

Work package Framework

Overview and Purpose of the document

Goal of this document is to explain the purpose of the work-package-based approach together with descriptions of all important topics and processes. It contains an explanation of all the terms and KPI used while specific numbers are recorded in separate “work package specification” document. This is to reflect different KPI targets which depend on technology and other conditions which differ by work package.

Performance specification

Effective time

Effective time is the time of the worker effectively used for doing the work. No breaks, meetings, no training is included.

In more detail, effective time includes activities directly related to output. From opening the trace in the processing tool, over actual processing and confirmation of quality by validator. This indicator captures active processing time and shouldn't include waiting time.

Note: Time for meetings, breaks, training and other inefficient activities is covered either by coefficient for “supporting & management” (explained in payment) or by the standard hourly rate. It's not reflected in any other way.

*Note: Training provided by Valeo is fully paid by standard hourly rate. Training organized by Contractor is covered by the standard hourly rate **after agreement by Valeo**. Standard operational trainings (new employees, improvements in quality) aren't covered by standard rate.*

Processing capacity

Processing capacity is the amount of efficient hours to be delivered to Valeo for the processing of the recordings over a given period of time. Specific capacity is captured in the contract. Any changes must be negotiated and confirmed by both, Valeo and Contractor. In case capacity is not used to maximum, remaining hours are considered to be “idle”. Responsibility of idle hours is addressed in later section.

Processing speed (workload complexity)

Processing speed is specified as “*amount of effective time needed to process one minute of the video*”. Purpose is to simply measure average processing time without introducing any other variables that isn't directly producing any output.

Complexity is reflected by following KPIs:

1. **Processing ratio (PR)** is time spent on processing of one minute of the recording usually also measured in minutes.

“PR = processing time in minutes / minutes of recording”

2. **Validation ratio (VR)** is time spent on checking quality of one minute of the recording usually also measured in minutes.

“VR = minutes spent on validation / minutes of recording”

3. **Total processing ratio (TPR)** is sum of processing and validation time.

“TPR = PR + VR”

Terms “processing ratio” and “annotation ratio” are the same. Term “annotation” is purposely avoided in this document to define general terms that can include other activities than annotation (e.g. sorting).

Several types of the processing ratios can be defined and measured. Usually only two PR are defined in work package:

- PR for annotatable files
- PR for not annotatable files

Work package specification

Specification can be any type of document (word, online, email) that include all the following points:

- Calendar period for price and quality calculation
- Estimation about the amount of data to be processed (not mandatory)
- Expected allocated processing capacity of Contractor (not mandatory)
- TPR targets over time, reflecting the time period during which Contractor must reach performance target.
- Quality targets over time, reflecting the time period during which Contractor must reach quality target.

- List of severe mistakes.

WP becomes active when both sides (Valeo and Contractor) approve it. Active WP signals that workload can be processed by the Contractor according to the conditions in WP specification. Having active WP doesn't reflect the actual workload. Valeo might decide to scrap WP without providing any data.

Goal of WP specification is to establish common ground and expectations how the data will be processed.

Performance calculation methods

Due to the nature of R&D it's very common to work on entirely new activity for both Valeo and Contractor. Additionally, current activity might change due to update of processing rules or data complexity. Such conditions produce need for cost calculation methods which are flexible and adjustable while defending both Valeo and Contractor.

Goal is to account for expectations of both Valeo and Contractor regarding risk of low performance and related costs.

- Valeo expects that Contractor will carry the risk of low performance due to operation issues (low performers, low efficiency)
- Contractor expects that Valeo will carry the risk lower performance due to changes in the WP specification (rules update, complex data).

Calculation methods highlights:

Goal is to precisely estimate effort (processing time) needed to process the workload. WP can be based on one of the several calculation methods. These methods reflect the different conditions that influence effort estimation and calculation:

- Timeline and duration of the project (e.g. short vs. long)
- Knowledge about processing complexity (e.g. how much effort should individual processing steps take)
- Knowledge about data complexity (e.g. distribution of the scenes according to the weather)

Calculation methods are presented in the following way:

- methods are sorted in a way that solutions with lower numbers are preferred.
- methods are sorted in a way that first option require the most accurate efforts estimation and the last one requires very little. In other words, first one relies on accurate effort breakdown while the last one is based

List of performance calculation methods:

1. Effort units evaluation

- Each video is evaluated based on the number and complexity of the processing steps that has been done by the worker.
- For example number of processed frames, length of the RB lines and number of attributes.
- This method is most accurate but also most complex as it requires accurate breakdown of the efforts and IT solution for precise evaluation.

