the users is encoded in language-independent knowledge representation systems, like taxonomies and ontologies, which are supporting the uniform handling of information originally coming from different sources existing in different languages as well as the presentation of factual information in an arbitrary language.

But in order to allow ontologies to interact with multilingual text in both the analysis and the generation mode, it is necessary to model the relation that natural language expressions can have with the language independent knowledge representation systems. Most of the latter are using a “label” feature in order to encode the natural language expressions that correspond to a concept. And often such labels are existing only in English, or in the language of the country for which a taxonomy or an ontology has been designed. For example in the XBRL taxonomy developed in the context of the German legislation for business reporting, we can see that the concept ID “de-gaap-ci_bs.ass.fixAss.fin.sharesInAffil.parentComp” has two associated labels: “Anteile an herrschender oder an mit Mehrheit beteiligter Gesellschaft” (in German) and “Shares in parent or in majority investor” (in English).

The content of such labels are in fact just terms, which are not explicitly linked to other terms included in the labels of other concept IDs. In this a lot of information about possible linguistic realisations of concepts is left by side, and we are missing also a possible generalisation on the meaning of certain words that are used in the context of various labels within an ontology (or a taxonomy).

The semantic web, in particular with the linked data project (Bizer et al, 2009), proposes solutions that allow to re-use lexical and terminological resources by their semantic interlinking. But currently there is no standard

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for providing complex lexical information for ontologies promoted by the semantic web and describing the relationship between the lexicon and the ontology.

Therefore a central aspect in Monnet consists in designing and developing a model that associates linguistic information with domain semantics as defined by the corresponding (domain-specific) ontologies. Our model, which we call “Lemon” (Lexicon Model for Ontologies), is building on existing work, while extending and integrating it, in particular LMF (Francopoulo et al., 2006), ISOcat (Kemps-Snijders et al., 2008), SKOS (Miles and Bechhofer, 2009), LexInfo (Buitelaar et al., 2009) and LIR (Montiel-Ponsoda et al., 2008). It is an RDF model that allows for lexical data to be shared and interlinked on the Web. Lemon is a central endeavor towards a formal model for multilingual, lexicalized knowledge representation, and it is supporting in Monnet the development of various components.

One of Monnet’s roles in regard to XBRL consists in supporting the process of tailoring a taxonomy to a language community. For this we plan to either “upgrade” XBRL to an ontology so that we can combine it with the Lemon model, or at least to find a way to “transplant” Lemon onto the XBRL taxonomic way of organizing the knowledge related to business reporting.

**General Architecture and Components of Monnet**

The main components of Monnet, building on Lemon, are shown in the context of the general overview of the project architecture illustrated in Figure 1. On the base of the Ontology-Lexicon model, first a service for ontology lexicalization is implemented (not represented in Figure 1). This service is separating the natural language expressions used in labels of an ontology (or a taxonomy) and enrich those automatically with linguistic information (e.g. morpho-syntax, syntax), in compliance with existing standards, like the ISO data categories proposed within ISO TC37 on “Terminology and other language resources”.

The Lemon model, together with the ontology lexicalization service, are the base for the three following functional components of Monnet, as can be seen in Figure 1:

- **Multilingual Ontology Localisation**: Creates a lexicon in a target language from a lexicon in a source language, semi-automatically
- **Cross-Lingual Ontology-based Information Extraction**: Uses localized ontologies for the semantic-level extraction and integration of information from text and (semi-) structured data across languages
- **Cross-Lingual Knowledge Access and Presentation Framework**: Uses localized ontologies for the quick customization of knowledge access systems to other languages

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24 See http://www.isocat.org/
Multilingual Ontology Localization

Since the Multilingual Ontology Localization (MOL) is in Monnet the step following immediately the design and implementation of Lemon and the associated ontology lexicalization, and so actually attracting the main attention of the project, we give a more detailed description of this task in this paper.

MOL is the key technology on which the Monnet approach to cross-lingual information extraction, and access relies. Ontology localisation requires automatic techniques for the translation of labels used in an ontology for expressing domain concepts (in the form of classes, properties and relations). We limited the localization to the lexical layer of the ontology.

Whereas ontology localisation has received some attention lately (see Suarez-Figureoa and Gómez-Pérez, 2008), it is far from solved. The challenge is to reduce the amount of work needed to localize a given ontology by integrating automatic techniques for finding term equivalents in expressing a certain concept in different languages, e.g. a concept defining the idea of ‘credit worthiness’ in the financial domain can be expressed in English by the term “credit worthiness”, in German by “Bonität” and in Spanish by “solvencia”. To solve this task, the project recognizes the need for:
• The performance of a sound morpho-syntactic analysis that guarantees a flawless translation process and an appropriate selection among a fixed set of transfer rules that will allow the translation of compound labels from the original language to a target one

• The selection of appropriate translation techniques and methods for translating simple and complex ontology labels depending on the resources available for a certain language and domain. For example, we will rely on direct translation approaches (e.g. [Babych et al. 2007]) or word to word approaches (e.g. [Voss et al. 2008]) when authoritative and reliable multilingual dictionaries exist for the implied languages and the domain in question. When no reliable multilingual dictionaries are available, we will have to resort to other techniques such as corpus-based translation techniques (e.g [Koehn 2005]), for example, whenever parallel corpora in the implied languages and domain are available, or to statistical machine translation techniques (e.g. [López 2008] or [Chiang 2005]) combined with knowledge-based machine translation techniques (e.g. [Mohanty et al. 2007] or [Habash et al. 2006]), whenever a semantic or knowledge resource is available.

