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Human resources utilization management in SAP Analytics Cloud [ENGLISH]

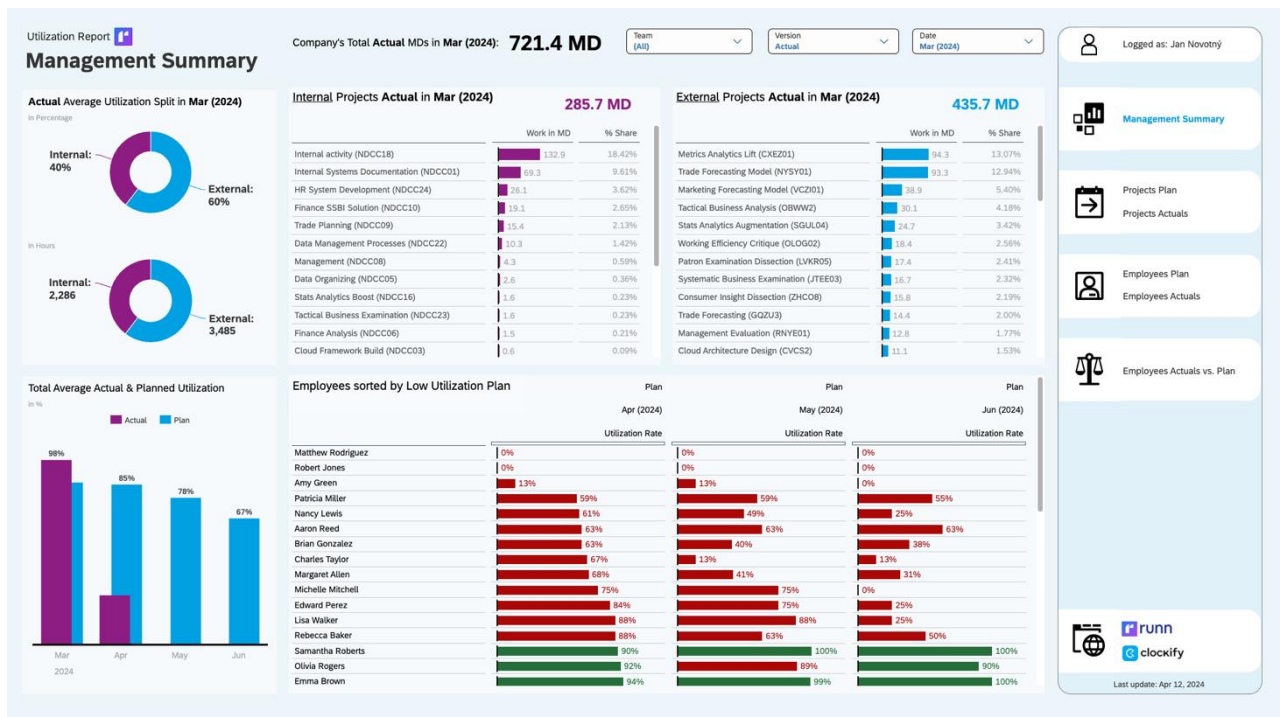
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**Český název:
Řízení utilizace lidských zdrojů v nástroji
SAP Analytics Cloud**



Jan Novotný

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This document is an addition to the main MBI-AF document oriented towards business analytics "AF_II_05_Podnikova_Analytika.pdf" and deals only with the topic of self-service business intelligence (SSBI) reporting solution design for human resources utilization management in SAP Analytics Cloud. The document is a summary of a master thesis (Novotný, 2024), the full version (including also planning solution design part in Runn) of which can be downloaded at the following link: <https://vskp.vse.cz/92514>

<p>[A] Self-service business intelligence (SSBI) development process</p> <p><i>(SSBI introduction; SSBI benefits and drawbacks; SSBI solution development procedure)</i></p>
<p>[B] Human resources (HR) utilization management principles</p> <p><i>(Human resources utilization management introduction; planning & reporting needs in HR utilization management; predictive analytics in HR utilization management)</i></p>
<p>[C] SAP Analytics Cloud (SAC)</p> <p>– Solution design for HR utilization management in a selected company</p> <p><i>(SAC features, user interface and pricing overview; reporting requirements in a selected company; reporting solution design, implementation and deployment)</i></p>



SAP Analytics Cloud (SAC) is a comprehensive cloud solution provided as a software-as-a-service (SaaS) that supports both self-service and enterprise business intelligence (BI), planning, and predictive analytics solutions. As a SaaS platform, it is also accessible through any web browser and further it enables businesses to **unify data and maximize data-driven decision** making based on custom reports and dashboards. SAC is a platform developed primarily for large international corporations with a lot of data and many requirements, therefore SAC includes many functionalities to meet all these requirements. However, the platform can be easily navigated and used also for smaller projects. (SAC Help Portal, 2024a)

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Introduction



The topic of this document is a self-service reporting solution design for project management in SAP Analytics Cloud (SAC) with focus on human resources utilization management. After self-service BI (SSBI) development process overview, human resources (HR) utilization management principles analysis and SAC overview, it takes the reader through current reporting needs analysis in the field of human resources utilization management in a selected company and development of a practical reporting solution design proposal in SAC that will be beneficial for company's management decision making process and as an overall overview of the actual and planned utilization of people on projects.

Utilization is “*the act of using something in an effective way*” (Cambridge Dictionary, 2024a) and is closely related to project management which is a process of efficiently coordinating and completing tasks to achieve specific goals within constraints. Nowadays, topic of utilization and project management have its place in every company as there are projects all-around.

SAP Analytics Cloud (SAC) is a very powerful business intelligence and enterprise planning cloud platform that helps companies to gain control over enormous amounts of data they produce. By data analysis and visualization, SAC provides valuable insights for the companies to make better decisions for the future.

The main goal of this document is to provide reader with an easy-to-follow guide and practical example how SAP Analytics Cloud could be used as a platform for human resources utilization management solution that provides project managers with an overview of all employee's actual and planned capacity and its allocation to specific projects together with the division of allocations on external client projects or internal projects within the company. While the practical example in this document includes a company with around 50 employees only, the same solution can be used for several times larger companies without any problem.

Please note that in this example SAC was used as a platform for the solution as the selected company's main business is consulting of solutions within this platform for huge international companies, therefore the company already had its own tenant, licence and the platform does not represent any additional costs. For other smaller companies that do not own the tenant and licence already for SAC or similar platforms, some other self-service BI platforms might be more suitable and cost efficient as well.

A) Self-service business intelligence (SSBI) development process

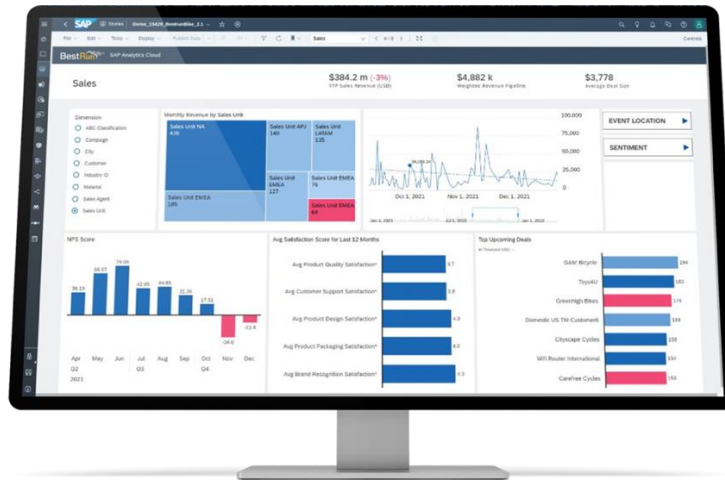


Figure 1 SSBI dashboard example in SAP Analytics Cloud
(Source: SAP, 2024a)

[1] Introduction to self-service BI	
[2] Self-service BI benefits and drawbacks	[3] SSBI solution development procedure



The **first section** provides necessary knowledge overview before proceeding with development of the actual reporting solution and is focused on analysis of self-service business intelligence solution development process. It is structured into three main chapters. These chapters are introduction to self-service business intelligence, self-service business intelligence benefits and drawbacks and self-service business intelligence solution development procedure overview.

