# Project Progress report

Version 19, December 2020

Foreword

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# 2022-H1 Project Progress report

OMD

OPTIMAL MANAGEMENT OF DEMAND

Edited by: HATİCE BETÜL HERSEK, PMP

Date: 19.09.2022

## Project key data

**Auto-generated section**: Do not edit or remove this box and do not provide any text in this chapter but provide the requested information directly on the ITEA Community website.

The inserted key data will contain (among others) acronym, full title, time frame, the respective countries and partners per country, the coordinator, project status as well as the PCA status.

## Project Acronyms

|  |  |
| --- | --- |
| OMD | Optimal Management of Demand |
| ML | Machine Learning |
| ITSM | Information Technology Service Management |
| NLP | Neuro-Linguistic Programming |
| GDPR | General Data Protection Regulation |
| KPI | Key Performance Index |
| DL | Deep Learning |
| AI | Artificial Intelligence |
| SDM | Service Demand Management |
| HLA | High Level Architecture |
| PCA | Project Cooperation Agreement |
| ARR | Automated Request Routing |
| SoTA | State of The Art |
| STG | ITEA Steering Group |
| min.s | minutes |
| PPR | Project Progress Report |

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1. Project one-page description

**Auto-generated section**: Do not edit or remove this box and do not provide any text in this chapter but provide the requested information directly on the ITEA Community website.

1. Project overall status
	1. Top 4 overall targeted innovations

Select the top 4 targeted innovations for the whole project, i.e., the main innovative results the project aims to achieve before its closure. Avoid generic terms, remain brief and to the point, by focusing on what the project really brings new to the table.

For each targeted innovation, please indicate:

* the main contributors (only the key contributors are expected there, not an exhaustive list of all contributors).
* a short description and the current State-of-the-Art related to the proposed innovation. The provided descriptions should be detailed enough to be self-explanatory, approximately in 50-100 words per innovation.

Please note that innovations are not necessarily deliverables per se.

|  |
| --- |
| **1. Automated Request Routing (ARR)** |

***Main contributors***: All

***Short description of innovation and the State-of-the-Art***:

OMD will introduce innovations in several use cases by employing Artificial Intelligence (AI) and optimization techniques. These include category classification, emotion classification, semantic capabilities to easily extract information from unstructured data, topic detection, demand and service level classification, intent classification, entity recognition and linking, request summarization and standardisation, agent classification, solution classification and dynamic “time to finish” prediction using state-of-the-art NLP, ML and DL models. The project will newly introduce these advanced technologies to some of the domains or will advance the AI applications on some domains beyond the state of the art.

In customer support operations, ARR is focused on ticket routing. Ticket routing is the process of setting rules around how tickets are assigned to particular departments, agents, and functions. OMD embodies technology innovations related to enhanced, cross-domain ticket routing. OMD will perform research and development in key topics: category classification, emotion classification, topic detection/classification, intent classification, entity recognition and linking, request summarization and standardisation, agent classification, solution classification and dynamic “time to finish” prediction; generating services, components and tools that will be designed taking into account the requirements from the use cases. Intent classification is the automated association of text to a specific purpose or goal. Different classifiers categorise text into intents such as buy, change, generate complaint, etc. Emotion classification will rely on NLP-based techniques as sentiment analysis to build a model to predict the emotion of a text (or transcript) from a client.Specific attention will also be given to aspects of multilingualism as the OMD platform addresses a broad market within the EU and beyond. Innovative ML approaches like e.g. Transformer models such as BERT may be considered because they enable the transfer of learned models across languages. This will help to solve challenges of under-resourced languages in the EU.

By combining well-established ticket classifications techniques, with the most cutting-edge solutions for category classification and intent classification, OMD will add new layers/aspects for the enhanced analysis and processing of ARR pipelines. These new aspects will rely on the latest advances in Speech Analysis, NLP, ML and DL, and will also include computer-vision based services that will support the automation of tickets where paper-based/manual-based steps may be required. This will open OMD to more traditional, but widely consolidated processes currently available throughout logistics (i.e. public postal service) and judicial services.

ARR will be optimising the processes in all domains, increasing usability of the OMD Framework for the management of demand.

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| **2. Framework for a cross-domain service management software** |

***Main contributors***: DT

***Short description of innovation and the State-of-the-Art***:

Our innovation applies novel AI solutions to support a general SDM framework that can serve in many different domains, considering many parameters related to request, service experts (agents), customers, and companies. This kind of framework does not exist to the best of our knowledge and thus this is the main innovation from this aspect. Bringing together technology providers and use case owners from different sectors, OMD goes far beyond the state of the art.

Currently, the state-of-the-art systems focus on specific domains; ITSM being the leading domain in terms of the maturity and utilisation of the new technologies such as AI. However, even in this leading domain, the use of AI technologies is still in their infancy. OMD aims for much more effective and deep use of AI technologies in ITSM domain as well as other domains by sharing and transferring AI models among domains as much as possible. That is our innovative vision.

Within the general concept of ITSM, we focus specifically on the development of SDM platforms. Three points stand out especially in our project; ticket prioritisation, ticket integration and automated ticket routing. The successes to be achieved at these points will produce results that will positively affect the entire system.

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| **3. Optimization based on the dynamic workload of the agents and other constraints** |

***Main contributors***: Hiperlink

***Short description of innovation and the State-of-the-Art***:

Our first task is to understand the distribution of requests for a "call center" or "help desk". We will search for such data to understand how the help desk requests (tickets) are opened/sent over some time period. With this information we will be able to understand its distribution (as well as its statistical attributes: mean, standard deviation, skewness, quartiles ... .etc). This will be the first step to understand what "kind" of the data that we will be dealing with.

