

National Software Distribution / Release Management Audit

**Final Audit Report
Project No.: 6580/03**

***Audit and Evaluation Directorate
Policy and Strategic Direction
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Executive Summary

Human Resources Development Canada's (HRDC) Information Technology (IT) infrastructure supports national applications throughout Canada. As part of this support, software, be it new, maintenance and/or Commercial off the Shelf (COTS), is continuously being developed. These custom business applications are released to the field for various reasons such as the introduction of new software, enhanced versions of existing software, legislative requirements, fixing 'bugs', and new operating systems. All national software releases are centralized through HRDC's Systems Branch, specifically Client Systems Services (CSS).

In summary, the National Software Release Management Process includes:

- National Headquarters (NHQ) Application Development and Infrastructure groups that submit software to be released to the field;
- CSS that schedule, coordinate, quality assure, distribute and monitor software releases; and
- Regions that receive, test, install and support software releases.

For the scope of this audit, Internal Audit and Risk Management Services (IARMS) reviewed the National Software Release Management Process, not individual regional processes (the latter being unique to a region and its distribution method for regional software specific to the region).

The audit's objectives were to assess HRDC's

- Planning and Organization;
- Delivery and Support;
- Implementation, and;
- Monitoring related to software release.

This internal audit was conducted in accordance with both the Treasury Board Policy on Internal Audit and the Institute of Internal Auditors Standards for the Professional Practice of Internal Auditing.

IARMS concludes that Planning and Organization, Delivery and Support, Implementation and Monitoring domains within HRDC's National Software Release Management process are being satisfactorily managed. IARMS believes that HRDC's National Software Release Management Process is a good one with the fundamental elements present although some areas were noted for improvement.

Most HRDC staff interviewed understand the need for and accept HRDC's Software Release Policy and indicated that the process has been steadily improving as evidenced by enhanced communication and documentation.

For the process to work well, all elements need to be synchronized (i.e. NHQ clients, Application Developers, Infrastructure, CSS, and regional and local offices). When one element is not coordinated with another, the process falters.

While it takes 5.7 days for a regular software release to go through the ‘quality assurance’ process, in total it takes approximately six weeks for the release to be installed in the field. Coincidentally, IARMS noted an increase in ‘Emergency Releases (ERs)’ and ‘Unplanned Releases (URs)’ of software application. ERs and URs are respectively installed immediately and within two weeks.

There is a perception among some Regional Headquarters (RHQ) people that, in its laudable pursuit of service delivery, HRDC is trying to release too much software, too quickly, resulting in too many software releases that do not work as well as planned. There is a perception that this lack of quality is evidenced by the increase in ERs and URs.

IARMS recommends the following.

Recommendation #1: Systems senior management should ensure that Systems’ Release and Readiness Coordinators have sufficient knowledge and authority to more effectively coordinate horizontal and vertical planning requirements for HRDC software releases.

Recommendation #2: Systems senior management should review the feasibility of automating the Advanced Notice of Planned Releases (ANPR) process and pursue implementing the Enterprise System Management Tools project.

Recommendation #3: Systems senior management should investigate alternative ways to manage the quality assurance and security testing more effectively.

Recommendation #4: Systems senior management should review the feasibility of incorporating other IT release changes (e.g. hardware, data communications, configuration, etc.) into HRDC’s software release change process.

Recommendation #5: Systems senior management, in consultation with regions, should develop a method to determine when incremental software release changes should be consolidated into a new, upgraded full release.

Recommendation #6: Systems senior management should:

- address escalating software releases (particularly Unplanned Releases); and
- set quality targets for national software applications that are released to the regions.

Recommendation #7: Systems senior management and regions should identify ways to apportion costs related to emergency, unplanned and essential maintenance software releases.

Recommendation #8: Systems senior management should reinforce HRDC’s Software Release Policy to ensure that all software implemented within HRDC’s IT environment adheres to HRDC’s authorized process.

Recommendation #9: Systems senior management should use their Dashboard Report to take action on items that need remediation.

1. Introduction

1.1 Background

On April 1, 2001 the Treasury Board of Canada implemented a new Internal Audit policy to better position and strengthen the internal audit function across government. In accordance with this new policy, the Internal Audit and Risk Management Services (IARMS) developed an annual Resource Utilization Plan for audit work in support of Human Resources Development Canada (HRDC) from July 2002 to June 2003. This plan was submitted to and approved by HRDC's Audit and Evaluation Committee (AEC). One of the assurance audits that the AEC approved was for HRDC's National Software Release Management process.

HRDC's Information Technology (IT) infrastructure supports national software programs and applications throughout Canada. As part of this support, software is continuously being developed, updated and released to the field for various reasons such as the introduction of new software, operating systems, enhanced versions of existing software, 'bug' fixes, legislative requirements, and regular software maintenance. This process involves mainframes, desktop personal computers, servers and other IT components including the internet/web. Software releases, such as custom business applications, Commercial Off The Shelf (COTS) software and other products are centralized through HRDC's Systems Branch, specifically Client Systems Services (CSS), a subgroup of the Client, Regional and Systems Services (CRSS) organization.

The CRSS organization has a CSS group that provides leadership and products management through its Office Automation, Testing Center and Model Production environment, Quality Assurance and Software Release, Implementation Services and the Adaptive Computer Technology Center. These support the people, programs/applications and tools that enhance the work environment of HRDC employees as they deliver services to Canadians. CSS organizational details are referenced in Appendix A.

In summary, HRDC's National Software Release Management Process includes:

- Software Program/Application Development and Infrastructure groups submitting software to CSS for release to the field;
- CSS schedules, coordinates, quality assures, monitors and distributes software releases; and
- HRDC staff (national, regional and local users) receives, test, install and support/maintain software releases.

Appendix B includes a diagram of the National Software Release Management Process.