2. Fixed effort evaluation

- Each video has the predefined value.
- WP specification provides expectations regarding efforts and data complexity.
- Requires both clear effort and data complexity expectations.

3. Category based evaluation

- Each video is evaluated according to the related complexity category (list) or combination of such categories (matrix).
- Example of list evaluation is weather (sunny, rain or fog)
- Example of matrix evaluation is weather related to number of the objects
- Requires clear effort expectations about individual categories.

4. Time and material (T&M)

- Evaluation is done according to actual efforts spent by Contractor to process video.
- Targets are set in parallel with processing of the videos. Contractor is responsible for trying to achieve maximum efficiency
- The most flexible solution for short or high-priority workload which hasn't been mapped properly in terms of effort.

Change requests and complains:

- Valeo expects that Contractor will do the maximum to achieve the targets and that Contractor won't escalate cases with extremely low occurrence which fall inside tolerance buffer. These cases are rare and doesn't accurately represent the complexity of the all data.
- Contractor expects that Valeo will adjust the evaluation targets according to actual complexity in case that Valeo isn't able to disprove that the issue is related to data complexity.

Quality specification

Valeo quality check team evaluates each recording based on the following documents:

1. **Baseline rules (BR)**, baseline document for all activities with clear technical instructions about quality.
2. **Baseline rules appendix (BRA)**, created and updated during technical discussions with the Contractor to clear up any misunderstanding and provide more specific explanation for areas which Contractor considers unclear.

Quality categories:

- OK (follows the rules)
- NOK/repair - repaired by Valeo
- NOK/rework - send for rework to the contractor
- NOK/severe - send for rework to the contractor and has influence on pricing

Quality KPIs:

- Average number of mistakes per 1 minute
- Ratio of severe mistakes per 1 minute
- Number of rework iterations that include same mistakes between iterations (only for partial review described in “price of quality” section)

Mistakes can occur due to:

- Imprecise annotation according to the baseline rules
- Missing annotation specified in baseline rules
- Additional annotation not specified in baseline rules

Mistake is defined as comprehensive breach of the baseline rules related to the specific part of the data. For example in annotation:

- Missing annotation of the object between the frames 100-150 is one mistake
- Missing annotation of the object between the frames 100-120 and 130-150 are two mistakes.

List of severe mistakes will be added to each work package specification and it might be updated during WP life cycle. It will specify mistakes which:

- Shouldn't be missed by trained workers. Receiving these mistakes signals critical error in Contractor's validation process.
- Are especially critical for evaluation by the customer and as such Contractor's team should be especially careful not to produce these mistakes..

Contractor is fully responsible for delivery only of OK traces. In another words, Contractor is fully responsible to make sure that every situation and scenario inside the delivery follows specified

quality documents. Corrupted and other types of files must be clearly marked and separated. No low quality traces should reach Valeo QC.

In case contractor is convinced that some scenarios aren't properly covered by the current rules and the rule appendix, he is responsible for marking the trace and immediately escalating it to the Valeo point of contact who will communicate how to proceed and updates quality documents if necessary.

Responsibilities:

Valeo is responsible for BR management (creation and updates) and it provides clear instructions which version to use.

Contractor is responsible for updating Q&A table where Valeo clarifies the specific situations which Contractor's team considers to be unclear.

Valeo might consolidate Q&A to create or extend BRA. Goal is to provide more specific rules in easy to read structure to help workers better understand the BR. Appendix is an extension of the baseline rules and it's release doesn't influence the current version of BR.

Role of baseline documents in quality check

QC team evaluate according to the following criteria:

- NOK in case that annotation goes against the rules described in baseline documents (e.g. missing annotation)
- OK with recommendation for annotation that can't be clearly decided according baseline documents (e.g. some camera based scene attributes)
- OK for any other annotation (either correct annotation or annotation that isn't covered by BR)

Contractor can dispute QC evaluation in case that it doesn't follow this process.

Note: Contractor is expected to reflect QC results in the continuous on-site quality training.

Payment

Billing period is based on calendar months. Monthly fee will be based on the amount of processed minutes that were delivered to Valeo and checked for quality.

Actual invoiced amount is based on following topics:

- Price of performance (price per one delivered trace)
- Price of quality (price per delivered low quality trace)
- Price of idle time (price for unused processing capacity)
- Price of delivery (price for low amount of delivered files)

Principles of cost calculation:

- Payment is based on the file output, not T&M spent on producing them (Contractor carries the risk of low operation efficiency).

