**ISO/IEC 29110 Series of Standards and Guides for Very Small Entities**

**INCOSE Chapter Kit**

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This kit has been developed to promote the awareness of INCOSE members worldwide about the set of ISO/IEC 29110 standards and guides developed specifically to help very small entities (VSEs) in applying systems engineering practices to their projects. VSEs, as defined in ISO 29110, are enterprises, organizations (e.g. public or non-profit), departments or projects having up to 25 people.

Within the context of ISO 29110, a system is typically composed of hardware and software components.

The Management and engineering guides of ISO 29110 provide a description of the basic set of actions that a VSE should perform. However, due to the different roles that a VSE may play in a project, it may be necessary to tailor the processes (e.g. adding a task, modifying the name of a document, changing the name of a role) described in the ISO 29110 guides.

1. **Content of the ISO 29110 Kit for INCOSE Chapters**

The kit contains the following elements:

* + A set of links to short videos on YouTube about an overview of ISO 29110
  + A set of Power Point slides introducing ISO 29110
  + A set of articles about ISO 29110 describing the ISO 29110 series and a few implementations
  + A set of ISO 29110 freely available documents from ISO
  + A set of systems engineering deployment packages available from INCOSE
  + A link to a public ISO 29110 web site
  + A link to self-learning modules

A brief description of the elements is provided below.

1. **Short videos on YouTube**
   * INCOSE webinar: [*International Systems Engineering Standards and Guides for Very Small Entities*](http://profs.etsmtl.ca/claporte/Publications/Communications/Webinar_SE%20for%20Very%20Small%20Entities.mp4). A 45-minute webinar describing ISO 29110 and implementation projects.



* + Link to 6-minute English video: <https://www.youtube.com/watch?v=viP7WLaFC8E>
  + Link to 7-minute French video: <https://www.youtube.com/watch?v=w8wCIyDqYLI>
  + Link to 7-minute Spanish video: <https://www.youtube.com/watch?v=HiFRhNSIPq8>

1. **Presentation material**

A set of slides providing an introduction to ISO 29110 and its uses and benefits for VSEs is available on the [VSE Working Group page](https://www.incose.org/incose-member-resources/working-groups/transformational/VSE) for INCOSE Members.

1. **Articles**

The articles listed below are excellent for helping users/readers understand how ISO 29110 can be applied in many dissimilar uses and by different types/levels of user organizations:

* + Galinier, S., Laporte, C. Y., Connecting Business Development and System Engineering with ISO/IEC 29110 Standard in Small and Medium Enterprises of France, 4th IEEE International Symposium on Systems Engineering, October 1-3, 2018, Rome, Italy.

**Abstract.** As systems are getting bigger, customers as well as systems integrators need to work with more performing and innovative small and medium-size suppliers. To stay in the game, these small and medium enterprises (SMEs) have to face new challenges such as developing their new strategic positioning, managing growth, complexity and interdisciplinarity, sharing with team and customers a clear product strategy, keeping competent engineers, developing their ability to inject innovation gradually, succeeding in industrializing their innovative prototypes, arranging consistent after sales service.

The authors make the idea emerge that these Business Development challenges can be clearly addressed at SME level with a Systems Engineering dedicated approach such as ISO/IEC 29110. It took them 18 months to write and publish a book in French that describes these issues. Subsequently, they lead a 24-month pilot project initiated early 2017, in the south of France to implement the engineering and management processes of ISO/IEC 29110 in 6 enterprises regarding their own business objectives. The selected enterprises are operating in a wide range of domains such as aeronautics, agriculture, automotive, nuclear and space. The size of these enterprises ranges from 10 to 200 people, where 3 of these enterprises have fewer than 20 people. They develop services, products, subsystems or systems, directly specified for a customer or for a market by self-specification. AFIS and French government funded the project where a team of 8 experts, members of the French systems engineering association AFIS and INCOSE, helped the 6 enterprises in implementing systems engineering processes and measured the effectiveness of their actions.

The lessons learned show how these processes helped the SMEs to understand the benefits of System Engineering for their Business Development, to embrace a bigger point of view and understand how their business environment changes. They can measure the value of their products or services for their customers and also adapt their innovation level to stay in the market. Finally, the authors show how closes the profiles of Business Developer and System Engineer are, based on System Thinking abilities.

* + Robinson, A., [Very Small Entities (VSE); The Final Systems Engineering (SE) Frontier,](https://www.researchgate.net/publication/325492958_Very_small_entities_VSE_The_final_systems_engineering_SE_frontier) 2018 Annual IEEE International Systems Conference, 23-26 April 2018, Vancouver, Canada.

**Abstract**. International standards are designed to codify engineering practices for uniformity and consistency. The origin of systems engineering, and software development standards comes out of the development of large systems and targets their use for large enterprises. Many industries in our global economy recognize the contribution of very small organizations to the health and wealth of not only emerging country economies but, their essential contribution to mature countries. Very small entities (VSEs) consist of organizations having up to twenty-five (25) persons and are considered a significant portion of the systems and software developers throughout the world.

Large organizations using the Systems Engineering Standard, ISO/IEC/IEEE 15288, found a need to better qualify the small companies with which they were doing business. There was a strong desire to:

* + - 1. Improve or make product development efficient by using Systems Engineering methodology
      2. Elaborate tailored practical guidance to apply to VSEs in the context of prime or subcontractor, of commercial products
      3. Contribute to standardization

The ISO standards, for use by organizations of twenty-five (25) people or less, was perceived as overly complex. In 2005, the first meeting of ISO/IEC JTC1 SC7 Working Group (WG) 24 was held, and the work on ISO/IEC 29110 series began.

At the 2009, International Council on Systems Engineering (INCOSE) International Workshop (IW), the Association Française d'Ingénierie Système (AFIS) (French INCOSE Chapter) and INCOSE established the Systems Engineering for Very Small and Micro Enterprises (VSMEs) WG. The systems engineering ISO/IEC 29110 is considered a child of the ISO/IEC/IEEE 15288, distilled to the perfect essence of Systems Engineering with a complete set of DNA from its parent, ISO/IEC/IEEE 15288.

This paper will discuss the intended users, the importance of VSEs, a product development approach, opportunities for VSEs using the ISO/IEC 29110 as a business proposition, and the basic tools provided by the ISO/IWEC 29110 to get a product started. We will introduce the operational framework of the ISO/IEC 29110 Basic Profile Group which includes Project Management Process, System Definition and Realization, Product Development Process (PDP) for limited resources, as well as Roles, Activities, and Tasks to develop a product with as few as 5 people using nine (9) Deployment Packages (DPs).