1.2 Audit Objectives

Audit objectives were to assess HRDC's National Software Release Management process regarding:

- Planning and Organization;
- Delivery and Support;
- Implementation; and
- Monitoring.

Audit Objectives, Criteria and Methodology are referenced in Appendix C.

The audit's primary focus concentrated on HRDC's National Software Release Management process, specifically starting with CSS' receipt of software applications/programs that require release through to CSS' ultimate distribution and implementation of the application to HRDC users. As referenced in Appendix B, while most of HRDC's software release activities are concentrated within the CSS organization, important interfaces occur between CSS initially with the areas requesting software to be released (via the Advanced Notice of Planned Releases (ANPR)) and ultimately with the Receiving Sites – i.e. Information Technology Centers (ITCs) – to which the software is distributed.

The audit's secondary focus examined these multi-organizational interfaces between CSS and its other partners in HRDC's National Software Release Management process. Prior to CSS' receipt of software, there is an interface with CSS and HRDC's software developers/designers, Operations and Infrastructure groups. This interface was reviewed primarily through interviews with the Release Coordinators, Readiness Coordinators, and Project Managers from Systems' Client Solutions group (i.e. software program/application development areas), Operations and Infrastructure branch representatives. Likewise, CSS' release of an application necessitates an interface between the recipients (ITCs, national, regional and local users, Regional Systems groups and Local Area Network (LAN) Administrators) of the application and CSS – e.g. national implementations, developing implementation strategies, coordinating end-user training development and delivery, and negotiating pilot sites – including Memoranda of Understanding (MOUs). On-site visits and interviews were held with representatives from this recipient group to further assess this interface.

This Audit reviewed the National Software Release Management Process, not the regional release management process (the latter being unique to a region and its distribution method for regional software specific to the region).

The audit was conducted at National Headquarters (NHQ) – including Belleville, Montreal and Moncton ITCs – and the regions of Newfoundland, Prince Edward Island, New Brunswick, Quebec and Ontario. IARMS conducted its field work from March to June 2003.

This internal audit was conducted in accordance with both the Treasury Board Policy on Internal Audit and the Institute of Internal Auditors Standards for the Professional Practice of Internal Auditing. As per Treasury Board's Internal Audit Guidelines, assurance was provided through interviews with NHQ (including ITCs), Regional Headquarters (RHQ) and Human Resource Centre of Canada (HRCC) representatives directly involved with HRDC's National Software Release Management Process. Information obtained from interviews was corroborated and cross-referenced with each other. Documentation (e.g. ANPR, Component Installation Requests (CIRs), etc.) and software version control reviews were undertaken. Applicable files and historical data were analyzed for trends and assurance of appropriate management. In response to this audit's recommendations, a Management Action Plan is referenced in Appendix D.

2. Audit Findings

All significant audit findings are presented in this section in accordance with the audit's objective(s) and criteria that are described in detail within Appendix C: Audit Objectives, Criteria and Methodology. They include assurance statements on all of the criteria, regardless of whether or not the performance expectations have been met.

2.1 Audit Objective 1: Planning and Organization

Audit Criteria No. 2.1.1:

Operational and strategic planning is being done

The basic elements are evident within HRDC's National Software Release Management process for efficiently performing operational and strategic planning. However, the effectiveness of this planning could be improved.

As software releases are identified by NHQ Application and Infrastructure areas, each area has designated a Release Coordinator to plan and schedule releases and a Readiness Coordinator to coordinate software testing. While the Coordinator system is good, two issues were noted.

First, from a horizontal perspective, the Coordinators represent only their immediate work group/area. Therefore, the Coordinators do not always have a good appreciation of the number and magnitude of software releases that are planned for release and testing in the other Application and Infrastructure groups/areas. As such, there are often numerous releases of varying complexity that are simultaneously given to CSS, all competing for priority. IARMS believes horizontal planning between the Application and Infrastructure groups/areas could be improved to better align and manage the number and timing of releases that are given to CSS.

Second, from a vertical perspective, some Coordinators aren't familiar with all the software release activity even within their own immediate area. As such, some Coordinators do not always appreciate which releases might be best accelerated/delayed and/or bundled with another release within their area. Even with this knowledge, since some Coordinators are junior staff, they do not have the authority to tell a more senior Project Manager within their area that their release schedule/process may need to be modified. IARMS believes vertical planning, the assignment of roles and responsibilities and corresponding authorization levels, within certain Application and Infrastructure groups/areas could be improved.

CSS coordinates this horizontal and vertical planning responsibility by liaising between these separate groups/areas. In IARMS' opinion, HRDC's National Software Release Management process could be more efficient if more horizontal and vertical planning occurred between the Application and Infrastructure groups/areas.

IARMS also noted that software programs/applications are often upgraded with minor software changes. Eventually, these minor changes can become numerous. Our analysis indicated that there was uncertainty as to when to stop upgrading original programs/applications with minor software changes and re-issue a completely new version. This issue is more fully explained in Section 2.1.3 of this report.

Recommendation #1:

Systems senior management should ensure that Systems' Release and Readiness Coordinators have sufficient knowledge and authority to more effectively coordinate horizontal and vertical planning requirements for HRDC software releases.

There are a number of planning tools used by NHQ and the regions to manage software releases such as HRDC's bi-weekly national implementation videoconference for staff who are involved with national software releases. System's CSS has also hosted annual national Systems Implementation Workshops that include HRDC's software release stakeholders (e.g. national, regional, etc.). These workshops are also good forums for discussing both operational and strategic planning issues and associated action plans such as HRDC's Enterprise Network Services Renewal project.

The ANPR is a primary planning tool which is administered by CSS' Implementation Services. The ANPR contains software release dates that are entered into this MS Word scheduling tool (retrievable from the web). The ANPR is the main software release planning and scheduling tool for both NHQ and the regions that identifies anticipated software releases up to eight months in advance. (Within the ANPR is the Component Installation Request (CIR), which is the authorizing document to install software on HRDC IT infrastructure).