Note: Only applies for calculation methods different from T&M

- Output files are translated to efforts according to the targets set in WP specification. These efforts are subject of payment by Valeo.
- Only efficient time (net time spent on processing) is considered.
- Inefficient time (e.g. meetings, internal trainings) is being reflected by the coefficient for “management & supporting activities” or in standard hourly rate.

Price of performance:

Calculation of the baseline price per trace is done by in the following way:

1. Establish efforts needed for processing one minute file (TPR)
2. Add time for mandatory activities (management and support)

For example:

Project	Total Annotation Rate in min	Management	Supportive activities	Hourly Rate	Fixed price for 1 min of video
Honda	160	+10%	+15%	10 EUR	33.73 EUR

Note: Currency used can be changed to different from euro after confirmation by Valeo

Purpose of this categorization is to clearly distinguish between the target to process one minute (net time ~ TPR) and supporting/inefficient costs. This allows standardized and fair approach to all annotation sites.

Time for management and supporting activities is considered to be high enough to also provide additional time to absorb operational issues and some variation in data complexity. Only serious mismatch between WP specification targets and actual situation should be escalated.

Calculation of processing ratio:

Total processing ratio will be based on one of the methods explained in the previous section about WP calculation methods:

- Effort units evaluation
- Fixed effort evaluation
- Category based evaluation
- Time and material

Alignment between Valeo and Contractor will be usually done by one of the following ways:

- Workshop between both parties where estimations will be established and confirmed
- Previous experience with activity supported by data which allows for reasonable estimations
- Preliminary estimation by Valeo based on measurable conditions which will be updated to reflect real situation if needed
- Time and material approach which will be managed during actual work.

Price of quality:

Quality check scope:

1. Full review of the data. All data is quality checked in full length. Contractor receives a complete report with all the mistakes. Data with mistakes might be repaired by Valeo or sent for rework to the Contractor.
 - Sanctions are based on the average number of mistakes per 1 minute of recording.
2. Partial review of the data. Only percentage of data (specified in WP) is going to be quality checked. Contractor receives a list of mistakes for quality checked files and is expected to check and repair the faulty and remaining data.
 - Sanctions are based on repeated NOK evaluation of the batch. Only repeated mistakes between quality check iterations make batch valid for a sanction.
 - Actual sample size might be less in case that average number of mistakes identified by quality check exceeds the target specified in WP. In this case batch is returned for rework immediately.

Evaluation & sanction matrix:

Low quality is reflected differently for following cases:

- Average number of mistakes is higher than the target set in the work package specification (only for full review evaluation method)
- Batch of data contains the same type of mistakes identified by quality check during previous evaluation round (only for partial review evaluation method)
- Trace contains severe mistake (always sent for rework)
- Trace has been sent for rework

Category	Target	Actual vs. Target	Scope	Impact on pricing
Average number of mistakes (full review)	Max. 105% of WP target	More than 105%	Delivered work package traces for given period	-5% of total value
		More than 110%		-10% of total value
		More than 120%		-20% of total value

		More than 130%		-30% of total value
Number of rework iterations (partial review)	0	Number of rework iterations that include same mistakes between iterations	Delivered work package	-2.5% of total value (per iteration)
NOK-rework (severe)	0%	More than 0%	Just delivered trace	-50% of total value Efforts for rework covered by Contractor.
NOK-rework	N/A	N/A	Just delivered trace	Efforts for rework covered by Contractor.

Note: In case that QC lacks capacity for full evaluation during a specific period, it can be shifted to the next month. Meaning full price will be paid for delivering traces in month N but reduction from price will be done in N+1 (after QC evaluation of the batch).

Price of idle time

Idle time occurs when Contractor doesn't have enough data from Valeo to fully fill out the processing capacity. Valeo is responsible for idle time costs that have occurred due to lack of data provided by Valeo, inside Processing capacity and only if the workforce has been fully idle. Valeo isn't responsible for idle time costs in these cases:

- Valeo is only responsible to provide enough data to cover for Processing capacity according to targets in WP specification. If the data is processed faster than expected, resulted idle time isn't covered by Valeo.
- Valeo isn't responsible for idle time that has been used by Contractor to cover for lower performance. The resources of Contractor needs to be fully idle.
- Valeo isn't responsible for idle time that has occurred due to refusal of WP specification.