Determining agent workload to ensure customer satisfaction and meeting their needs while minimizing service costs is a continuous challenge. OMD will enhance prediction-based approaches, by combining not only traditional demand-supply schemas, but also different dimensions and constraints of every company. Besides agent and department workload, the profiling of agents based on emotional fingerprint (what is the mood of an agent ) and the analysis of external sources (i.e. weather ) will increase the efficiency and will allow us to provide much more detailed SLA forecasts. These innovations will be based on NLP, ML and DL approaches that will be analysed and tested during the project.

Workforce scheduling and dynamic task assignment is an optimization problem which focuses on assigning the tasks to appropriate agents for minimizing the "total" duration to complete "all / or many" tasks in a shorter time. There have been many studies on task optimization which mostly focus on integer programming. We focus on a “mixed integer programming”1 approach as it fits our project which the method is often used to solve scheduling problems for multi-skilled agents.

Statistical metrics such that; task durations (how long a task normally takes in average and what is its standard deviation) as well as agents average resolving durations (how long does it take a ticket in category A to be resolved by an agent X, what is the average and what is the standard deviation), ( and finally, what is the std of the std of the agents) can be used as the inputs of optimization algorithm. Additionally deep learning methods such as LSTM can be used to forecast demands (number of tickets in a time frame: for example hours) which can also be used as the inputs of optimization algorithms. With this approach we aim to assign the tasks not only with the information of incoming tickets at that moment, but also with the prediction of future incoming tickets.

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| **4. Use of NLP for topic classification** |

***Main contributors***: DT, XT, USZ

***Short description of innovation and the State-of-the-Art***:

Current state-of-the-art in probably most NLP applications is to utilise a large pre-trained language model and either fine-tune it in a domain-specific downstream task, or use a meta-training strategy, e.g., few-shot learning without actual model weight updates. The project involves mainly classification tasks in various domains. The idea is to develop AI-based solutions to these tasks relying on pre-trained language models.

Copy the above template if more targeted innovations need to be indicated.

* 1. Top 4 overall targeted business impacts

Select the top 4 targeted business impacts for the whole project, i.e., the main business results the project aims to achieve by and after project closure. Avoid generic terms, remain brief and to the point, by focusing on what the project expects to achieve business-wise thanks to the project’s technical results.

For each targeted business impact, please indicate:

* a short description of the business impact.
* the main contributors (only the key contributors are expected there, not an exhaustive list of all contributors), and
* the targeted market and its current competitors, approximately in 50-100 words.

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| **1. EqualityInJustice Business Impact** |

***Short description***: EqualityInJustice use case will enable enterprise licensing for Government Authorities including Ministry of Justice, General Directorate of Police and Union of Turkish Bar Associations. The EqualityInJustice Cloud Application is planned to be licensed for the 82 Bars and Union of Turkish Bar Associations and end user licensing model will be provided for the attorneys who will participate in assignments to counsel.

***Main contributors***: ARD

***Market / competitors***:

There are 160.651 attorneys registered to the union as of December 2021. End users (attorneys, law enforcement personnel and Ministry of Justice personnel) will be connecting the EqualityInJustice Cloud Application via the web application and mobile application, which will provide flexibility of usage. Furthermore, this business model will be targeted for other countries. There is no competition in the AI / NLP integrated demand management systems in the justice domain.

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| **2. Health care Business Impact** |

***Short description***: Caretronic has strong network of partners and distributors around the world. Caretronic also has network for selling products as direct sales to homecare organisations and nursing homes in Slovenia. Our network consists of:

350 hospitals and nursing homes

100 mio documented services

112 users

***Main contributors***: Caretronic

***Market / competitors***:

National & international markets

|  |
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| **3. Contact services, Telemarketing and Big Data Business Impact** |

***Short description***: Both the initial business model proposal and the estimates will have to be updated during the execution of the project. SBD proposes a sales model for contact process optimization services. OMD's services are also applicable to corporate clients and users of contact and telemarketing solutions in general. The following table shows the estimated sales of corporate and individual licences for OMD services.



***Main contributors***: SBD, The Konecta Group has:

- An R&D&I strategy based on the optimization of all aspects that accompany contact processes.

- Data, based on the daily relationship of more than 71,000 agents internationally with more than 2 million daily contacts.

- A specific BIG DATA and Modeling company with experts in Data Science as STRATEGY BIG DATA.

- A proprietary S2T model, developed according to the problems of a Contact Center and telematic models.

- A distribution of operation centers in Spain based in Castilla y León where the human capital is distributed.

- A distribution of operation centers in Spain where human capital is distributed.

- A process of attracting resources and a local and international training model.

- The need to systematize learning with new real KPIS.

Additionally, the current situation has allowed:

- Large corporate clients assume teleworking as a reality.

- Homeshoring model is a necessity.

- The user experience in the contact is a variable with as much weight as the efficiency of the process.

***Market / competitors***:

Strategy Big Data S.L. frames OMD's results in the field of contact services, Telemarketing and Big Data.

It is increasingly difficult for companies to differentiate themselves. Therefore, they must offer remarkable experiences to customers, leaving a positive memory. In this sense, the Call Center can be a support for business success.

The key factor is to have the necessary technology to offer a unique customer experience, meet their needs and expectations to create a bond.