1. Introduction to self-service BI



Self-service business intelligence (SSBI), which is already for many years one of the most important trends in the area of BI, has been defined by Imhoff and White (2011) as “*the facilities within the BI environment that enable BI users to become more self-reliant and less dependent on the IT organization.*” Portal MBI-AF (2022) further describes the purpose of SSBI as “*to provide users with an environment for carrying out their analytical tasks based on new technologies without the need to use complex and usually very complicated BI systems*”.

SSBI solutions provide the users with easier access to company’s data for reporting, planning and analysis, where the analysis is due to its greater simplicity user driven. These applications respect the principles of classic BI, which SSBI solutions do not replace but complement. End users (even non-IT) gain **greater flexibility and autonomy in data analysis** without the need for intervention of the IT department and can thus obtain an answer to a given question much faster.

On the other hand, IT workers still fulfil the function of the central managers of company data and ensure user access to cleaned data in an understandable form but as the amount of new analysis and reporting requirements is **reduced** due to SSBI, they can focus more on other tasks within the company. (MBI-AF, 2022) (Pour et al., 2018) (Imhoff and White, 2011)

As for the popularity of analytics and business intelligence, there is no surprise that there are **quite a few competitors on the market** trying to reach as many customers as possible. Gartner in the *Magic Quadrant for Analytics and Business Intelligence Platforms 2023* reveals, after evaluation of 12 critical capabilities, who are currently leaders, challengers, visionaries, and niche players on the market. From Figure 2 can be seen that Microsoft’s Power BI, Salesforce’s Tableau and Qlik’s Sense are within the leader’s quadrant with Microsoft Power BI being shown as the strongest solution. (Dijk, 2023) (CX Today, 2023)



Figure 2 Gartner Magic Quadrant for Analytics and Business Intelligence Platforms 2023
(Source: CX Today, 2023)

SAP Analytic Cloud (SAC), which is the platform used in this document for self-service reporting, can be found within the visionary’s quadrant. It offers a wide range of features for data visualization and manipulation, business planning, custom reporting, application development, predictive scenarios and enhanced analytics along with seamless data integration and connectivity. (Dijk, 2023)

2. Self-service BI benefits and drawbacks



In this chapter are analysed the main **positive effects** and, on the contrary, the main **limitations** and problems of self-service business intelligence.

2.1 Benefits of self-service BI

Implementing SSBI solutions within a company brings **a lot of benefits** for business users, IT departments and for the organization itself. Data and access to it are given to business users, who can analyse and evaluate them at any time according to their current needs using the provided tools prepared by the IT employees. This way, they don't have to wait long time for new outputs to be delivered from IT based on their requests.

IT department instead of being overwhelmed with constantly new and changing requests for reports and analyses, **transfers the data analysis agenda directly into the hands of the business users**. Due to SSBI solution, they can focus more on management and activities that bring greater value to the company. Last but not least, adoption of SSBI solutions also bring benefits to the entire organisation. As end users become more satisfied with the IT department within the organisation, they start to perceive IT employees as a flexible assistant in meeting ends users' business requirements. (MBI-AF, 2022) (MBI, 2014)

Further benefits of SSBI applications include:

- similar flexibility and performance offered as is usually found in applications based on OLAP databases,
- required time for analytical application implementation is substantially reduced,
- data analysis is performed directly by the business users and the delivery time of desired outputs is substantially reduced,
- ease of basic applications setup,
- significantly lower financial, resource, and operational demands. (MBI-AF, 2022) (MBI, 2014)

In addition to all the benefits already mentioned, SSBI application also have a very good support for creating analytically and visually more demanding applications, such as dashboards. (MBI-AF, 2022)

2.2 Drawbacks of self-service BI

Self-service BI solutions also have their own **problems and limitations**. Such as ability to implement SSBI solutions only for relatively simpler and more isolated tasks. This kind of a solution would not be suitable for detailed enterprise-wide reporting, especially for big multinational companies. (MBI-AF, 2022) On the other hand, SSBI solution implementation is very suitable for fulfilment of the main goal of this document.

Further drawbacks of SSBI applications include:

- limited capabilities for data cleaning and consolidation,
- challenging data integration within the enterprise in comparison with enterprise-wide data warehouses,
- increased risk of poor decisions based on poor data from business users. (MBI-AF, 2022) (MBI, 2014)

For development of more advanced applications, it is still necessary for users to understand at least the basic principles of analytical methods such as dimensional and data modelling. Also, the role of IT shifts from being a producer of outputs to being a supervisor that oversees the entire environment and the outputs produced. Additionally, to yield the desired benefits of SSBI tools, it is necessary that **IT trains business users** how to use them and makes them understand its value and possibilities. (MBI-AF, 2022)

3. SSBI solution development procedure



In this chapter is analysed the **development procedure of a successful self-service business intelligence solution** that will perform planning, reporting and analysis tasks according to the user requirements and will bring clarity for decision making processes executed by business users within the company.

The **generalized procedure** for implementing SSBI applications described by Pour et al. (2018) is as follows:

- 1) **Processing of the initial study** for SSBI application:
 - specification of functional requirements for SSBI solution from business users,
 - specification of goals and expected effects of the new solution for business users,
 - specification of data sources,
 - selection of the SSBI tool,
 - creation of a simple solution architecture.
- 2) **Analysis and design** of SSBI application:
 - specification of the SSBI solution content based on dimensional modelling,
 - creation of data models,
 - functionality design.
- 3) **Implementation** of SSBI application:
 - creation of the application,
 - testing the application,
 - documenting the application.
- 4) **Deployment** of SSBI application. (MBI-AF, 2022) (MBI, 2016)

These gradual steps need to be taken to create a successful SSBI application that will be beneficial to business users in the company.

Section conclusion



- The main takeaway related to the document goal from this section is understanding the role that SSBI plays in enhancing users' access to data and analytics without heavy reliance on IT department and its employees.
- Further is clearly explained to the reader the balance between user autonomy and IT's managerial role, and the specific benefits and challenges of SSBI deployment.
- To drive value from the SSBI initiatives, it is greatly important to align technical solution with business strategies.
- Finally, when implementing a new SSBI solution, it is crucial to fully understand user requirements and expected effects, that must be clearly described, and to choose the right SSBI tool that will drive the final solution success.
- The results and gained insights from this analysis are crucial and later used for the self-service human resources utilization management solution development.

B) Human resources (HR) utilization management principles

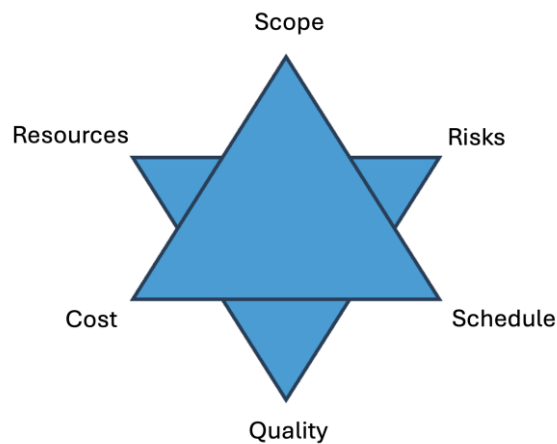


Figure 3 Resources (including HR) are part of six-constraint model in project management
(Source: PMI, 2021, own processing)

[4] Introduction to human resources (HR) utilization management

[5] Planning & reporting needs in HR utilization management

[6] Predictive analytics in HR utilization management



The **second section** is focused on analysis of general planning & reporting needs in the field of human resources utilization management. This part is structured into four main chapters. These chapters are introduction to human resources utilization management, planning & reporting needs in human resources utilization management and predictive analytics in human resources utilization management.