• The adaptation of the conceptualization may be necessary for cases in which the original conceptualization or ontology does not reflect the organization of a certain aspect of the domain semantics as expressed by the target language. Conceptualization adaptation requires manual inspection and goes beyond the scope of the project. We expect however that the ontology translation process will support conceptualization adaptation by appropriate identification of translation conflicts, which flags potential adaptations that need to be manually checked and updated in a separate process.

We are thus exploring approaches leading to high-quality translation, requiring only a minimal human effort to check the automatically localized ontology. Instead of producing only one possible translation, the localisation process will produce a ranked list of translation candidates which can be inspected by the human validator, achieving localisation in a semi-automatic form, which allows cost reduction and a economic interaction with the involved actors.

4. The Financial and Business Use Case

The scenario, which has been set up, is the following: A financial analyst in a certain country is looking for relevant data about companies across Europe. The relevant data might be dispersed in the following sources:

• Structured sources: balance sheets in textual and semi-structured format (Publicly available for example in German at http://www.bundesanzeiger.de/), short company profiles (e.g from European Business Register), Wikipedia Infoboxes, and XBRL instance documents (the Belgian National Bank is for example publishing on-line all the financial reports of Belgian companies that are available in XBRL)

• Semi-structured: longer company profiles, imprint information on company web pages (mainly available in Germany in line with current legal requirements)

• Unstructured: annexes to balance sheets in annual reports of companies, newspapers, specialized web pages etc. Language and legislation-specific issues in financial reporting are dealt with by the ontology-based information extraction machinery, i.e. different extraction instantiations for the different financial reporting formats/contents will be developed. The extracted information can then be harmonized and integrated on the XBRL ontology level.

The objective of this use case is to develop a prototype which allows accessing relevant data about companies originally distributed across languages and sources. The prototype will allow a financial analyst to search for data by filling in structured search forms localized to his/her own language. The results will be presented in terms of charts, diagrams, results lists etc. localized to their preferred language.
In the background, this use case will exploit the methods developed for the lexicalization service and the three main components of Monnet (see the explanatory text of Figure 1):

- **Ontology Localization**: Techniques for ontology localization will be applied to the different XBRL taxonomies to localize them (mainly translating the labels) to the different languages we consider: English, German, Dutch and Spanish. The main beneficiaries here are the translators of taxonomies that can profit from the (semi-) automatic translation support provided by our ontology localization techniques. We will measure the effort reduction with respect to translating all the labels by hand here as a baseline. In localizing a given XBRL taxonomy to various languages, we will consider the taxonomies for other countries as a valuable resource and domain-specific data to guide the localization component.

- **Cross-language Ontology-based Information Extraction**: While some of the data we expect to exploit is already formalized according to the XBRL standards (we will refer to documents containing such data as “XBRL instance documents” as they instantiate the concepts defined in the XBRL taxonomies to convey specific factual data), there is a plethora of information that remains unstructured and dispersed across sites and languages (compare the non-exhaustive list of relevant sources above). Cross-language information extraction techniques will thus be applied to extract relevant information from documents across languages. The extracted facts will be represented in a normalized and language-independent fashion by resorting to the XBRL taxonomies.

- **Cross-language Knowledge Access and Presentation**: This component will allow the financial analyst to query the knowledge repository in his own language. It will use the knowledge base where the factual data is stored to answer the query and rely on the component to present this content in the language of choice of the user. While we will focus on the languages: German, English, Spanish and Dutch in the Monnet project, the approach will be able to scale to other languages as well.

The main beneficiaries of the technologies developed in this use case will thus be:

1. The translators of the XBRL taxonomies (who will profit from the effort reduction yielded by using our automatic ontology localization functionality) and also
2. The users of XBRL taxonomies (e.g. financial analysts), who will be able to see the information formalized by XBRL instance documents or extracted from unstructured resources in accordance to the XBRL taxonomies in their preferred language.

