

2006RP-01

**Risk Assessment of the Project to
Migrate to the Free Office Suite
Under Linux
"End-User" Group**

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Rapport de projet
Project report

**Part of a RESOLL study conducted and translated for the
Treasury Board of Canada Secretariat**

Montreal
February 2006

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Risk Assessment of the Project to Migrate to the Free Office Suite Under Linux "End-User" Group

Malika Aboubekr¹, Suzanne Rivard²

Abstract

The penetration and performance of free software is raising issues regarding its true capacities and, particularly, the desirability of choosing it. It is from this perspective that the Linux Migration Project was launched within the Sous-secrétariat à l'inforoute gouvernementale et aux ressources informationnelles (SSIGRI). The project, supported by a CIRANO research team, seeks to assess the risks involved in the migration project and to identify the conditions for success.

This report describes an assessment of the risk exposure of one of the groups participating in the project: end users.

Principal results

The risk assessment that was conducted enabled the following observations to be made:

- The project risk exposure is medium to high.
- Three objectives, and more particularly the first, are vulnerable to a relatively high level of risk: *Operational continuity for the user*, *Interactional continuity for users*, and *Technical support*.
- Two risk factors were undervalued in this project because of the very nature of the project:
 - *Mismatch between the functionalities of the free office suite/functionalities targeted by the organization;*
 - *Degree of interdependence with non-project units/persons.* This factor is important as a result of the context in which the project is being carried out, particularly the absence of a shared interoperability framework.

A review of these risk factors could result in a new positioning on the risk exposure map for four of the five objectives, in particular for the two objectives that are related to the two undervalued factors.

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Mandate

The Sous-secrétariat à l'inforoute gouvernementale et aux ressources informationnelles (SSIGRI) has tasked CIRANO with supporting a pilot project to migrate to the OpenOffice.org free office suite under Linux and to document the process. This project, which affects approximately ten SSIGRI workstations, aims to test the infrastructure and test the feasibility of such an approach.

CIRANO's support approach focusses on two components: risk assessment and identification of the critical elements of success. Risk assessment will involve an evaluation of the degree of risk exposure, which will include determining the project's main risk factors. The keys to success will then be identified in light of the results stemming from the risk assessment; possible areas for reflection with respect to the implementation of these elements will be proposed.

This project is distinctive due to the fact that it targets two separate groups of users belonging to different organizational structures, which furthermore do not have the same objectives, the same timetable, or the same constraints. In order to ensure the relevance of our analyses, we distinguish between these two groups as the "End user" group and the "Support" group.

This first report aims to assess the pilot project's degree of risk exposure for the "End users." A second report will be submitted at the end of the project and will examine the project's key elements of success.

This supporting role includes a second component that will take the shape of an overview of the current global state of affairs in terms of migration to OpenOffice.org. This assessment will be based on concrete successes and failures identified from a review of the literature on the topic.

Introduction

In light of the penetration of free software throughout the world, many organizations—as much central and local administrations as large companies—are examining the desirability of adopting it. The migration to free software is stimulating reflection today, particularly with respect to the following aspects:

- Among proprietary and free solutions, which are the most beneficial (in terms of costs, dependence on the supplier, performance, functionalities, security, etc.)?
- Is migration to free software technologically feasible in today's world (Are applications mature? Can they effectively replace the many applications currently in place in organizations? etc.)?
- What are the impacts on organizations (in terms of costs, risks, changes, etc.)?

The Québec government began examining this issue in 2002. From this reflection, it became clear that establishing a free software bundle for all stakeholders in the machinery of government poses the problem of diverse technological contexts into which this bundle would need to be able to integrate. In fact, several technologies coexist in both the “back office” and Web and network environments.³

It is in this context, and with a view to ensuring the success of a potential migration to the OpenOffice.org office suite under Linux, that the pilot project emerged. This also provided the context for the support approach of this project, which involves emphasizing the following aspects:

- the degree of risk exposure of this project,
- the presence of critical elements of success,
- paths for reflection regarding risk mitigation and establishing the critical elements of success.

This report will assess the project risk exposure,⁴ while the critical elements of success will be examined in a later report. This report presents the risk exposure map and identifies the project's risk factors. The methodology adopted to proceed with this assessment of risk exposure is presented in Appendix 1.

³ Secrétariat du Conseil du trésor, “Offre de services avec prix”, September 2004, p. 10.

⁴ For one of the groups of participants: the “End user” group.

Assessment of the project risk exposure: "End user" group

Assessment of the risk exposure was carried out using a method based upon sound scientific foundations⁵ and whose practical relevance has been demonstrated, having been used in several projects—completed and ongoing. This method is presented in Appendix 3. Its application provides a risk exposure map and a series of histograms that identify the factors contributing to increase the likelihood of each of the undesirable results in the map.

Risk exposure map

The risk exposure map, in Figure 1, shows that the project risk exposure is medium to high. In fact, the extent of the impacts resulting from a deviation from any of the five objectives identified for the project is relatively high, while the probability of each of the five undesirable results⁶ occurring varies from low (2.50 for the *Need to modify the technological infrastructure*) to medium (3.38 for *Interactional discontinuity for the user* and *Failure of the users to adapt to the new work environment*).

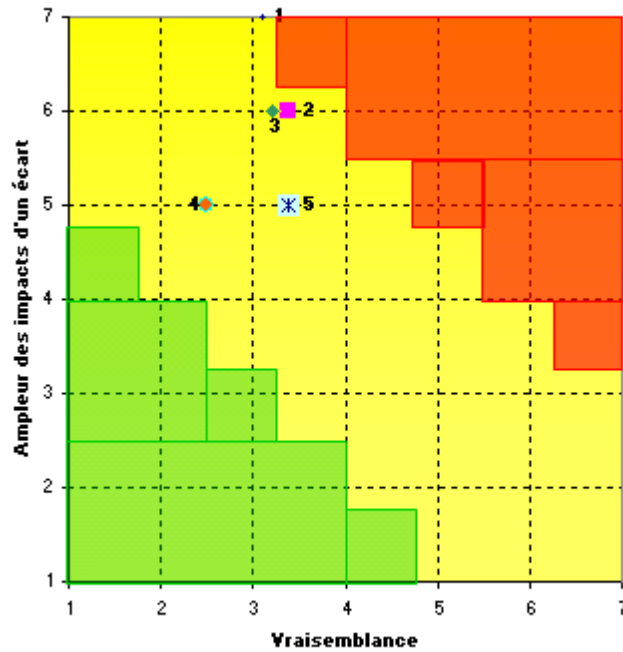
For the objective *Operational continuity for the user*, risks are high (they are located on the border of the high risk-exposure area).

For the objectives *Interactional continuity for the user* and not having to provide *Technical support*, the risks, though lower, remain in the medium risk-exposure area, closer to the high risk-exposure area than to the low risk-exposure area.

Finally, the last two objectives, *Not modifying the technological infrastructure* and *Users' adaptation to their new work environment*, fit into the medium risk-exposure area.

⁵ Barki *et al.*, 1993, and Bernard *et al.*, 2004.

⁶ These results are presented in Appendix 3.



#	Undesirable outcome	Probability	Magnitude of the impacts of a deviation
1	Operational discontinuity for the user	3.11	7
2	Interactional discontinuity for the user	3.38	6
3	Insufficiency of technical support	3.20	6
4	Need to modify the technological infrastructure	2.5	5
5	Failure of the users to adapt to the new work environment	3.38	5

Figure 1 Risk exposure map

Risk factors

The big picture of the project risk exposure as given by the project risk exposure map must be complemented with an analysis of the role played by the various risk factors for each of the undesirable results. These factors are presented in detail in Appendix 3.

