Tentamen Requirements Engineering (232081) 17 juni 2007

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Ten geleide

De casustekst voor dit tentamen is geformuleerd in de vorm van een opdracht voor een requirements engineer. Van deze opdracht zult u delen uitvoeren aan de hand van de tentamenvragen op pagina 5. Bij het tentamen mag u gebruik maken van het boek van Lauesen.

Context:

In 2000, Telus Corporation was created as a result of a merger among three telecommunication companies:

- British Columbia Telecom (BC Tel), a privatized (formerly government-run) telecommunication business active in West Canada)
- Alberta Government Telecom (AGT), a telecommunication business in the Canadian provinces of Alberta and Sascatchewan, and
- Clearnet Communications Inc (CCI), a national provider of wireless telecommunication services.

While BC Tel and AGT are traditional providers of landline services and had to consolidate their landline business operations, CCI became the mobile business unit of Telus and did not have to consolidate any core business processes with BC Tel and AGT. For BC Tel and AGT, the very motivation of buying CCI was to get a ready-to-use country-wide cellular network and extend it, instead of having to start building out their own mobile networks.

Each of these three merging units (BC Tel, AGT and CCI) had its unique employee compensation schemas emphasizing the core values of each company. These schemas drive how the performance of the individual employee is appraised and how the individual performance appraisal of the employee affects his/her salary increase and his/her eligibility for monetary benefits (bonus, purchasing of stock options at preferred prices and more). After the merger, the Telus Leadership Team set out to harmonize the business processes in a number of back-office areas including the area of Human Resources. The key objective of the Telus Leadership Team in the Human-Resources-business-process harmonization effort is to have the three former business units adopt one standardized process for

(i) setting-up employee's performance objectives, and
(ii) evaluating employee's performance.

The new standardized processes will be automated to a large degree by using a performance management software package. Independently on the software vendor, a key requirement is that the new HR software solution rests on a common database which will be shared by BC Tell, AGT and CCI. The purpose of implementing the software package **and** the common database is to *improve the efficiency and effectiveness of employee's performance reporting and tracking and the related data management.*

Opdracht:

The requirement engineer is asked to specify the requirements for a performance management solution that supports HR managers in running their processes in a standardized fashion across locations and across formerly-independent units (BC Tel, AGT and CCI). The solution includes a performance management tool and a database which this tool shares with other HR applications. The requirements engineer has at his disposal the process documentation which you see below and which includes:

- information about the project (see page 2)
- description of how - at the present time, the HR staff carries out the business process called 'Setting Personal Performance Objectives' (see page 3 and Appendix 1)
- description of how – in the future, the HR staff should carry out the business process called 'Setting Personal Performance Objectives' (see page 4 and Appendix 2)
- description of how - at the present time, the HR staff carries out the business process called 'Performance Objective Review' (see page 4 and Appendix 3).

- description of how – in the future, the HR staff should carry out the business process called 'Performance Objective Review' (see page 5 and Appendix 4)

Project Information

The HR department wants the proposed solution to tie together several manual workflows and eliminate redundant process steps as well as redundant employee information.

At the time of the merger, a major portion of data elements which are going to be part of the common database is being managed within standalone, self-managed Microsoft Excel spreadsheets and Microsoft Access databases that are used as the prime sources for producing some of the critical HR reports such as the Projected-Cost-of-Training Report, the Basic Salary Report and the Headcount Report. The shared solution and the common database will work on the premise that all the users and managers of these standalone systems (the Excel and Access based databases) will eventually abandon these personal systems and migrate to the package solution.

The specific recommendations by the HR department to the solution implementation team for the quality of the data in the common database are as follows:

1. It should have the same simplicity and user-friendly interface as the existing stand-alone Excel and Access databases.
2. It should have a standard response time acceptable for the users at various regional offices.
3. It should have sufficient potential for future growth, as Telus plans to acquire two more companies in the coming years.
4. The common database should implement a data mastering concept, which determines which HR application will update which records in the database. For each record in the database, there will be only one data-mastering application. The stakeholders should arrive at a consensus on the data-mastering concept (that is, which application will control the changes over certain data fields in the database).