Many companies invest in the Call Centers to maintain the relationship with the customer, launch campaigns, sell products, answer questions and conduct opinion surveys.

Technology companies

In general, the service used by the sector is based on the helpdesk style. It has, in general, the function of providing solutions to technical problems that the customer may have. It has different levels of service.

Financial Institutions

Banks, insurance companies and credit card companies also use call center services to maintain customer relationships. The call center also becomes an alternative, new sales channel for offering investment and financing products. It also ends up facilitating the fulfillment of the objectives of professionals, who do not need to move from their work environment to conduct a negotiation.

Product sales and convergence

In addition to traditional product sales (telemarketing), providers (i.e. cable TV, Internet and telephone channels...) use the Call Center to offer products to customers and increase their chances of sales. It is based on customer prospecting, satisfaction surveys and product sales.

The contact center sector is undergoing a major change in the way it operates.

Until now, the massive incorporation of resources, manual call validation processes and/or the implementation of automation (IVRS) that flattened the demand curve sought to bring quality and profitability to the service.

The increase in process capabilities and the emergence of Machine Learning techniques has enabled a change in this model where Big Data and Inference processes allow a proactive exploitation of the customer relationship.

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| **4. Consumer Electronics Targeted Business Impact** |

***Short description***: As consumers learning and working from home, consumer electronics sales grown faster. To grow revenue in the domain, business analytics need insights about consumers feedback and intent after sales. There is a gap between sales and after sales customer problems for data flow because of complexity of processes on after sales support platforms or contacting call centers. OMD framework aims to prioritise data governance and collecting accurate data to unlock deeper insights and more cohesive decision making. Also to tolerate the complexity and make activities smart, using artificial intelligence is a must adoption at work and in our private lives. OMD will deliver practical actions to produce immediate business impact powered by AI. Such as shortening problem identification and also solution generation will reduce number of tickets and requests to call centers. In addition, 60% of the records coming to the Call Center are simple problems. Solving these problems through the call center creates a huge time and cost loss.

***Main contributors***: DT

***Market / competitors***:

In the service management market, some of the global competitors are Qudini (44.7K visitors/month), SeviceHub (15.4M visitors/month) and Qless (15K visitors/month).

Copy the above template if more targeted business impacts need to be indicated.

* 1. Top 4 overall project KPIs

This section relates to the FPP chapter “Quantified objectives and quantification criteria”. Elaborate the Key Performance Indicators (KPIs) as mentioned in the FPP considering the expected main project results, ie., the “Top 4 targeted innovations” and the “Top 4 targeted business impacts” mentioned above in this PPR. The KPIs must quantify these expected project results and allow both the consortium and the evaluators to monitor the progress of each of them towards the goals.

The KPIs section refers to the project’s final goals (not strictly to the reporting period) and are thus presumably quite stable from one PPR to the next one (except for the current status update). In the lifetime of an ITEA project, the actual project goals may, however, be refined or slightly reoriented (e.g. to adapt to changes in the technological State-of-the-Art or in the market environment): in such cases, the project may update its KPIs if needed, so that they fit with the new adapted goals.

In the Project Progress Report, project management related KPIs (such as the number of milestones completed in time) should be excluded.

For each defined KPI, please indicate:

* the status of KPI in the beginning of the project (Initial value);
* the targeted value, computed thanks to the defined metric (whenever possible, provide the unit of measurement, e.g. “%”, “ms” or “fps”);
* the current value, and
* the metric description, i.e. how the actual values are computed, incl. the reference architecture / hardware / algorithm / data, whenever relevant.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Initial value | Targeted value | Current value |
| **1. Decrease in ticket assignment time to the most appropriate agent** | 13min.s | 5min.s | 13min.s |

The duration between registering a ticket and assigning to consultant.

|  |  |  |  |
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| **2.** **Reduction of average maintenance costs for tasks assigned using the developed method>** | 5 hrs per task | 4 hrs per task | 5 hrs per task |

The value is computed by analysing the internal issue management system. Times spent on fixing bugs and closing the issues are recorded by the developers. We compute a simple average to determine the actual value of this KPI.

|  |  |  |  |
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| **3. User Satisfaction** | 3 Stars | 4 Stars | 3 Stars |

Baseline: average of 3 stars on user satisfaction reviews target: average of 4 stars on user satisfaction reviews.

|  |  |  |  |
| --- | --- | --- | --- |
| **4. Decrease in ticket filling time** | N/A | %5 decrease | N/A |

The duration registering the ticket.

Copy the above template if more result KPIs need to be indicated.

* 1. Top 4 overall risks

Analyse any possible risks (technological, managerial, commercial, etc.) identified during the reporting period.

Identify the top 4 risks for the project, and for each of them, present ideally both:

* an appropriate and realistic avoidance action;
* an appropriate mitigation / back-up plan, in case the realisation of the risk cannot be avoided, approximately in 30-50 words per risks, and
* a period in which the risk is relevant (e.g. end of the project).

The analysis of the commercial risks is crucial during a project’s final year (and recommended for previous years).

For each risk, define also its **Severity** and **Probability** of occurrence.

**Severity** is indicated as one of the following:

* Low: the impact on the project would be minimum and easily repairable (e.g. a partner is leaving and its tasks can mostly be transferred to remaining partners).
* Medium: the project would be impacted, but the core project outcomes, despite being somehow downsized, would remain very relevant (e.g. the technological breakthrough is not fully achieved, with performances 20% below what was planned, while remaining above the State-of-the-Art).
* High: the project would be significantly impacted, with a considerably decreased business impact (e.g. one of the three core partners for the exploitation reshapes its strategic planning and decides to leave the targeted market).
* Critical: the rationale of the project would be at stake, and a complete reshaping of the future goals would be required (e.g. a competitor markets a product comparable to what was planned, two years before the project planned delivery).