1. Operational continuity for the user

Figure 2 shows that the factors that could create a risk to the *Operational continuity for the user* are distributed as follows:

Four factors with a low severity rating:

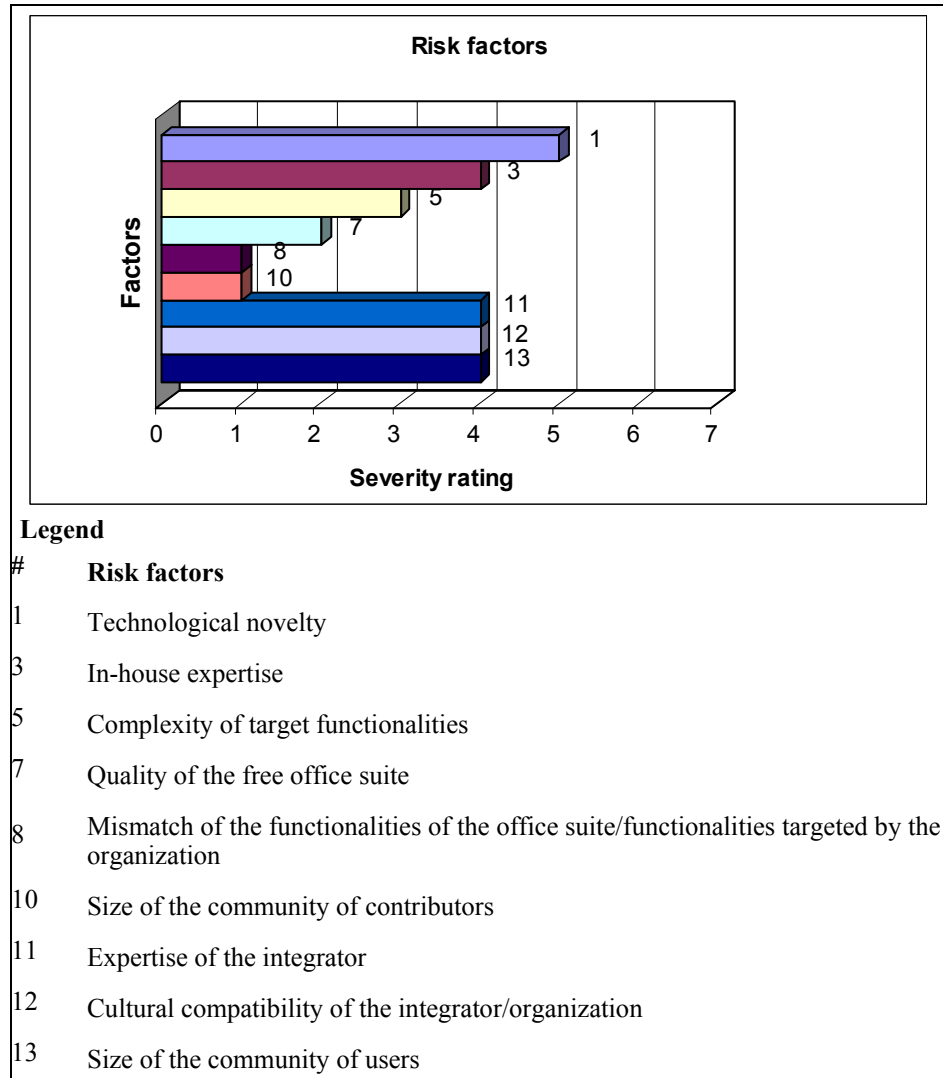


Figure 2 Risk factors/Operational continuity for the user

These are *Complexity of the target functionality* factors (severity rating of 3), *Quality of the free office suite* (severity rating of 2) and *Mismatch of the functionalities of the free office suite/functionalities targeted by the organization*, and *Size of the community of contributors* (minimum severity rating of 1). The low severity rating of this last factor illustrates the fact that there are many producers of free software, that this community of contributors is particularly dynamic, and that increasingly larger companies are becoming involved. One key example is IBM and, very recently, Novell, which bought out the free software publisher Suse. Finally, the OpenOffice.org (www.openoffice.org) foundation is known for its dynamism.

- Four factors with a medium severity rating of 4:

These factors are *In-house expertise*, *Expertise of the integrator*, *Cultural compatibility integrator/organization* and *Size of the community of users*. The medium severity rating of the factor *Cultural compatibility integrator/organization* captures the differences in corporate culture between the government administration (the client) and the small, private service enterprise (the contractor). The average severity rating of the factor *Size of the community of users* shows both that this community is very underdeveloped in North America and that it is highly developed in France,⁷ and especially that it is heavily involved in the development of this software.

- One factor has a high severity rating of 5.

The factor *Technological novelty* comprises two dimensions: *Newness of the software* and *Newness of the equipment*. Its severity rating of 5 is an average of the maximum severity rating (7) for *Newness of the software*, based on the fact that the free office suite under Linux had never previously been used in the organization, and a lower severity rating (3) for *Newness of the equipment*, owing to how few modifications were made to the technological infrastructure.⁸

2. Interactional continuity for the user

Figure 3 shows that the factors likely to create risk to *Interactional continuity for the user* are distributed as follows:

- Four factors with a low severity rating:

The factors are: *Mismatch of the functionalities of the free office suite/functionalities targeted by the organization*, *Quality of the free office suite*, *Systems complexity*, *Complexity of target functionalities*. Their severity ratings are 1, 2, 3, and 3, respectively.

⁷ Mandrakesoft was able to rectify its financial situation by appealing to this user community.

⁸ One of the clauses in the contract stipulates that the project must not result in any changes to the technological infrastructure.

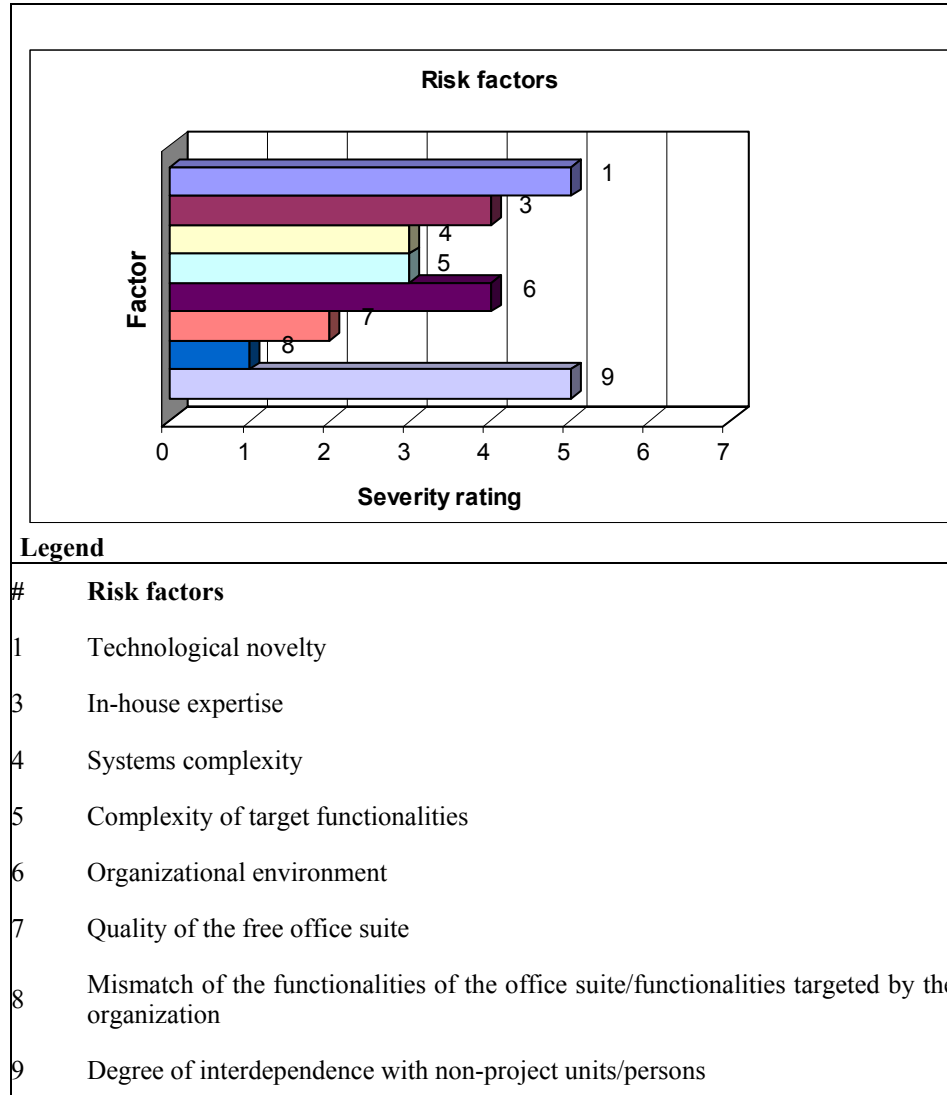


Figure 3 Risk factors/interactional continuity for the user

- Two factors had a medium severity rating of 4:

These are *In-house expertise* and *Organizational environment*. The severity rating of the factor *In-house expertise* is heightened by the difficulty finding and/or replacing users (dependence on key users), which is particularly attributable to the fact that they were constrained to pursue their activities seamlessly. In the same way, a lack of expertise with implementation methodologies and the support tools used by the contractor tends to drive this factor up, while knowledge of the organization and expertise in terms of project and change management tend to reduce it. As to the factor *Organizational environment*, owing to the limited scope of the pilot project the only element accounted for was the level of interdepartmental cooperation. This was particularly focussed on the level of exchanges between departments, in terms of ideas and information as well as computer systems and projects.

- Two factors with a high severity rating of 5:

These factors are *Technological novelty* and *Degree of interdependence with non-project units/persons*. The risk created by the factor *Technological novelty* resides essentially in the newness of the office suite. The risk created by the factor *Degree of interdependence with non-project units/persons*, despite its severity rating of 5, presumably remains undervalued, for much the same reasons as this was the case with the factor *Mismatch of the functionalities of the free office suite/functionalities targeted by the organization*. It was evaluated using responses given by the current project participants who, for the most part, do not have to share work documents with non-project colleagues.⁹

3. Technical support

Figure 4 shows that the factors liable to create a risk that the Direction des ressources informatiques (DRI) will have to provide technical support are distributed as follows:

- One factor with a minimum severity rating of 1:

The factor *Size of the community of contributors* captures both the size and the degree of commitment of this community, but also the involvement of a growing number of businesses.

- One factor with a severity rating of 3:

This severity rating of the factor *System complexity* expresses both the low complexity of the new software and the infrequency of interference with other existing or future systems.

- Three factors with a medium severity rating of 4:

The factors are as follows: *In-house expertise*, which appears here because we cannot discount the possibility of failure on the part of the integrator; *Expertise of the integrator*, which captures extensive expertise with the software to be implemented, but limited knowledge of the organization and of the users' tasks, and *Size of the community of users*.

⁹ It should be noted that one user, for example, who initially volunteered, withdrew before the project was launched because his work requires using an Access database incompatible with the free office suite, while two other users perform part of their work at another workstation.

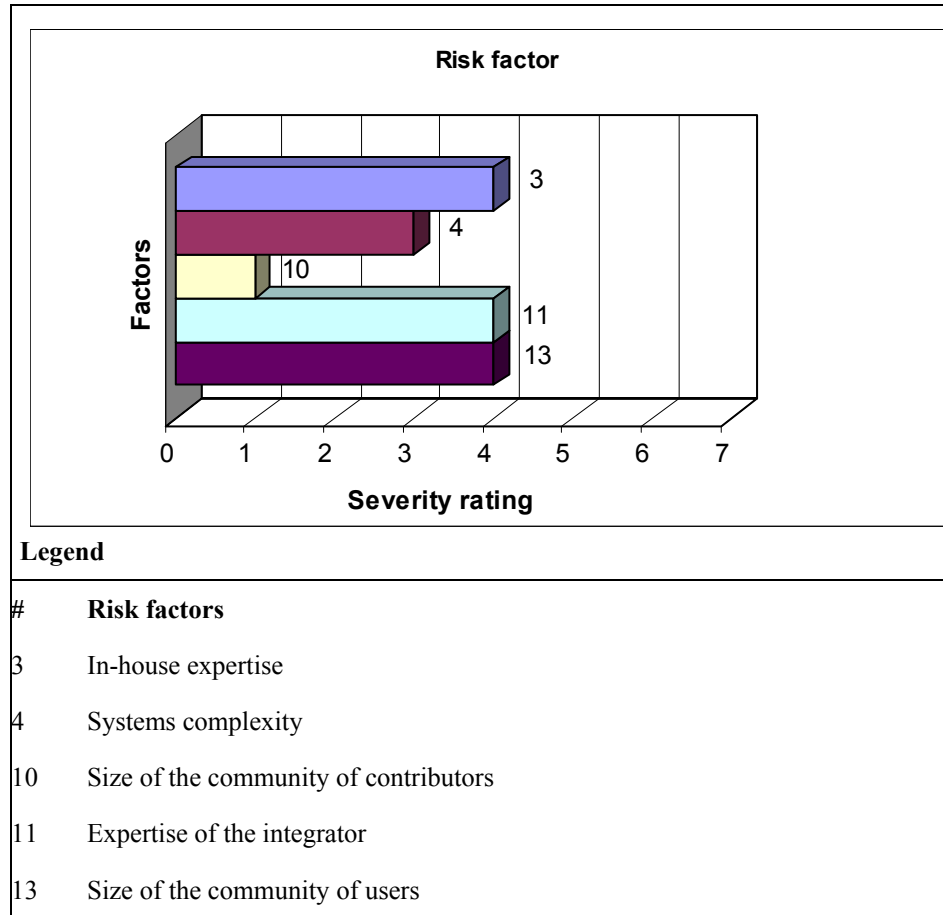


Figure 4 Risk factors/Technical support

4. Requirement to not modify the technological infrastructure

Figure 5 shows that factors liable to create a need to modify the technical infrastructure are distributed as follows:

- Two factors with a minimum severity rating of 1:

The factors are as follows: *Project size*, which does not figure as a risk factor, given the small scope of the project (small number of users, small project team, small budget), and *Mismatch of the functionalities of the free office suite/functionalities targeted by the organization*. This factor is probably undervalued, given the sample of persons questioned. In fact, the users¹⁰ chose to participate in the project in the full knowledge that they would have to continue their tasks normally. This probably caused some potential participants to disqualify themselves. The only ones willing were those who were sure, before starting, that there was no mismatch between the required and available functionalities¹¹ and those who could, if required, work around any eventual mismatch.

¹⁰ The ones interviewed as part of this assessment.

¹¹ With the free office suite under Linux in the installed configuration.