By building on semantic technologies instead of on unstructured information access approaches, we will also be able to answer aggregate queries asking for data across companies, countries etc. such as:

- Compare the revenues in 2008 of Opel (Germany), SEAT (Spain) and Ford (U.S.)
- Show financial data of European software companies with over 10,000 employees

Note that within this use case we do not aim to restructure or to align the XBRL taxonomies for different countries or legislations with each other. This is a complex task that is well beyond what can be achieved in this project. We will instead focus on localization without changing the structure of the ontologies. In case some concept is not directly translatable into the target language in a one-to-one fashion (e.g. through a single term), paraphrases will be used instead. Automatic generation of appropriate paraphrases is not in the scope of our localization component and will require the involvement of domain specialists. As we conceive ontology localization as a semi-automatic process in which a tool makes suggestions to a domain expert, involvement of experts in providing paraphrases for concepts that cannot be directly translated fits well into our general approach and will be integrated into our methodology.
5. Conclusion

We presented the goals and challenges of a recently started European R&D project, which aims at supporting the collection, extraction, integration and presentation of information on the Web in a multilingual fashion, and so to support the Internet users of in having access to information in her/his own language. We gave a general overview of the technologies we started to deploy and which constitute an innovative combination of Semantic Web and machine translation and localization technologies.

As two first steps of the project, we have been i) designing and implementing a new model for the description of linguistic information of natural language expressions used in the context of labels of ontologies, and offering thus a ontology lexicalization service, which is building the base for ontology localization and ontology-based information extraction applied to a large number of different types of documents, and ii) specified 2 use cases in the field of e-Government and Financial and Business reporting, whereas we focused in this paper in describing the business use case.

Acknowledgment

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References


Integrated COSO SPICE Assessments

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Abstract: ISO/IEC 15504 (SPICE – Systems/Software/Services Process Improvement and Capability dEtermination) describes a two dimensional framework for performing assessments. Assessment models are based on a process dimension (processes are specific to a domain) and a capability dimension (same used on all processes across all domains).

In the EU project IA-Manager (2005 – 2007), a process reference model and a process dimension has been developed based on the COSO 2006 Guidance and was translated into 5 European languages. During the EU project MONTIFIC (2008 – 2010) an assessment model and assessment software (with defined terminology in different languages) was also developed to offer COSO based SPICE capability assessments. SPICE assessments deliver so call capability profiles where each process (of a set of processes) is measured with a capability level (scale 0-5). Thus a strengths- and weaknesses profile is analyzed and forms the basis for improvement planning to effectively achieve COSO based governance objectives.

1. History and Motivation

The ISO/IEC 15504 standard describes an assessment framework to perform capability level assessments. Assessment models are based on a process dimension (processes are specific to a domain) and a capability dimension (same used on all processes across all domains).

Each process in a specific domain is rated on a capability level scale (Figure 1). Depending on the application domain a specific agreed set of processes (process reference model) is applied. In the governance domain we use the COSO 2006 Guidance as a basis and COSO based process descriptions have been elaborated in the IA-Manager EU project (2005 – 2007).

While so called “banking” SPICE used the Basel II processes as a basis and focused on banks, the COSO based SPICE is sector independent and applicable to prove the transparency of the financial reporting by keeping the COSO internal control requirements.

So called assessment indicators (e.g. generic practices) help to rate if a specific process fulfills a process attribute (e.g. PA.2.1 Performance Management) on a certain capability level (e.g. Level 2 - Managed).

In the EU project MONTIFIC we elaborated tools and systems to perform governance capability assessments based on the capability levels of the ISO/IEC 15504 standard.
2. **COSO based process reference model**

Each process of the COSO 2006 Guidance has been described using the descriptors based on part 2 of ISO/IEC 15504 (see example in Figure 2).

<table>
<thead>
<tr>
<th>Process ID</th>
<th>IFC.CE.IEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Name</td>
<td>Integrity and Ethical Values</td>
</tr>
<tr>
<td>Process Purpose</td>
<td>Sound integrity and ethical values, particularly of top management, are developed and understood and set the standard of conduct for financial reporting.</td>
</tr>
</tbody>
</table>
| Process Outcomes | As a result of successful implementation of IFC.CE.IEV process:  
  **Values articulated** – Top management develops a clearly articulated statement of ethical values that is understood at all levels of the organization.  
  **Adherence monitored** – Processes are in place to monitor adherence to principles of sound integrity and ethical values.  
  **Deviation addressed** – Deviations from sound integrity and ethical values are identified in a timely manner and appropriately addressed and remedied at appropriate levels within the organisation. |
3. COSO based process dimension

Each process of the COSO process reference model has been further elaborated based on the guidance of the ISO/IEC 15504 part 5 exemplar assessment model. Thus for each process outcome one or more base practices (and related work products) have been elaborated (Figure 3).

Base practices describe necessary activities to achieve the purpose of the process. In the standard each base practice is rated on a scale N (not achieved), P (partially achieved), L (largely achieved), and F (fully achieved).