Because active support and sponsorship of senior management is critical to the success of any process improvement initiative, Telus appointed a high-level management team to oversee this mechanism of continuous improvement for the HR business processes. The main goal of this group is to maintain the gains of the common database and the standardized automated processes by:

- Obtaining and analyzing the necessary feedback regarding the viability of the new processes and the effective utilization of the solution. The feedback should include metrics data on the timeliness, the accuracy of employee performance data input by Regional HR Managers and the utilization of the solution to produce the intended reports (e.g. as the Projected-Cost-of-Training Report, the Basic Salary Report and the Headcount Report, the Projected-Rate-of-Retirement Report).
- Checking if the agreed upon service levels are being maintained by the stakeholder departments. For example, timely provision of performance evaluation data by department managers with respect to those employees reporting to them. Or timely provisioning of training data by the HR managers to produce the Training Plan by the Employee Training Provisioning Department.
- Assessing stakeholders' satisfaction with the solution.
- Maintain commitment to the ownership of the data elements and improvement of the existing processes,
- Agreeing upon and proactively carrying out the required changes to the business processes, the software solution and the database, if and when needed.

The high-level management team is headed by the Vice President – Employee Services and consists of process owners (the HR Director and the three Regional HR Managers) as well as two representatives of the Corporate Business & IT Architecture Office, who act as facilitators.

The project scope includes two processes:

- Setting Personal Performance Objectives (PPO), and
- Personal Performance Review (PPR),

These processes are described below in terms of how they worked before the merger and how they are expected to work after the merger and with the new solution in place.

Setting Personal Performance Objectives (PPO)

Telus is committed to move all employees to a 'pay-for-performance' compensation schema. While this is not new for CCI (who had been started-up with this schema in mind), it's a brand-new organizational concept for BC Tel and AGT. The PPO process is the foundation of this schema. The key distinction between how the PPO process works at CCI and how it works at BC Tel/AGT is that it is linked to the salary of the CCI employees which means, employee's compensation highly depends on a variable of how an employee meets his/her objectives each quarter. (This also implies that if someone is on a sabbatical/maternity leave, the variable part of his/her salary will be $0, as there were no performance objectives set up for the time when on sabbatical/maternity).

In contrast to this schema, BC Tel and AGT use no PPO process with respect to employee compensation. They use it exclusively for the purpose of defining training needs and estimating the costs to cover them.

Telus sees this process (when adopted in all three units) as THE tool which the HR team provides to each employee to define and prioritize his or her personal and team objectives and ensure they link to the objectives of the business unit and the corporate objectives.

Current State of the Business Process

The current state of this process in presented in Appendix 1.
Right now, the PPO process is tied to the variable pay for those Telus employees who worked for CCI before the merger. The process is also used at BC Tel and AGT to maintain performance-driven culture. However, there is no variable pay component for employees at these two business units.

The process starts with the definition of the employee's personal objectives. Currently, CCI provides two approaches to determining the objectives. For front-end team-members, for example those working at the Sales department, employee's objectives are very metrics-driven and are set completely by directors/managers. In departments, like Finance, Engineering, Information Technology, objectives are set in a more collaborative way. There, the employee's objectives are linked to the objectives of the team (to which the employee belongs). These team objectives are provided by the support person (that is, by the team leader or the department manager of the employee).

Once the objectives are drafted, the support person organizes a connection meeting with the employee for the purpose of reviewing employee's commitments, success criteria and measurable results and negotiating the percentage weighting for each objective. The target percentages associated to the objectives are to serve as guidelines of how the employee should allocate her/his time. The success criteria and the decisions that both the support person and the employee agree upon are documented in the PPO-form. The support person validates this form when filled out, signs if off, and gets it signed-off by the employee. Currently, the PPO forms are kept with the Department Managers of the company.

The Regional HR Manager contacts the department directors to get feedback on how directors/managers/team leads feel about this process and to get understanding of what worked and what can be improved.

Current Systems used in support of this process: All steps in this process are manual.
The PPO-form is made available to employees through the Telus Intranet site. Currently, it is maintained and stored in WinWord format.