However, IARMS heard from a number of interviewees that because the ANPR contains so much data, it is difficult to manage, particularly when trying to identify specific data. Due to this, some regions have developed programs that filter the ANPR so as to identify only their respective regional requirements.

In addition, there is a belief that automating the distribution of HRDC's software releases would improve the National Software Release Management process. Examples were cited of LAN administrators presently having to visit each employee's computer to install software releases and virus updates (HRDC has 27,000 employees).

Systems has initiated the Enterprise System Management Tools project to address desktop management tools for software distribution, remote support and inventory control. This project, and ultimately the software tool used, will address the automation of delivering software to the desktop. The Project Charter is currently being developed and CSS has identified their requirements for this project.

Recommendation #2:

Systems senior management should review the feasibility of automating the ANPR process and pursue implementing the Enterprise System Management Tools project.

IARMS noted from its interviews with application program developers their belief that HRDC's National Software Release Management process takes too long. While lead time requirements for software releases vary according to their size and complexity, according to HRDC's Software Release Policy, releases can take up to six weeks (up to 2 weeks for Implementation Services to schedule software on the ANPR, up to 2 weeks (average of 5.7 days) for Quality Assurance (QA) testing, and up to 2 weeks to install in the regions). However, applications (e.g. Appli-web) that are used by the public may also require additional security testing. This security testing is done by the IT Security group, an organization that is not part of the CSS group. This security testing is also done after QA testing which adds more time to the six weeks. Additionally, if problems are detected in security testing, the software is then returned to the original Application Development and/or Infrastructure group for resolution and then re-scheduled for QA and security testing again.

While Application Developers understand HRDC's need to have a standard National Software Release Management process, they believe that when security testing is also required, this adds to what they perceive as an already lengthy process. It was felt that efficiencies in the process may be realized by simultaneously conducting QA and security testing by CSS.

Recommendation #3:

Systems senior management should investigate alternative ways to manage the quality assurance and security testing more effectively.

***Audit Criteria No. 2.1.2:
Organization and relationships are articulated***

The organization and relationships are well articulated for HRDC's National Software Release management process.

Systems' CSS organization is mandated to provide software release services to HRDC. Their website identifies the CSS organization for the National Software Release Management process and the roles and responsibilities have been outlined comprehensively in the CSS Service Organization Models. Appendix A further describes the CSS organization, roles and responsibilities.

Interviewees were aware of their roles and responsibilities for the National Software Release Management process, which aligned with HRDC's Software Release policy. Application program developers interviewed knew their responsibilities for releasing software through System's CSS organization. Regions also know that one of their major support functions is the installation of national software from NHQ. Regional IT organizations are in place to manage the installation of national software.

Part of the CSS release management responsibility is to let the sites that will be receiving upcoming software changes know of these impending releases as much in advance as possible. Several interviewees believe this communication process works better than other communication processes used for other IT changes within HRDC. As such, some HRDC

personnel believe other IT changes, such as hardware, data communication and configuration changes, may also benefit from this communication process. Presently, these latter changes follow a separate change process that is not always well understood. IARMS was cited an example in which data communications changes occurred that caused an operational disruption in an HRCC; neither the HRCC nor the region claim to have been aware of the impending change. In IARMS' opinion, if other IT release changes follow the same process as software release, HRDC may derive some benefits.

When dealing with these competing priorities, such as software, hardware, data communications and configuration changes, an appropriate priority-setting framework needs to be maintained that will prioritize which changes take precedent, coordinate schedules, maximize budgets, resource, time and minimize disruption of service delivery.

Recommendation #4:

Systems senior management should review the feasibility of incorporating other IT release changes (e.g. hardware, data communications, configuration, etc.) into HRDC's software release change process.

***Audit Criteria No. 2.1.3:
Management aims and direction are communicated***

Management aims and direction are communicated well through national and regional video and teleconferences (e.g. Bi-Weekly National Implementation Video Conference, Regional Conference Calls, Monthly Regional Systems Management (RSM) meetings, regular regional Technical Support Analyst (TSA) / Micro Support Specialist (MSS) meetings etc.), and various workshops.

HRDC's 'IT Software Release Policy' and 'Managed Release Process' are promulgated and available on the Systems web site. Both are understood, endorsed and fully supported nationally by most interviewees. They know that software should not be installed without proper authorization. Regional representatives also indicated that adhering to the policies ensures a controlled regional environment which makes it easier to support the desktop computer environment.

As previously mentioned in Section 2.1.1 (Operational and Strategic Planning), some applications are developed and maintained (e.g. fixes, small changes, patches, etc.) with incremental changes to the original complete/full software release. These incremental changes are then installed onto existing full release software in the field. Incremental installations initially save time when they are installed onto an existing computer that already has the original full release installed; it is much simpler and takes less time to install a small upgrade than reinstall a full release. However, problems arise when new computers need to have the original full release installed plus the required incremental changes.

One problem is the time it takes to install full releases plus the incremental changes, multiplied by the number of new computers. Also, retaining the original release and all incremental changes needs to be carefully managed. IARMS noted that many interviewees expressed uncertainty concerning the retention period for software releases, specifically

the CIRs and related documentation they receive which total from 24 to 60 per month. The regions indicated they are not aware of any retention/destruction policy for CIRs. IARMS' research also confirmed that no such policy exists. Lastly, when installing so many releases, the chronological order of installations needs to be exact to ensure that the original release is installed first, incremental change #1 is second, incremental change #2 is third, and so forth; otherwise the installation may abort, requiring the installation to recommence.

IARMS could not find an HRDC a policy or standard as to when incremental changes should be consolidated into a new, upgraded full release. Some application developers have made it a practice of releasing the entire full updated release instead of just the additional incremental changes. Other developers believe that a new, upgraded full release should be built only after so many incremental releases.

Recommendation #5:

Systems senior management, in consultation with regions, should develop a method to determine when incremental software release changes should be consolidated into a new, upgraded full release.