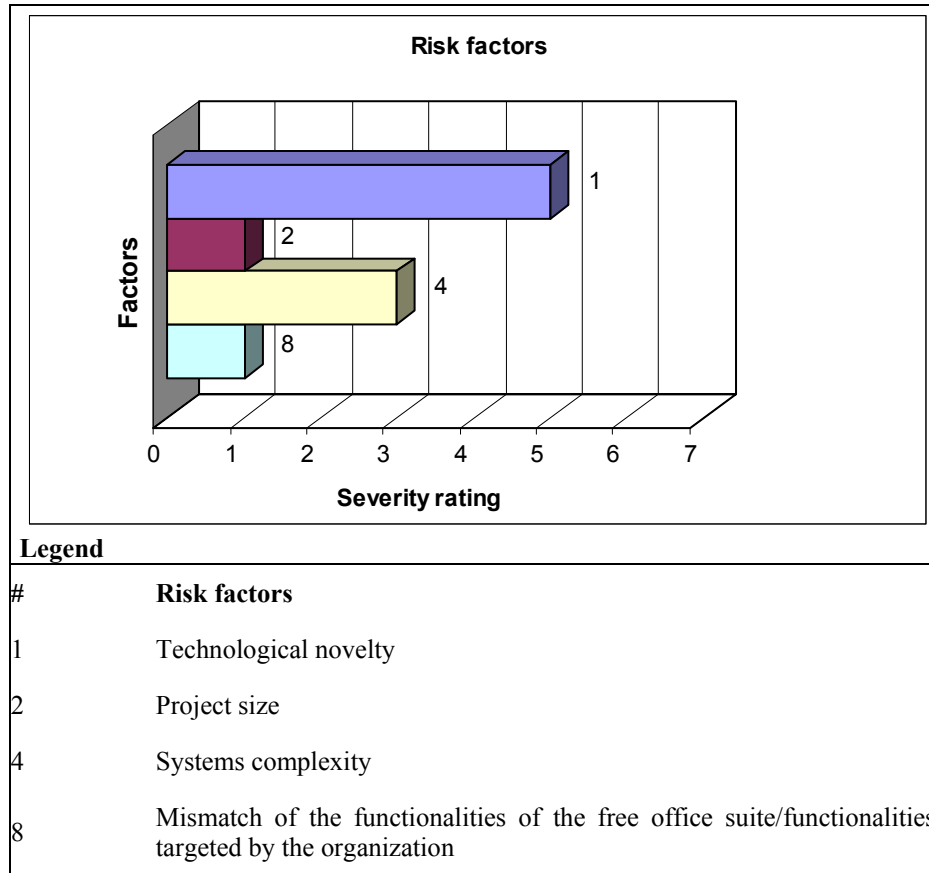


Figure 5 Risk factors/Requirement to leave the technological infrastructure unmodified

- One factor with a low severity rating (3):
The factor *Systems complexity* has a severity rating that expresses both the low complexity level of the new software and the limited interference with other systems.
- One factor with a severity rating of 5:
The factor *Technological novelty*, whose sub-factor, *Newness of the software*¹² drives up the severity rating.

5. Users' adaptation to their new work environment

Figure 6 shows that the factors liable to create a risk for *Users' adaptation to their new work environment* are distributed as follows:

¹² This is one of two components for this factor (cf. Appendix 3).

- Three factors with a low severity rating:

The factors *Mismatch of the functionalities of the free office suite/functionalities targeted by the organization*, *Quality of the free office suite*, and *Complexity of target functionalities* have a severity rating less than or equal to 3.

The low severity rating of the factor *Complexity of target functionalities* springs from the fact that the tasks performed are relatively simple. The severity rating of 2 for *Quality of the free office suite* reflects the quality of the office suite under Linux. It appears to be reliable (both in terms of security and data integrity), efficient in processing, user- and developer-friendly, easily understood (consistency, intuitive links between the software).

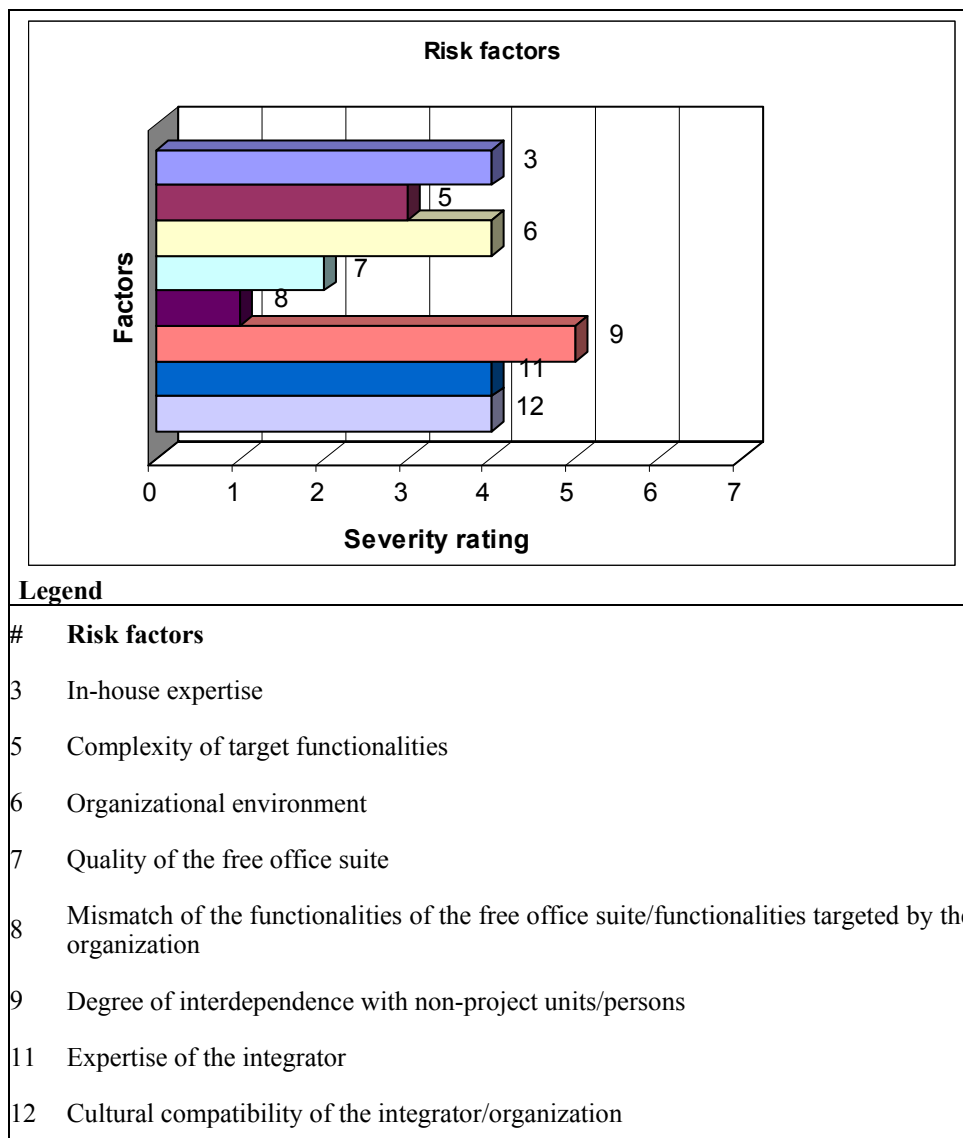


Figure 6 Risk factors/Users' adaptation

- Four factors with a medium severity rating of 4:

In-house expertise; Organizational environment, Expertise of the integrator, Cultural compatibility of the integrator/organization.

- A single factor has a high severity rating of 5:

This is the factor *Degree of interdependence with non-project units/persons.*

* * *

Based on this risk analysis, the following elements become clear:

- Of the five objectives identified for the project, the following three are positioned at the limit of a high degree of risk exposure on the risk map:
 - *Operational continuity for the user*
 - *Interactional continuity for the user*
 - *Absence of in-house technical support*
- Owing to the very structure of the project,¹³ two risk factors have probably been undervalued.
 - *Mismatch of the functionalities of the free office suite/functionalities targeted by the organization.* Since users had the choice of whether or not to participate in the project, those whose work require functionalities incompatible with the office suite either did not volunteer or withdrew from the project.
 - *Degree of interdependence with non-project units/persons.* We must consider the fact that none of the current participants in the project interact with non-project colleagues. In fact, interactions between OpenOffice.org under Linux and Microsoft Office under Windows are possible in the case of simple documents (that do not contain macros, complicated graphics, etc.). When it becomes a matter of sharing documents across platforms and/or working with documents containing macros or other advanced functionalities, interaction between the two suites proves more difficult and may affect the format of the documents. However, this risk factor is only significant owing to the absence of a shared interoperability framework.

¹³ On one hand, before the beginning of the project, it was expected that the volunteers would be users who could pursue their work seamlessly. On the other hand, whether these users carry out collaborative work with non-project colleagues was not taken into consideration.

- A reassessment of these risk factors could yield a new positioning on the risk exposure map for four out of the five objectives, in particular for *Interactional continuity for the user* and *Users' adaptation to their new work environment*, which are related to the two factors.

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Appendix 1: Methodology

The data that served as a basis for the project's risk analysis was collected using various methods.

Meetings in Quebec City

As of the start of the project, a number of meetings were held in Quebec City with the participants. They allowed:

- preliminary discussions with some participants concurrent with two training sessions;
- Collection of information from various stakeholders. Thus, the project leader, the project manager, members of the user group, two members of the support group, and a representative from Révolution Linux filled out a questionnaire evaluating various risk factors.