Current Process/Systems Issues

The high-level management team agrees on the following issues in the current process:

- Weak back-end of the existing PPO-form (this means duplication of forms, inconsistent updates – for example updates are done by an employee's manager but not carried over by the HR team to reflect this in the pay-check of the employee).
- Manual performance reporting represents a tedious, time-consuming and error-prone exercise (65% of the managers complain that this task "eats up a major chunk of their time, but must be done so that they and everyone on their teams get their bonus in time").
- Redundant entry of employee information (it was found out that employee performance information has been keyed in upto 7 times!!).

- Difficulties in double-checking to see that the PPO form is being used properly. The effective use of the form has been highly dependent on the individual knowledge, skills and experience of both the support person and the employee. (A CCI-wide employee survey indicated that (i) 30% of the managers are questioning themselves whether they did the things right, and (ii) 46% of the employees believe that there is nothing to stop their managers from abusing the PPO process while 4% say they indeed suffered a PPO-abuse and are considering leaving the company if HR does not take a prompt action).

Future State of the Process
The future process is presented in Appendix 2.
The business owners expect manual steps and double keying of data be **eliminated or reduced** in the future process. HR and management will have full control over this process with tracking, oversight, and reporting. For this process to have credibility with the business, reporting and PPO tracking should be done automatically by means of a suitable Performance Management tool. The Regional HR Managers will also use this tool to perform PPO audits: samples of PPO forms will be extracted from the tool's database as per the needs of the HR users.

Expectation of the Future System
The PPO process workflow will be supported by means of a Performance Management tool that should:
(i) be tied to the Telus post-merger organizational structure and allow employee information and performance data to travel from employees to support persons and to next level support persons, as well as to HR.
(ii) be easy-to-use and flexible enough to meet all reporting and tracking needs of the HR team,
(iii) serve as a coaching/performance improvement tool and not only as a variable-pay tool.

Expected Effects
- All PPO-data processing steps will be automated.
- When auditing PPO documents, the regional HR Managers team would no longer depend on e-mail and PPO paper copies.
- The Performance Management tool will be the sole information source for performance tracking and reporting.

Personal Performance Review (PPR) for PPO
The current process is presented in Appendix 3.
This business process has the goal to understand how the employee is doing compared to his or her performance objectives (which are set up in the PPO-form), to evaluate the extent to witch the employee's accomplishments meet the objectives, to revise/replace PPO-form, and to calculate the variable pay for the employee and submit it to the HR Incentive Analyst.

Current State of the Process
For 68% of the pre-merger CCI departments, the process of PPR for PPO is carried out on semi-annual basis. For the remaining 32% - on quarterly basis. The process is initiated by the support person who requests input from the employee on the accomplished objectives. The employee provides information on personal accomplishments to be reviewed by the support person and to be used as input to the PPR meeting. The accomplishments are put in a report that says what the employee worked on in the past period. Together, the support person and the employee go through the accomplishments.
The support person provides comments on achievements and obstacles, determines the target percentage achieved with respect to each objective, determines the total percentage, and communicates team percentages achieved. The support person updates the PPO form by adding this information, signs it off and lets the employee sign it off as well. A paper copy of the PPO form is kept by the support person in the employee's personal file.
The support person calculates the variable pay by using a spreadsheet form and sends it via e-mail to the HR Incentive Analyst. The quantity specified in the spreadsheet is used for processing the employee's variable compensation amount (bonus).

Current State of the System: All steps in this process are manual.

Current Process Issues: This process shares the same issues which were identified for the PPO process (see page 3).

Future State of the Process and the System

The future process is presented in Appendix 4.

The business owners expect manual steps in process of PPR for PPO and double keying of data be eliminated or reduced. In the cases when the employee changes departments or support persons, the employee's file will automatically go to the new support person.

The workflow associated with PPR will be automated by means of a suitable Performance Management tool. It will allow users to maintain one single source of employee and performance information, including all data items needed for the generation of the PPO-form.

Expected effects

- Updates to existing PPO-forms will be done automatically.
- Support persons would no longer depend on e-mail and paper copies of the PPO-forms.
- Calculation of the variable pay should be done automatically.

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Let a.u.b. op het volgende.