Engaging very small business partners for Systems Engineering projects using an ISO Standard designed just for them is a new frontier with unlimited opportunities for women and minorities to remove barriers to entry into business sectors with an unusually high bar to entry.

* + Laporte, C.Y., [Applying Software Engineering Standards in Very Small Entities: From Start-ups to Grownups](https://www.researchgate.net/publication/322059955_Applying_Software_Engineering_Standards_in_Very_Small_Entities_From_Startups_to_Grownups?_sg=EnaRH-xd7HBJsCCUUFoKovFrNrQoEuP5hvROOOQKLhibD7Nm90sdCuPOgCQ9OgCmsMcl5wSbUyMNOFbIQsWWSitzTG4W42g-lG5bNvAG._T9NqC8mSWqgAb2xLAgfkgw7OZswP2IRpiP_oIpv-urCFqCIUmdxM5UbUyS4oHcZMf3CgdMKBrVliROzVqKXOw), IEEE Software, Vol. 35, Issue 1, pp 99-103 (January/February 2018)

**Abstract**. Very small entities (VSEs) are organizations with up to 25 people. The ISO/IEC 29110 series of standards and guides target VSEs with little or no experience or expertise in selecting the appropriate processes from lifecycle standards and tailoring them to a project’s needs. This article gives an overview of ISO/IEC 29110, some examples of VSEs that have implemented it, and those implementations’ results.

* + Lebel, K., Laporte, C.Y., [Development of an Application in a Large State-Owned Utility Provider Using an Agile Approach with ISO 29110.](https://www.researchgate.net/publication/325973216_Development_of_an_Application_in_a_Large_State-Owned_Utility_Provider_Using_an_Agile_Approach_with_ISO_29110?_sg=EnaRH-xd7HBJsCCUUFoKovFrNrQoEuP5hvROOOQKLhibD7Nm90sdCuPOgCQ9OgCmsMcl5wSbUyMNOFbIQsWWSitzTG4W42g-lG5bNvAG._T9NqC8mSWqgAb2xLAgfkgw7OZswP2IRpiP_oIpv-urCFqCIUmdxM5UbUyS4oHcZMf3CgdMKBrVliROzVqKXOw)

* + Laporte, C.Y., O’Connor, R.V. (2016), [Systems and Software Engineering Standards for Very Small Entities: Accomplishments and Overview](https://www.researchgate.net/publication/304778603_Systems_and_Software_Engineering_Standards_for_Very_Small_Entities_Accomplishments_and_Overview), IEEE Computer, Vol 49, number 8, pp. 84-87.

**Abstract**. A large majority of organizations very small entities (VSEs) - commercial, government, or non-profit organizations; departments; or projects with up to 25 people who develop systems with hardware and software components and/or software products. Their products are sold to their customers directly or are integrated into those developed by larger organizations, possibly distributed to thousands of users worldwide. A supply chain of large products often has a pyramidal structure composed of many first, second and third level suppliers. If an undetected defect is left in a low-level component, once this component is integrated in a higher-level component, the defect may still be undetected. This defective component, once integrated in the final product, could result in a loss of millions of dollars by the manufacturer.

* + Ptack, K., [VSE 101 – Who, What, When, Where, Why](http://isotc.iso.org/livelink/livelink?func=ll&objId=19210572&objAction=Open&nexturl=%2Flivelink%2Flivelink%3Ffunc%3Dll%26objId%3D17238579%26objAction%3Dbrowse%26viewType%3D1), How, 27th Annual INCOSE International Symposium, Adelaide, Australia, July 15-20, 2017.

**Abstract**. International standards capture proven engineering practices for systems engineering and software engineering development. The perception by very small entities (VSEs) is that these standards are developed and targeted for use by large enterprises. However, governments and industry alike recognize that VSEs, consisting of 25 staff members or less, constitute a majority of the systems and software developers throughout the world.

During a worldwide survey of many different domain VSEs, it was verified that existing ISO standards were “too complicated” for use by VSEs. In 2005, the first meeting of ISO/IEC JTC1 SC7 Working Group (WG) 24 was held. This ISO WG is mandated to develop standards and guides for VSE use, thus the work on the ISO/IEC 29110 series began.

The paper will address how the ISO/IEC 29110 series and the INCOSE VSE WG deployment packages (DPs) work collaboratively to help VSEs incorporate systems engineering concepts within their entities. The use of these systems engineering concepts can provide VSEs the opportunity to successfully participate and grow in the global market environment.

* + Marvin, J.W., Bailey, G.V., Cadigan, J.J., [A SE VSE Company Use Case](http://isotc.iso.org/livelink/livelink?func=ll&objId=19173110&objAction=Open&nexturl=%2Flivelink%2Flivelink%3Ffunc%3Dll%26objId%3D17238579%26objAction%3Dbrowse%26viewType%3D1), 27th Annual INCOSE International Symposium, Adelaide, Australia, July 15-20, 2017.

**Abstract**. Prime Solutions Group, Incorporated (PSG) is a systems engineering company and Very Small Entity that has benefited from association with INCOSE and specifically the Very Small Entity Working Group. This paper presents the company’s use of the INCOSE Very Small Entity Working Group Deployment Packages for research projects, engineering services and software development. Further tailoring of the Very Small Entity Working Group Deployment Packages derived from ISO/IEC Technical Report 29110 into a System of Research & Development Innovation is discussed. Finally, the current INCOSE Technical Operations policy review and update activity is presented as an example of applying Very Small Entity systems engineering process on INCOSE. The objective of the paper is to describe the application of an INCOSE technical product in the small business world.

* + Laporte, C.Y., O'Connor, R., [Software Process Improvement Standards and Guides for Very Small Organizations - An Overview of Eight Implementation](https://www.researchgate.net/publication/316688489_Software_Process_Improvement_Standards_and_Guides_for_Very_Small_Organizations_-_An_Overview_of_Eight_Implementation), CrossTalk - The Journal of Defense Software Engineering, May/June 2017. Vol. 30, No 3, pp 23-27.

**Abstract**. Very small entities (VSEs) — organizations with up to 25 people — are very important to the worldwide economy. The products they develop are often integrated into products made by larger enterprises. However, it has been established that such entities often do not utilize existing best practice standards and frameworks such as ISO/IEC/IEEE 12207 software life cycle processes standard. In addition, small organizations do not usually have the expertise to search for and adapt process improvement best practices from many frameworks to their needs. Finally, these organizations are usually also looking for low-cost evaluation or certification schemes that would provide them with visibility.