<table>
<thead>
<tr>
<th>Base Practices</th>
<th>IFC.CE.IEV.BP1 Articulate and Demonstrate Integrity and Ethics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The key members of management articulate and demonstrate the</td>
</tr>
<tr>
<td></td>
<td>importance of sound integrity and ethical values to employees.</td>
</tr>
<tr>
<td></td>
<td>[Outcomes: 1, 2, 3]</td>
</tr>
<tr>
<td></td>
<td>NOTE: Management can perform this practice through their:</td>
</tr>
<tr>
<td></td>
<td>• Day-to-day actions and decision-making.</td>
</tr>
<tr>
<td></td>
<td>• Interactions with suppliers, customers, and other</td>
</tr>
<tr>
<td></td>
<td>external parties that reflect fair and honest dealings.</td>
</tr>
<tr>
<td></td>
<td>• Performance appraisals and incentives that diminish</td>
</tr>
<tr>
<td></td>
<td>temptations inconsistent with financial reporting</td>
</tr>
<tr>
<td></td>
<td>objectives.</td>
</tr>
<tr>
<td></td>
<td>• Intolerance of ethical violations at all levels.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IFC.CE.IEV.BP2 Inform Employees about Integrity and Ethics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management implements mechanisms to inform new employees</td>
</tr>
<tr>
<td>and remind current personnel of the organisation’s</td>
</tr>
<tr>
<td>objectives related to integrity and ethics and related</td>
</tr>
<tr>
<td>corporate values. [Outcomes: 1, 2]</td>
</tr>
</tbody>
</table>

*Figure 3: Example – Base Practices for the process IFC.CE.IEV*
Chapter 5: Integrated COSO SPICE Assessments

Table: COSO Finance SPICE vs. COSO Trial

<table>
<thead>
<tr>
<th>COSO Finance SPICE</th>
<th>COSO Trial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrity and Ethical Values</td>
<td>Sound integrity and ethical values, particularly of top management, are developed and understood and set the standard of conduct for financial reporting.</td>
</tr>
</tbody>
</table>

**CE.1.1:**

**CE.1.BP1** Articulate and Demonstrate Integrity and Ethics. The key members of management articulate and demonstrate the importance of sound integrity and ethical values to employees. [Outcomes: 1, 2, 3]

- NA: ☐
- PA: ☐
- LA: ☐
- FA: ☑
- Not App.: ☐

**CE.1.BP2** Inform Employees about Integrity and Ethics. Management implements mechanisms to inform new employees and remind current personnel of the company's objectives related to integrity and ethics and related corporate values. [Outcomes: 1, 2]

- NA: ☐
- PA: ☑
- LA: ☐
- FA: ☐
- Not App.: ☐

**CE.1.BP3** Demonstrate Commitment to Integrity and Ethics. Management demonstrates its commitment to sound integrity and ethical values by following a prescribed investigation process and taking appropriate, timely corrective action when possible violations are identified. [Outcome: 2]

- NA: ☐
- PA: ☐
- LA: ☐
- FA: ☑
- Not App.: ☐

Figure 4: Example – Rating Base Practices for the process IFC.CE.IEV

For each rating the standard requires a traceable evidence for what is the reason of this rating. Thus notes are kept per rating and maintained in an assessment record.

**CE.1.BP1** Articulate and Demonstrate Integrity and Ethics. The key members of management articulate and demonstrate the importance of sound integrity and ethical values to employees. [Outcomes: 1, 2, 3]

- NA: ☐
- PA: ☐
- LA: ☐
- FA: ☑
- Not App.: ☐

A chart for employees has been established and posted into all departments. It is used as basis for rules of conduct by the introductory training for employees.

**CE.1.BP2** Inform Employees about Integrity and Ethics. Management implements mechanisms to inform new employees and remind current personnel of the company's objectives related to integrity and ethics and related corporate values. [Outcomes: 1, 2]

- NA: ☐
- PA: ☑
- LA: ☐
- FA: ☐
- Not App.: ☐

Figure 5: Example – Evidence documentation for Rating Base Practices for the process IFC.CE.IEV
4. COSO based capability dimension

For each process attribute on a capability level (see Figure 1) there are generic practices which outline the achievement of a specific process attribute.

![Figure 6: Example – Generic practices for the process attribute performance management on capability level 2](image)

Generic practices describe necessary activities to achieve the process attributes for a specific capability level. In the standard each base practice is rated on a scale N (not achieved), P (partially achieved), L (largely achieved), and F (fully achieved).

All single ratings of generic practices are aggregated into an overall rating of capability level 2 to 5.

Level 2 is achieved if level 1 is fully achieved and on level 2 the aggregated coverage of the two process attributes performance management and work product management are both rated minimum L (largely).

Level 3 is achieved if levels 1 and 2 are fully achieved and on level 3 the aggregated coverage of the two process attributes process definition and process deployment are both rated minimum L (largely).

Etc.

For each rating of a generic practice the standard requires a traceable evidence for what is the reason of this rating. Thus notes are kept per rating and maintained in an assessment record.
Chapter 5: Integrated COSO SPICE Assessments

5. COSO SPICE assessment results

The assessment delivers a process capability profile. It shows weak areas in the processes and gives an oversight about strengths and weaknesses in all COSO processes. The aim is to define improvement plans and to implement them to effectively implement COSO.
Chapter 5: Integrated COSO SPICE Assessments

Such a profile illustrates the compliance with the COSO framework. It also illustrates which aspects need improvement.

Not achieving level 1 means that compliance is generally missing.