• *Bij het tentamen mag u gebruik maken van het boek van Lauesen (2002): Software Requirements – styles and techniques. U mag geen gebruik maken van andere meegebrachte papieren, bijvoorbeeld het huiswerk of aantekeningen over het proeftentamen.*

• *Bij veel vragen is er niet één goed antwoord, maar zijn verschillende keuzes mogelijk. In zulke gevallen zijn de argumenten die u voor uw keus aanvoert belangrijker dan de keus zelf. De argumentatie telt dus in belangrijke mate mee in de beoordeling.*

• ***Verschillende opgaven worden door verschillende mensen nagekeken. Begin daarom iedere opgave op een nieuw vel papier. Schrijf op ieder vel uw naam.***

Opgave 1:

a) Identify and formulate 2 goal-level requirements, 2 domain-level requirements, 2 product-level requirements and 2 design-level requirements (if there are any of each type). (8 points)

b) Let's assume that Telus has decided to engage a supplier who is a vendor of packaged software. The requirement engineer is asked to write the requirements document which Telus will give to the vendor. Make a list of 5 requirements, which you think are appropriate for inclusion in this specification. (6 points).

c) Let's assume that Telus has decided to engage a management-and-IT consulting firm, which bundles organizational and technology solutions. Let's assume that Telus engages this company to help choose the right performance management solution for Telus. The requirements engineer is asked to write the requirements document which Telus will give to this firm. Make a list of 5 requirements, which you think are appropriate for inclusion in this specification. (6 points).

Opgave 2:

a) Make a list of the stakeholders for the performance management solution. (5 points)

b) Who of the stakeholders is/are the most important to consider in the elicitation of the requirement? Motivate why. (5 points)

c) Are the Telus employees stakeholders in this project? Motivate your answer. (5 points)

Opgave 3:

There is a number of techniques for describing the data which the system will use. Choose two techniques which you think are the best fit for use in this project. Motivate why you think these techniques are the most suitable ones. Document the data requirements for the system by using these techniques (15 points)

Opgave 4:

a) Below, there is a list of techniques for specifying functional requirements. Which of the techniques from this list would you use for specifying the functional requirements in this project and why. Write down any assumption you make, when answering this question. (15 points)
   - Event list (product events and domain events)
   - Features
   - Scenarios
   - Screens
   - Task descriptions
   - Use cases

b) Draw a domain model to provide an example of how work can be split up between computer and human in the case of the performance management system. (8 points)

c) Make a data flow diagram for the system (15 points)

Opgave 5:

a) Formulate two usability requirements. Motivate your choice (8 points)

b) Can we conclude from the case study text that scalability is an important quality requirement for this project (a must-have requirement)? Motivate your answer (4 points)

