
PERSONALIZED LEARNING & COLLABORATIVE WORKING ENVIRONMENTS FOSTERING SOCIAL CREATIVITY AND INNOVATIONS INSIDE THE ORGANISATIONS

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Introduction

The general aim of the ARISTOTELE project was to foster workplace learning of employees through the use of innovative information technology tools and environments. The main objective of the evaluation framework was to design and to provide evaluation methods for the “pilot trials” of the ARISTOTELE project in which the tools were tested. The objective here was to define and provide the ARISTOTELE Evaluation Framework with all selected methodologies and required instruments (e.g. models, processes, criteria) which could be used to assess innovative learning models and processes. These methods were the basis for developing a set of indicators: They were used and applied to assess the outcomes of the ARISTOTELE project and to measure the impact. In addition, it built an assessment methodology to evaluate the effect of the integrated ARISTOTELE Platform, Tools and Methodologies on learning processes, collaboration and knowledge sharing in enterprises.

Hereby, the ARISTOTELE impact measurement concentrated on five main impact categories: costs, time, quality, outputs and fit with the organisation. These categories and the respective indicators served to quantify differences using the ARISTOTELE platform and tools in comparison to the technical solutions used before in similar circumstances. Thus, the aims were to identify objectively measurable performance indicators and to measure them applying business processes which are relevant both for the two application partners and potential users.

The internal design process of the business processes was to go back to the already identified work and learning practices (which fall into the ARISTOTELE key areas and are in a knowledge work context) and the requirements on one side and available ARISTOTELE platform functionalities on the other.

The industry partners in the project consortium together with business analysts and HR experts elaborated the final version of the business cases, proposals for their measurement and expected improvements. The associated business processes which were expected to be improved were identified.

This procedure guaranteed the relevance of the business processes used in pilot trial II both for the application partners (APs) and for the ARISTOTELE project.

Summary of the ARISTOTELE Evaluation Framework Section

The following table shows the overview of the whole ARISTOTELE Evaluation Framework: It presents the Evaluation Levels and their phases with the chosen methodologies which were used in the evaluation levels.

The first Iteration Cycle of the ARISTOTELE Evaluation Framework included the concept validation and the Pilot Trial 1 with the Usability Study and User Validation, whereas the second Iteration Cycle covered the Software Validation and Impact Measurement focusing on both (i) the validation of the ARISTOTELE platform and (ii) the impact evaluation of the usage of the integrated ARISTOTELE Platform and Tools.

Through the two iterations, the ARISTOTELE evaluation ensured the improvement and optimization of the ARISTOTELE models, methodologies, tools and of the ARISTOTELE platform as well as of the ARISTOTELE impact for best development and support of the ARISTOTELE outcomes and their long-term and sustainable usage and exploitation.

Table 1: Overview of the ARISTOTELE Evaluation Framework

Phases	Level	Name	Methods
Conceptual Evaluation	Level 1	Concept Validation (qualitative evaluation)	Phase 1: Individual Experts Reviews (internal and external experts)
			Phase 2: SWOT Analysis from Focus Group
Pilot Trial 1	Level 2	Usability Study (qualitative evaluation)	Cognitive Walkthrough
	Level 3	User Validation of Tools (qualitative and quantitative evaluation)	Functional Testing
			Quantitative Survey (Online Questionnaire)
Pilot Trial 2	Level 4	Software Validation and Impact Measurement (qualitative and quantitative evaluation)	Phase 1: Software Validation - Functional Testing (Validation and Verification) - Extended Oral Feedback on Usability Aspects (if needed)
			Phase 2: Impact Measurement - Semi-Structured Interviews on Impact (Platform and Tools) - Impact measurement (KPI) - Quantitative Survey (Online Questionnaire)

Evaluation methods

Specifications

Pilot trial II was mainly conducted at the application partners (AP) AMIS and PHI, where five business scenarios were observed following a pre-post design: first, each scenario was observed under normal conditions (without the use of ARISTOTELE) and then using the ARISTOTELE tools and platform. 57 test persons from different main system actor groups and from both APs were involved. Both APs had access to their own installation of the ARISTOTELE platform with AP-specific data available.