**Probability** of occurrence is indicated as:

* Rare: 1-10 % of chance to occur.
* Possible: 10-50 % of chance to occur.
* Likely: 50- 90 % of chance to occur.
* Almost certain: ≥ 90 % of chance to occur.

**Stage** of each risk should be indicated too:

* Identifying: A risk has been identified and the project consortium is developing avoidance action or back-up plan.
* Mitigating: The consortium is applying avoidance actions or implementing back-up / mitigation planning
* Monitoring & Controlling: The risk is under control.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Severity | Probability | Stage |
| **1.** Hungarian partners (FrontEndART and University of Szeged) leave the project due to funding issues. | High | Rare | Identifying |

***Avoidance action***:

The decision on the funding of the project by Hungarian national authorities has not been made yet. The result of the preliminary check of the project by the authorities was supportive, but the final decision is expected by the end of September. As the project started before the decision was made, Hungarian partners decided to start the project self-funding.

***Back-up / Mitigation plan***:

In case of a negative decision, Hungarian partners will recalculate their expected budget with self-funding. If they make the decision to leave the project, Use Case 7 (Optimal Software Maintenance Task Assignment) will be dropped, and the remaining tasks (not specific to this use case) could be transferred to other partners.

***A period in which the risk is relevant***

The final decision on the national funding is expected by the end of September, in case of a negative result the partners need some weeks to make their decision to stay self-funded or leave the project.

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| **2.** BEIA not being able to continue with the consortium. | Medium | Possible | Indentifying |

***Avoidance action***:

BEIA in search for sponsor.

***Back-up / Mitigation plan***:

Still self founding

***A period in which the risk is relevant***

N/A

|  |  |  |  |
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| **3.** Justice use case has risks related to GDPR. | High | Possible | Mitigating |

***Avoidance action***:

The data pool will either be anonymous or synthetic in order to be compliant with GDPR as well as the national regulations covering justice domain and issuance of personal data.

***Back-up / Mitigation plan***:

Enabling a synthetic data pool and developing the solution according to non-usage of personal (attorney) data will provide compliance with GDPR as well as national regulations in Turkey.

***A period in which the risk is relevant***

The risk is relevant to all periods of the project. Possible updates in EU or Turkish regulations will be followed throughout the lifecycle of the project.

|  |  |  |  |
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| **4.** Cross-domain platform endangered | High | Possible | Monitoring & Controlling |

***Avoidance action***:

Redefined the deliverable for HLA, dividing it into two.

***Back-up / Mitigation plan***:

Everybody focuses on their particular use-case to get the feature engineering as a first step.

***A period in which the risk is relevant***

Between the two deliverable of HLA.

Copy above template if more risks need to be indicated.

* 1. Change in the technology and market during the reporting period

Reconsider the relevance, importance and impact of the project with respect to the current technological State-of-the-Art (as opposed to the one described in the FPP) and to the current and forecasted trends. Address possible new or similar projects. Also document the market relevance changes that occurred since the PPR was issued.

Do not refer the changes in technology and business within your project but report the changes in the “external world”. Do not copy technical and strategic relevance related sections from previous PPRs, only report on updates and evolutions. If major changes occurred since the latest PPR or FPP release, document such changes in this paragraph. If the technological and business relevance has not changed, state it here.

In 2020, the top 10 IT Service Management software vendors accounted for nearly 87.2% of the global IT Service Management applications market which grew 16.5% to approach nearly $6.3 billion in licence, maintenance and subscription revenues. Last year ServiceNow led the pack with a 39.6% market share riding on a 22.4% jump in ITSM licence, maintenance and subscription revenues. Atlassian was #2, followed by LogMeIn, Inc, BMC Software, and Ivanti.



Fig. 1 – 2020 IT Service Management Applications Market Shares Split By Top 10 IT Service Management Vendors and Others

Through our forecast period, the ITSM applications market size is expected to reach $6.8 billion by 2025, compared with $6.3 billion in 2020 at a compound annual growth rate of 1.5%.

ITSM applications are being used to make a growing number of employee self-service functions possible through enterprise service management for asset, incident and project management. ITSM applications are considered a derivative market with revenue contribution to functional areas such as Project and Portfolio Management and Enterprise Resource Planning.

Massive software projects to digitise business communities fuel growth of Cloud-based vendors such as Atlassian and ServiceNow as incumbents like BMC and CA race to meet changing IT requirements.