Achieving level 1 and failing in process attribute performance management means that generally compliance is there but is not well tracked against targets (e.g., coverage of people knowing the ethical and integrity level).

Achieving level 1 and failing in process attribute work product management means that generally compliance is there but the results of successful departments are not kept in a structured way that they can be accessed and re-used as good practice.

Achieving levels 1 and 2 and failing in process attribute process definition means that the compliance is there, targets are tracked, results are accessible, but there is no agreed standard process across all departments.

Etc.

Thus from a capability level profile auditors can read levels of compliance and become experts using defined measurement tools to establish improvement plans for firms.

There is a shift then from pure audit to continuous improvement thinking.

6. COSO Compliance Strategy

Figure 9: Level of Compliance Mapping

Figure 9 shows how the levels of compliance in COSO are mapped onto the capability levels in SPICE.
Level 1 means that the transparency of financial reporting is compliant with the COSO compliance objectives.

Level 2 means that the transparency of financial reporting can be tracked against targets and has all results under control and is compliant with the COSO reliability (or reporting) objectives.

Level 3 means that the transparency of financial reporting can be tracked against targets and has all results under control and is implemented in a defined way in all departments and is compliant with the COSO operational (effectiveness and efficiency) objectives.

Level 4 means that the transparency of financial reporting can be tracked against targets and has all results under control and is implemented in a defined way, and all measures across all departments are aggregated to corporate trends in all departments and is compliant with the COSO strategic objectives.

7. Lessons Learned

The COSO SPICE assessment is a powerful tool to visualize improvement potentials for financial reporting control processes. Using ISO/IEC 15504 standard makes internal financial control assessments repeatable, structured and delivers an easy to read result for corporate improvement programs.

References

Chapter 5: Integrated COSO SPICE Assessments

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Dr. Richard Messnarz (rmess@iscn.com) is the Executive Director of ISCN LTD. He studied at the University of Technology Graz and he worked as a researcher and lecturer at this University from 1991 - 1996. In 2 European mobility projects (1993 and 1994) he was involved in the foundation of ISCN, and he became the director of ISCN in 1997.

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He is the author of many publications in e-working and new methods of work in conferences of the European Commission (E-2001 in Venice, E-2002 in Prague), and in the magazine for software quality (Software Quality Professional) of the ASQ (American Society for Quality).

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Mr Janos Ivanyos

János Ivanyos is one of the founders of Memolux Ltd., a Hungarian 70 people in staff accounting and IT service company established in 1989. As managing director he is responsible for Information Technology and Payroll Outsourcing services.

He was graduated as an economist at the Karl Marx University of Economics, Budapest in 1984. He has about 25 years experience in IT, and he has successfully managed many technically complex, international (Europe-wide) research and training projects since 1995. He is the author of several papers and proceedings of international conferences about process improvement (EuroSPI, SPICE DAYS) and internal auditing (IIA).

He was the leader of the IT and Quality Assessment section of the Hungarian Institute of Internal Auditors. He is an associate professor at the Budapest Business School teaching ISO/IEC 15504 based assessment of internal control and enterprise risk management systems. He is leading the “European Internal Financial Control Assessor” job-role committee of the European Certification and Qualification Association. He is the initiator of the Governance Working Group and a founding member of INTACS, an independent non-profit association aiming to foster the education and experience exchange of ISO/IEC 15504 (SPICE) assessors on a worldwide basis.
Human Resources Based Improvement Strategies – the Learning Factor

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Abstract: Processes usually are defined according to underlying standards (ISO/IEC 15504, ESA ECSS, ISO 9001, …) and are described with process steps to be performed by roles and producing results (outputs) from well defined inputs, methods and tools to support the process steps, and activities to be done and skills to be covered by roles. Assessments and resulting improvement initiatives very much focus on the processes and less on the human resources based strategies.

In this paper we want to emphasise that both issues are of equal importance, the processes and the highly skilled human force. We also highlight the currently running European initiative called European Certification and Qualification Association – www.ecqa.org, which supports the establishment of such a human resource and learning strategy in Europe.

1. Motivation

European studies illustrate that the success of an innovation or improvement is not just dependent on the correct technical approach. A lot of learning strategy related aspects influences the success. See Figure 1.

Beside top management support the study outlined a positive learning culture (learning from mistakes, team learning, knowledge sharing, etc.) and a supporting organisational infrastructure which helps with the implementation of the learning organisation.

Please note that we regard human skills as a complementary set needed in addition to qualified processes to be successful on the market.
Chapter 6: Human Resources Based Improvement Strategies – the Learning Factor

2. What is a learning organisation?

A learning organisation creates a positive learning culture and enables team learning and synergy exploitation in an organisation. By team learning knowledge is spread much more quickly and a high level of a skilled human force is maintained.

Typical examples of failure are

- You recognise that for the implementation of a new product or new processes you lack specific skills and have no chance of acquiring them in time.
- You recognise that departments inside the company have the knowledge but do not want to share it with other departments.
- You recognise that your competitors have formed a group to share knowledge and jointly compete against you on the market.
- You recognise that some of your management staff does not fully understand the mission.
- You recognise that someone in your firm bought a knowledge management system but none uses it.
- Etc.