4. Introduction to human resources (HR) utilization management



Before it is proceeded with planning and reporting needs analysis, it is necessary to clearly define what is meant by **human resources** in the context of this document and what exactly is human resources utilization management.

Term human resources (HR) is generally referred to as “*the department of an organization that deals with finding new employees, keeping records about all the organization’s employees and helping them with any problems*”. (Cambridge Dictionary, 2024b) But it can also be referred to human resources only as to “*the personnel of a business or organization, regarded as a significant asset in terms of skills and abilities*”. (Oxford English Dictionary, 2024) **In this document are by human resources considered all the company’s employees, not the HR department as such.**

Human resources utilization management is then an area of project management in which project managers plan, control and optimize the **utilization rate** of individual employees of the company or within a team, to ensure that human resources are used efficiently and effectively for the benefit of both the employees and the organization. By utilization metrics, the performance and effort over the given time or capacity available can be measured and reported. This project management area is critical for organizations that aim to achieve optimal performance and competitiveness by ensuring that their employees are not overutilized or underutilized. (Viter, 2023) (IBM, 2021) (Kenton, 2024)

5. Planning & reporting needs in HR utilization management



In this chapter are analysed planning and reporting needs in **human resources utilization management**.

5.1 Planning needs in human resources utilization management

The planning objective of human resources utilization management is mainly to **maximize the productivity and profitability** of all employees and ensure that all projects (either external or internal) are delivered successfully within their constraints while also making sure that **employees are satisfied and not overwhelmed**, which could lead to their potential burnout. (Viter, 2023) (IBM, 2021) (Kenton, 2024)

Human resources utilization planning represents a process from gathering as accurate as possible **availability** view of all employees for upcoming period (including the scheduled time-off) together with the information about their skills. Subsequently, it is necessary to **forecast human resources need** for the upcoming period and predict project demands and employee requirements. Next, individual employees are **allocated** to various projects and tasks based on their availability & skills and the project's capacity need. Only in this way it is possible to ensure that each project is stuffed with the right employees. Further, through the utilization reports is monitored the workload of individual employees and the plan is **continuously adjusted** if necessary. (Viter, 2023) (IBM, 2021)

Employee utilization ratio measures “*how long someone spends on billable work as opposed to non-billable activities such as training and attending meetings*”. (Viter, 2023) It emphasises the importance of differentiating employee allocation to billable and non-billable tasks, which gives much clearer information about the true effectiveness of company's workforce. Billable activities are the ones that represent work on income-generating tasks and therefore must be prioritized. Hours spend on **billable activities** are the actual hours spend on delivering the project and are beforehand arranged with and paid by the client. They can include for instance meetings with the client, solution development or change requests. On the contrary, **non-billable activities** are the ones not requested by the client and may include for example management of the company, pre-paring demos or workshops for potential clients, but also these hours can be spent on training the team. (Viter, 2023) (IBM, 2021)

5.2 Reporting needs in human resources utilization management

Balancing workload is always challenging task, but by ensuring accurate reporting with the right design elements and layout that will provide project managers with access to **clear utilization overview**, the challenge is considerably decreased. The main part of the reporting is the already mentioned **utilization rate** which is “*the amount of an employee's work time that benefits the company*”. (Viter, 2023) As can be seen in the formula below the utilization rate value is given as a percentage and is simply calculated by dividing scheduled (or allocated) hours by effective capacity hours. **Effective capacity hours** represent the actual hours an employee is available for work (work schedules, planned holiday or other time-off are already subtracted). (Viter, 2023) (IBM, 2021)

$$\text{Utilization rate (in \%)} = \frac{\text{Scheduled hours}}{\text{Effective capacity hours}} \times 100$$

To obtain utilization rate separately for either billable or non-billable activities, all that need to be done is replacing overall allocated hours in the formula by only billable or non-billable allocated hours. Further, utilization rate can be obviously monitored also on global or team level, not only on the individual employee level and by using **filters** in the report, there are even more display options. According to the project manager's reporting needs, it is possible to report not only the planned but also the **actual or last month's utilization rate** and compare the differences between them. (Viter, 2023) (IBM, 2021)

Utilization rate is mostly not stable and **fluctuates** according to what is happening in the company's business. Both underutilization and overutilization can bring minor or major problems to the business. **Underutilization** represents a state when the utilization rate is under 100% which indicates that the individual, team or whole organisation is utilized at less than its effective capacity. In other words, these employees cost the company money without generating sufficient revenue to make a profit, not by their fault. It is a good idea to transform the underutilized time to employee training and growth from which will the company benefit in the future.

Overutilization, on the other hand, represents a state when the utilization rate is over 100% which indicates that the individual, team, or whole organisation is utilized at more than its effective capacity. This might lead to employee burnout, deterioration of working abilities or quality issues. Therefore, it should always be carefully analysed and resolved, especially in long-term cases. (Viter, 2023) (IBM, 2021)

6. Predictive analytics in HR utilization management



Predictive HR analytics is a set of “*sophisticated statistics and quantitative analyses techniques used by scientists to predict things and apply them to the information about people in organizations*”. (Edwards and Edwards, 2019)

By understanding and interpreting the analyses results, it can be **predicted** which employees are expected to leave the company, what are the reasons behind such employee’s behaviour or on the contrary, which factors might drive their high performance and motivation to do a great work. Predictive modelling techniques include various statistical techniques such as regression analyses but also bigdata analyses or machine learning. (Edwards and Edwards, 2019)

Predictive analytics in human resources utilization management could instead of only descriptive reports which provide to the management important information about what is currently going on in the organization, also explain why things are happening and provide predictions about what could happen in the future and what should be done about that. Based on historical utilization data about employees or teams within an organization, the performance trends could be predicted and understood. Subsequently, management could make **better informed decisions** based on the provided analyses results including metrics such as employee’s engagement, performance, productivity, or retention and drive the organization to a greater success. (Edwards and Edwards, 2019)

Section conclusion



- The main takeaway related to the document goal from this section is that the utilization rate is the key metric used for evaluating and maximizing employees productivity and satisfaction.
- To optimize this metric’s value, it is important for project managers to gather accurate employee availability, forecast project demands for staff and correctly allocate individual employees to projects.
- Further is significant to differentiate between billable and non-billable tasks, continuously monitor the workload and act quickly when underutilization or overutilization appears.
- The results of this analysis are crucial when developing the solution metrics to fulfil the main goal of this document.

C) SAP Analytics Cloud (SAC) – Solution design for human resources utilization management in a selected company

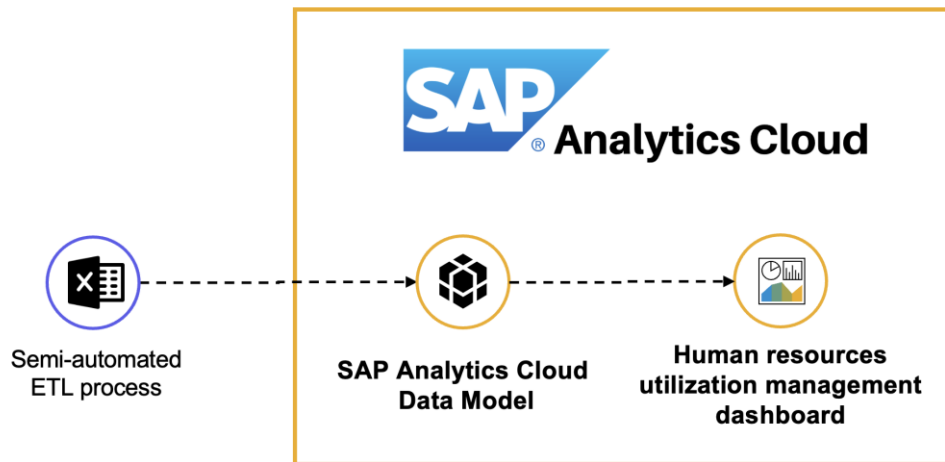


Figure 4 Reporting solution architecture design for human resources utilization management in SAP Analytics Cloud (Source: Author, 2024)

[7] SAC features overview	
[8] SAC user interface overview	[9] SAC pricing overview
[10] SAC reporting requirements in a selected company	[11] SAC reporting solution design
[12] SAC reporting solution implementation and deployment	



The **third and last section** firstly briefly introduces the SAP Analytic Cloud (SAC) platform and then are during this chapter analysed solution requirements from project managers and its design, implementation and deployment. This part is structured into six chapters. These chapters are SAC features overview, SAC user interface overview, SAC pricing overview, SAC reporting requirements in a selected company, SAC reporting solution design and SAC reporting solution implementation and deployment.