Tentamencijfer T := (aantal punten)/10

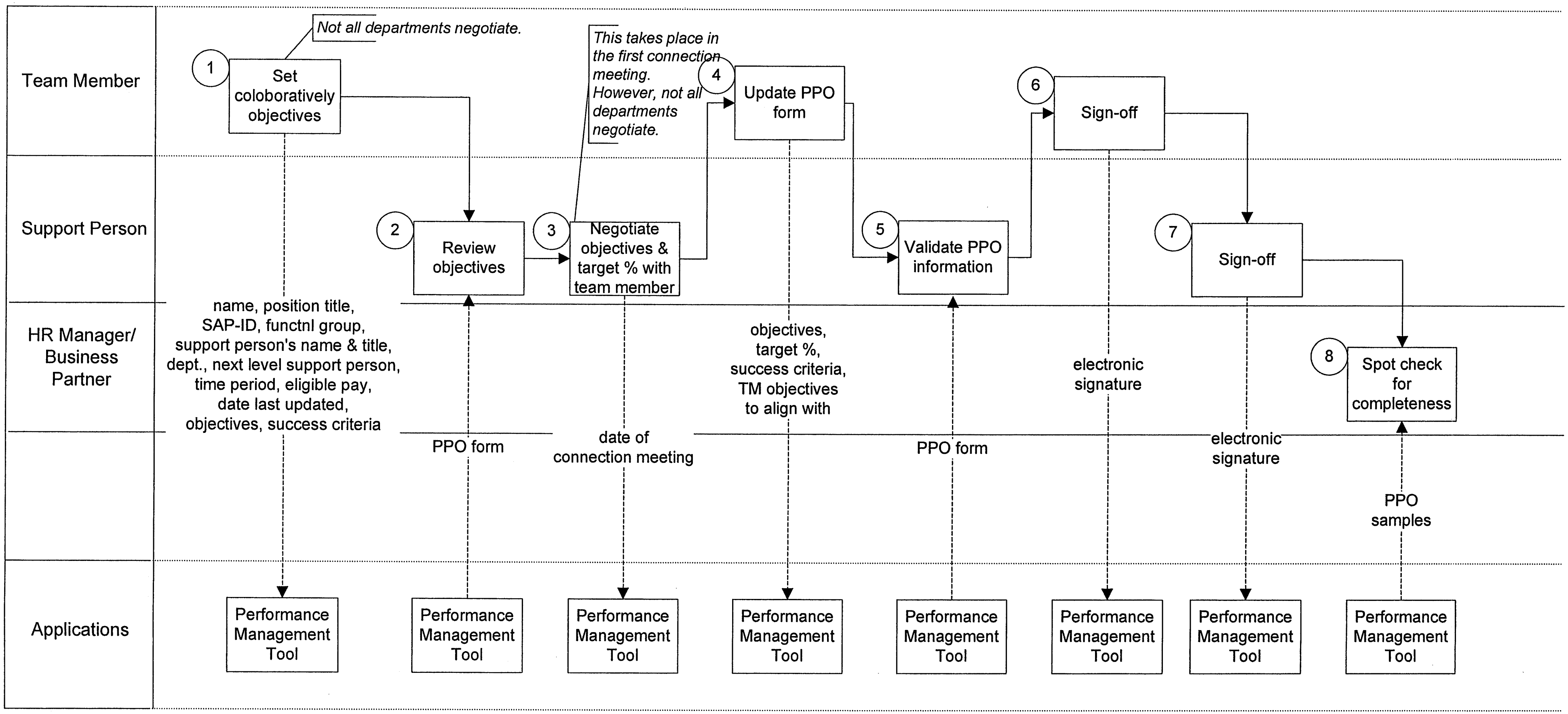
Huiswerkcijfer H := gemiddelde van de beste vijf huiswerkopgaven

Eindcijfer **if** H ≥ 5.5 **and** T ≥ 5.0 **then** E := max(T, (T+H)/2)

Appendix 2

DESCRIPTION

TELUS Performance Management: TO-BE Process for Setting Personal Performance Objectives (PPO) DRAFT



Comments:
1. This process is tied to the variable pay.
2. It is up to the Director of the department in determining how objectives are set (for example, frequency of payouts, duration of objectives).
3. PPO meetings, so-called connection meetings, can happen as often as needed.
4. Objectives can be modified based on changing business needs. Any modification to the PPO form is followed by a joint review and sign-off. Both support person and team member must acknowledge the form.
5. Progress on objectives is checked for reporting purposes.
6. Currently, the IT team is working with the HR team to select a Performance Management tool that would support the steps in this process.