Telephone contacts

Several telephone conversations, particularly with the project manager and the Révolution Linux representative, enabled us to better understand certain aspects of the project and to follow its progression.

Information on problems encountered by participants

This information was obtained by:

- receiving a copy of all messages¹⁴ sent by the participants to Révolution Linux describing problems encountered, and the responses provided by the contractor;
- registering in a discussion forum set up by Révolution Linux. The goal was to enable all those registered (participants in the project, the contractor) to be informed of problems encountered and the solutions.

¹⁴ Révolution Linux provided the participants with a support e-mail address enabling them to be promptly informed of problems encountered and respond accordingly.

Appendix 2: The project to migrate to free software

The project

The pilot project forms part of a more comprehensive project with the following mandate: *definition of a business model enabling the Government of Québec to fully benefit from the potential of free software.*¹⁵

The project involves migrating approximately ten Windows workstations to OpenOffice.org under Linux for several months,¹⁶ in order to test the infrastructure and evaluate the feasibility of this type of migration.

This change of environment is accompanied by a major constraint: It must not interrupt the activities of the project participants or interfere with their normal interactions with other employees.

The first stage of the project involved identifying the software, applications, and macros used by each of the participants, since they all had unique profiles and concerns. On this basis, a standardized Linux workstation was designed by the contractor and submitted to the project leader for authorization.

After authorization, the new configuration was implemented. The implementation was carried out in three phases. The first two dealt with the workstations of the “End user” group in one of the three branches (DLAI, DSGIG, DPIGL). The third phase dealt with the workstations of the “Support” group under the DGTIC. The training was organized as part of the implementation of the new configuration.

Finally, the third stage of the project involved ensuring support to project participants during the three months of the project. This support will be provided by way of a private interactive discussion forum and a telephone line reserved for this purpose. Moreover, in case of an emergency, the workstation of the user experiencing problems can be accessed remotely. This response must be requested by the user.

The original schedule¹⁷ could not be maintained, owing to difficulties encountered by the contractor in finding an alternative to the initially proposed solution, which was not acceptable to the DRI. Owing to these changes, the project schedule was delayed by one month. The workstations were finally reconfigured in October. The project is expected to end in March.

¹⁵ Secrétariat du Conseil du trésor, *Offre de services avec prix*, September 2004, p. 6.

¹⁶ This mandate is expected to last six months. Source: Secrétariat du Conseil du trésor, *Offre de services avec prix*, September 2004, p. 17.

¹⁷ It was expected that the project would run from September to February.

The project team

The project team, shown in Figure 8, is organized into two levels. The first ensures supervision and coordination of the project team, and is made up of two persons representing the project promoter (the Sous-secrétariat à l'inforoute gouvernementale et aux ressources informationnelles, SSIGRI), and the contractor (Révolution Linux).

The second level, operations, involves three persons including two from Révolution Linux, who are responsible for carrying out the migration, and the project leader (in the SSIGRI participant group), who ensures proper follow-up and is also the main resource person for the representatives of Révolution Linux. Relationships between team members are cordial.

In addition to project participants, representatives of Révolution Linux are in contact with resource persons outside of the project. In fact, computer support is provided to the participants from the Sous-secrétariat à l'inforoute gouvernementale et aux ressources informationnelles by the staff of the Direction des ressources informatiques (DRI) who, in this respect, serve as a resource in the project.

Two separate groups of users

The twelve participants in the project belong to two distinct groups:¹⁸ Seven of them are end users, while the five others are computer support staff. Furthermore, they are not on the same schedule, do not share the same objectives, and are not bound by the same constraints.

The "End user" group

This group, which was supposed to consist of eleven persons, comprised seven at the time the report was drafted. In fact, five users withdrew and a new user joined the project. The members of this group, including the project manager and the project leader, agreed to participate in the project on a voluntary basis following the request sent out by the current project leader.

All of these participants knew what to expect even before the project was launched.¹⁹ Some of them shared the philosophy of free software, others had already tested or used it, and they were all particularly interested in participating in the project.

Computer support is provided to these users by DRI staff, who had reservations regarding the project from the beginning. Discussions with representatives of the contractor (Révolution

¹⁸ Belonging to different organizational structures implies different objectives and a different schedule (p. 5).

¹⁹ Including those who withdrew.

Linux), as well as this latter's expertise in this type of migration and the solutions proposed to resolve certain limitations have, it appears, reassured them.

Users face a major constraint: being able to continue their activities without this experiment disrupting their work. This constraint resulted in four volunteers withdrawing before the start of the project, and a fifth several weeks later.

Figure 7: Team and participants in the pilot project to migrate to free software

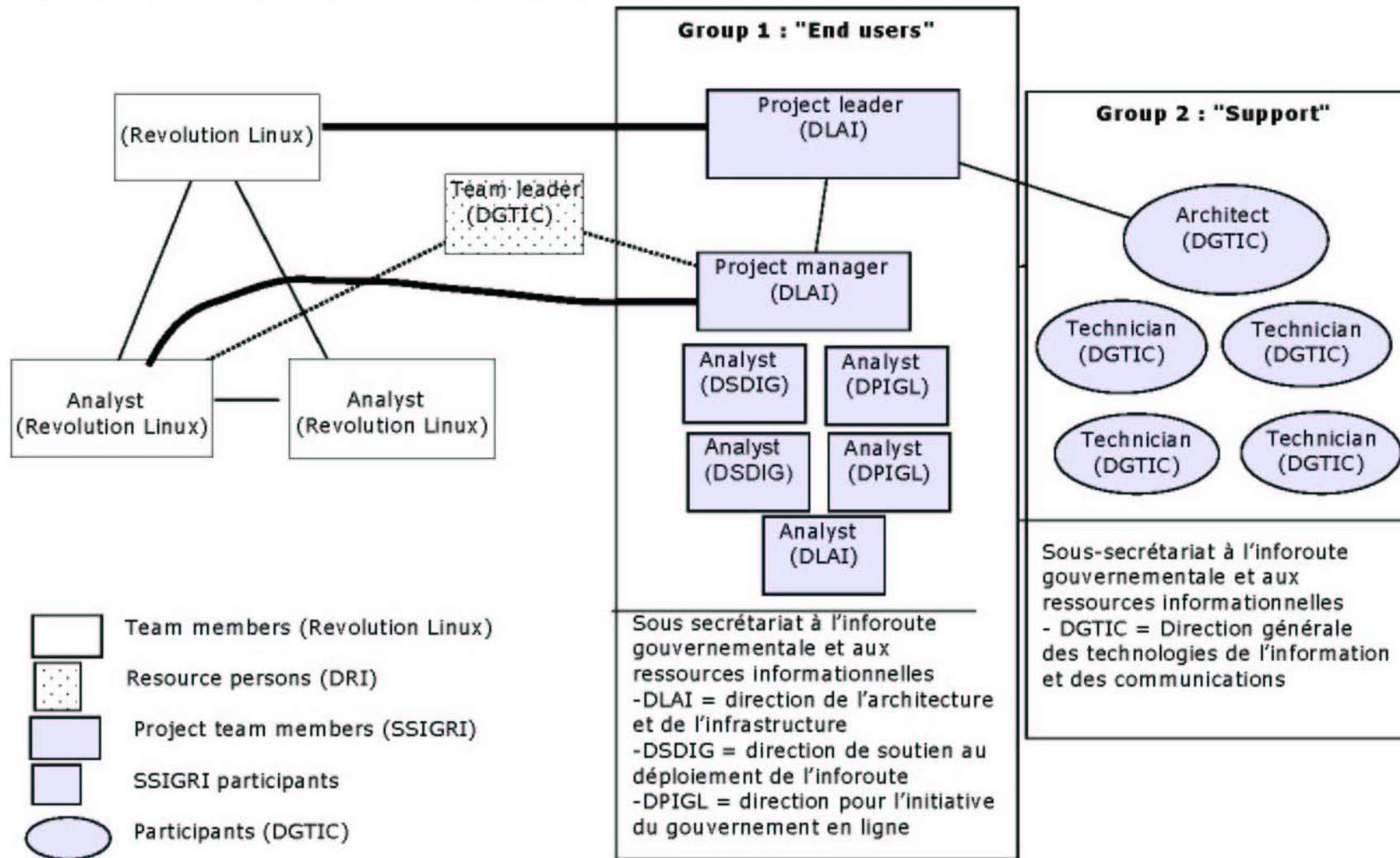


Figure 7: Team and participants in the pilot project to migrate to free software

These withdrawals from the project are due to the fact that the participants feared not being able to continue working normally as a result of changes brought about by the project. Some of the reasons set forth are:

- o work overload;
- o the need to use an Access database that was incompatible with the new configuration;
- o the unavailability of an ancillary Windows environment—enabling some of the work to be carried out collaboratively;
- o the impossibility of maintaining the required level of interoperability with colleagues under the Windows environment.