To address their needs, ISO/IEC 29110 software and systems engineering standards and guides have been developed using elements of published standards. A four-stage road map has been developed to support process improvement activities of VSEs. In this paper, we present eight implementations of ISO/IEC 29110 as an exemplar of the potential benefits from the use of this standard.

* + Bougaa, M., Bornhofen S., O’Conner, R.V., Rivière, A., [A Standard Based Adaptive Path to Teach Systems Engineering: 15288 and 29110 Standards Use Cases,](http://isotc.iso.org/livelink/livelink?func=ll&objId=19193434&objAction=Open&nexturl=%2Flivelink%2Flivelink%3Ffunc%3Dll%26objId%3D17238579%26objAction%3Dbrowse%26viewType%3D1) 11th Annual IEEE International Systems Conference, April 24-27, 2017, Montréal, Québec, Canada, pp. 112-119.

**Abstract.** This paper discusses the use of two different standards for teaching Systems Engineering (SE): ISO/IEC/IEEE 15288 and ISO/IEC 29110. The first one is a general and widely used standard describing the lifecycle processes of the entire system, whereas the second one is a relatively new standard based on a reduced set of standards elements focused on lifecycle profiles for Very Small Entities (VSEs). We are especially interested in the impact that SE standards can have on teaching this discipline to engineering students. We consider the teaching of fundamental principles of systems engineering. In this paper we illustrate how our, previously developed, standard based solution for systems engineering education can be used as a framework to support these standard-based teaching paths. We mainly focus on illustrating how adapting standard processes can be done, considering not only the learning goals, but also projects size and complexity, in a project-based learning environment.

This paper shows that, thanks to its adaptation from the ISO/IEC/IEEE 15288, and to its reduced size, the ISO/IEC 29110 standard is particularly suitable for teaching systems engineering fundamental knowledge to undergraduate students, new to the discipline. While the ISO IEC/IEEE 15288 might be more suited for students that already have a good grounding in systems engineering fundamentals, especially thanks to the ability to use some from its various processes to separately teach different topics of systems engineering.

* + Buczacki, A., Laporte, C.Y**.,** [Technology planning approach for Very Small Entities](http://isotc.iso.org/livelink/livelink?func=ll&objId=19197553&objAction=Open&nexturl=%2Flivelink%2Flivelink%3Ffunc%3Dll%26objId%3D17238579%26objAction%3Dbrowse%26viewType%3D1), 26th Annual International Symposium of INCOSE (International Council on Systems Engineering), Edinburgh, UK, July 18-21, 2016.

**Abstract.** Systems engineering is usually seen as the domain of large enterprises. However, small and medium sized (SMEs) and micro-enterprises are coming to play an ever-larger role even in industries traditionally dominated by large enterprises. In new product development projects carried out by SMEs or micro-enterprise using systems engineering, three aspects should be noted. Firstly, such enterprise wants to initiate the project independently, i.e. develop a new product/system under ISO 29110, there is some information regarding how it could do it, i.e. the stage that would involve the definition of the requirements. But enterprise should be able to understand and apply this information. Secondly, it must be underlined that project execution, is preceded by establishment of cooperation of new product development process. This process is frequently tedious, time-consuming and – especially for small organizations – troublesome. Thirdly, such cooperation should be anchored in the strategy especially in technology strategy of the company. Technology road mapping could be considered as a tool which is helpful in technology strategy creation process.

* + Laporte, C.Y., Tremblay, N., Menaceur, J., Poliquin, D., Houde, R., [Developing and implementing systems engineering and project management processes at CSIT - A small Canadian company in public transportation](https://www.researchgate.net/publication/305771653_Developing_and_implementing_systems_engineering_and_project_management_processes_at_CSiT_-_A_small_Canadian_company_in_public_transportation), 26th Annual International Symposium of INCOSE (International Council on Systems Engineering), Edinburgh, UK, July 18-21, 2016.

**Abstract.** A project was created to define and implement project management and systems engineering processes at CSinTrans Inc. (CSiT), a Canadian company, founded in 2011. CSiT specializes in the integration of communication and security systems in transit industry such as trains, subways and buses as well as railway stations, subway stations and bus stops. ISO/IEC 29110 standards and guides for systems engineering have been used as the main reference for the development of these processes.

The project's history, purpose and rationale that prompted CSiT to adopt this recently published standard are presented. The implementation of the standard is described. The reflections and decisions made during the implementation are presented. The lessons learned are discussed. Recommendations and advice for organizations wanting to implement ISO/IEC 29110 are described.

ISO 29110 has helped raise the maturity of the organization by implementing proven practices and developing consistent work products from one project to another. ISO/IEC 29110 was a good starting point to align processes with specific practices of CMMI® Maturity Levels 2 and 3. ISO/IEC 29110 has also helped CSiT with developing light processes as well as remaining flexible and quick in its ability to respond to its customers.

* + Houde, R., Laporte, C.Y., Blondelle, G., [ISO/IEC 29110 Deployment Packages and Case Study for Systems Engineering: The "Not-So-Secret" Ingredients That Power the Standard](https://www.researchgate.net/publication/305488384_ISOIEC_29110_Deployment_Packages_and_Case_Study_for_Systems_Engineering_The_Not-So-Secret_Ingredients_That_Power_the_Standard), 26th Annual International Symposium of INCOSE (International Council on Systems Engineering), Edinburgh, UK, July 18-21, 2016.

**Abstract**. Very small entities (VSEs) play an increasingly important role in the global economy. The products they develop are often integrated into products made by larger enterprises. Clients, furthermore, demand of the VSEs that they assume a much broader role, spanning the entire development life-cycle of the product instead of being limited to a “build-to-print” approach. The ISO/IEC 29110 systems engineering management and engineering guides were developed mainly from ISO/IEC/IEEE 15288 to address this new reality, to exploit the lean and efficient nature of VSEs and to adapt to their typical budget and resource constraints. By design, the management and engineering guide is supported by Deployment Packages (DP), the development of which was taken on by the INCOSE VSE Working Group. A DP is a set of artefacts designed to facilitate the implementation of the management and engineering guides of ISO/IEC 29110 by VSEs. In tune with the need for low cost and flexibility, Open Source software tools are emerging to support VSEs and provide a bridge with “Big League” development life-cycle toolsets. Finally, to make the deployment of ISO/IEC 29110 possible in VSEs, training packages, supported by relevant pilot projects help VSE personnel learn how to apply all of the above. This paper describes the Systems Engineering DP for Requirements Engineering (RE DP) and shows how it can be applied using the Autonomous Rover Case Study developed under the Eclipse Foundation Polarsys project.