Since our data set source is Jira, a product of Atlassian, we would like to present the companies that provide ITSM-SDM services for your information. This market can be our target market.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Customer** | **Industry** | **Empl.** | **Revenue** | **Country** | **Vendor** | **New Product** | **Category** |
| [The Home Depot, Inc.](https://www.appsruntheworld.com/customers-database/customers/view/the-home-depot-inc-united-states) | Retail | 504800 | $132.11B | United States | [Atlassian](https://www.appsruntheworld.com/customers-database/vendors/view/atlassian) | [Jira Service Desk](https://www.appsruntheworld.com/customers-database/products/view/jira-service-desk) | [IT Service Management](https://www.appsruntheworld.com/customers-database/category/it-service-management) |
| [Fiat Chrysler Automobiles](https://www.appsruntheworld.com/customers-database/customers/view/fiat-chrysler-automobiles-united-kingdom) | Automotive | 191752 | $131.64B | Italy | [Atlassian](https://www.appsruntheworld.com/customers-database/vendors/view/atlassian) | [Jira Service Desk](https://www.appsruntheworld.com/customers-database/products/view/jira-service-desk) | [IT Service Management](https://www.appsruntheworld.com/customers-database/category/it-service-management) |
| [Bosch](https://www.appsruntheworld.com/customers-database/customers/view/bosch-germany) | Manufacturing | 395000 | $87.41B | Germany | [Atlassian](https://www.appsruntheworld.com/customers-database/vendors/view/atlassian) | [Jira Service Desk](https://www.appsruntheworld.com/customers-database/products/view/jira-service-desk) | [IT Service Management](https://www.appsruntheworld.com/customers-database/category/it-service-management) |
| [Citibank National Association](https://www.appsruntheworld.com/customers-database/customers/view/citibank-national-association-united-states) | Banking and Financial Services | 239000 | $76.40B | United States | [Atlassian](https://www.appsruntheworld.com/customers-database/vendors/view/atlassian) | [Jira Service Desk](https://www.appsruntheworld.com/customers-database/products/view/jira-service-desk) | [IT Service Management](https://www.appsruntheworld.com/customers-database/category/it-service-management) |
| [T-Mobile Retail USA](https://www.appsruntheworld.com/customers-database/customers/view/t-mobile-retail-usa-united-states) | Communications | 75000 | $68.40B | United States | [Atlassian](https://www.appsruntheworld.com/customers-database/vendors/view/atlassian) | [Jira Service Desk](https://www.appsruntheworld.com/customers-database/products/view/jira-service-desk) | [IT Service Management](https://www.appsruntheworld.com/customers-database/category/it-service-management) |

We present to your information the developments experienced in the products of the top 10 companies that stand out according to their market shares in the sector as of 2020-2021, with the below table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Rank** | **Vendor** | **YoY Growth** | **Recent Developments** |
| 1 | [ServiceNow](https://www.appsruntheworld.com/cloud-top-500-applications-vendors/servicenow?apps=true) | 22.4% | ServiceNow expects to have an estimated $5.5 Billion in revenues worldwide for CY2021, and an international presence that can generate new business across geographies. ServiceNow acquired the following companies in 2021 to accelerate innovation and enhance talent: DotWalk (Nov 2021), Gekkobrain (Oct 2021), Mapwize (Aug 2021), Swarm64 (Aug 2021), Lightstep (May 2021), Intellibot (Mar 2021), ElementAI (Jan 2021). |
| 2 | [Atlassian](https://www.appsruntheworld.com/cloud-top-500-applications-vendors/atlassian?apps=true) | 11.6% | The company stopped selling new on-prem server licenses as of 2021. While the company is supporting existing on-prem server customers until 2024, the idea is to now move them to the cloud and this offering should help. One thing that is clear is that the pandemic has accelerated the move to the cloud by companies of every size, and this should encourage the company’s largest customers to make the move.Atlassian’s number of total customers increased to 236118 as of June 2021 from 174,097 at June 30, 2020. |
| 3 | [LogMeIn, Inc.](https://www.appsruntheworld.com/cloud-top-500-applications-vendors/logmein-inc?apps=true) | 30.0% | In 2020, LogMeIn has launched Remote Deployment for GoToMyPC enabling IT administrators and business professionals to remotely deploy, install, and configure GoToMyPC remote access software across any number of computers simultaneously. |
| 4 | [BMC Software, Inc.](https://www.appsruntheworld.com/cloud-top-500-applications-vendors/bmc-software-inc?apps=true) | 12.7% | BMC Software has recently announced the industry’s first end-to-end integrated ITSM and ITOM platform which brings together the capabilities of ITSM and ITOM into BMC Helix. Integrated solutions will enable IT teams to discover, optimize, remediate and deliver through an omnichannel for IT and business users. Such solutions will eliminate silos to make better-informed decisions and enhance the customer experience. It’ll also help in discovering unknown assets in multi-cloud, monitor & predict events, uncover & remediate security vulnerabilities and provide 360-degree intelligence environment. |
| 5 | [Ivanti](https://www.appsruntheworld.com/cloud-top-500-applications-vendors/ivanti?apps=true) | 0.2% | Ivanti’s software is utilized by over 40,000 customers across various industries and five continents. From patch management and IT security solutions to IT Asset Management, IT Service Management, and IT Systems Management to solutions for the warehouse, Ivanti changes the way businesses work. |
|   |   |   | In 2021, Ivanti acquired Cherwell and their Cherwell Service Management platform to provide even greater capabilities in ESM and also in 2021, released Ivanti Neurons for HR and Ivanti Neurons for Facilities to provide the same consistent experience for employees across their onboarding, remote work services, and return to the office initiatives. |
| 6 | [Microsoft](https://www.appsruntheworld.com/cloud-top-500-applications-vendors/microsoft?apps=true) | 14.3% | GitHub, which has 73 million developers, has emerged as the focal point of Microsoft’s ITSM strategy. Customers are choosing GitHub Enterprise to provide their developer teams the right platform to build, ship, and maintain software. In 1QFY22, it introduced more than 70 enterprise features like GitHub Actions for developers to better manage their workflows. |
| 7 | [Broadcom Inc.](https://www.appsruntheworld.com/cloud-top-500-applications-vendors/broadcom-inc?apps=true) | 5.4% | Broadcom Inc. has acquired CA Technologies to build one of the world’s leading infrastructure technology companies. The all-cash transaction represents an equity value of approximately $18.9 billion and an enterprise value of approximately $18.4 billion. CA Technologies has more than 90000 customers across the globe. |
| 8 | [IBM](https://www.appsruntheworld.com/cloud-top-500-applications-vendors/ibm?apps=true) | -8.8% | ITSM remains a key focus for IBM after spinning off units like AppScan, Big Fix, Notes and Domino to HCL. Its Red Hat purchase could be a boon for IT security. |
| 9 | [Cisco Systems](https://www.appsruntheworld.com/cloud-top-500-applications-vendors/cisco-systems?apps=true) | 6.7% | Cisco ACI, Cisco Cloud Center, and ServiceNow together automate and orchestrate service provisioning & activation workflow by completely hiding complexities of infrastructure from IT or LOB end-users through software-defined abstraction. Using this powerful integrated solution, IT organizations can achieve accurate service mapping and extremely fast service provisioning, while having automated coordination between dynamic Hybrid IT infrastructure and relevant business services. |
| 10 | [Datto](https://www.appsruntheworld.com/cloud-top-500-applications-vendors/datto?apps=true) | 9.7% | Datto protects business data and provides secure connectivity for tens of thousands of the world’s fastest-growing companies. Datto’s Total Data Protection solutions deliver uninterrupted access to business data on-site, in transit, and in the cloud. Thousands of IT service providers globally rely on Datto’s combination of pioneering technology and dedicated services to ensure businesses are always on. |