Legend

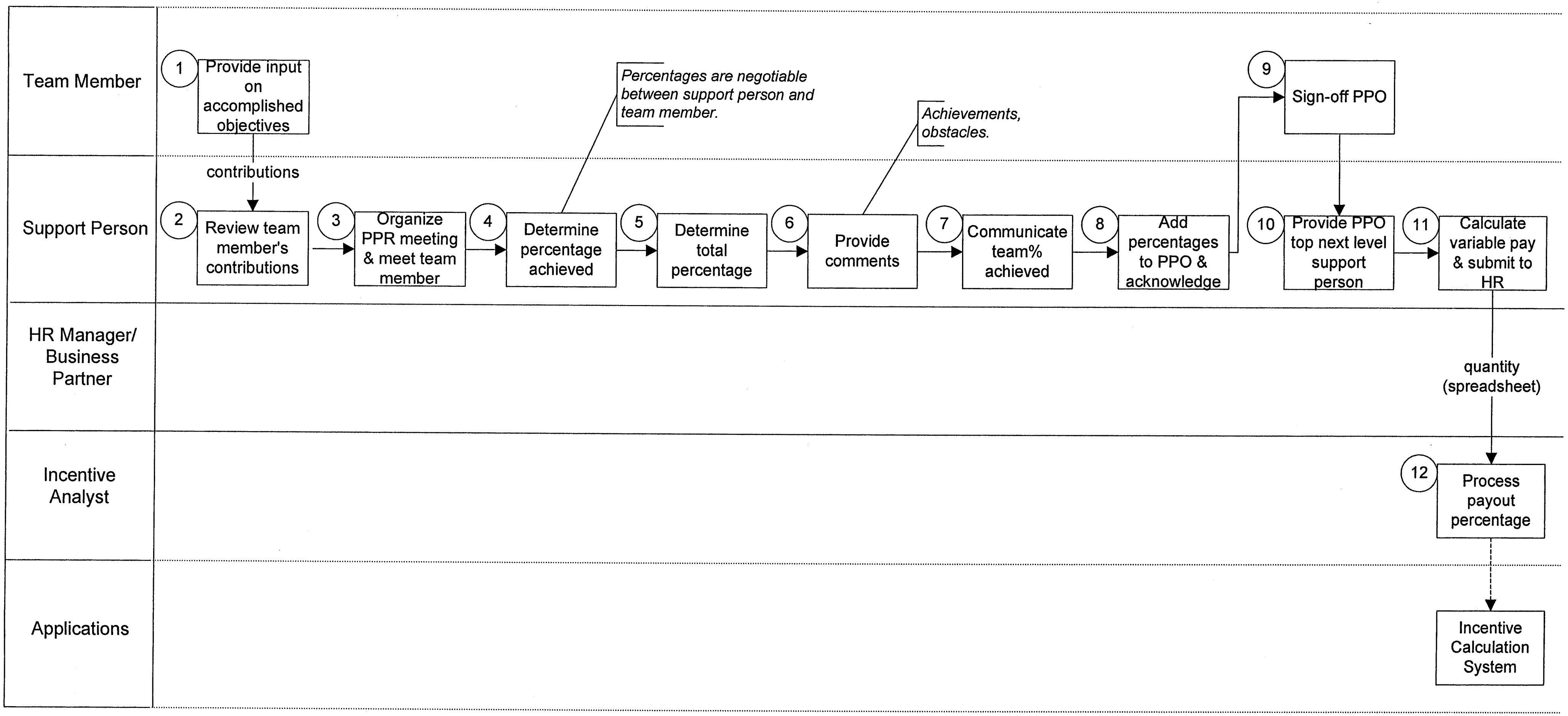
Process Flow

System Flow

FILENAME	DATE	DRAWN BY	PAGE
TM-PPO-JUNE13-FUTURE-PROCESS.VSD	jun 13, 2008	Maya Daneva	1 OF 1

Appendix 3

DESCRIPTION	
TELUS Performance Management: Personal Performance Review (PPR) for PPO	**Sept 2, 2003**



Comments:
1. The Personal Performance Review is tied to the variable pay.
2. Based on the review, percentages are determined and forwarded as input to the Incentive Calculation System (ICS).
3. Variable compensation is calculated and processed in ICS. For more information on the Incentive Calculation process, please review the Incentive Calculation Process Map delivered as part of the HR ODS Project.
2. All steps in this process are manual.