Typical examples of success are

- You linked in time yourself to experience partnerships and training networks and can react on the market immediately with any skills required.
- You manage that knowledge and team learning is used in a synergy approach between the departments and teams.
- You were the one who formed the group that jointly learns and shares knowledge and collaborates against your competitors.
Chapter 6: Human Resources Based Improvement Strategies – the Learning Factor

- You ensure that the mission is a goal which binds everyone to a big picture.
- You analyse the core knowledge (the one that differentiates you from the competitors) and build all knowledge management strategies around that core (=realistic and not holistic knowledge management!).
- Etc.

In learning organisations there is an infrastructure in place which enables the team learning and the spreading of knowledge and team communication.

3. The Skills Acquisition Strategy

We have set up a partnership of experienced partners in 18 European countries to create a pool of knowledge for specific professions. This pool can be extended to further professions.

If there is a need a person can attend a course for a specific job role online through an advanced learning infrastructure. See example in Figure 2.

*Figure 2: The Integrated European Skills Acquisition and Learning System*

You start with a self assessment against the skills. Then you can sign into an online course. Here you are guided by a tutor and do a homework which is being corrected by the tutor. Finally the homework and real work done in your project is sufficient to demonstrate the skills.

We have installed similar platforms and strategies in multinational organisations so that their process related training programs can be delivered in this advanced form of human skills acquisition management (either at central sites or learning centres).
4. The Skills Provision Strategy

The knowledge and pertaining training materials could be organized according to the following structure:

**Domains**: (e.g., Governance domain, IT domain, Tourism domain), which represent an occupational category, under which the job descriptions are grouped.

**Job Role**: is a certain profession that covers part of the domain knowledge (e.g., internal financial control assessor, project manager, innovation manager, e-commerce manager).

**Units**: the knowledge and skills required for performing a specific job are grouped in units within a job role description.

**Elements**: to provide better structuring of the units, the units are divided into elements.

**Performance Criteria (PC)**: is the criteria for the minimum level of knowledge and performance required for a participant to pass the exams. Performance criteria are defined for each element.

**Evidences**: about fulfillment of required knowledge can be provided in a form of answers or additional documents (like examples of project plans, developed by a participant of an exam).

On an annual basis, the existing platform of knowledge is continuously enhanced. Existing skills sets are being reworked and new skills sets will be added. Joined knowledge is being configured in the form of a job role with standard content structures:

- Skills set
- Syllabus
- Learning materials and online configuration
- A set of test questions

So-called job role committees regulate the content for a specific skills set.

The job role committee for an innovation manager, for instance, created a skills set for an innovation manager together with a set of online courses. People can register from the workplace and perform skills self-assessment online by answering the test questions evaluated automatically.
Chapter 6: Human Resources Based Improvement Strategies – the Learning Factor

So far more than 20 professions/job roles have been configured, including the Internal Financial Control Assessor. See most current information at [www.ecqa.org](http://www.ecqa.org)

Figure 4: Skills Assessment

We have installed similar platforms and strategies in multinational organisations so that they configure the content with process and technology related skills sets and training materials. In the first run we use a combination of process assessment (weak processes areas) and the access to specific knowledge by training.

5. European Certification and Qualification Association (ECQA)

Nowadays it is important that training courses are really recognised and attendees receive a certificate valid for all European countries. As a backbone of the above described initiative the EU supported the establishment of a European Certification and Qualification Association (ECQA).

The ECQA is the result of a number of EU initiatives in the last ten years where in the European Union Life Long Learning Programme different educational developments decided to follow a joint process for the certification of persons in the industry.

Through the ECQA it becomes possible that you attend courses for a specific profession in e.g. Hungary and perform a Europe wide agreed test at the end of the course. The certificate will then be recognized by European training organizations and institutions in 18 member countries.
ECQA created a set of rules, exam systems, and certification procedures to apply Europe wide a defined certification process in industrial training.

- **Defined Certification Rules and Procedures**: The acceptance of job roles (e.g. the certified internal financial control assessor is a job role) and skills sets and the certification of students is based on defined quality rules and certification procedures.

- **Skills Sets**: A defined set of quality criteria has to be followed to create the learning objectives and syllabus for new professions. Only skills sets which fulfil the defined criteria are accepted by the ECQA.

- **Job Role Committees**: European consortia are built per accepted professions to annually update the skills set and create a European wide test questions pool.

- **Certified Training Body**: There are certified training bodies in 18 countries. Training bodies have to fulfil defined criteria to be listed for a specific profession.

- **Certification bodies**: These are certification bodies who accepted to use the defined skills sets, exam questions, and exam portals to test and certify the attendees.

In addition to the defined set of procedures the ECQA has set up an infrastructure with defined services.