Input for the evaluation activities was collected through different validation methods:

1. functional testing;
2. semi-structured interviews on impact (platform and tools);
3. impact measurement (KPI);
4. quantitative survey (online questionnaire);
5. implementation costs.

Method 3) required the development of KPIs regarding time, staff-costs, quality, accuracy and fit with the organisation.

Functional testing

In order to guarantee a reliable execution of pilot trial II, a functional testing has been performed. This testing focused on the functionalities of tools and services to be used by the Application Partners in the daily activities of their business processes. The results of the testing allowed identifying:

- some bugs that were still present in the tools/services under testing and that were fixed;
- some issues that was not possible to address in view of the experimentation (i.e. the last version of EUROPASS format is not managed by the CV analyser prototype)
- some issues that have been addressed to better support the experimentation (i.e. extension of the ticket matching approach by introducing matching based on word similarity).

Semi-structured interviews on impact (platform and tools)

At the end of the measurement phase without ARISTOTELE and the measurement phase with ARISTOTELE, 24 interviewees (in each case the same persons) have been interviewed on implicit details of the business scenarios and informal feedback on the impact of the ARISTOTELE tools and platform, especially on details on changes in the work process, problems/obstacles, IT-support of the ARISTOTELE key areas, usability aspects and improvements/proposals. The results tackled primarily the aspects quality, changes in business processes and usability.

Impact measurement (KPI)

For each of the five business scenarios, several KPIs were measured during/before and after the phase in which ARISTOTELE was used. The indicators referred to different levels of complexity (overall business scenario, sub-process, single step). The results tackled primarily the aspects time, resources and to a minor extent quality.

Quantitative survey (online questionnaire)

The survey was administered at the end of Pilot Trial 2 and had four parts:

1. personal data, role and AP;
2. the System Usability Scale (SUS – Brooke (1996));
3. Part 3 on usability, validation and perceived usefulness;
4. Part 4 on platform validation and changes in business processes.

The results tackled primarily the aspects changes in business processes and usability.

Implementation costs

The partners involved in pilot trial II provided estimations on the following: CRMPA/MOMA on the internal costs for setting-up, maintaining and consulting activities of the pilot installations; AMIS on the internal costs for setting-up and maintaining activities of the piloting installation; PHI on setting up, technical implementation and training activities of a hypothetical complete installation of ARISTOTELE. This allowed extrapolating on a) the consulting costs for external clients (market prices); b) return of investment.

Overall evaluation results

Triangulation of the data coming from the different validation methods allowed condensing the results as follows:

1. The Human Resource Management (HRM) tool is a good candidate for a product that needs some improvements on the reported usability concerns and the integration of different languages and could prove direct and positive impact on the business processes.
2. The Personal Work and Learning Experience (PWLE) tool needs a better focus on and integration into business processes to provide substantial impact and measurable improvements on required time and resources.
3. The Knowledge Building (KB) tool (Recommender System) needs some improvements, but in general it can be considered as a good candidate for a product supporting the business processes within e.g. call centres.

The results of the evaluation level 4 could prove that the tested ARISTOTELE tools are providing support for the application partners with specific impact on their business

processes. The findings could be used for the further development and improvement of the ARISTOTELE tools and platform towards valuable products with potentials for the market and acceptance by the application partners and other business customers for achieving values, advantages and impact within their own business processes and relationships with external stakeholders.

Limitations of the impact measurement can be seen in the following aspects:

1. Pilot trial 2 activities and daily operational business run in parallel threatened the validity of the data;
2. Pilot trial 2 activities constituted an additional workload for the test persons, which could have influenced negatively the attitude of the test persons towards ARISTOTELE;
3. Due to the complexity of the platform, only some aspects/tools could be evaluated;
4. Some test persons showed a certain resistance to change;
5. An even more extended period for pilot trial 2 would have helped to improve the validity of the evaluation data.

Impact measurement – evaluation results for BP “Customer complaints / fault report management”

AMIS is a telecommunications provider in Slovenia. The call centre tackles all kind of request from clients, dealing with contractual, technical, etc. problems and requests. Problems that cannot be solved directly by the first-level call centre agents are passed to specialised agents on other levels via a “ticket” (= standardised template for unsolved customer problems) system; the final result of the problem solving process is reported back to the client.