**Audit Criteria No. 2.1.4:
Controls are implemented to assess risks and manage quality/change**

While the design of the controls implemented to assess risks and manage quality/change for the National Software Release Management process is adequate, the effectiveness of the controls could be improved.

Evident controls are HRDC's ANPR that assists people in managing and scheduling the releases; Quality Assurance's final inspection testing (QA-FIT) of the integration and installation of software and reviewing the software's associated documentation; authorizing the software to be installed by using a CIR form; and tracking the software installation to completion through HRDC's Software Tracking System (STS). IARMS concurs, along with the regions visited, that these controls work well.

In addition, the release management process is flexible enough to allow for exceptions (e.g. risks) to regularly planned releases. Reasons for exceptions include:

- Emergency Releases (ERs) that need to be immediately installed to correct a critical software problem (e.g. directly impact on service delivery) – ERs normally bypass the regular release process;
- Unplanned Releases (URs) to install software within two weeks; and
- Additional functional testing at QA-FIT not required after integration and installation testing.

Controls are in place to invoke these alternate processes and exceptions including requiring the appropriate Director General's (DG) authorization and signature. All exceptions to the regular release process are still recorded and tracked by CSS in Dashboard Reports. These are regularly generated for the Application and Infrastructure areas and CSS

who review them for potential problematic trends such as an increase in ERs, URs, etc. These trends are then presented for remediation through the communication venues referred to in *Audit Criteria No. 2.1.3 Management aims and direction are communicated*.

While the above controls are implemented to assess risks and manage quality/change, IARMS analysis noted that for Fiscal Year (FY) 2002/03, HRDC had 1,323 national software releases, 668 (50.5%) for the mainframe computers at HRDC's four ITCs, 655 (49.5%) for either micros, servers or web hardware to support HRDC's approximately 27,000 staff. The 1,323 releases consisted of 909 (69%) regular releases, 261 (20%) ERs, and 153 (11%) URs.

In its 'Comprehensive Audit of the Moncton ITC' (October, 2001), IARMS noted a concern as to the number of ERs that were being released which were averaging 1.76 daily for the Moncton ITC. IARMS subsequently noted that for FY 2001/02, HRDC had 1,121 national software releases, 552 (49%) for mainframe computers, 569 (51%) for either micros, servers or web hardware. The 1,121 releases consisted of 811 (72%) regular releases, 237 (21%) ERs, and 73 (7%) URs.

As indicated in CSS's "Emergency and Unplanned Releases, A Six Point Plan" Group Management Committee (GMC) presentation (June, 2003), regular releases have increased 18%, ERs 10%, and URs 110% from last year (FY 2001/02). RHQ personnel indicated that these increases caused them to divert more time away from their regular duties in order to devote extra time to manage the increase in national software releases. URs and ERs have to be implemented with minimal lead time which further exacerbates the situation. Some regions informed IARMS that these constrictive time frames have now made implementation of URs and ERs unmanageable. As a result, some releases, including URs and ERs, may be at risk of not being installed on time, consequently putting HRDC's commitment to service delivery at risk, since timeliness of software installations is required to meet HRDC's service delivery requirements.

There is a perception amongst regions that there is a correlation between the increase in software releases and problems (e.g. 'bugs') with some of the software they receive. As well, the regions perception is that the functional testing process of the Application Development groups could be better. Some regions informed IARMS that they are now managing regular releases with the expectation of follow up releases (e.g. ERs and/or URs) to fix likely problems within the original release. This loss of confidence in the quality of software appears to be causing a cynicism among some regional representatives whom IARMS interviewed.

While it was not within the scope of this audit to analyze and verify the increase in national software releases and quality of the Application Development groups functional testing, various speculation was put forward to IARMS by some interviewees as to why they thought software releases were increasing and quality decreasing.

The most prominent perception among some interviewees is that HRDC's desire to serve their clients and meet its service delivery commitments, sometimes creates deadlines that don't fully appreciate the complexities involved with software development, particularly within HRDC's large, complex IT environment. Therefore, there is a perception that

some HRDC software programs/applications are more focused on deadlines rather than quality. Some interviewees believe this is why additional releases (e.g. ERs, URs) are needed to rectify the problems in the original software release.

The quest to meet deadlines is further exacerbated when other unforeseen issues inevitably arise, particularly during larger IT projects. For example, the conversion of HRDC's Departmental Accounts Relievable System (DARS) legacy data to the new DARS database took longer than planned. One of the results was that some software release timelines for the DARS were truncated.

Regions expressed a willingness to wait for quality products instead of releasing software that they claim causes them extra work and frustration, ultimately impeding HRDC's service delivery levels. While IARMS noted that Systems' Dashboard Report identifies the ERs by application groups, we did not find any concrete action plans to address the increase in URs and ERs and the perceived decrease in quality.

Recommendation #6:

Systems senior management should:

- a) address escalating software releases (particularly Unplanned Releases); and***
- b) set quality targets for national software applications that are released to the regions.***

2.2 Audit Objective 2: Delivery and Support

Audit Criteria No. 2.2.1: Operations are managed

Operations are well managed within the National Software Release Management process.

As previously mentioned HRDC employs various mechanisms to plan, organize, direct and control its National Software Release Management process. For example, CSS conducts bi-weekly Implementation Videoconferences, which includes but is not limited to, introducing new software installations, identifying issues, reporting status, etc. Also, a Challenge Committee meets weekly to review the planned, unplanned and emergency releases and, if necessary, taking necessary action to resolve any outstanding issues.

For large projects, such as Windows 2000, separate implementation strategies and plans are developed and maintained by CSS and affected program areas and regions.

It was noted that CIR documentation is readily available to all support personnel (e.g. TSA/MSS community) to keep them informed and current with software releases. Some regions have set up online documentation repositories that include CIR documentation for their support personnel.