When we examine the above-mentioned companies and their software, the most important innovation we reveal within the scope of OMD will be the scoring technique we will use in the problem of assigning the ticket to the most accurate expert, and accordingly our optimization technique. With this aspect, we perform assignments with a more precise accuracy than our competitors in the market.

1. Market access & Exploitation
	1. Partners’ market access

**Auto-generated section**: Do not edit or remove this box and do not provide any text in this chapter but provide the requested information directly on the ITEA Community website.

Each partner must update Market access of its’ organisation on the ITEA Community website. There are two locations where a partner can update the Market access:

* ITEA Community website > Project page > Partners > Click relevant organisation in the list > Reporting > Click relevant PPR to update

or

* ITEA Community website > Project page > Partners > Click relevant organisation in the list > Partner details (click edit button on this page)

For more information, please check the latest version of the PPR instruction.

* 1. Top 8 overall partners’ achievements

**Auto-generated section**: Do not edit or remove this box and do not provide any text in this chapter but provide the requested information directly on the ITEA Community website.

For more information about this section, please check the latest version of the PPR guideline.

* 1. Realised achievements

**Auto-generated section**: Do not edit or remove this box and do not provide any text in this chapter but provide the requested information directly on the ITEA Community website.

For more information about this section, please check the latest version of the PPR guideline.

1. Project progress during the reporting period
	1. Project progress and issues during the reporting period
		1. Top 4 technical achievements

Identify and provide the 4 main technical achievements made during the reporting period. Do not simply list the deliverables as technical achievements. Focus on results that generate value (or enable value to be generated), i.e. outputs that bring you closer to your innovation and business goals.

This top 4 should provide the current technical highlights of the project that were achieved or completed during the reporting period.

For each identified technical achievement, provide some more details and - whenever relevant - clarifications on the actual nature of the achievement in approximately 50-70 words per achievement.

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| **1. Data Structure Analysis** |

According to the first data set provided, we started our trial studies as we share the details below. We have diversified the queries in our database to qualify our dataset for successful applications of feature engineering methods.

Our database consists of about seventeen thousand IT support tickets from several different customer companies. These tickets are assigned to a large pool of experts. The data in this database is in one of the common normal forms therefore distributed to many tables. So we first denormalize and transform the data into a single table. This preprocessing step also includes feature generation. Twenty features are created at this step. Some of these features are eliminated by manual observation of the domain experts. Most of the available features are categorical. These are also transformed to numeric features using one-hot-encoding for attributes with a small number of values. For attributes with large numbers of values, we use integer encoding if it is meaningful. Missing values are either filled with column average or the instance is deleted depending on the number of missing values in that instance. We also explore several normalisation techniques such as z-score normalisation. We manually checked for the outliers and eliminated several of them. Numeric prediction is a supervised machine learning task. Regression algorithms are commonly used in this task. In regression analysis, it is aimed to understand the effect of the change of one or more inputs, independent variable on the output, dependent variable. The regression problem, which is the subject of this article, aims to predict or model service completion time from historical data. The regression algorithms we use and their classification counterparts are listed in Table I. We use the most commonly used machine learning library, the Scikit-Learn in Python. For the preprocessing operations we also use Python libraries such as pandas, numpy, matplotlib, and seaborn along with SQL.

In our dataset a ticket represents a task to be completed or a problem to be solved in a particular IT system. Ticket line object features; Issue\_Id, Reporter, Issue\_Type, Priority, Compname, Jiraname, Worker, Employee\_Type, Work\_Log, Work\_Log\_Total, Work\_Log\_Ratio, Issue\_Category, Creation\_Date, Resolution\_Date. In our study, we use following features as an input to the machine learning based regression algorithms:

* Issue type: {incident, services request, change request, question, proactive, story, epic, task}
* Issue category: {BI, CST, Custom, DB, EAM, FA, CL, HR, INV, OE, PA, PO, SF, SYSADMIN}
* Priority: {blocker, critical, major, minor, trivial}
* Employee type: {Analyst, DBA, Developer}
* Day of Month: [1, 31]
* Day of Week: [1,7]
* Hour of Day: [0, 23] Prediction results for completion times were obtained by applying the prediction model with the specified algorithms.