7. SAC features overview



SAP Analytics Cloud (SAC) is an “*all-in-one cloud product offered as a software as a service (SaaS) for **business intelligence (BI), planning, and predictive analytics***”. (SAC Help Portal, 2024a)

As a SaaS platform, it is also accessible through any web browser and further it enables businesses to unify data and **maximize data-driven decision making** based on custom reports and dashboards. SAC is a platform developed primarily for large international corporations with a lot of data and many requirements, therefore SAC includes many functionalities to meet all these requirements.

However, the platform can be easily navigated and used also for smaller projects such as reporting on data from Runn (resource management software) as in the case of this document. The list of main SAC features from SAC Help Portal (2024b) that are utilized later in the context of this document includes:

- *Stories* – reporting dashboards that uses charts, tables, visualisations, text, images, and other widgets to describe data and create a complex SSBI dashboards for users to interact with (now in Story 2.0 are also included scripting possibilities to configure the behaviour of various elements).
- *Models* – representation of business data from various source systems with defined measures and dimensions that are used to build visualizations, filters, and calculations in Stories.
- *Calculated Measure* – a new measure defined by calculation formula utilizing available functions, conditions, and operators.
- *Security* – pre-configured settings for limiting data access within the organisation and SAP Analytics Cloud system.

Apart from these features that are the main ones used during reporting part of the solution development to fulfil the main document goal, SAC furthermore offers features such as building complex analytical applications, planning, connecting to various SAP and non-SAP data sources, creating allocation processes, designing value driver trees, using augmented analytics, or creating predictive scenarios. In addition, its capabilities also include calendar, catalog, files system, collaboration, content network, administration, translation, analytics hub, or even mobile app. (SAC Help Portal, 2024b)

8. SAC user interface overview



SAC is a **robust platform** but still maintains an organized user-friendly environment consisting of the main navigation on the left including nineteen sections as can be seen in Figure 5.

The sections used in this document for reporting solution development are **Files, Stories and Modeler**. In addition, in the top navigation bar on the right are additional functionalities spanning from left to right Search, Just Ask, Search to Insight, Notifications, Collaboration, Feedback, Help and Profile.

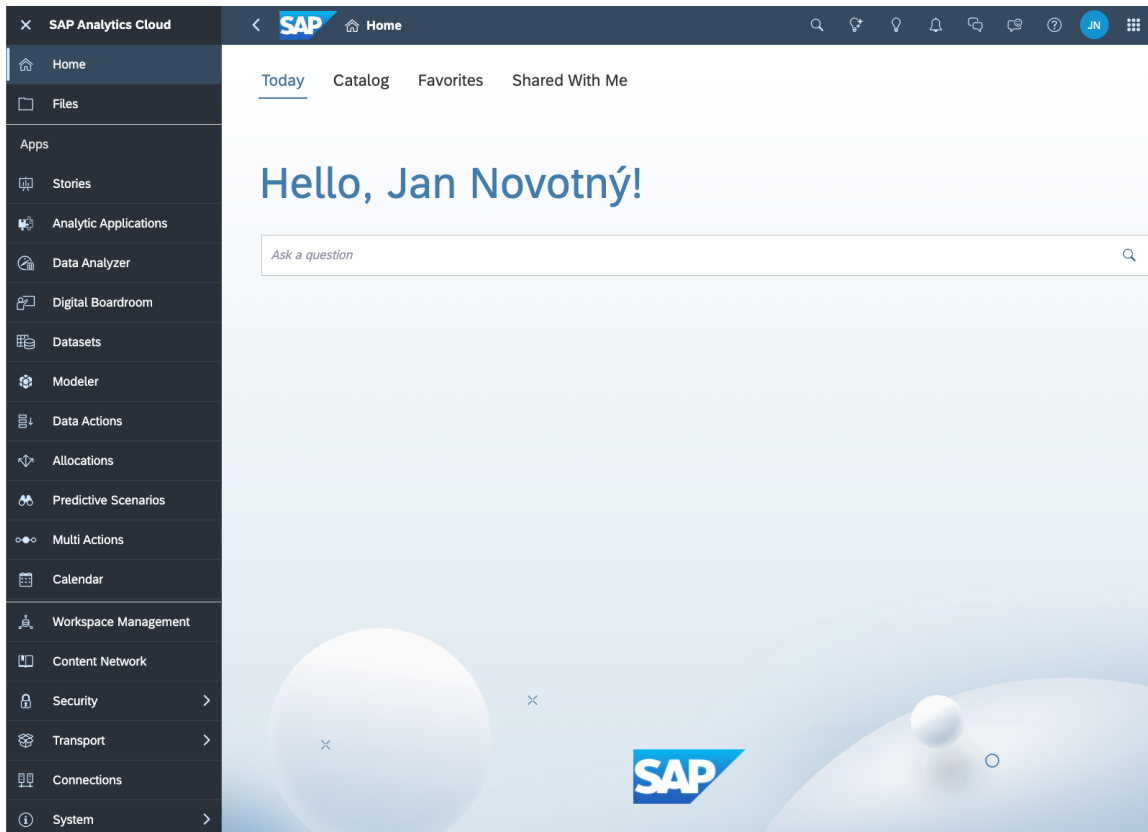


Figure 5 SAP Analytics Cloud user interface – section Home
(Source: Company's SAC tenant, 2024, own processing)

Sections Security, Transport and System offer an additional list of options when user clicks on them. These supplementary options can be seen in Figure 6 (when clicked on Security or Transport) and Figure 7 (when clicked on System and further on Performance).

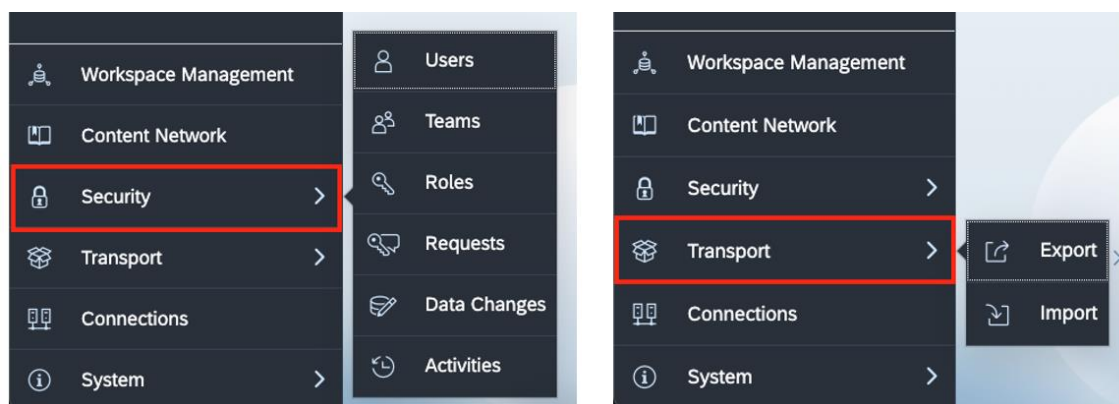


Figure 6 SAP Analytics Cloud user interface – sections Security and Transport
(Source: Company's SAC tenant, 2024, own processing)