The "Support" group

This group is comprised of five persons from the Direction générale des technologies de l'information et des communications (DGTIC). Its objective is to test the feasibility of the migration to free software, not only for the users, but also for the support staff providing services to those using the software. They wish to take the opportunity provided by this project to evaluate their own ability to ensure the support of workstations running Linux. To do so, they need to evaluate the user support tools available for this new environment, so as to identify potential areas of compatibility and incompatibility.

They also differ from the first group of participants with respect to the timeframe. They have no fixed date for reverting to the Windows environment—feeling that they may remain under this new environment for as long as the workstations are active.

Training

Participants received training in two parts. The first part, lasting a half day, focussed on the KDE environment and the functionalities directly associated with it. The second part, lasting a full day, dealt with OpenOffice.org, and particularly with Writer and its features.

These sessions coincided with the introduction of the new configuration of workstations. They were in the form of a theoretical course, since the users did not have computers. Only those who had already used this software could interact with the instructor.

The contract

The SSIGRI, the project promoter, contracted with an integrator to implement the new configuration. The integrator was selected using the assessment grid currently used at the Secrétariat du Conseil du trésor of the Government of Québec.

The contractor selection criteria

The selection was made on the basis of a service tender. An assessment grid²⁰ comprising two components, quality and price, was used to select the contractor.

1. Quality, which amounts to 50 per cent of the final score, was evaluated using five criteria.

- *The project manager's experience* was evaluated by taking into account its expertise in this type of project, in particular, with respect to the complexity and scope of the project and its specific contribution.²¹
- *The recommended approach* was particularly evaluated from the perspective of the originality and quality of the proposed solution in light of the project goals.²²
- *Relevance of the provider's experience* was evaluated based on his expertise carrying out major projects in the field of "free software, in terms of identifying orientations and implementing the targeted software type."²³
- *Relevance and experience of professionals on the team proposed by the provider* were evaluated. For each team member, the following elements were considered:²⁴
 - o "experience in technological environments combining free and proprietary software, involving both office and WEB tools;
 - o participation in projects allowing a thorough knowledge of technological infrastructures (hardware and software) to be demonstrated, as described briefly in Point 2.1.4 and widely used within the Government of Québec;
 - o participation in projects allowing a thorough knowledge of the potential issues and impacts associated with the implementation of free software, particularly in the public and parapublic sectors, to be demonstrated;
 - o demonstration, through experience, of a great deal of expertise in carrying out technological orientation studies."

²⁰ Secrétariat du Conseil du trésor, *Offre de services avec prix*, September 2004, p. 20-22.

²¹ Expérience du chargé de projet, *ibid.*, p. 20.

²² Approche préconisée, *ibid.*, p. 20 and 21.

²³ Expérience du fournisseur, *ibid.*, p. 21.

²⁴ Expérience et pertinence de l'équipe proposée, *ibid.*, p. 21.

- *The depth of the provider's team.*²⁵ The provider's capacity to replace the project manager and team members, as required, while continuing to comply with the aforementioned criteria was evaluated.

2.- Price²⁶ amounts to 50% of the evaluation.

The evaluation starts with the lowest quote, which is awarded 100 points. The other quotes have a number of points struck off corresponding to the difference between their price and the lowest price, up to a maximum of 10 points. Any quote exceeding the lowest quote by more than 10 points is eliminated.

The provider obtaining the highest total, and whose proposal is acceptable, is selected by the committee, which recommends that it be awarded the contract.

"In the event of a tie, the selected provider is the one who proposed the lowest price. If both the proposal and the price are tied, the selection is made by way of a draw between the equally-ranked providers."

The technology

The new workstation configuration (free office suite installed under Linux) was determined by considering the prior configuration of the workstations, since the users were going to have to continue their tasks uninterrupted. It was also expected that there would be no data conversion.

Prior configuration of workstations²⁷

The SCT network is comprised of servers running NetWare 5.1 and 4.11, NT 4, Windows 2000, and Windows 2003. The workstations run Windows XP (850 stations), Windows 2000 (100 stations), and Windows 98 and 95 (325 stations). The authentication service as well as file- and printer-sharing services are provided by NetWare 5.1 servers. All of the Windows XP workstations are standardized and equipped with the following software:

- *Windows XP Professional*
- *Acrobat Reader 5.0*
- *Agent EPO*

²⁵ Capacité de relève, *ibid.*, p. 22.

²⁶ Évaluation de l'offre de prix, *ibid.*, p. 27.

²⁷ Secrétariat du Conseil du trésor (Government of Québec), "Appel d'offres de service", no DLAI-04-08-020, August 2004, pp. 6-7.

- *McAfee VirusScan*
- *Lotus Notes 5.10 Client*
- *Novell Client*
- *SMS Client*
- *Copernic*
- *Internet Explorer 6.0*
- *Macromedia Shockwave*
- *Microsoft Intellimouse*
- *Office 97 Pro*
- *Telephone Directory (internal application)*

The Windows XP workstations are locked. All the software deployed on these stations undergoes testing, and an automated install/uninstall kit is prepared by the DRI. The software is deployed via SMS.

The currently used protocols are IP and IPX. However, the DRI plans to retire the IPX protocol soon, once the last NetWare 4.11 servers have migrated to version 5.1. This migration is to take place during the summer.

Objectives of the Direction des ressources informatiques with respect to managing the mandate

The DRI is interested in management tools and mechanisms for the installed base that will make this goal reality, particularly with respect to the following points:

- *Antivirus software and signature files updated at least once a week in an automated fashion*
- *Change of password enforced every 30 days*
- *Centralized management of group access rights*
- *Complete control of the workstation configuration, software installations, and hardware (locking of workstations)*
- *Centralized management of software installations and access to printers*
- *Remote access to workstations*
- *Automated inventory of the installed base and software*

New configuration of workstations

Graphic environment: KDE

Edulinux 2004

- **Inkscape:** vector graphics software. A vector image uses mathematical equations for paths and fills to define the graphic, unlike The GIMP which relies on a matrix representation. This allows the shape, layout and colour of objects on Web sites, posters, logos, etc., to be altered at will. Since the image is a vector definition, its scale can be adjusted without sacrificing quality. The advantage is that a small logo can be enlarged to create a poster while preserving the original quality. Basically, vector graphics are very versatile. Finally, the graphics created in Inkscape are easily reused. Simply copy a graphic from one document and insert it into another to avoid having to start from zero.

- **GIMP 2:** acronym for “GNU Image Manipulation Program.” This is widely used for photo touch-ups, image compositing, and graphics creation.

- **K3b Kreator:** CD burning software.

- **Scribus:** software for desktop publishing. It can be used to create elegant text layouts for printing or to export into a pdf file. Scribus is useful for designing brochures, newspapers or magazines.

- **OpenOffice.org 1.1.2:** Office software
 - o Writer: Word equivalent
 - o Draw: Paint equivalent
 - o Impress: PowerPoint equivalent
 - o Calc: Excel equivalent

- **Browser:** Mozilla-Firefox 1.0

- **E-mail:** Lotus Notes in Crossover
 - o Authentication Pam_LDAP (Dgtic) and Pam (Ssigri)
 - o File access: smbmount, ncpmount and pam_mount (configuration)
 - o Printing: cups
 - o Forms (expenses, vacations, timesheets), with minor changes to the format during the migration from Excel to Calc and requiring some debuggingA VB equivalent exists that enables macros created in VB to import correctly.