* + Laporte, C.Y., Chevalier, F., [An Innovative Approach to the Development of Project Management Processes for Small-scale Projects in a Large Engineering Company](https://www.researchgate.net/publication/280154922_An_Innovative_Approach_to_the_Development_of_Project_Management_Processes_for_Small-scale_Projects_in_a_large_Engineering_Company), 25th Annual International Symposium of INCOSE (International Council on Systems Engineering), Seattle, US, July 13-16, 2015**.**

**Abstract**. A Canadian division of a large American engineering company has developed and implemented project management processes for their small-scale and medium-scale projects. The company was already using a robust project management process for their large-scale projects. The objectives of this process improvement project were to reduce cost overruns and project delays, standardize practices to facilitate the integration of new managers, increase the level of customer satisfaction and to reduce risk-related planning deviations.

For this improvement project, the engineering organization used the new ISO/IEC 29110 standard developed specifically for very small entities. An analysis of the cost and the benefits of the implementation of small and medium scale project management processes was performed using the ISO economic benefits of standard methodology.

The engineering enterprise estimated that, over a three-year timeframe, savings of about 780,000$ would be realized due to the implementation of project management processes using the ISO/IEC 29110.

* + Laporte, C.Y.,Houde, R., [Open Source Systems Engineering Guides, Deployment Packages and Support Tools for Very Small Enterprises – A Case Study](http://isotc.iso.org/livelink/livelink?func=ll&objId=19197892&objAction=Open&nexturl=%2Flivelink%2Flivelink%3Ffunc%3Dll%26objId%3D17238579%26objAction%3Dbrowse%26viewType%3D1),25th Annual International Symposium of INCOSE (International Council on Systems Engineering), Seattle, US, July 13-16, 2015.

**Abstract**. Very small entities (VSEs) play an increasingly important role in the global economy. The products they develop are often integrated into products made by larger enterprises. The “Big League” clients, furthermore, demand of the VSEs that they assume a much broader role, spanning the entire development life-cycle of the product instead of being limited to a “build-to-print” approach. To address this new reality, to exploit the lean and efficient nature of VSEs and to adapt to their typical budget and resource constraints, the ISO/IEC 29110 systems engineering standards, management and engineering guides were developed from ISO/IEC/IEEE 15288.

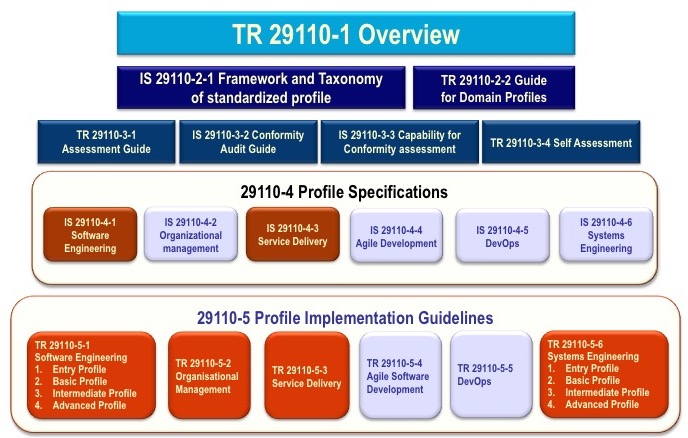
In addition, and by design, the standard is supported by Deployment Packages, software tools and training kits. The INCOSE VSE working group developed the deployment packages. A deployment package is a set of artefacts designed to facilitate the implementation of a standard or a set of practices in a VSE. In tune with the need for low cost and flexibility, Open Source software tools are emerging to complete “Big League” development life-cycle toolsets, which are often out-of-reach to VSEs. Finally, to make the deployment of the standard possible in the VSE, training packages, supported by relevant pilot projects help VSE personnel learn how to apply all of the above.

* + Laporte, C.Y., O'Connor, R., Fanmuy, G., [International Systems and Software Engineering Standards for Very Small Entities](https://www.researchgate.net/publication/236395131_Systems_and_Software_Engineering_Standards_for_Very_Small_Entities), CrossTalk - The Journal of Defense Software Engineering, May/June 2013, Vol. 26, No. 3, pp. 28-33.

**Abstract.** Very Small Entities (VSEs) developing systems or software are very important to the military since the components they develop are often integrated into products made by larger organizations. Failure to deliver a quality product on time and within budget may threaten both customers and suppliers. One way to mitigate these risks is to put in place proven engineering practices. ISO has approved recently the publication of standards and technical reports, known as ISO/ IEC 29110, to address the needs of VSEs.

1. **ISO/IEC 29110 Series**

The figure below illustrates the elements of the ISO/IEC 29110 series of standards and guides. A few guides (e.g. overview, management and engineering guides) are freely available from ISO[[1]](#footnote-1).