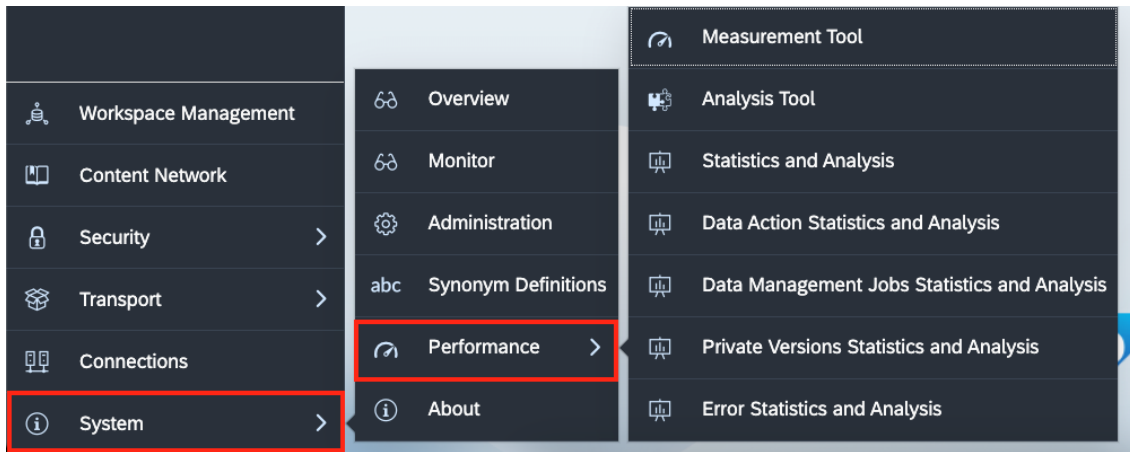


Figure 7 SAP Analytics Cloud user interface – section System / Performance
(Source: Company's SAC tenant, 2024, own processing)

9. SAC pricing overview



SAP charges for SAP Analytics Cloud annual **subscription fee** based on the number of active users. Minimum contract duration is 12 months, and the minimum number of users is 5.

SAP pricing varies according to specific case and is also different for only business intelligence and predictive analytics licence or planning professional licence. However, the prices range starts from around **\$32 USD per user per month** before taxes and discounts.

There is also a 30-day free trial (possibly extended to 60-day) in order to test whether the system meets the potential client's business needs. (SAP, 2024b) (SAP, 2024c)

10. SAC reporting requirements in a selected company



Reporting solution is developed and configured to the specific needs of selected company in SAC platform. **Case study methodology of qualitative research** (Priya, 2020) is used to obtain end user requirements, where project managers were continuously questioned in the form of **unstructured interviews** about their expectations from the solution and what specific views and functionalities the given solution should offer. According to the results of this analysis can be the reporting solution later developed and help project managers to respond adequately and in time to prevent resources from being either underutilized or overutilized.

Runn and Clockify are other tools that are part of the solution architecture, but for the purpose of this document, the configurations and planning within these tools is not included here (detailed information about planning part of the solution in these tools can be found in the master thesis that has been linked in page 2 and page 28 of this document).

Runn is a real-time resource management software suitable for both small and medium-sized companies and its strengths lie in visual planning with very user-friendly interface that simplifies human resources planning and management. Its weakness is the small possibility of native reports customization to suit the various business needs.

Clockify is a popular timesheet tool that records the employee's utilization actual data and by use of API, these records are included in Runn model as well from which is obtain the dataset for reporting in SAP Analytics Cloud.

Below is the list of **main functional user requirements** provided by project managers (end users of the final solution) at selected company for reporting solution, based on unstructured interviews:

- The solution must have one model with version (Actual and Plan), date, person, project, team, and role dimension.
- The solution's model must have effective capacity measure, work hours measure and further calculated measures with correct settings.
- The solution's model must have imported actual and planned data for the next three months from Runn and Clockify refreshed once a month (5th day of each month).
- The solution must have one prepared dashboard (in SAC dashboard = Story) with following views consisting of tables, charts, and other necessary widgets:
 - Overall management summary.
 - Projects planned allocation.
 - Projects actual allocation.
 - Employees planned utilization.
 - Employees actual utilization.
 - Employees actual vs. planned utilization for previous month.
 - The solution must enable users to additionally filter content.
- The solution must have implemented conditional formatting for straightforward orientation in the meaning of reported values.
- The solution must have company's logo on each page of the dashboard.
- The solution must offer navigation for effortless transition between individual views.
- The solution must enable quick links to Runn and Clockify applications.
- The solution must have a dedicated folder with all parts of the reporting solution included in one place.
- The solution must have implemented access control with access only for project managers and for solution administrator.
- The solution must enable automated generation of PDF from the report and sending it to the project managers' inbox.

This list was also retroactively supplemented with other functional requirements that arose during the individual development iterations, when feedback was provided.

11. SAC reporting solution design



In this chapter **is developed the reporting solution design** in SAP Analytics Cloud (SAC) software according to selected company's project managers' requirements.

As mentioned previously in this document, **selected company's main business** currently relies on implementing of various SAC solutions and therefore as all the employees already know the platform very well and the company already pays for their own SAP Analytics Cloud tenant and user licences, it was an obvious choice that even this custom reporting solution design is carried out on this powerful platform. Owing to this, the development of such custom reporting solution does not represent for the company any additional costs except for the time required to create it.

The solution is designed to **meet all the project managers' requirements** mentioned before and to support them in human resources utilization management. To build this solution in selected company's SAC tenant, first needs to be created a new folder outside of the Public folder (where all employees have access) in My Files, to make sure only the creator is able to see and work with the files until the solution is finished, thoroughly tested and shared with the project managers and other people who should have access to it. **Automated emails** regarding monthly allocation plan inputs request and sharing updated report (in SAC reports are called Stories) are also part of the solution design.

Before it can be proceeded with new Story build, **data model** needs to be created in SAC and filled with data from Runn data model, as shown in the solution architecture. In this case is tested the New Model Type approach (SAC Help Portal, 2024c) which enables creation of multiple measures without account dimension. In this model are set two versions for actual and planned data. Subsequently, necessary dimensions, measures and model calculations are developed before it is proceeded with automated data import. **Data import process** starts with CSV export from Runn for the selected period, automated columns unpivoting through Microsoft Power Query and actual import to SAC data model. In SAC data model are created automated data import jobs. Once a month when new data needs to be imported into SAC model and refreshed, it only requires a replacement of the data source and the whole transformation process and data update is then done automatically.

Once data import process is completely ready and **model is loaded with the latest data**, it is proceeded with Story creation. For this solution is tested the new Optimized Design Experience (ODE) format (SAC Help Portal, 2024d) that improves the overall story performance and offers more capabilities. Created model is connected to that new story dashboard and gradually, individual views consisting of many widgets combinations and additional story calculations are developed in order to fulfil all the user requirements. Model configuration needs to be adjusted to these requirements as well. **These views include** overall management summary, projects utilization plan, projects utilization actuals, employees utilization plan, employees utilization actuals and finally employees actuals vs. plan comparison. For effortless transition between individual views, navigation in the form of a right-side panel with interactive links is implemented in the solution as well. Additionally, users can **filter data** in all views to adjust the given information according to current needs.

As soon as the whole solution is finished, tested, and verified with the updated requirements of project managers (during this verification is the solution continuously modified in several iterations), it is managed the **access control** to the folder with both model and story. Access is granted only to project managers who will be able to make multidimensional analysis in this solution to gain insights they need to manage human resources utilization and allocation effectively and efficiently. Additionally, some tables in the dashboard pages are enriched with implemented **conditional formatting**, company's logo, last update information, input controls to further filter the data shown and quick links to Runn and Clockify applications.

12. SAC reporting solution implementation and deployment



In this last chapter is the **reporting solution implemented in SAP Analytics Cloud (SAC)** software and deployed so that project managers can start using it immediately. Please note, that to conceal sensitive selected company's data, for the purpose of this document, **generic fictitious data** of the same structure as the selected company's original data was generated with the help of artificial intelligence and loaded, which fully serves to present the complete developed solution and its properties.