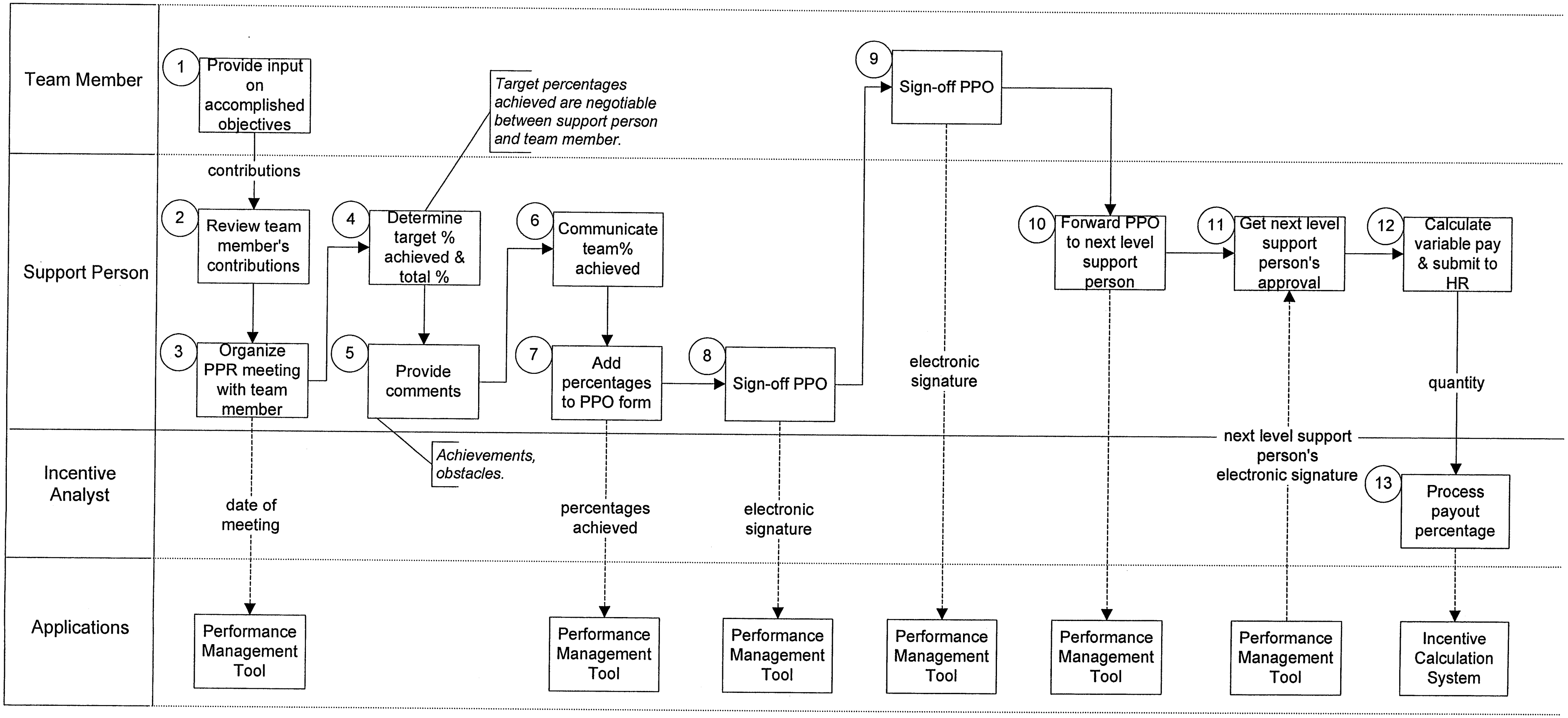
Legend

Process Flow ⟶
System Flow - - -▸

FILENAME	DATE	DRAWN BY	PAGE
TM-PPR-FOR-PPO-PROCESS-SEPT15.VSD	jun 13, 2008	Maya Daneva	1 OF 1

Appendix 4

DESCRIPTION
TELUS Performance Management: TO-BE Process for Personal Performance Review (PPR) for PPO **DRAFT**