***Audit Criteria No. 2.2.2:
Service levels/third party services are defined***

Service levels/third party services are appropriately defined as evidenced through documented agreements, expectations and service levels at NHQ and the regions. This includes the Release and Readiness Coordinators requirements, CSS Planning and Scheduling Releases Service Levels, CSS Products and Services Service Levels, and Regional Service Levels for installing and supporting the released software. Also, as stated within the Software Release Policy, all software released to external partners must conform to the existing policy.

These service agreements are supported and maintained on the CSS Web site. This is a comprehensive Web site, complete with checklists and templates and accessible to HRDC staff.

***Audit Criteria No. 2.2.3:
Performance, capacity, problems and incidents
are managed***

Performance, capacity, problems and incidents are effectively managed as it relates to the Release Management Process. Systems' CSS unit has identified its current performance and capacity within their release management process. They review this regularly and manage against these indicators. Problems and incidents are identified, addressed and tracked by CSS. Critical problems and incidents are escalated to the appropriate level for action.

CSS' QA-FIT has published its capacity and expected turnaround time for quality assurance of the software, which has been consistently exceeded. CSS's Software Distribution unit also monitors its performance.

All interviewees were aware that problems, including installations, are to be reported to HRDC's National Service Desk (NSD). Some regions regularly review the NSD logs to better manage trends and reoccurring problems.

ANPRs are available online to review interactively by ANPR number and/or name of program/application.

***Audit Criteria No. 2.2.4:
Costs are identified and attributed***

Costs are not identified and attributed consistently.

In general, the 'Total Cost of Ownership (TCO)' of any system or software release is a broader issue within HRDC, not just limited to CSS. TCO for software releases impacts other areas of the Systems branch (including CSS), client/business areas as well as recipient regions/HRCCs.

There is no specific regional costing for National Software Release Management. Rather, it is a component of the regions' overall IT support community salary dollars/allocation (e.g. TSA and MSS located in HRDC's regional and local offices). The function of software installation and support is part of the generic TSA and MSS job descriptions. For some major releases, regions have apportioned specific costs but this is not the norm, nor is it handled consistently across the country. Total costs for the National Software Release Management process could not be found.

Large projects/major releases (iVolution, Windows 2000, Microsoft Outlook, etc.) are well defined with the help of a costing formula that has been developed by CSS in consultation with the regions and application development areas. Project Managers have used this costing formula when planning projects within Systems' standard Project Life Cycle (PLC) methodology. However, this costing formula identifies only planned releases within the project. URs and ERs are not costed and this has a direct impact on CSS, regions, and ITCs in terms of additional workload and costs. As referenced above, URs and ERs have increased from last year by 110% and 10% respectively. The extra costs (i.e. overtime and travel) related to installing URs and ERs are absorbed by the regions. Regions indicated to IARMS that it's not necessarily large projects/major releases that "bog down" the process but all the other releases that the regions must implement. Also, after reviewing the Dashboard Report, almost 70% of all releases for FY 02/03 were classified as essential maintenance.

Addressing TCO for ERs, URS and essential maintenance may entail changes to HRDC's corporate financial system/coding structure.

Recommendation #7:

Systems senior management and regions should identify ways to apportion costs related to emergency, unplanned and essential maintenance software releases.

2.3 Audit Objective 3: Implementation

Audit Criteria No. 2.3.1: Changes are managed

Software release changes are effectively managed for the Release Management process evidenced by existing:

- Policies and Procedures;
- Communication Tools;
- Documentation;
- Review Committees; and
- QA Testing.

Along with QA testing being performed at NHQ, QA testing is also done in the regions. Regions have indicated that they want "no surprises" because it must work in the regional environment. Therefore, regional review and testing is done and, if required, regional

changes are made. Where appropriate, these experiences are shared with other stakeholders. It must be noted that all regions have expressed their opinion that the quality of the installation (i.e. CIR and associated documentation) received from CSS has improved over the last couple of years. It should be noted that this is not the same as software quality. They indicated that they can now send out more national software to the HRCCs without any 'regional' changes.

IARMS also reviewed selected software, at both regional and local offices, to ensure that the software being used by HRDC staff was the appropriate version. Our analysis verified that all software versions were appropriate.

One issue emerged [The information withheld qualifies for exemption pursuant to paragraph 16(2)(c) of the *Access to Information Act*]. The Moncton ITC has been the lead site for operating iNet Web servers for HRDC since 1996. One of the iNet roles and responsibilities is software installation and configuration. In compliance with HRDC's Software Release policy, all software (e.g. executable programs) should be using HRDC's standard release management process. However, web site information, sometimes referred to as "static content", does not need to be tested or CIPed since it is assumed that there are no executable programs. The process to load the static content is through posting the information onto a designated area, after which it is then automatically loaded onto the designated web site. It has been brought to IARMS' attention that executable programs are being embedded with some web site static content and ultimately installed without using HRDC's authorized process. This contravenes HRDC's Software Release Policy. [The information withheld qualifies for exemption pursuant to paragraph 16(2)(c) of the *Access to Information Act*.]

Recommendation #8:

Systems senior management should reinforce HRDC's Software Release Policy to ensure that all software implemented within HRDC's IT environment adheres to HRDC's authorized process.

2.4 Audit Objective 4: Monitoring

Audit Criteria No. 2.4.1: Processes are monitored

Processes are adequately monitored through various means such as HRDC's regular national implementation videoconference meetings. Standing agenda items on these conferences monitor the current installation and other implementation concerns nationally. Also, as previously identified in section 2.1.4, HRDC's Software Tracking System monitors the current status of implemented software and indicates the most current software versions that should be implemented nationally. CSS monitors regional concerns as evidenced in their survey tabled at the January 7, 2003 video conference. The QA-FIT Web page allows users (program areas, regions, etc.) to view the status of their respective CIRs.