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| **2. Scenarios and Use-Cases** |

OMD scenarios and use cases studies defined in Task 2.1 were completed and Scenarios and use cases document (D2.2) was submitted. Scenarios and use cases for OMD domains are indicated below:

* Software Support
* Justice
* Healthcare
* Consumer Electronics
* E-Commerce
* Telemarketing
* Manufacturing
* Logistics
* Software Development

The study first addressed the problem and defined the stakeholders. Expected benefits to End Users and innovations expectations were identified before the scope and objectives of the use case.

KPI’s were also included in this study for a clear reflection of the outcome for the domain.

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| **3. IT Support Ticket Completion Time Prediction** |

We use many machine learning algorithms because the results of the algorithms are mostly unpredictable and the best performing algorithms in a particular field should be chosen based on experiments. We emphasize again that data preprocessing and feature selection are very important steps in increasing the performances of the algorithms used.

Linear Regression, Decision Tree Regression, Support Vector Machines Regression, Random Forest Regression, Multiple Regression algorithms from the scikit-learn library of the Python programming language were chosen to be used in the prediction model. The default parameters of the scikit-learn library have not been changed. The experiment plan was presented in three different stages. The first plan is to split the dataset to train and test algorithms. Using the hold-out method in the evaluation of our data set, we divided our data into training, 70% and test data, 30%. In practice, it is quite common to use one-third (1/3) of the available data for tests and the rest for trains. It was not considered necessary in our study, but we also state that some of the data to be used for training can be separated as validation data. In the second experiment, the data is split as %70 testing %30 training data by using test\_ train\_ split function in scikit-learn library. In the third experiment, finally, the confidence interval was set to 95%.

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| **4. Article in the November edition of the ITEA Magazine** |

This dissemination activity mentions the outcomes of the OMD Project. Primarily in the ITSM use case and also mentions the other use cases briefly.

Copy the above template if more technical achievements need to be indicated.

* + 1. Top 4 next technical targets

Identify and provide the 4 main technical targets planned for the forthcoming reporting period. Provide further details in approximately 50-70 words per target.

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| **1. Legal, ethical and Acceptance analysis** |

Ethical problems and approach are generally not considered in research and development processes in a project and often addressed during the commercialization period. Our target focuses on Giving the project participants an overview of the importance of ethics for OMD project and to ensure that OMD meets the applicable and ethical framework and General Data Protection Regulation (GDPR). The study will cover legal imprescriptibility as well as social exigency.

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| **2. First version of requirement analysis** |

This target will enable to identify the requirements of all domains within OMD Framework. The purpose of this task will be defining all functional and non-functional requirements of OMD Framework. The base requirements of the FPP document will be elaborated according to the project-level and partner-level key results and objectives that are set by the contributors.

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| **3. Definition of the Optimization Problem** |

Workforce scheduling and dynamic task assignment is an optimization problem which focuses on assigning the tasks to appropriate agents for minimizing the "total" duration to complete "all / or many" tasks in a shorter time. There have been many studies on task optimization which mostly focus on integer programming. When we come to the ticket resolution business, the optimal solution will be to assign the problems to the right person at the right time and to solve them. When we look at the different use cases we have in order to reach the optimal solution, the system will need different inputs. For example, company wide ticket, agent information and their schedule information are among the data types that we can normally collect as raw data. However, we want to work on algorithms that we can use on the side of artificial intelligence and on deep learning algorithms on the side of the data that comes to us. We aim to predict ticket dynamic time to finish times with machine learning, regression algorithms, dynamic optimization to determine optimization based on the dynamic workload of the agents, SLAs and other company wide constraints. In addition, we aim to estimate the workload of the agents and the workload of the company / departments, again with the information of regression analysis and time series forecasting.

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| **4. General system architecture - GSA1 - High Level Architecture** |

The OMD is an application that can be rented as a SAAS service or sold as an application setup. The application is a shell that provides basic functions and will be able to support different sectors and applications through Plugins. The application will consist of parts provisioned as pods running in the Kubernetes environment. The communication between the pods and the connections will be provided by a service mesh application. The application and plugins will be expected to have their own databases.

Copy the above template if more next technical achievements need to be indicated.

* + 1. Top 4 issues

This part should highlight the 4 main issues the project had to face during the reporting period. Issues can be related to: management, overall progress, technical bottlenecks, funding, a brand-new game-changing competitor, etc. Issues can typically be realised risks that were identified beforehand (they can also be related to unexpected events or results).

For each identified issue:

* provide details in approximately 20-30 words per issue;
* indicate the impact on the project; and
* explain which mitigation action has been (or will be) set up to solve the issue. Clarify if the current situation is the final one related to this issue or if there is still remaining impact to be dealt with, in approximately 20-30 words.

If needed, the project leader can identify up to 8 issues in the template reviewed by the STG. In this case, copy the necessary table rows and insert as new rows. However, it is important to properly select the 4 main ones, as only these will be visible in the final generated PPR.

|  |
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| **1. Delay in the project start date** |

***Details***:

National contracts arrived late and at different times.

***Impact***:

Big uncertainty in the initial phase and a delayed kick-off on our part.

***Mitigation action***:

We have adopted our Gannt chart and deliverables, compensated for the delay and so avoided changing our calendar.