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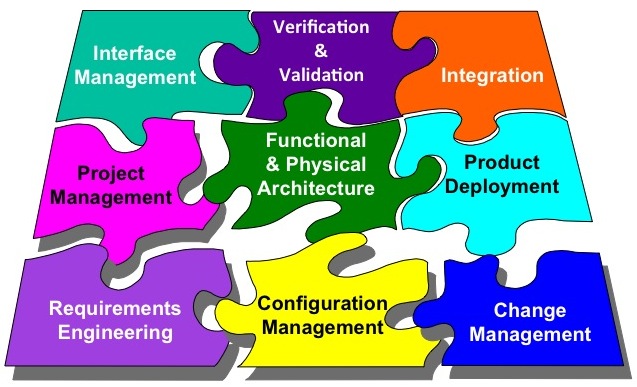
* + [ISO/IEC TR 29110-1:2016 - Overview](http://standards.iso.org/ittf/PubliclyAvailableStandards/c062711_ISO_IEC_TR_29110-1_2016.zip)
    - **Abstract**:
    - ISO/IEC TR 29110-1:2016 introduces the major concepts required to understand and use the ISO/IEC 29110 series. It introduces the characteristics and requirements of a VSE and clarifies the rationale for VSE-specific profiles, documents, standards and guides.
    - It also introduces process, lifecycle, standardization concepts and defines the organizational terms common to the VSE Profile Set of Documents.
    - It is applicable to a VSE. A VSE is an entity (enterprise, organization, department or project) having up to 25 people. The lifecycle processes described in the ISO/IEC 29110 series, Standardized Profiles and Technical Reports are not intended to preclude nor discourage their use by an entity that is larger than a VSE.
    - It is targeted both at the general audience wishing to understand the series of documents and, more specifically, at users of the ISO/IEC 29110 series. It should be read first when initially exploring VSE Profile documents. While there is no specific prerequisite to read this part of ISO/IEC 29110, it will be helpful to the user in understanding the other parts.
    - The lifecycle processes defined in the set of Standardised Profiles and Technical Reports can be used by a VSE when developing, acquiring and using, as well as when creating and supplying systems having hardware and software elements and software. They can be applied at any level in a systems development, software system's structure and at any stage in the lifecycle. They are not intended to preclude or discourage the use of additional processes that a VSE finds useful.
  + [ISO/IEC TR 29110-3-1:2015 – Assessment guide](http://standards.iso.org/ittf/PubliclyAvailableStandards/c062713_ISO_IEC_TR_29110-3-1_2015.zip)
    - **Abstract**:
    - ISO/IEC TR 29110-3-1:2015 defines the process assessment guidelines needed to meet the purpose of defined Very Small Entity (VSE) profiles. It is applicable to all VSE profiles and is compatible with ISO/IEC 33002.
  + [ISO/IEC TR 29110-5-6-1:2015 - Systems Engineering Entry Profile](http://standards.iso.org/ittf/PubliclyAvailableStandards/c066342_ISO_IEC_TR_29110-5-6_1_2015.zip)
  + **Abstract:**
    - ISO/IEC 29110-5-6-1:2015 is applicable to Very Small Entities (VSEs). VSEs are enterprises, organizations, departments or projects having up to 25 people. The lifecycle processes described in the set of International Standards (IS) and Technical Reports (TR) are not intended to preclude or discourage their use by organizations bigger than VSEs.
    - ISO/IEC TR 29110-5-6-1 provides the management and engineering Guide to the systems engineering Entry Profile described in ISO/IEC 29110-4-6 through Project Management and System Definition and realization processes. This part of ISO/IEC 29110 is a standalone guide; it is not intended for a VSE to use the standardised profile to implement this Guide.
    - This Guide applies for non-critical systems development projects. The system development should fulfil the project requirements and the system description.
    - Using this Guide, a VSE can obtain benefits in the following aspects:
      * an agreed set of project requirements (technical part of contract) and expected products are agreed by the Acquirer;
      * a disciplined management process, that provides project visibility and corrective actions of project problems and deviations, is performed;
      * a systematic System Definition and Realization process, that satisfies Acquirer needs and ensures quality products, is followed.
    - VSEs developing software that is part of a larger system and for standalone software products and services are encouraged to use the management and engineering Guide of the software engineering Entry Profile (ISO/IEC TR 29110‑5‑1‑1).
  + ISO/IEC TR 29110-5-6-1:2018 – Ingénierie des systèmes – Profil d’Entrée
  + **Résumé:** 
    - Le profil d'Entrée cible les TPO de démarrage (c'est-à-dire les TPO qui ont commencé leur activité il y a moins de 3 ans) et/ou les TPO qui travaillent sur un petit projet (par exemple, de 6 mois-personnes ou moins).
    - En utilisant cette partie de l'ISO/CEI 29110, un TPO peut obtenir des avantages dans les aspects suivants:
      * Un ensemble convenu d'exigences du projet (partie technique du contrat) et les produits attendus sont convenus par l'acquéreur;
      * Un processus de gestion discipliné, qui fournit la visibilité du projet et des actions correctives des problèmes et des écarts du projet, est effectué;
      * Un processus systématique de Définition et de Réalisation du Système, qui répond aux besoins des Acquéreurs et garantit la qualité des produits, est suivi.
    - Les TPO développant un logiciel faisant partie d'un système plus important sont encouragés à utiliser le guide de gestion et d'ingénierie du profil d'Entrée pour le logiciel (ISO/CEI TR 29110-5-1-1).
  + [ISO/IEC TR 29110-5-6-2:2014 - Systems Engineering Basic Profile](http://standards.iso.org/ittf/PubliclyAvailableStandards/c063371_ISO_IEC_29110-5-6-2_2014.zip)
  + **Abstract:**
    - ISO/IEC TR 29110-5-6-2 is applicable to Very Small Entities (VSEs). VSEs are enterprises, organizations, departments or projects having up to 25 people. The lifecycle processes described in the set of International Standards (IS) and Technical Reports (TR) are not intended to preclude or discourage their use by organizations bigger than VSEs.
    - ISO/IEC TR 29110-5-6-2 provides the management and engineering guide to the systems engineering Basic Profile described in ISO/IEC 29110-4-6 through Project Management and System Definition and realization processes. This part of ISO/IEC 29110 is a standalone Guide; it is not intended for a VSE to use the standardised profile to implement ISO/IEC 29110-5-6-2:2014.
    - ISO/IEC 29110-5-6-2:2014 applies for non-critical systems development projects. The system development should fulfil the project requirements and the system description.
    - Using this Guide, a VSE can obtain benefits in the following aspects:
      * An agreed set of project requirements (technical part of contract) and expected products are agreed by the Acquirer.
      * A disciplined management process, that provides project visibility and corrective actions of project problems and deviations, is performed.
      * A systematic System Definition and Realization process, that satisfies Acquirer needs and ensures quality products, is followed.
    - VSEs developing software that is part of a larger system, and for stand-alone software products and services, are encouraged to use the management and engineering Guide of the software engineering Basic Profile (ISO/IEC 29110-5 1-2).
  + ISO/IEC TR 29110-5-6-3:2019 - Systems Engineering Intermediate Profile
  + **Abstract:**
    - This document has been developed using the management and engineering guide of the systems engineering Basic profile and by modifying and adding elements (e.g. process, task, work product, role) for VSEs involved in the development of more than one project in parallel with more than one work team.
    - Using this part of ISO/IEC 29110, a VSE can obtain benefits in the following aspects:
      * an agreed set of project requirements (technical part of agreement) and expected products satisfying the Acquirer's needs.
      * a disciplined management process, that provides project visibility and corrective actions of project problems and deviations, is performed.
      * a systematic System Definition and Realization process, that satisfies Acquirer needs and ensures quality products, is followed.
    - Once the system, developed by a VSE, has been accepted by their customers, the VSE that wants to provide after delivery services can refer to ISO/IEC TR 29110-5-3.
    - In the context of systems engineering, that is System Definition and Realisation (SR) process, the group that is part of the VSE responsible for developing software elements that are part of the system are encouraged to use the management and engineering guide of the software engineering Intermediate Profile (ISO/IEC TR 29110-5-1-3).
  + [ISO/IEC TR 29110-5-6-2:2014 – Ingénierie des systèmes – Profil Basique](http://standards.iso.org/ittf/PubliclyAvailableStandards/c063371_ISO_IEC_TR_29110-5-6-2_2014(F).zip)
  + **Résumé:**
    - L'ISO/IEC TR 29110-5-6-2:2014 s'applique aux très petits organismes (TPO). Les TPO sont des entreprises, des organisations, des services et des projets regroupant jusqu'à 25 personnes. Les processus du cycle de vie décrits dans l'ISO/IEC 29110 sont aussi utilisables par des organismes de plus grande envergure que les TPO.
    - L'ISO/IEC TR 29110-5-6-2:2014 fournit un guide de gestion et d'ingénierie pour le profil Basique de TPO spécifié dans l'ISO/IEC 29110‑4-6 dans le cadre de la gestion de projet et des processus de mise en oeuvre. L'ISO/IEC TR 29110-5-6-2:2014 constitue un guide autonome, lequel n'a pas pour but de faire en sorte qu'un TPO utilise le profil normalisé pour mettre en oeuvre la présente partie de l'ISO/IEC 29110.
    - L'ISO/IEC TR 29110-5-6-2:2014 s'applique aux projets de développement de systèmes non-critiques. Le développement du système devra satisfaire les exigences du projet et la description du système.
    - En utilisant L'ISO/IEC TR 29110-5-6-2:2014, un TPO peut bénéficier des avantages suivants:
      * Accord du client sur les exigences du projet (partie technique du contrat) et les produits attendus
      * Mise en place d'un processus de gestion discipliné, permettant visibilité sur le projet et mesures correctives pour les problèmes et les écarts potentiels.
      * Un processus systématique de mise en oeuvre qui répond aux besoins du client et garantit la qualité des produits.