Constraints and challenges imposed by the new configuration

The new configuration of workstations does not support certain applications such as Access and Visio. Applications exist that can replace Access and Visio, but they are not compatible.

With respect to the applications having a compatible equivalent in OpenOffice.org (such as Word, Excel and PowerPoint), translation of one document from one environment to another (Microsoft Office under Windows versus OpenOffice.org under Linux) is not perfect and may result in formatting problems (Word, PowerPoint) or loss of data (Excel: truncation of a column, Excel macros do not run in Calc, etc.).

Problems encountered by users

Two types of problems were encountered by the users:

- Problems that cannot be resolved under this contract:
 - collaborative work (sharing documents across platforms) involving project participants and non-participants
 - work performed on applications that are incompatible with the office suite as installed (e.g. Visio, Access, etc.)
 - work on documents created with Excel (for example) and containing macros, complicated graphics, etc.

- Other problems are resolved as required by the integrator, such as problems arising when using Lotus Notes, WinRAR (a file archiving application), or those encountered by some participants while using memory keys or network directories. These problems are sometimes attributable to insufficient training, and at other times necessitate adjustments that the integrator makes as needed.

Appendix 3: Risk exposure assessment: method

*A software implementation project – risky business*²⁸

The risky nature of implementing information technologies has been extensively documented. The greater the potential benefits associated with this type of project, the greater the potential for negative impacts resulting from a failure.

Some definitions

The notion of risk exposure is central to every effort made to assess project risk. The risk exposure of any project depends on two essential elements:

- Impacts associated with undesirable results that could potentially arise from the project;
- The likelihood of each of these undesirable results occurring.

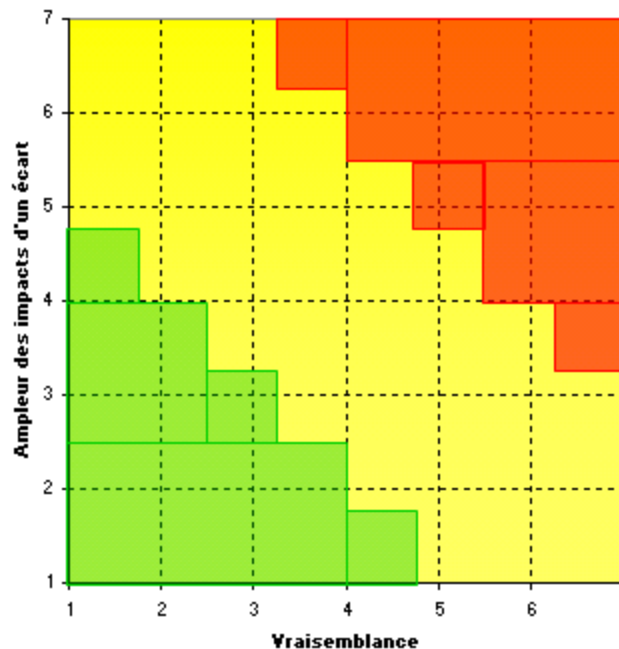


Figure 8 Risk exposure areas

²⁸ This text is based on the following two sources: Bernard *et al.*, *Rapport CIRANO* no. 2002-RP15, August 2002. Available at www.CIRANO.qc.ca and Bourdeau *et al.*, chap. 3: Évaluation du risque en gestion de projet, in *Mesure intégrée du risque dans les organisations* edited by B. A. Aubert, and J.-G. Bernard, 2004.

As shown in Figure 8, there are three significant areas of exposure to risk:

- High risk exposure (red area) when an undesirable result has a significant impact (cost to the organization) with a high probability of occurring;
- Low risk exposure when an undesirable event has a minimal impact and a low probability of occurring (green area);
- Medium risk exposure when an undesirable event has a minimal impact and a high probability of occurring or a significant impact and a low probability of occurring (yellow area).

In the context of software implementation, the losses arising from the occurrence of an undesirable result associated with a project are the tangible or intangible costs that the affected body (business unit, company, department, or government) must assume in the event of that outcome. The probability of an undesirable result occurring is estimated by evaluating some of the features of the project identified as being directly associated with it. Consequently, the presence of these features heightens the probability of an undesirable result occurring. These features are called risk factors.

Undesirable results

Un undesirable result is defined as being a deviation from a project objective. Such a deviation generally results in one or more losses, representing a cost to the organization. Generally speaking, these losses can take a variety of forms. For example, a project may have yielded the expected outcomes in terms of implemented system functionalities, but for a much higher price tag than expected. Conversely, a project may have complied with the deadlines and budgets, but failed to provide the desired functionalities.

In the case of the pilot project, undesirable results (summarized in Table 2) are deviations from the five objectives retained by the project promoters:²⁹

- **Operational continuity for the user**

*Setting up and dismantling the pilot site should not affect the users' uninterrupted performance of their tasks. The users must have access to their documents, software and applications at all times. No data conversion should be required.*³⁰ Here the greatest impact will be felt in the event of deviation from the objective (7). This is attributable to the fact that the goal of this project is precisely to verify whether the users can continue their tasks normally under the new environment.

²⁹ These objectives are listed in the document entitled *Appel d'offres de service*, August 2004. They were also approved by the project leader.

³⁰ Sous-secrétariat à l'inforoute gouvernementale et aux ressources informationnelles, *Appel d'offre de services*, August 2004, p. 8.

- **Interactional continuity for the user**

*Users must have a stable workstation that performs predictably. They must have access to services that are currently offered to them: e-mail, file sharing, backup copies of data stored on the servers, printing, Internet access, applications developed in-house, and specialized applications. They must be able to exchange data with users who are not part of the pilot site.*³¹ The magnitude of the impact of a deviation is evaluated at 6 for this objective. This is because the very goal of the project is to verify whether the users can continue their tasks normally under the new environment.

- **Users' adaptation to their new work environment**

One of the project goals is to verify that the users can easily adapt to the new work environment. The magnitude of the impact of a deviation in the case of this objective is 5.

The last two objectives capture the DRI's inability to ensure technical support to users and the fact that the technological infrastructure onto which Linux and the office suite must be grafted cannot be modified.

- **Technical support**

*"All configuration activities related to software and the operating system, installations on the workstations and, if necessary, on the servers, technical support for the use and operation of software and of the operating system, as well as any other task required for managing the project's installed base, must be ensured by the firm. The technical services of the DRI have neither the resources nor the expertise to assist in the project."*³² The magnitude of the impact of a deviation related to this objective is high (6), since the DRI lacks the resources to ensure the technical support.

- **Requirement to not modify the technological infrastructure**

*"The DRI appears very reluctant to change the existing infrastructure to accommodate realization of the pilot site."*³³ The magnitude of the impact of a deviation for this objective was assessed at 5, since the DRI lacked resources to ensure this technical support.

³¹ *Ibid.*, p. 7.

³² *Ibid.*, p. 8.

³³ *Ibid.*, p. 8.

Undesirable results

- Operational discontinuity for the user
- Interactional discontinuity for the user
- Need for technical support from DRI
- Need to modify the technological infrastructure
- Failure of the users to adapt to the new work environment

Table 1 Undesirable results

Risk factors

Identification of the undesirable results and evaluation of the severity of their impacts shed light on the scope of the problems that an organization might face during a software implementation project. However, these considerations must also account for the probabilities of the results actually occurring. The evaluation of these probabilities involves identifying and assessing a certain number of factors that impact on the likelihood of the undesirable results.

The risk factors applied to the case of the pilot project to migrate to OpenOffice.org were adapted from the project management literature³⁴ to reflect the reality of a migration to open source software. They are presented in Table 3.

• **Technological novelty**

This factor evaluates the risk created by technological novelty. For example, it examines the extent of changes made to the network and the novelty of the software and/or hardware.