- **European Exam Systems**: Assuming that a group of training bodies agreed the same skills set then students must be able to pass a test, independently from the region or country in a Europe wide scope. This is the reason why (supported by the former EU Cert project 2008 - 2009) a Europe wide pool of test questions for the developed skills sets plus European test portals which computer automate this test scheme have been set up and allow a cross-European Internet based collaboration.
Chapter 6: Human Resources Based Improvement Strategies – the Learning Factor

- **Learning Environment**: In the EU Cert Campus Project (2008 – 2009) the existing skills and exam portals were extended to an online campus for training of trainers and the multiplication of that approach into more training bodies and more regions in Europe.

- **European Knowledge Pool**: Assuming that a group of training bodies agreed the same skills set then students must be able to pass a test, independently from the region or country in a Europe wide scope. This is the reason why (supported by the former EU Cert project 2008 - 2009) a Europe wide pool of test questions for the developed skills sets plus European test portals which computer automate this test scheme have been set up and allow a cross-European Internet based collaboration.

- **ECQA Exams**
  - Computer based and random generated exams
    - European test portals
    - European test questions pool
    - Automatic correction
    - Certification process automated
    - Registration of participants and logging of tests

*Figure 6: ECQA – Automated Exams*

One of the most important professions and certificates offered by ECQA is the Certified Internal Financial Control Assessor. The Job Role Committee comprises organisations which have a long experience with internal financial control systems, international audit and assessment standards, and exploitation of results in the EU. So far more than 5000 people were certified in ECQA, from which about 500 are certified international financial control assessors.
6. Outlook

The innovation studies illustrated that to make process improvement and innovation strategies successful we need to consider the human skills and team learning factors to a large extent. How quick we can roll out a good practice to all teams is decisive about the time to impact and the time to success.

Advanced firms (e.g. the 156 multinational companies in the Ted O’Keeffe study) understand the need of such systems and beside top management support count most on the supporting infrastructure of team learning and knowledge sharing and the creation of a positive learning culture.

In such an environment we can (1) build a critical mass of joint certificates in Europe, and (2) use the advanced learning systems to install supporting infrastructures in the European firms.

If you are a training organisation and want to be joining EU Certification and Qualification Association and want to find out synergy options, please search for [www.ecqa.org](http://www.ecqa.org) and contact one of the coordinators or Job Role Committee (JRC) representatives.

If you are a trainer and want to be trained as a trainer in one of the promoted professions, EU Cert campus will fund and sponsor your education. Please select the right job role and contact the JRC (Job Role Committee) representative to be included in the training of trainers program.
Chapter 6: Human Resources Based Improvement Strategies – the Learning Factor

References


[9] DTI - Department of Trade and Industry UK, British Standards for Occupational Qualification, National Vocational Qualification Standards and Levels


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He is the editor of a book "Better Software Practice for Business Benefit", which has been published by IEEE (www.ieee.org) in 1999 (the leading research publisher in the USA). He is the chairman of the EuroSPI initiative and chair of the programme committee of the EuroSPI conference series.

He is author of many publications in e-working and new methods of work in conferences of the European Commission (E-2001 in Venice, E-2002 in Prague), and in the magazine for software quality (Software Quality Professional) of the ASQ (American Society for Quality).

He is a lead ISO 15504 assessor. He has worked as a consultant for many automotive firms, such
Chapter 6: Human Resources Based Improvement Strategies – the Learning Factor

as BOSCH, ZF TE, ZF N, Continental TEMIC, Audi/VW, etc. He is a founding member of the INTACS (International Assessor Certification Scheme) accreditation board, a founding member of the Austrian Testing Board, a founding member of the Configuration Management Board, and he is the technical moderator of the SOQRATES initiative (www.soqrates.de).

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Partners’ Introduction

ISCN International Consulting Network

Since 17 years ISCN moderates European task forces and networks for process improvement and systems engineering. The knowledge of the task forces is collected, analyzed and archived in teamworking and knowledge management portals which created a unique European knowledge base for the industry. Also your company can benefit from collaboration with ISCN and access to this vast pool of knowledge. ISCN is the coordinator of EuroSPI (www.eurosip.net).

ISCN is the moderator of the German SOQRATES initiative (www.soqrates.de) in which cross company task forces collaborate to share knowledge about practical implementation of SPICE. ISCN is the technology platform provider and member of the executive board of the European Certification and Qualification Association (ECQA, www.ecqa.org) in which 16 European professions (with ISCN as prime manager of the Certified Innovation Manager network) are supported with learning and exam portals and Europe wide certification.

ISCN is the provider of the Capability Adviser web assessment platform which supports SPICE assessments (Automotive, Finance, ISO 9001, etc.), online learning and reporting. The systems are currently used by major suppliers such as ZF Friedrichshafen, Continental, Magna Powertrain, T-Systems, Giesecke & Devrient, etc.

ISCN is an INTACS accredited ISO 15504 Provisional Assessor (ISO 15504 and Automotive SPICE) course provider and offers an experienced team of assessors in collaboration between ISCN and Methodpark.