This BP used a version of the Recommender System which proposed semantically similar “tickets” of past problems and the implemented solution to the agent in order to solve the actual problem. The Recommender System was integrated into the graphical user interface of AMIS.

This business scenario started in September and October with the measurement phase without ARISTOTELE and switched to the measurement phase with ARISTOTELE on 8 November; data were collected till 10 December 2013.

Table 2: Results of the KPI measurement

Indicator		Sept 2013	Oct 2013	Nov 2013	Dec 2013
a)	How long is the average time from "Open a ticket" to "Closing a ticket"? (in seconds)	500010	446765	277931	240521
d)	AK-11: Average talking time on first level/time to answer to/solve a problem (in minutes and seconds)				
e)	AK-12: Percentage of unsolved problems (= amount of tickets that could not be closed on the first level divided by number of all tickets) (in percent)	13.14	8.1	9.7	7.2
f)	AK-13: Percentage of problems solved on the phone by Agent (not by SMS or email) (in percent)	86.85	91.87	90.26	92.78
g)	AK-21: Time from ticket is passed to 2nd level till 2nd level starts to work on it (in seconds)	21408	17845	24958	19080
h)	AK-22: Time from 2 nd level starts to work on ticket till it says it is solved (in seconds)	415998	379721	197048	240530
i)	AK-23: Percentage of tickets solved at level 2 (in percent)	13.14	8.1	9.7	7.2
j)	AK-24: Percentage of tickets solved at level 3 (in percent)	0.53	0.55	0.34	0.07
l)	- The total talk time / period				

The recommender system was operational from 8 November on

- Ad a) The average “life”-time of tickets dropped down substantially after the implementation of the recommender system (from approximately 139 hours in September down to 69 hours in December), although neither the amount of tickets (approximately 800 per day) nor the number of call centre agents did change;
- Ad d) From the curves it is already clearly visible that the variation of the average talking time within each month was much more important than the variation between months; the average talking time per month did not vary i.e. it was not possible to detect an effect of the ARISTOTELE tools on that;
- Ad e) There is a slight tendency of improvement over the measurement period;
- Ad f) There is also a tendency of improvement over time;
- Ad g) No apparent tendency could be detected;
- Ad h) There is an improvement from the measurement phase without ARISTOTELE to the measurement phase with ARISTOTELE, although level 2 did not use the recommender system; an indirect effect of ARISTOTELE could be that better informed first level agents give more useful hints to the second level in the ticket description;
- Ad i) Decreasing, as percentage on level 1 increased;
- Ad j) Decreasing, as percentage on level 1 increased;
- Ad l) See d).

Input from the interviews

The general impression was that the recommender system was very useful for inexperienced colleagues, because it helped them to learn from “old” tickets, which leads to a higher problem-solving capacity in the future. Experienced staff members did or not use it very often or used it in unexpected ways (“It helps me to save time, because I copy-and-paste the old description of the problem and just modify it according to the new problem”). No technical problems were reported.

The integration of the Recommender System into the existing platform was perceived as positive, but the perceived usefulness (and thus the opinion on it) was split into two: new first level agents acquired more rapidly the necessary knowledge; more experienced users considered the tool to be useful for new colleagues, because it saved them time and effort for mentoring them, but they considered it to be unnecessary for themselves (“For the more complicated issues, I can’t find adequate answers; for the easy issues, I don’t need it”). Nevertheless, they used the tool to find ticket descriptions that they could reuse for the new tickets.

Return-of-investment-considerations

Assuming that an average call centre agent on the first level earns 10.00 Euro per hour and an agent on second level 15.00 Euro, the implementation of ARISTOTELE would be justified in economic terms if it would save approximately 2200 hours (10,978.40 Euro implementation cost divided by 5 Euro per hour) of second-level-agent-time.

As can be seen from the indicator measurement above, the percentage of solved calls/problems at the first level (line f) increase by 6% from September to December; based on 800 calls per day, this is a reduction of roughly 50 tickets per day which are not passed to second or third level; assuming that an agent on level 2 needs 30min to solve a ticket and – to simplify the calculation – ignoring the average talk time of the first level agent, every day some 1500min (=25 hours) of second-level-agent-time are saved. Thus, it would take some 90 days to justify the investment in the ARISTOTELE tools and platform (here: especially the recommender system).

References

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