As previously mentioned, a Challenge Committee has been established to monitor the release management process. This committee meets each week to review ERs, URs, new releases and other related release topics to readjust the ANPR and plan accordingly. CRSS has also presented to Systems' senior management its Emergency and Unplanned Releases, A Six Point Plan.

CSS monitors its operations and produces monthly and quarterly Dashboard reports. This Dashboard Report is presented to Systems' senior management and identifies trends, volumetrics and priorities pertaining to mainframe, micro, server, web applications, planned, unplanned, emergency releases, and is delineated by Client Solutions (i.e. application development) groups. IARMS noted that sometimes the reports indicate trends that may require further analysis and possible remedial action. However, IARMS did not find any evidence as to how this analysis and action occurs when problematic trends are noted.

Recommendation #9:

Systems senior management should use their Dashboard Report to take action on items that need remediation.

***Audit Criteria No. 2.4.2:
Independent assurances of the processes
are obtained***

Adequate independent assurances of the processes are obtained through both direct and indirect methods, such as:

- The mainframe release process within the Software Distribution section in CSS is ISO certified;
- Moncton's ITC CIR process is ISO certified;
- CSS staff has gone on Information Technology Infrastructure Library (ITIL) certification training, which includes the change management process; and
- IARMS does regular independent reviews of the Income Security Programs Information Technology Renewal (ISP ITR) project, which includes the change management process.

3. Conclusions

3.1 Planning and Organization

- The basic elements are evident within HRDC's National Software Release Management process for efficiently performing operational and strategic planning. However, the effectiveness of this planning could be improved.
- The organization and relationships are well articulated for HRDC's National Software Release Management process.
- Management aims and direction are communicated well through national and regional video and teleconferences (e.g. Bi-Weekly National Implementation Video Conference, Regional Conference Calls, Monthly Regional Systems Management (RSM) meetings, regular regional TSA/MSS meetings etc.), and various workshops.

3.2 Delivery and Support

- While the design of the controls implemented to assess risks and manage quality/change for the National Software Release Management process is adequate, the effectiveness of the controls could be improved.
- Operations are well managed within HRDC's National Software Release Management process.
- Service levels/third party services are appropriately defined as evidenced through documented agreements, expectations and service levels at NHQ and the regions.
- Performance, capacity, problems and incidents are effectively managed as it related to HRDC's National Software Release Management process.
- Costs are not identified and attributed consistently.

3.3 Implementation

- Changes are effectively managed for the Release Management process.

3.4 Monitoring

- Processes are adequately monitored through various means.
- Adequate independent assurances of the processes are obtained through both direct and indirect methods.

In our professional judgment, sufficient and appropriate audit procedures have been conducted and evidence gathered to support the accuracy of the conclusions reached and contained in this report. The conclusions were based on a comparison of the situations as they existed at the time against the audit criteria. The conclusions are only applicable for the National Software Release Management processes examined. This internal audit was conducted in accordance with the Treasury Board Policy on Internal Audit and the Institute of Internal Auditors Standards for the Professional Practice of Internal Auditing.

Appendix A

Organizational Details: Client Systems Services (CSS)

Office Automation helps HRDC identify, select, deploy and subsequently maintain corporate office tools in order to enhance the productivity of the office worker. It acts as an expertise center helping projects integrate office products into corporate solutions for HRDC.

The Test Center Model Production (TCMP) provides technical leadership and support services to Application Groups, Testing Groups and Program Area/Client Groups. TCMP's primary function is the configuration, maintenance, management and technical support of comprehensive test environments for HRDC Testing. TCMP provides pre-testing technical consultation services to Application Test Group regarding new or modified application testing platform requirements. TCMP also plays a key role in departmental initiatives that impact or influence the HRDC corporate infrastructure.

QA ensures that application releases will function on HRDC's corporate hardware and software platform. Upon receiving approved release packages from Testing and Readiness, QA performs a final inspection of the release to ensure that the application can be installed, installation procedures are clear and accurate, and that overall, the release package is compatible with the corporate IT hardware and software platform. At the conclusion of QA testing, staff prepares a report detailing test results.

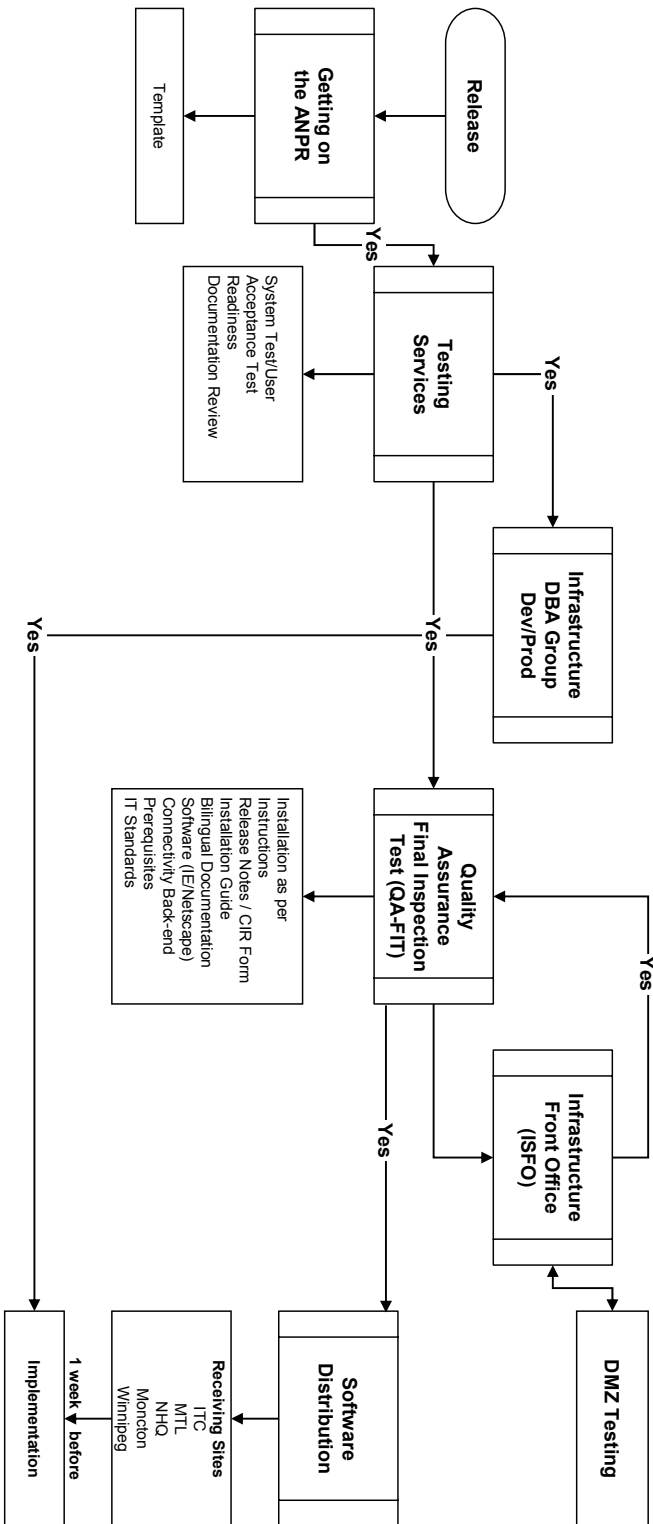
Software Release ensures the timely release and integration of the release package into HRDC's corporate IT environment. Working closely with Implementation Services (Release Planning Services), QA, and other Systems groups, Software Release adds value to the implementers in NHQ and the regions by providing distribution services, duplication services, a mainframe readiness function, and a central repository of released software.