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TermNet – International Network for Terminology – since 1988

TermNet, the International Network for Terminology, is an international co-operation forum for companies, universities, institutions and associations who engage in the further development of the global terminology market. The products and services of this market are considered and promoted by TermNet as integral and quality assuring parts of any product and service in the areas of

a) information & communication,

b) classification & categorization as well as

c) translation & localization.

TermNet Members co-operate with a view to:

- Developing and marketing terminology products and services,
- Planning and implementing joint projects (research and innovation projects, as well as market development or awareness raising projects),
- Organizing practice-oriented training opportunities and summer schools,
- Networking and promoting own products and services during conferences, workshops and other joint activities,
- Developing high-end consultancy and training services of application-oriented terminology.

TermNet was founded on the initiative of UNESCO, with the aim to establish a network for co-operation in the field of terminology. In 1988, TermNet was registered as a non-profit organization being allowed commercial activities for the benefit of its members.

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FGUVA – Fundación General de la Universidad de Valladolid

The UNIVERSITY OF VALLADOLID GENERAL FOUNDATION - FGUVA was created in 1996 having the Mission of promoting the relationship between the University and the Society in general. It provides different services to the university community through its Employment Services by analysing market trends, providing career guidance and job placements both to students and graduates and by supplying complementary training to the current formal training delivered by the University of Valladolid.

FGUVA has a large experience in EU projects, mainly related to vocational training and to the adaptation of students and recent graduates to the labour market requirements. FGUVA has taken part in more than 30 EU Projects, like the Leonardo da Vinci Projects “Certified European Internal Audit Manager” or “MONTIFIC”. In 2008 FGUVA was granted with the second prize of quality to B Procedure projects within Leonardo da Vinci Programme at national level.

FGUVA is member of different international networks like EURES, LEONET or MOdENet between others. Is also member of ECQA (European Certification and Qualification Association).

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UBB – Babeș-Bolyai University

Babes Bolyai University is a public institution of higher education whose mission is to promote and sustain within the local, regional, national and international community the development of specific cultural components.

Within the current context, these components are: a culture of action based on systematic and innovative knowledge (culture of scientific and technological competence, of organizational competence and of citizenship competence), a culture of permanent and innovative learning, multiculturalism, inter-cultural and inter-confessional dialogue; a culture of personal and moral development; a culture of proactive attitude and involvement; a culture of personal development; a culture of integration in diversity and of globalization based on identity respect and reciprocity.

The university has 21 faculties and over 1,700 faculty members. The University offers bachelors, masters, and Ph.D. degrees, along with advanced postgraduate studies. The university is located in an ethnically diverse area and this is very well illustrated in its structure: 19 of the 21 faculties provide a Romanian curriculum; 17 of them provide a Hungarian curriculum; 9 of them provide a German curriculum and 6 of them provide an English curriculum.

In the most recently national and international ranking Babes-Bolyai University was ranked in the top 3 Universities in Romania in 2009. The Babes-Bolyai University is one of the two Romanian universities taken into consideration by the world rankings and is considered to be the most attractive university from the point of view of the firms.

The Babes-Bolyai University is a university with a completely open basis and which is trying to be as selective as possible towards the top, with all the resulting implications.

At the same time, the Babes-Bolyai University is an entrepreneurial university. In the past year we had projects that won European funding worth 31,768,975 Euro, and other already accepted projects worth 19.75 millions Euro. University is involved annually in over 500 research or other types of national and international projects with public or private finances.
European Certification and Qualification Association (ECQA)

The ECQA is a non-profit association, joining institutions and thousands of professionals from all over Europe and abroad.

- **ECQA provides a world-wide unified certification schema for numerous professions.**
  
The same exam pool, exam rules and the same electronic exam system are used for certification exams in any participating country.

- **ECQA brings together experts from the market and supports the definition and development of the knowledge (Skills Sets) required for professions.**
  
Experts, brought together in so called Job Role Committees, are initiating new professions and updating the existing professions as needed on the market.

- **ECQA defines and verifies quality criteria for Training organizations and Trainers to assure the same level of training all over the world.**
  
The certification procedure offers modularity of certification therefore modularity of training all over the world should be assured. Only verified and approved organizations and individuals may become ECQA certified service providers.

- **ECQA promotes all certified professionals.**
  
Certified professionals are supported by ECQA promoted recognition and visibility on the market to help organizations and individuals for cooperation and collaboration.
The company was established in 1989 for providing best quality services in supporting of organizational governance activities such as:

- Accounting
- Taxation
- Bookkeeping
- Payroll Services
- Audit
- Due Diligence
- Internal Control
- Information Services

MemoLuX has been participating in EU funded multilateral research and learning management projects since 1995 in the fields of:

- Software Process Improvement
- Quality Management
- Team-working
- Project Management
- Internal Financial Control Assessment
- Governance Capability Assessment
- Multilingual Ontology
- European Skills and Certificates

MemoLuX is sponsoring the “Integrated Audit Manager” knowledge-sharing initiative providing starting point for managers, internal and external auditors in each sector to acquire necessary skills, knowledge and certification in the fields of managing and auditing governance, risk management and internal controls in a common integrated framework.

www.ia-manager.org