12.1 Model development

As stated in reporting solution design, **new model type with measures** is used for this project. When creating a model in SAC, it is chosen to start with an empty model as data are loaded a bit later. As can be seen in Figure 8, apart from Version and Date dimension which are created automatically in Model Structure workspace, also Person, Project, Team, and Role dimensions have been created. In Version dimension is next to the Actual version also created a new version Plan through the Version Management settings in any Story. (SAC Help Portal, 2024e)

In **Date dimension** is prolonged time range until year 2040 (this can be adjusted in the future if needed). For Person dimension is additionally created "Contract" property with text type in order to distinguish whether the employee is working on **full-time or part-time** contract. For Project dimension is also additionally created text type property with name "Type" which serves to distinguish whether the project is internal or external (non-billable or billable). Team and Role dimensions do not have any additional properties created. When dimensional modelling is finished, it is proceeded with measures creation.

The screenshot shows the SAP Analytics Cloud Model Structure workspace. The 'Model Structure' dropdown is highlighted in red. The 'Dimensions' section is expanded, showing a table of dimensions. A red box highlights the table content, and another red box highlights the '+' icon for adding dimensions.

Name	Description	Type	Additional Details
Version	Version	Version	2 -
Date	Date	Date	- -
Person	Person	Person	0 0
Project	Project	Project	0 0
Team	Team	Team	0 0
Role	Role	Role	0 0

Figure 8 Created dimensions in SAC model
(Source: Selected company's SAC tenant, 2024, own processing)

Model cannot be saved until at least one measure is created. In this project, it is needed to create **Work Hours** measure which represents the number of hours that are planned to work per each employee and project in the Plan version or the number of hours that each employee worked during the past period on specific projects if these hours are mapped to the Actual version. The fixed unit for this measure is set to hours and the data type to decimal (with one decimal place). On the other hand, **Effective Capacity Hours** measure expresses the total number of hours that employees are available for work in a given time period (contracted capacity minus time-off). The fixed unit for this measure is set to hours and the data type to integer (a whole number). Additionally, for this measure is also set exception aggregation type to Max across all dimensions in order to aggregate recurring data in a CSV exported from Runn and to display the correct values in the report.

Once the main measures are created, it is proceeded with defining the calculated measures in the next model workspace named **Calculations** as can be seen in Figure 9. Main calculated measure is **Utilization Rate** which is calculated as "Work Hours / Effective Capacity Hours" and expresses how effectively are employees used for productive activities (again the planned utilization is calculated on the Plan version and the actual utilization is calculated on the Actual version). For this measure is scale set to percent with zero decimal places and the exception aggregation type is set to Sum across all dimensions in order to later calculate correctly full-time equivalent (FTE) across all dimensions.

Next calculated measure is **Overall Utilization** which is calculated as “Utilization Rate” with exception aggregation type set to average on Date and Person dimensions. This measure has scale set to percent with zero decimal places and expresses the total average actual or planned utilization based on the version selected later in the dashboard. Last calculated measure in this model is **Work Hours MD** (where MD stands for Man-day, the time corresponding to the working day of one worker). It is calculated as “Work Hours / 8”, has fixed unit set to MD and scale set to none with one decimal place. When all the measures are set, the model can be finally saved.

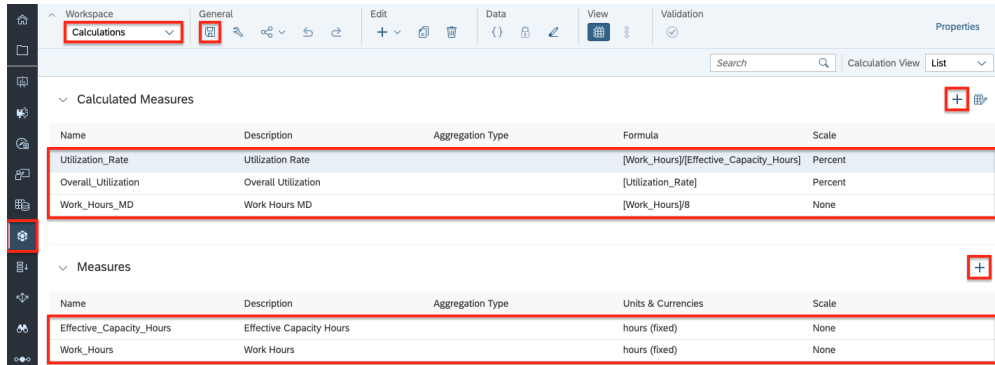


Figure 9 Calculations workspace in SAC consisting of measures and calculated measures (Source: Selected company's SAC tenant, 2024, own processing)

12.2 Automated data import jobs development

Next, data in CSV from Runn model (which includes planned allocations by project managers and actual utilization data from Clockify) are **exported and unpivoted** using Microsoft Power Query Editor. Then can be proceeded with development of automated data import jobs in SAP Analytics Cloud. **These consists of 5 steps:**

- data preparation,
- mapping to facts,
- mapping properties,
- review and validation of import job,
- import settings configurations.

Data preparation is the first step of import job set-up, where the data in columns are transformed on a dataset sample to the required format that is later, after the final validation, applied to the entire dataset before the data is uploaded into the SAC model. It can be seen in Figure 10.

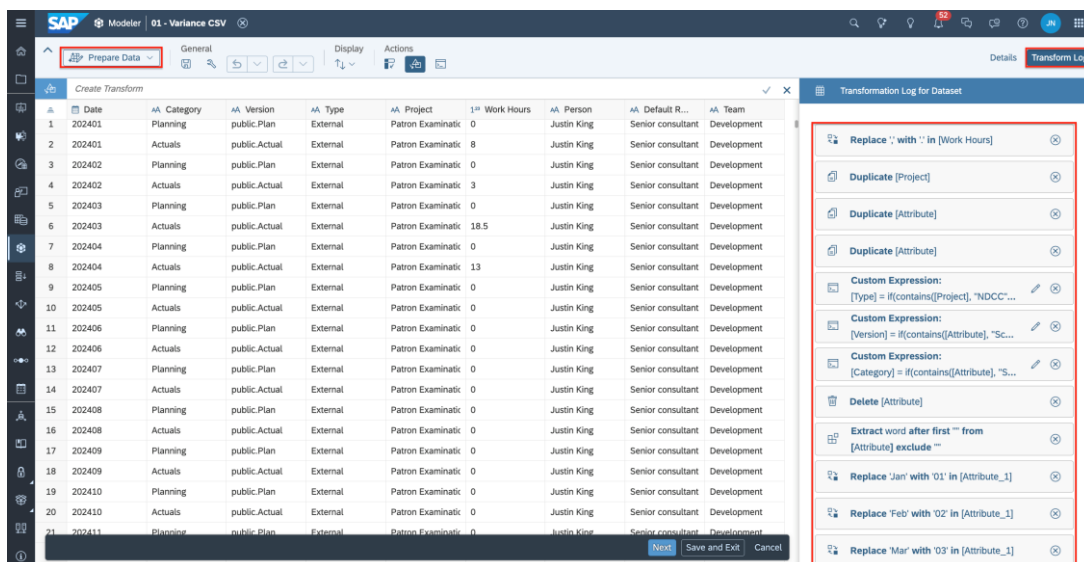


Figure 10 Data preparation step (Source: Selected company's SAC tenant, 2024, own processing)

During the second step of import job settings named **Map to Facts**, transformed source columns are mapped to target dimensions and measures in the model. As all the transformations have been done correctly in the previous step, now the columns only need to be mapped accordingly using drag & drop functionality. In the third step are mapped using drag & drop also **property columns**.

Finally, in the last step are the transformations and mapping **automatically validated** and if there are no restrictions, it is time to set import settings, where the import method needs to be Update and Update Local Dimensions with New Members option needs to be switched on, as it is desirable that the dimensions are updated automatically with new members during current and next data imports. After that, it can be proceeded with the import by clicking the button Run import which loads data into the model and saves the import job for the next updates, so that this import job set-up does not need to be repeated and the following import jobs are therefore automated. The graphical model view with data foundation sample can be seen in Figure 11.