    - Les TPO développant du logiciel faisant partie d'un système plus grand et/ou des services et produits logiciels autonomes sont encouragées à utiliser le guide de gestion et d'ingénierie du profil Basique (ISO/IEC TR 29110‑5‑1-2).
  + [ISO/IEC TR 29110-5-1-1:2012 - Software Engineering Entry Profile](http://standards.iso.org/ittf/PubliclyAvailableStandards/c060389_ISO_IEC_TR_29110-5-1-1_2012(E).zip)
  + **Abstract:**
    - ISO/IEC TR 29110-5-1-1:2012 is applicable to Very Small Entities (VSEs). VSEs are enterprises, organizations, departments or projects up to 25 people. The life cycle processes described in the set of International Standards (IS) Profiles and Technical Reports (TR) are not intended to preclude or discourage their use by organizations bigger than VSEs.
    - ISO/IEC TR 29110-5-1-1:2012 provides the management and engineering guide to the entry profile described in ISO/IEC 29110-4-1 through project management and software implementation processes. ISO/IEC TR 29110‑5‑1‑1:2012 is a stand-alone guide. It is not intended for a VSE to use the standardized profile to implement ISO/IEC TR 29110-5-1-1:2012.
    - ISO/IEC TR 29110-5-1-1:2012 applies for software development project. The project may be to fulfil an external or internal contract. The internal contract need not be explicit between the project team and their customer.
    - Using ISO/IEC TR 29110-5-1-1:2012, a VSE can obtain the following benefits:
      * an agreed set of project requirements and expected products is delivered to the customer;
      * a disciplined management process, that provides project visibility and corrective actions of project problems and deviations, is performed;
      * a systematic software implementation process, that satisfies customer needs and ensures quality products, is followed.
    - ISO/IEC TR 29110-5-1-1:2012 is targeted at VSEs (a start-up VSE that started the operation less than 3 years ago and/or with a project size less than 6 person months).
    - It is intended to be used with any processes, techniques and methods that enhance the VSE's customer satisfaction and productivity.
  + [ISO/IEC TR 29110-5-1-1:2012 – Ingénierie du logiciel - Profil d’Entrée](http://standards.iso.org/ittf/PubliclyAvailableStandards/c060389_ISO_IEC_TR_29110-5-1-1_2012(F).zip)
  + **Résumé:**
    - L'ISO/CEI TR 29110-5-1-1:2012 s'applique aux très petits organismes (TPO). Les TPO sont des entreprises, des organismes, des services et des projets regroupant 25 personnes et moins. Les processus du cycle de vie décrits dans l'ISO/CEI 29110 ne sont pas destinés à empêcher ou à dissuader les organismes de plus grande envergure que les TPO de les utiliser.
    - L'ISO/CEI TR 29110-5-1-1:2012 propose un guide de gestion et d'ingénierie pour le profil basique de TPO défini dans l'ISO/CEI 29110-4-1 dans le cadre de la gestion de projet et des processus de mise en oeuvre. L'ISO/CEI TR 29110‑5‑1‑1:2012 constitue un guide complet et autonome. Un TPO n'a pas besoin du profil normalisé pour mettre en oeuvre l'ISO/CEI TR 29110-5-1-1:2012.
    - L'ISO/CEI 29110-5-1-1:2012 s'applique aux projets de développement de logiciel en vertu d'un contrat établi en interne ou en externe. Le contrat établi en interne, entre l'équipe de projet et le client, n'a pas à être explicite.
    - En utilisant l'ISO/CEI TR 29110-5-1-1:2012, un TPO peut bénéficier des avantages suivants:
      * Les livrables correspondent aux attentes et aux exigences du client documentées par le projet;
      * Un processus de gestion rigoureux, permettant d'en garder une vue d'ensemble et comportant des mesures correctives pour les problèmes et les écarts potentiels, est mis en oeuvre;
      * Un processus systématique de mise en oeuvre qui répond aux besoins du client et garantit la qualité des produits.
    - L'ISO/CEI TR 29110-5-1-1:2012 cible les TPO (un TPO en démarrage qui a débuté ses opérations depuis moins de 3 ans et/ou qui a des projets d'une envergure de moins de 6 mois-personnes).
    - Elle est conçue de manière à être utilisée avec tout processus, toute technique ou toute méthode visant à augmenter la satisfaction du client et sa productivité.
  + [ISO/IEC TR 29110-5-1-2:2011 - Software Engineering - Basic Profile](http://standards.iso.org/ittf/PubliclyAvailableStandards/c051153_ISO_IEC_29110-5-1-2_2011.zip)
  + **Abstract:**
    - ISO/IEC TR 29110-5-1-2:2011 is applicable to Very Small Entities (VSEs). A VSE is defined as an enterprise, organization, department or project having up to 25 people. A set of standards and guides have been developed according to a set of VSEs' characteristics and needs. The guides are based on subsets of appropriate standards elements, referred to as VSE Profiles. The purpose of a VSE Profile is to define a subset of ISO/IEC International Standards relevant to the VSEs' context.
    - The ISO/IEC 29110 series is targeted by audience. ISO/IEC TR 29110-5 is targeted to VSEs. ISO/IEC TR 29110-5-1-2:2011 provides the management and engineering guide to the Basic VSE Profile specified in ISO/IEC 29110-4-1 through project management and software implementation processes. The Basic Profile is one profile of the Generic profile group. The Generic profile group is applicable to VSEs that do not develop critical software. The Generic profile group does not imply any specific application domain.
  + [ISO/IEC TR 29110-5-1-2:2011 – Ingénierie du logiciel - Profil Basique](http://standards.iso.org/ittf/PubliclyAvailableStandards/c051153_ISO_IEC_TR_29110-5-1-2_2011(F).zip)
  + **Résumé:**
    - L'ISO/CEI 29110-5-1-2:2012 s'applique aux très petits organismes (TPO). Les TPO sont des entreprises, des organismes, des services et des projets regroupant 25 personnes et moins. Un ensemble de normes et de guides a été élaboré en fonction de caractéristiques et de besoins propres aux TPO. Ces guides sont fondés sur des sous-ensembles d'éléments pertinents de normes nommés «Profils TPO» L'objectif de ces profils TPO consiste à définir un sous-ensemble de Normes internationales appropriées au contexte des TPO.
    - La série de l'ISO/CEI 29110 est ciblée par destinataire. L'ISO/CEI 29110-5-1-2:2012 cible les TPO. L'ISO/CEI TR 29110-5-1-2:2012 fournit un guide de gestion et d'ingénierie pour le profil basique de TPO spécifié dans l'ISO/CEI 29110-4-1 dans le cadre de la gestion de projet et des processus de mise en oeuvre. Le profil basique est un profil du groupe de profils génériques. Le groupe de profils génériques s'applique aux TPO qui ne développent pas de produits logiciels critiques. Le groupe de profils génériques n'implique aucun domaine d'application spécifique.
  + [ISO/IEC TR 29110-5-1-3:2017 - Software Engineering - Intermediate Profile](https://www.iso.org/standard/69603.html)
  + **Abstract:**
    - ISO/IEC TR 29110-5-1-3:2017 provides management and engineering Guide to the Intermediate profile described in terms of business management, project management, software implementation and acquisition processes.
    - ISO/IEC TR 29110-5-1-3:2017 is applicable to Very Small Entities (VSEs). VSEs are enterprises, organizations, departments or projects having up to 25 people. The life cycle processes described in the ISO/IEC 29110 series are not intended to preclude or discourage their use by organizations bigger than VSEs.
    - ISO/IEC 29110-4-1 identifies the requirements applicable to the tasks and work products described in this document.
    - ISO/IEC TR 29110-5-1-3:2017 has been developed using the management and engineering guide of the Basic profile and by modifying and adding elements (e.g. process, task, work product, role) for VSEs involved in the development of more than one project in parallel with more than one work team.
    - ISO/IEC TR 29110-5-1-3:2017 applies for VSEs developing non-critical software.
    - Using this document, VSEs can obtain the following benefits:
      * the management and monitoring of more than one project in parallel with more than one work team;
      * reuse existing software components (e.g. code and document) in new projects;
      * continuously measure projects and improve processes.
    - Once the software, developed by a VSE, has been accepted by their customers, the VSE that wants to provide after delivery services can refer to ISO/IEC TR 29110-5-3.
    - ISO/IEC TR 29110-5-1-3:2017 is targeted to VSEs which are familiar with ISO/IEC TR 29110‑5-1-2, i.e. the Basic profile, for their software development projects and are involved in the development of more than one project in parallel with more than one work team.
    - ISO/IEC TR 29110-5-1-3:2017 is intended to be used with any lifecycles, processes, techniques and methods that enhance the VSEs customer satisfaction and productivity.
  + [ISO/IEC TR 29110-5-1-4:2018 - Software Engineering - Advanced Profile](https://www.iso.org/standard/72898.html)
    - **Abstract**:
      * This Management and engineering guide is targeted at VSEs that want to sustain and grow as an independent competitive software development business. This document is also targeted to VSEs which are familiar with ISO/IEC TR 29110 5-1-3:2017 - Management and Engineering Guide: Generic profile group: Intermediate profile for their software development projects.
      * This Guide has been developed using the management and engineering Guide of the Intermediate profile and by modifying and adding elements (e.g. process, task, work product, role) for VSEs that want to sustain and grow as an independent competitive software development business.
      * ISO/IEC TR 29110-5-1-4:2018 applies for VSEs developing non-critical software.
      * Using this Guide, VSEs can obtain the following benefits:
        + The management and monitoring of more than one project in parallel with more than one work team.
        + Reuse existing software components (e.g. code and document) in new projects.
        + Continuously measure and evaluate projects.
        + Continuously evaluate and improve processes.
        + Continuously sustain and grow.
        + Support its customer in the disposal of software and installation of new software.