Implementation Services is responsible for the planning and coordination of all national systems' implementation. It provides Systems clients and users with a single focal point for systems' implementation. Activities include negotiating pilot sites, coordinating end-user training development and delivery, and developing implementation strategies for pilots and national implementations. Release Planning Services, part of Implementation Services, adds value to the implementers in NHQ and the regions by informing them of upcoming releases via the Advance Notice of Planned Releases (ANPR).

The Adaptive Computer Technology Center (ACTC) provides HRDC's disabled employees, their managers, and others, including government departments, with solutions that will allow them to use a computer system to enhance their employability and productivity in the workplace.

Appendix B

National Software Release Management Process



Prepared by: Quality Assurance and Release Services / Implementation Services
Client, Regional and Systems Services
Revised: June 27, 2002

Appendix C

Audit Objectives, Criteria and Methodology

Objective

The audit assessed HRDC's National Software Release Management process as to:

- Planning and Organization;
- Delivery and Support;
- Implementation; and
- Monitoring.

Criteria

The following audit criteria that were used within this audit are referenced from the Information Systems Audit and Control Association's (ISACA) Control Objectives for Information and related Technology (COBIT) standards. ISACA's COBIT is an internationally recognized Information Technology (IT) / Information Management (IM) standard that is supported and endorsed by other internationally recognized IT entities such as The Gartner Group and IBM's PricewaterhouseCoopers Consultants.

Audit Objective No. 1: Planning and Organization

Audit Criteria:

- Operational and strategic planning is being done
- Organization and relationships are articulated
- Management aims and direction are communicated
- Controls are implemented to assess risks and manage quality/change.

Audit Objective No. 2: Delivery and Support

Audit Criteria:

- Operations are managed
- Service levels/third party services are defined
- Performance, capacity, problems and incidents are managed
- Costs are identified and attributed

Audit Objective No. 3: Implementation

Audit Criteria:

- Changes are managed

Audit Objective No. 4: Monitoring

Audit Criteria:

- Processes are monitored
- Independent assurance of the processes are obtained

Methodology

As per Treasury Board's Internal Audit Guidelines, assurance will be provided through interviews with NHQ (including ITCs), RHQ and HRCC representatives directly involved with HRDC's Distribution/Release Management process. Documentation reviews and sampling (e.g. ANPR, CIRs, etc.) were undertaken. Applicable files and historical data were analyzed for trends and assurance of appropriate management.

IARMS conducted the field work from March to June 2003.

Responding to the audit's recommendations, a Management Action Plan (with management responses, corrective actions, due date and contact person/branch) will be completed by Systems senior management and incorporated into the FINAL DRAFT for presentation to the Audit and Evaluation Committee.

Appendix D

Management Action Plans

This annex provides the details of management's response to the recommendations in the National Software Distribution/Release Management Audit Report.

Audit Report Recommendations	Corrective Management Action Plan	Expected Completion Date	Directorate level within Branch
<p>#1. Systems senior management should ensure that Systems Release and Readiness Coordinators have sufficient knowledge and authority to more effectively coordinate horizontal and vertical planning requirements for HRDC software releases.</p>	<p>Systems' Client, Regions and Systems Services (CRSS) has defined the new roles and responsibilities for the Release Coordinators to facilitate/coordinate horizontal planning. Systems' General Management Committee (GMC) endorsement was sought and given on January 14, 2004. Representatives have been nominated by the GMC members (DGs). Release Coordinators represent all directorates, regions and ITCs. Training will be provided on the overall release management process. The framework will be in place by March 31, 2004. Release plans will identify sufficient content that should provide opportunities for enhanced horizontal coordination.</p> <p>CRSS has developed, coordinated and provided the Release Management learning events to over 800 Systems staff in fiscal year 2003/04.</p> <p>The learning events will continue to be offered.</p> <p>An instance of horizontal planning, CRSS developed a comprehensive information package for the implementation of Compassionate Care which included mainframe, web and desktop releases.</p>	<p>March 2004 - completed</p>	<p>R. Ramsey</p> <p>All Systems DGs</p>