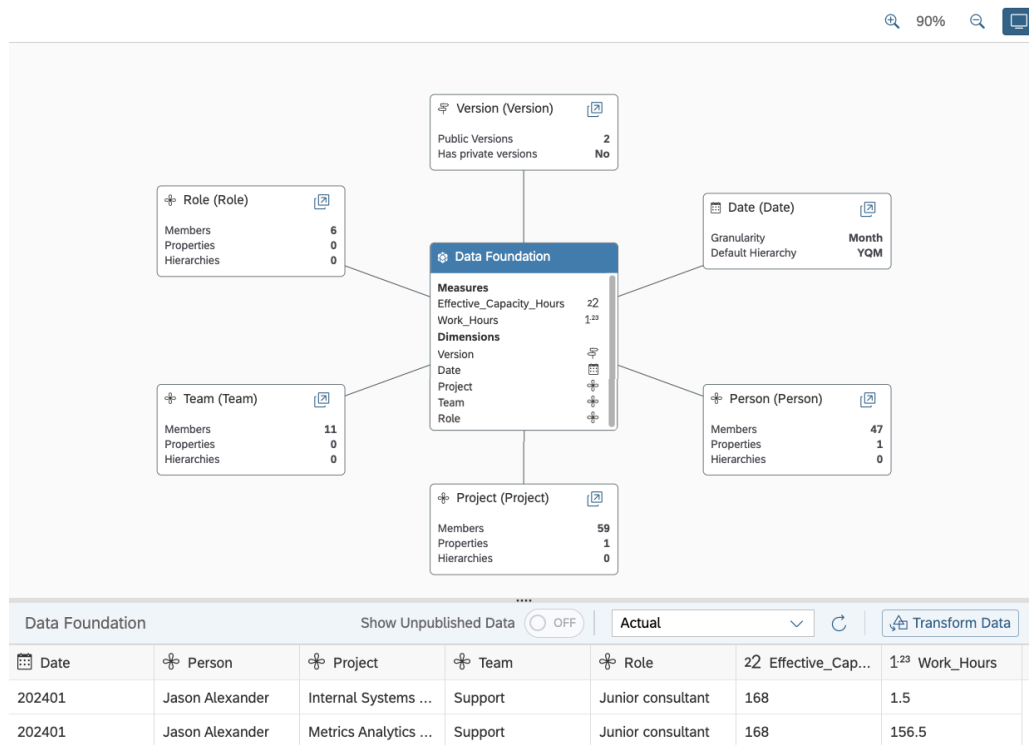


Figure 11 Model structure overview in SAC with data foundation
(Source: Selected company's SAC tenant, 2024, own processing)

12.3 Dashboard development

As data model is successfully loaded with all the necessary data, it is proceeded with the dashboard creation consisting of six views development in total. These views consist of tables, charts and other necessary widgets to meet the project manager's requirements. Also, **additional calculations** in the dashboard are performed so that all the data are represented as expected.

In **Figures 12-17** are shown the finalized dashboard views with company logo being removed. These views are specifically:

- Figure 12: Overall management summary.
- Figure 13: Projects planned allocation.
- Figure 14: Projects actual allocation.
- Figure 15: Employees planned utilization.
- Figure 16: Employees actual utilization.
- Figure 17: Employees actual vs. planned utilization for previous month.

Once all the user requirements are successfully implemented and the custom reporting solution in SAP Analytics Cloud is finally consulted with chosen projects managers at the selected company and tested by them again, it can be proceeded with the actual **deployment** of the solution and delivering the application to end users. During deployment is the created Utilization Management folder in SAC shared to all the project managers and other users who should have access to the reporting, according to management's decision. Also are further configured both **automated emails** mentioned in the previous section. Moreover, all the end users are **trained** on how to use the utilization report and what self-service tasks can they address during multidimensional analysis in the created views. Additionally, this document in its full version (thesis version) is provided to them as it serves also as the **solution documentation** and answers most of the questions users might have.

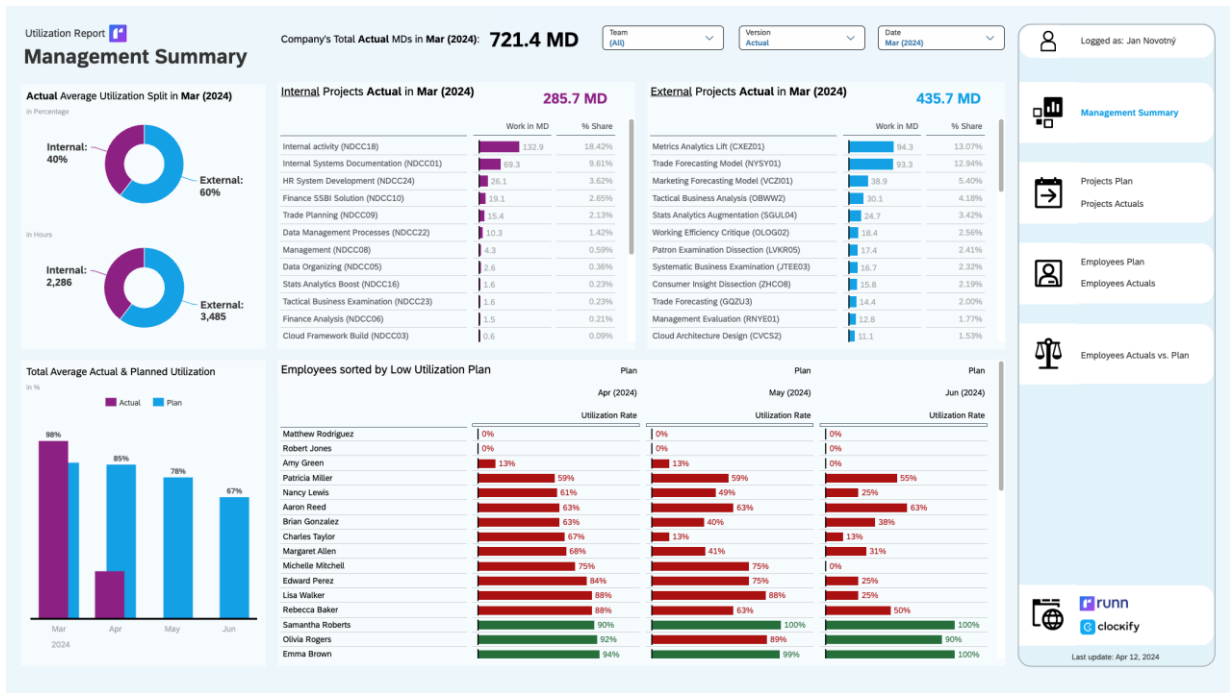


Figure 12 Management summary view of the utilization report (Source: Selected company's SAC tenant, 2024, own processing)



Figure 13 Projects utilization plan view of the utilization report (Source: Selected company's SAC tenant, 2024, own processing)



Figure 14 Projects utilization actuals view of the utilization report (Source: Selected company's SAC tenant, 2024, own processing)