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| **2. Project start differences for each partner** |

***Details***:

Varying project start dates for the consortium made it more difficult to coordinate and to keep a coherence between the tasks and groups.

***Impact***:

The so-called architecture focus group could not make joint efforts towards an overarching structure.

***Mitigation action***:

We delayed the generalised architecture to a later deliverable, and started our feature engineering in the first deliverable for the high level architecture.

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| **3. Changing staff** |

***Details***:

In this extreme period of pandemic circumstances most companies changed their project team, some companies changed themselves or were bought in by others, as the delays during the last years have changed structures.

***Impact***:

We have delays with the PCA document and the change request.

***Mitigation action***:

Both documents are in progress and on their ways to completion.

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| **4. Delays in data acquisition** |

***Details***:

In the first six months while conducting the requirements analysis our companies endured also some difficulty in data acquisition.

***Impact***:

It was impossible for us to complete the deliverables without gaining access to the data.

***Mitigation action***:

We overcame that trouble and our deliverables are complete to 70 %, we will be able to give the Change request soon after the PPR.

Copy the above template if more issues need to be indicated.

* + 1. Status of deliverables

Indicate the status of the deliverables. If available, include the Gantt chart or any other overview that shows the progress of project tasks and the status of deliverables.

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| **[Planned] What is the total number of deliverables in the project?**  |

There are twenty-six deliverables defined in the overall project.

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| **[Planned] How many deliverables are supposed to be finalised (from the start of the project until the end of this reporting period)?** |

The following deliverables are supposed to be finalised in this reporting period:

|  |  |
| --- | --- |
| D2.1.1 - State-of-the-art Analysis - SOTA1 | Jun 2022 |
| D2.2 - Scenarios and Use cases | Jun 2022 |

|  |
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| **[Actual] How many deliverables have already been finalised (from the start of the project until the end of this reporting period)?** |

We have started the following five deliverables which are complete up to 80%.

|  |  |
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| D2.1.1 - State-of-the-art Analysis - SOTA1 | Jun 2022 |
| D2.2 - Scenarios and Use cases | Jun 2022 |

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| **[Delayed] Are there any deliverables delayed more than 2 months in this reporting period? If so, please explain why.** |

If useful, include the Gantt chart that shows the progress of project task and status of deliverables .

* + 1. Statement on project progress during the reporting period

Explain the current global status and progress of the overall project in approximately 100 words. Indicate any possible change or delay that occurred during the reporting period, as well as its cause.

Do not report detailed technical progress of each WP here. The progress per WP can be reported in Chapter 4.2 of this PPR. Do not report on achievements from previous reporting periods (if such past achievements are required to better understand the current achievements, then state clearly that they are from previous reporting periods).

The level of the international collaboration might be mentioned here whenever relevant.

OMD Project has started with a Kick-off Meeting on the first of April. Since then, global and national meetings, communication of the stakeholders were carried out. Teams have prepared project deliverables. Project leaders did the monitoring and controlling tasks and configuration management. Our PCA document is in progress and the change request is being prepared.

* 1. Details of progress per Work Package

**Auto-generated section**: Do not edit or remove this box and do not provide any text in this chapter but provide the requested information directly on the ITEA Community website.

Each WP leader must provide input on the following location: ITEA Community website > Project page > Management > Reporting > Select the current PPR to report >Work Package progress.

For more details, check the latest version of the PPR instruction.

* 1. Per partner progress during the reporting period

This instruction is for Chapters 4.3.1 and 4.3.2 of this PPR. These chapters are auto-generated. All project partners need to fill in all the required fields in their respective “Reporting” tab on the ITEA Community website.

* + 1. Partners’ main contribution and effort

**Auto-generated section**: Do not edit or remove this box and do not provide any text in this chapter but provide the requested information directly on the ITEA Community website.

All project partners must provide input on the following location: ITEA Community website > Project page > Partners > Click Relevant organisation in the list > Reporting > Click relevant PPR to update.

Project coordinators must initiate the PPR for the current reporting period on the website, so that the rest of partners can access the current PPR reporting section. For more information please check the latest version of the PPR instruction.

* + 1. Actual vs. planned effort overview

**Auto-generated section**: Do not edit or remove this box and do not provide any text in this chapter but provide the requested information directly on the ITEA Community website.

All project partners must provide input on the following location: ITEA Community website > Project page > Partners > Click Relevant organisation in the list > Reporting > Click relevant PPR to update.

Project coordinators must initiate the PPR for the current reporting period on the website, so that the rest of partners can access the current PPR reporting section. For more information, please check the latest version of the PPR instruction.

1. Additional feedback to previous STG remarks (optional)

This chapter is meant to provide additional information on the status of previously defined actions by the reviewers (in addition to the information in the comment-field of the Project action list tool on the ITEA website). Use this chapter to provide more detailed information on how the reviewers can verify the updated action status. The status of the actions must be updated in the online project action list (under Management>Project Action list).

The aim of the Project action list tool is to react on the previous remarks from the Steering Group (STG), i.e. from the latest FPP evaluation, CR evaluation, latest PPR and/ or review. It can also be used to ask for recommendations from the STG (in which case the question should be detailed enough for any feedback to be possible).

**To STG reviewers**: This chapter is meant to provide additional information on the status of actions, in addition to the information on the online action tool (the information is exported on the Excel file). The project consortium uses this chapter to provide longer and more detailed information that are too exhaustive for online action tool and the Excel export.