1. **Deployment Packages**

In order to facilitate the implementation, by VSEs, of a Profile, a set of systems and software engineering Deployment Packages are available. A deployment package is a set of artefacts developed to facilitate the implementation of an ISO 29110 Management and Engineering Guide in a VSE.

Deployment packages are not intended to preclude or discourage the use of additional guidelines that VSEs find useful.

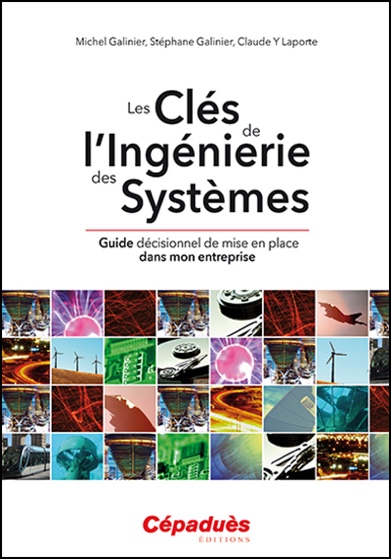
The elements of a typical deployment package are: technical description, relationships with ISO/IEC 29110, key definitions, detailed description of processes, activities, tasks, steps, roles, products, templates, checklist, example, references and mapping to standards and models, and a list of tools.