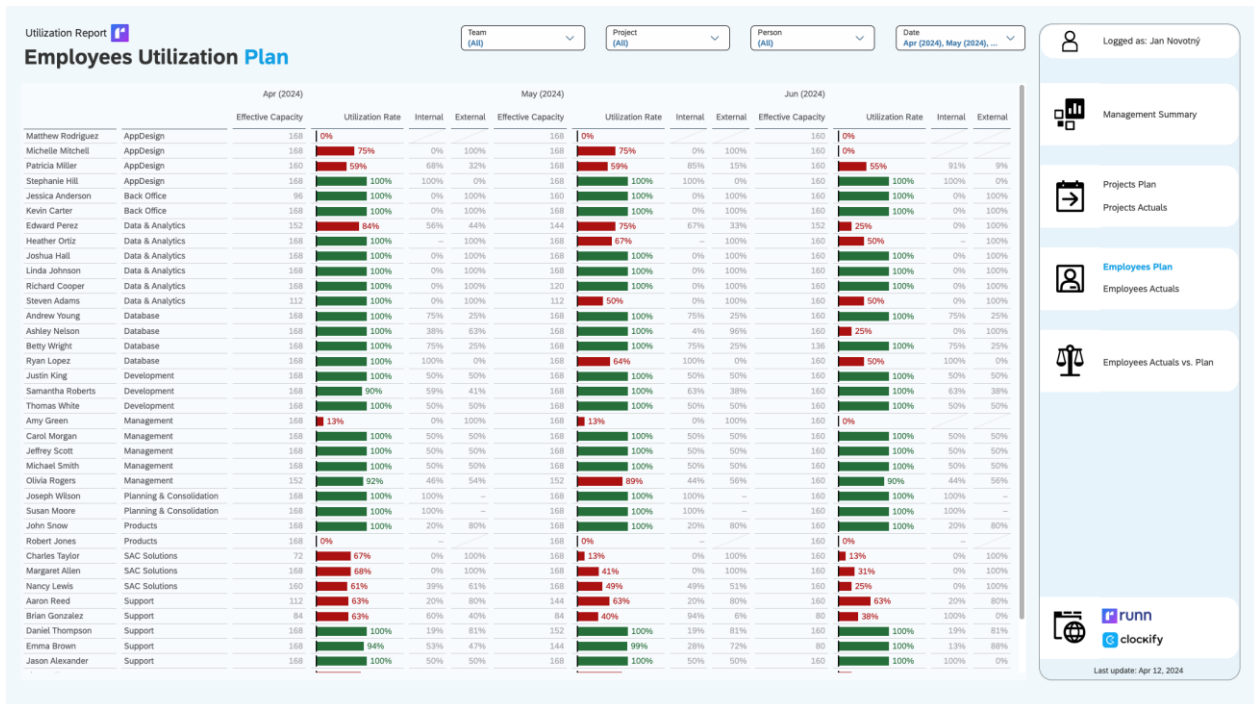


Figure 15 Employees utilization plan view of the utilization report (Source: Selected company's SAC tenant, 2024, own processing)

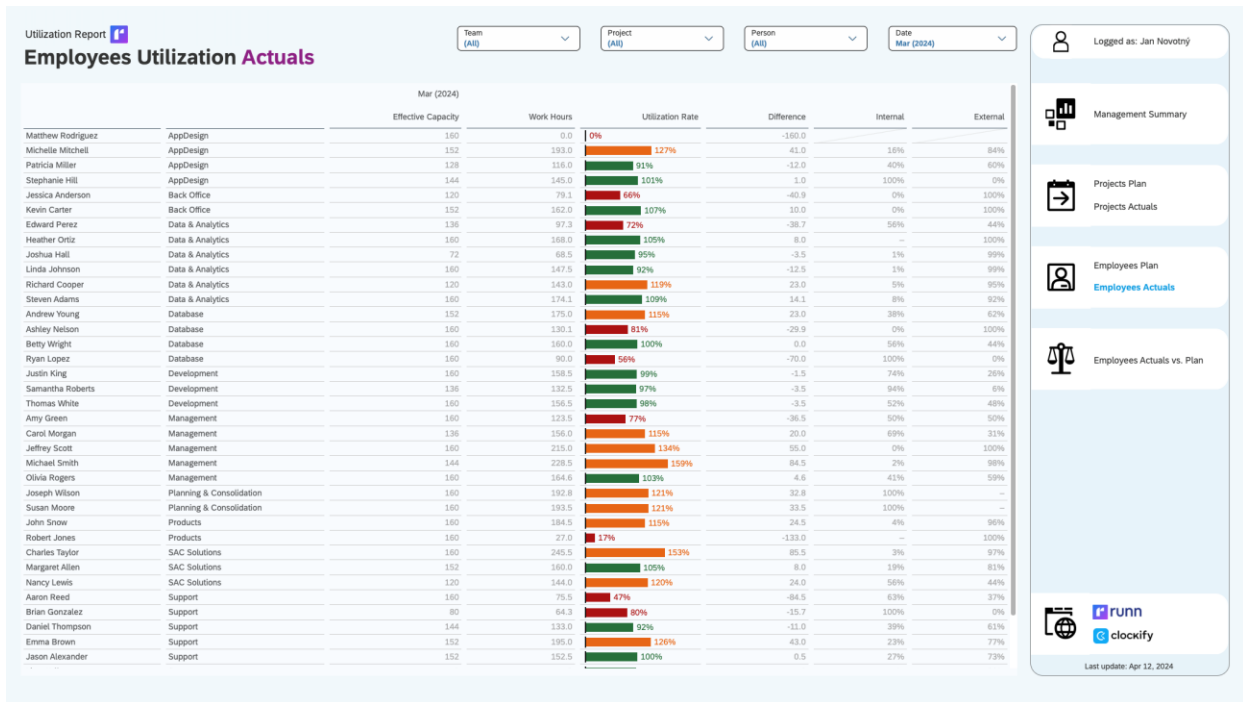


Figure 16 Employees utilization actuals view of the utilization report (Source: Selected company's SAC tenant, 2024, own processing)



Figure 17 Employees utilization actuals vs. plan view of the utilization report (Source: Selected company's SAC tenant, 2024, own processing)

Section conclusion



- Within this section the document goal has been fulfilled.
- An overview of the main features and capabilities of the SAP Analytics Cloud software was provided with an insight into how the given tool can be used for human resources utilization reporting.
- Exact requirements of project managers from the selected company for the solution have been analysed.
- Section finalized with practical successful implementation of all requirements for the self-service custom reporting solution in SAP Analytics Cloud.
- This utilization report has been during its development modified many times based on the ongoing feedback from project managers and therefore it is ensured that it will serve them well and help them to plan allocation of people on projects better while preventing overutilization or underutilization from happening.

Conclusion



This document's purpose was to **show individual steps during development** of a self-service reporting solution by use of SAP Analytics Cloud (SAC) platform on a real-life scenario as project managers at selected company will use it for human resources utilization management.

The main benefit of such a development is that project managers have been provided with a new self-service reporting solution that completely covers the area of actual and planned capacity management, allocation management of employees on projects and brings visibility into their utilization. The solution exactly reflects all the project managers' requirements, enhances project managers efficiency, reduces manual data processing and associated error rate, and improves overall productivity and clarity resulting in better data-based decision-making along with time and costs savings leading the company to success.

Self-service reporting solution in SAC **enables project managers** to further multidimensionally analyse different views in one place on actual and planned data imported from Runn. Additionally, these views enable managers to easily analyse the overall metrics on the whole company level (and further at any other level of detail), planned allocation on projects with division between external client projects or internal projects within selected company and projects actual allocation. Moreover, the created views clearly inform about **each employee's planned and actual utilization** in selected time range and provides a comparison between the actual utilization and planned utilization for the previous month. All these views can be modified by filtering options that enable, apart from the multidimensional analysis, also data evaluation for both future and previous periods. Owing to the insights that managers gain from these views, they can manage allocations effectively and respond adequately and in time to **prevent human resources from being either underutilized or overutilized**.

This reporting solution in SAC has been developed to meet specific end user's requirements that might more or less differ in other companies and therefore the approach to the solution must be customized accordingly. As already mentioned in the document, **SAP Analytics Cloud target customers** are big international companies that require custom robust planning and reporting solution that can handle huge amounts of data processing. In this case it has been used as even though the selected company is small, its main business is to consult solutions in this platform and therefore development of internal solution for utilization management within this platform did not represent any additional costs for the company. On the other hand, small companies that do not already have licence for SAC or similar platforms, should seek for "lighter" and more cost-efficient tool that will correspond to their needs.

This document is an addition to the main MBI-AF document oriented towards business analytics "AF_II_05_Podnikova_Analytika.pdf". The document is a summary of a master thesis (Novotný, 2024), the full version (including also planning solution part design in Runn) of which can be downloaded at the following link: <https://vskp.vse.cz/92514>

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