• **Project size**

This factor covers a set of elements such as the number of participants within or outside of the organization, the number of persons on the implementation team, the diversity of the team, the distribution of the users within the hierarchy, and the number of person-days required for project development. Its weight will depend on the size of the project, since the impact of this factor is widely recognized as being positively correlated with project size. Conversely, small projects are generally easier to conduct and less risky.

³⁴ Bourdeau *et al.*, 2004.

- **Experience and expertise**

Experience and expertise generally play a major role in computer projects and can have important consequences for them.³⁵ Expertise in both software implementation (methodology, software selection, identifying hardware requirements) and aspects of managing projects and change are vital. The expertise and experience of the in-house project team and the contractor's team must also be evaluated as two distinct risk factors.

- **Systems complexity**

This factor covers both the system's technical complexity (software complexity, interoperability) and the scope of relationships with existing (or future) systems in the organization.

- **Complexity of the organization's target functionalities**

This factor seeks to evaluate the complexity of the tasks; the interdependence of processes: Do they cut across several departments? Are they supported by different software? It also accounts for standardization of the tasks and the number of business units affected.

- **Organizational environment**

The project environment also influences the project and its chances for success. The resources available for the project are one element whose impact appears obvious. Other elements, such as the organization's ethos and the degree of collaboration and exchange between departments affected by the project, must also be considered during the project's risk assessment.

- **Quality of the software to implement**

This factor is of particular importance in any IT project. It provides an assessment of the technical features of the software to be implemented.

- **Mismatch of the functionalities of the office suite/functionalities targeted by the organization**

This factor yields an evaluation of the functional characteristics of the software to be implemented and a measure of how far they diverge from those targeted by the organization. This involves establishing the percentage of functionalities that are abandoned by the project, that require the development of specific applications, or that require gateways.

- **Degree of interdependence with non-project units/persons**

This factor allows us to evaluate the risk to the project resulting from users having to carry out activities that call for other systems or perform task in collaboration with non-project persons.

³⁵ Bernard *et al.* , 2002-RP15, CIRANO, August 2002.

- **Size of the community of contributors**

One of the distinctive features of free software is the fact that since the source code is open, the future of this software only partially depends on the publisher. If the publisher fails, this does not automatically lead to the disappearance of the software it created, which may be taken up by another company, a foundation, individuals, etc. The factor *Size of the community of contributors* reflects this dimension by evaluating, not only the number of producers of this software type, but also the dynamism of the community of contributors to this software and, finally, the commitment large firms and/or major foundations have demonstrated to it.

- **Cultural compatibility with the integrator**

This factor allows the degree of correspondence between the client organization and the integrator (contractor) to be evaluated in terms of their cultures. Misunderstandings can lead to problems during the implementation of the new system.

- **Size of the community of users**

One of the specificities of free software is the place and role occupied by the user community, which is active in its development as well as in testing and using the software. The factor allows us to account for this aspect by evaluating the size and involvement of the software's community of users and to take note of its opinion of the product.

Relationship between undesirable results and risk factors

The project's risk exposure map is generated using probabilities of the occurrence of undesirable outcomes and linking them to the factors liable to cause them. This identification of the relationships connecting undesirable results to the various factors is based on a review of the literature.³⁶ Table 4 summarizes the correspondence between each of the objectives and the different risk factors.

1. Technological novelty
<ul style="list-style-type: none">• New hardware requirements<ul style="list-style-type: none">○ Computer equipment○ Technological architecture• New software requirements<ul style="list-style-type: none">○ Office suite○ Programming languages○ Utilities○ Operating system

³⁶ Bourdeau *et al.*, 2004.

2. Project size
<ul style="list-style-type: none"> • Number of users • Number of persons in the project team • Number of person-days on the project team • Number of months • Estimated cost of the project
3. In-house expertise
<ul style="list-style-type: none"> • Team's lack of expertise with the methodology • Team's lack of expertise with the technology • Team's lack of expertise with the organization • Lack of experience and user support • Dependence on key users
4. Systems complexity
<ul style="list-style-type: none"> • Technical complexity <ul style="list-style-type: none"> ○ of the software ○ of interoperability with existing systems • Number of interfaces with existing systems • Number of interfaces with future systems
5. Complexity of the organization's target functionalities
<ul style="list-style-type: none"> • Complexity of the tasks • Interdependence of target processes • Standardization • Number of affected business units
6. Organizational environment
<ul style="list-style-type: none"> • Level of interdepartmental cooperation <ul style="list-style-type: none"> ○ Exchange of ideas between departments ○ Sharing of computer systems between departments ○ Pooling of information between departments ○ Interdepartmental joint project development
7. Quality of the office suite under Linux
<ul style="list-style-type: none"> • Reliability • Effectiveness • User-friendliness • Developer-friendliness • Comprehensibility • Verifiability

8. Mismatch of the functionalities of the office suite/functionalities targeted by the organization
<ul style="list-style-type: none"> • Available functionalities • Non-project functionalities targeted by the organization • Functionalities targeted by the organization and requiring development of specific applications • Functionalities targeted by the organization and requiring development of gateways
9. Degree of interdependence with non-project units/persons
<ul style="list-style-type: none"> • Collaboration with non-project persons • Activities requiring compatibility with non-project systems
10. Size of the community of contributors
<ul style="list-style-type: none"> • Number of producers • Dynamism of the community • Involvement of large organizations or major foundations
11. Expertise and culture of the integrator
<ul style="list-style-type: none"> • Integrator's lack of expertise with the methodology • Integrator's lack of expertise with the technology • Integrator's lack of expertise with the organization
12. Cultural compatibility with the integrator
<ul style="list-style-type: none"> • Preoccupation of the organization with how tasks are carried out rather than with obtaining results • Preoccupation of the organization with employees rather than with the work to be done • Employees identify with the organization rather than with their field of expertise • Outward, rather than inward, orientation of the organization • The organization's management philosophy is flexible rather than rigid
13. Size of the community of users
<ul style="list-style-type: none"> • Scale of the community of users • Involvement of the user community • Reputation of software to implement within the user community

Table 2 Risk factors

Undesirable results					
Risk factors	1 – Operational discontinuity for the user	2 – Interactional discontinuity for the user	3 – Need for technical support/DRI	4 – Need to modify the technological infrastructure	5 – Users' adaptation to their new work environment
F01 – Technological novelty	√	√		√	
F02 – Project size				√	
F03 – In-house expertise	√	√	√		√
F04 – Systems complexity		√	√	√	
F05 – Complexity of target functionalities	√	√			√
F06 – Organizational environment		√			√
F07 – Quality of the free office suite	√	√			√
F08 – Mismatch of the functionalities of the office suite/functionalities targeted by the organization	√	√		√	√
F09 – Degree of interdependence with non-project units/persons		√			√
F10 – Size of the community of contributors	√		√		
F11 – Expertise of the integrator	√		√		√
F12 – Cultural compatibility with the integrator	√				√
F13 – Size of the community of users	√		√		

Legend: √ = Presence of a strong linkage between the undesirable result and the risk factor

Table 3 Correspondence between risk factors—undesirable results

Risk management

Undeniably, implementation of a free office suite is a risky business. It is, however, an activity that can be very worthwhile for an organization. While it is true that the very act of conducting an assessment of a project's risk exposure is already a first step towards mitigating it—since it draws our attention to the challenges to be met—it remains that this is only a beginning. Appropriate attenuation and mitigation mechanisms must then be identified and implemented. Research has shown that the weight of the risk factors varies with the phase within which the

project finds itself, suggesting that the appropriate mitigation mechanisms should be implemented at the same time. Examining the very nature of the risk factors reveals how critical timely decisions are for mitigating risk. The same is true of the choice of software to implement, the choice of integrator, and the appointment of project leaders, for example. A sound decision with respect to these elements can have a major effect on reducing risk exposure, while a bad decision will have the reverse outcome. Furthermore, other risk mitigation mechanisms should be present throughout the project, such as managing change, training, managing relationships with the user departments, etc. The nature of risk mitigation mechanisms must correspond to the nature of the risks they target.