For systems engineering, the following [set of DPs](https://connect.incose.org/WorkingGroups/VSE/ISO%20DP%20Draft/Forms/AllItems.aspx?RootFolder=%2FWorkingGroups%2FVSE%2FISO%20DP%20Draft&View=%7B9599A981%2D4DA3%2D478B%2DB06A%2D9FDB2586B54F%7D&) is under review:

* + [Project Management](http://www.incose.org/docs/default-source/Working-Groups/vse-deployment-packages/project_management_deployment_package_vsme_v2-0.docx?sfvrsn=2)
  + [Requirements Engineering](http://www.incose.org/docs/default-source/Working-Groups/vse-deployment-packages/requirements_engineering_deployment_package_vsme_v2-0.docx?sfvrsn=4)
  + [Interface Management](https://connect.incose.org/WorkingGroups/VSE/ISO DP Draft/Interface Management/Interface_Management_Deployment Package_VSME_0.1.docx)
  + [Configuration Management](http://www.incose.org/docs/default-source/Working-Groups/vse-deployment-packages/configuration_management_deployment-package_v1-0.docx?sfvrsn=2)
  + [Functional and Physical Architecture](http://www.incose.org/docs/default-source/Working-Groups/vse-deployment-packages/functional-and-physical-architecture_deployment_package_vsme_1-02.docx?sfvrsn=4)
  + [Integration](https://connect.incose.org/WorkingGroups/VSE/ISO DP Draft/Integration/Integration_Deployment Package_VSME_0.1.docx)
  + [Verification and Validation](http://www.incose.org/docs/default-source/Working-Groups/vse-deployment-packages/verification-and-validation_deployment_package_vsme-d0-00afc7ea8472db67488e78ff000036190a.docx?sfvrsn=4)
  + [Product Deployment](http://www.incose.org/docs/default-source/Working-Groups/vse-deployment-packages/product-deployment_deployment-package_vsme_1-01.docx?sfvrsn=6)

1. **Book in French**
   * Galinier, M., Galinier, S. and Laporte, C.Y., [Les Clés de l’Ingénierie des Systèmes – Guide décisionnel de mise en place dans mon entreprise.](http://www.cepadues.com/livres/les-cles-ingenierie-des-systemes-9782364935976.html)
   * Book published by Cépaduès in June 2017.

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* + **Résumé[[2]](#footnote-2)**

Cet ouvrage s’adresse prioritairement aux dirigeants de petites et moyennes entreprises d’ingénierie et à leur management rapproché. Ces dirigeants sont des entrepreneurs donc des décideurs directs tant au niveau financier qu’au niveau stratégie.

Ce guide leur permet de découvrir l’essentiel de l’Ingénierie des Systèmes et comment la mettre en place pour leur permettre de prendre une décision d’investissement argumentée.  
  
L’Ingénierie des Systèmes doit être leur outil privilégié (mais quel autre ?) pour maîtriser les risques et améliorer de manière continue les performances de leur entreprise. Elle leur est maintenant directement accessible via la formation des jeunes ingénieurs et les nouveaux référentiels ISO qui leur sont dédiés.

L’entreprise ciblée par ce guide est autonome, elle développe des services, des produits, des lignes de produits, des sous-systèmes ou des systèmes, soit en sous-traitance (sur cahier des charges), soit en autofinancement.

**Les Clés de l’Ingénierie des Systèmes** est composé de trois parties :

* 1. La première partie est une sensibilisation à l’Ingénierie Système ; elle en décrit les concepts fondamentaux et les principes de sa mise en place dans une PME.
  2. La deuxième partie décrit les deux principaux processus de l’Ingénierie Système : définition et réalisation du système et gestion de projet associée.
  3. La troisième partie propose une démarche de déploiement et de conduite du changement dont l’efficacité est démontrée depuis de nombreuses années et qui permettent la mise en place de pratiques correspondant aux objectifs business, définies par le management de l’entreprise.

1. **Book in English**
   * Galinier, M., Galinier, S. and Laporte, C.Y., [Les Clés de l’Ingénierie des Systèmes – Guide décisionnel de mise en place dans mon entreprise.](http://www.cepadues.com/livres/les-cles-ingenierie-des-systemes-9782364935976.html)
   * Book published by XXXX 2019.
   * **Abstract**

This book is primarily intended for managers of small and medium-sized (SME) engineering firms and their management. These leaders are entrepreneurs and therefore direct decision-makers at both the financial and the strategic levels.

This guide allows them to discover the basics of Systems Engineering and how to set it up to enable them to make a well-informed investment decision.

Systems Engineering must be their preferred tool (but what else?) To control risks and continuously improve the performance of their business. It is now directly accessible to them through the training of young engineers and the new ISO standards that are dedicated to them.

The company targeted by this guide is autonomous, it develops services, products, product lines, subsystems or systems, either by subcontracting (on terms of reference) or self-financing.

The Keys of Systems Engineering is composed of three parts:

* + - 1. The first part is an awareness of System Engineering; it describes the fundamental concepts and principles of its implementation in an SME.
      2. The second part describes the two main processes of System Engineering: definition and realization of the system and associated project management.
      3. The third part proposes a deployment and change management approach, the effectiveness of which has been demonstrated for many years and which allows the implementation of practices corresponding to the business objectives, defined by the management of the company.

1. **Mini Case studies**

A set of short case studies, in [English](http://profs.etsmtl.ca/claporte/English/VSE/VSE-MINI_CASES.html) and [French](http://profs.etsmtl.ca/claporte/VSE/VSE-Mini_Cas.html), describes the implementation of systems and software ISO 29110 in enterprises and government agencies.

Each mini case study has the following content:

* Abstract
* The VSE and its Environment
* Starting Point
* The Improvement Project
* Results
* Lessons Learned
* Plans for the Future
* References

1. **A link to a Public ISO 29110 web site**

A public web site provides information in English, French and Spanish

* <http://profs.logti.etsmtl.ca/claporte/English/VSE/index.html>

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The site has the following tabs:

* Members of WG
* Introduction
* Survey of VSEs
* Network of Centers
* Generic Profiles
  + Systems engineering
  + Software engineering
* Deployment Packages
* Pilot Projects
* Mini Case Studies
* Education DPs
* Publications
* Certification
* Service Delivery

1. **Self-learning Modules**

A set of ISO 29110 self-learning modules are available:

* In English: <https://ena.etsmtl.ca/course/view.php?id=4430>
* In French: <https://ena.etsmtl.ca/course/view.php?id=4431>
* In Spanish: <https://ena.etsmtl.ca/course/view.php?id=4434>

1. Freely available documents from ISO at <http://standards.iso.org/ittf/PubliclyAvailableStandards/index.html> [↑](#footnote-ref-1)
2. Tiré de: [Les Clés de l’Ingénierie des Systèmes – Guide décisionnel de mise en place dans mon entreprise.](http://www.cepadues.com/livres/les-cles-ingenierie-des-systemes-9782364935976.html)  [↑](#footnote-ref-2)