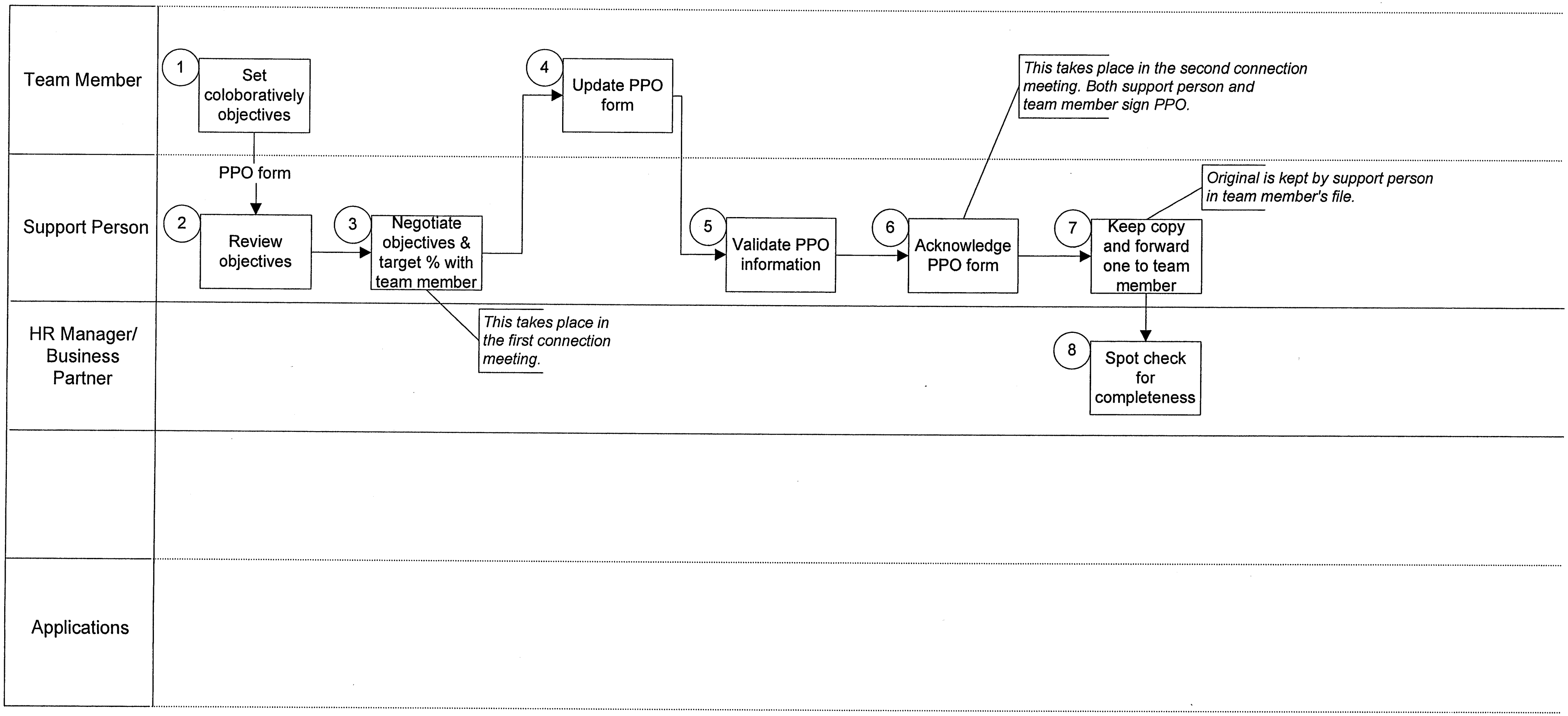
Comments:
1. The Personal Performance Review is tied to the variable pay.
2. Based on the review, percentages are determined and forwarded as input to the Incentive Calculation System (ICS).
3. Variable compensation is calculated and processed in ICS. For more information on the Incentive Calculation process, please review the Incentive calculation Process Map delivered as part of the HR ODS Project.
4. Currently, the IT team is working with the HR team to select a Performance Management tool that would support the steps in this process.

Legend
Process Flow →
System Flow - - - →

FILENAME	DATE	DRAWN BY	PAGE
TM-PPR-FOR-PPO-JUNE13-FUTURE-PROCESS- VSD	jun 13, 2008	Maya Daneva	1 OF 1

Appendix 1

DESCRIPTION
TELUS Performance Management: Setting Personal Performance Objectives (PPO) **Sept 15, 2003**



Comments:
1. This process is tied to the variable pay.
2. It is up to the Director of the department in determining how objectives are set (for example, frequency of payouts, duration of objectives).
3. PPO meetings, so-called connection meetings, can happen as often as needed.
4. Objectives can be modified based on changing business needs. Any modification to the PPO form is followed by a joint review and sign-off.
5. All steps in this process are manual.

Legend

Process Flow →
System Flow - - - →

FILENAME	DATE	DRAWN BY	PAGE
TM-PPO-PROCESS-JUNE13.VSD	jun 13, 2008	Maya Daneva	1 OF 1