Audit Report Recommendations	Corrective Management Action Plan	Expected Completion Date	Directorate level within Branch
<p>#2. Systems senior management should review the feasibility of automating the Advanced Notice of Planned Releases (ANPR) process and pursue implementing the Enterprise System Management Tool (ESMT) project.</p>	<p>CRSS is currently finalizing the business requirements to automate the ANPR/Component Installation Request (CIR). A business case has been developed to seek funding from the Information Technology Oversight Board to proceed with a Request for Proposal. EDTM (Enterprise Desktop Management Tool) requirements were finalized and the procurement process started for this tool to address Software Distribution, Remote Control, and Inventory Collection components at the desktop level. The tool was procured in March 2004.</p>	<p>March 2004 - completed; Implementation TBD.</p> <p>Implementation TBD.</p>	<p>R. Ramsey</p> <p>M. Jaques</p>
<p>#3. Systems senior management should investigate alternative ways to manage the quality assurance and security testing more effectively.</p>	<p>CRSS and IT Security have jointly developed the MOU outlining roles/responsibilities, processes/procedures, checklist to transfer the responsibility for Demilitarized Zone testing function from IT Security to CRSS.</p> <p>CRSS is currently initiating a competitive process to resource the function, planning transfer of knowledge to undertake the responsibilities in the new fiscal year 2004-05.</p>	<p>March 2004 - completed</p> <p>June 2004 - completed</p>	<p>D. Holdham D. Adamson</p>

Audit Report Recommendations	Corrective Management Action Plan	Expected Completion Date	Directorate level within Branch
<p>#4. Systems senior management should review the feasibility of incorporating other IT release changes (e.g. hardware, data communications, configuration, etc.) into HRDC's existing release change process.</p>	<p>Operations commissioned a Gap Analysis/Study of our current Information Technology Infrastructure Library (ITIL) practices under the Service Support side of the process, including release management. After reviewing the report, an IT Service Management program function has been initiated that will coordinate activities related to process improvement. This function will help support/establish the new process elements as well as relate to the automation of processes through the acquisitions of tools from the ESMT project (i.e. the EDMT referred to in #2 above). The service management and planned process improvements are no longer waiting for funding; they were completely removed from our Enhance submissions. Any funding received will be dedicated to the implementation of tools purchased last fiscal year.</p>	<p>August 2004 Delayed - TBD</p>	<p>M. Jaques</p>
<p>#5. Systems senior management, in consultation with the regions, should develop a method to determine when incremental software release changes should be consolidated into a new, upgraded full release.</p>	<p>A review of the software release policy has been initiated between CCSS and IT Policy with a view to potential policy change requirements. Due to recent changes in the Quality Assurance and Release Planning Services, and Implementation Services areas, these groups will review their corresponding parts of the existing Software Release Policy and update, where required. A Systems Working Group has been established to review potential policy changes and update as required.</p>	<p>April 2004 - completed</p>	<p>R. Ramsey D. Giasson</p>

Audit Report Recommendations	Corrective Management Action Plan	Expected Completion Date	Directorate level within Branch
#6. Systems senior management should:	a) CRSS is currently producing the quarterly DGs' Dashboard report that details the release activity. Ongoing analysis of releases is continuing for Emergency Releases and Unplanned Releases.	March 2004 - completed	R. Ramsey
a) address escalating software releases (particularly Unplanned Releases); and	Comparative analysis has been completed and submitted to GMC in July and December 2003 and clearly demonstrated a decrease in both emergency/unplanned releases. ISP Systems is creating a matrix to map ISP Computer-Off-The-Shelf-Software (COTS) interdependencies with ISP Custom Application development to improve the release and readiness situation and ensure well planned releases for technical adaptive upgrades so that the technical adaptive activity is posted within the ANPR early.	Sept. 2004	Duc-Chi Tran
b) set quality targets for national software applications that are released to the regions.	b) Quality assurance applied through the Systems Development Life Cycle (SDLC) is required, starting with improved and verified requirements, then moving on to improved and reviewed design and development along with improved testing. ISP Systems will undertake a review of the SDLC processes this fiscal year with a view to recommending improvements for management consideration.	Sept. 2004	D. Giasson Duc Chi Tran
	Quality guidelines are being reviewed with the intention of defining quality and the potential for establishing targets.	Sept. 2004	Daniel Giasson

Audit Report Recommendations	Corrective Management Action Plan	Expected Completion Date	Directorate level within Branch
#7. Systems senior management and regions should identify ways to apportion costs related to emergency, unplanned, and essential maintenance software releases.	As part of the enterprise approach to IT management, work is presently underway in support of a simplified national infrastructure for IT management which is based on a new business model proposal, a financial strategy and reinvestment framework based on Project Portfolio Management. An implementation plan in support of the rationalization of IT projects is expected to address the total cost of ownership related to emergency, unplanned and essential maintenance software releases.	March 2005	D. Giasson Bettylynn Stoops
#8. Systems senior management should reinforce HRDC's Software Release Policy to ensure that all software implemented within HRDC's IT environment adhere to HRDC's authorized process.	The use of the IT Standards Committee and approval process successfully provides for agreements between the Standards Office and the functional areas which outline the standardized environment. The Corporate Services Re-Alignment initiative, bringing Systems functions from the program areas to the Systems branch, facilitates the adherence to HRDCs authorized processes. CRSS in consultation with IT Policy will review the Software Release Policy for potential enhancements. GMC approval will be sought for any policy changes identified.	March 2004 - completed April 2004 - completed	All Systems DGs R. Ramsey D. Giasson
#9. Systems senior management should use their Dashboard Report to take action on items that need remediation.	CRSS is currently producing the quarterly DG's Dashboard Report that details release activity and will continue to do so, as detailed in a Six Point Action Plan which was developed and presented to GMC in July 2003. An update was presented at the GMC in Dec. 2003. A process has been put in place whereby all DGs of Systems review the DG's Dashboard Report and identify any trends and items that need remediation.	Completed Completed	R. Ramsey All Systems DGs