1. Idle time due to fast processing - Contractor is responsible

Valeo is only responsible to provide enough workload to cover for Processing capacity (measured in hours). Provided workload is calculated using the following approach:

Processing capacity: 1000 hrs

Provided workload: 180 files

Effort target per file: 6 hrs (WP specification)

*Covered capacity: $180 * 6 = 1080$ hrs*

In case that actual efforts are less (reduction from 6 to 5 hours of effort), Valeo isn't responsible for the idle time. This situation is described in the following example:

Processing capacity: 1000 hrs
Provided workload: 180 files
Effort target per file: 6 hrs (WP specification)
*Covered capacity: $180 * 6 = 1080$ hrs*
Actual effort per file: 5 hrs
*Actual capacity used: $180 * 5 = 900$ hrs*
Idle time: 100 hrs

In this case, Valeo isn't responsible for idle time of 100 hours.

2. Idle time due to lack of data (workforce isn't idle) - Contractor is responsible

Valeo isn't responsible for the idle time that Contractor has used to cover for low performance. These resources aren't truly idle and the Contractor is responsible for additional costs due to low performance. Idle time in this case isn't valid.

Processing capacity: 1000 hrs
Provided files: 180 files
Effort target per file: 5 hrs (WP specification)
*Covered capacity: $180 * 5 = 900$ hrs*
Actual effort per file: 6 hrs
*Actual capacity used: $180 * 6 = 1080$ hrs*
Idle time: 0 hrs

3. Idle time due to refusal of the work package - Contractor is responsible

Both Contractor and Valeo should work together to find challenging but fair targets and expectations. Valeo must be always able to clearly establish conditions on which efforts estimations are based so these conditions can be revisited later and updated if the actual situation is different. In case that Contractor refuses work package without consent of Valeo, Contractor is responsible for any idle time costs that arise as a result of this action.

4. Idle time due to lack of data (workforce is idle) - Valeo is responsible

Idle time costs that has been caused by lack of data from Valeo side, and doesn't fall into the previous categories, is considered a Valeo's responsibility.

To properly invoice idle time costs, Contractor must do following:

- Define time period between the data delivery and the distribution to workforce (e.g. 4 hours). This means that even if data is delivered to idling workforce, there will be 4 hours of additional idle time before the data is distributed and idle time stops.
- Report idling resources and amount of files to the Valeo on a daily basis. Method of reporting is to be specified by Valeo.
- Only real idling resources are to be reported. Not the full capacity of the Contractor. This means that for example workers on sick leave aren't going to be reported as idling.

Note: Valeo isn't responsible for lack of data caused by Contractor. For example logistic issues on side of Contractor such as losing HDD with data.

Price of delivery

Goal of the milestones is to ensure the steady delivery of the processed data by the Contractor. This is achieved by introducing sanctions in the form of the hours that are subtracted from the invoice. Subtracted hours are added to the later invoice in case that Contractor makes up for the difference in data deliveries.

Sanctions essentially work like a buffer in the following way:

- Hours are added to the buffer in case of low deliveries (blocked)
- Hours are removed from the buffer in case of high deliveries (invoiced)

Delivered hours calculation:

Delivered hours is a number of efficient working hours delivered to the Valeo. These hours are calculated from all deliveries for the given period according to the targets inside WP specifications. Calculation is done in the following way:

WP1 deliveries: 100 files

WP2 deliveries: 200 files

WP3 deliveries: 300 files

WP1 effort target: 50 minutes

WP2 effort target: 100 minutes

WP3 effort target: 150 minutes

*Delivered hours = $((100*50)+(200*100)+(300*150))/60 = 1166.66$ hrs*

In this example Contractor has delivered 1166.66 hrs to the Valeo.

Milestone calculation:

Calculation of sanctions and reparations is captured in the following table:

Delivered hours vs. Processing capacity	Payment effect	Example (1000 hrs capacity)
Delivered less than 90%	10% of invoiced hrs blocked	<i>Delivered: 850 hrs Blocked: $850 * 0.1 = 85$ hrs</i>
Delivered less than 80%	20% of invoiced hrs blocked	<i>Delivered: 750 hrs Blocked: $750 * 0.2 = 150$ hrs</i>
Delivered more than 90%	(X% over 90%) of invoiced hrs returned	<i>Delivered: 1100 hrs Return ratio: $1100/1000 - 0.9 = 20\%$ Returned: $= 1100 * 0.2 = 220$ hrs</i>

Note: Total amount of returned hours can't go over the amount of hours that has been sanctioned for the past invoicing periods.

Payment calculation method

The monthly fee billed to Valeo will be based on number of delivered minutes. Only minutes accepted by QC are billable. Monthly fee is calculated in the following way:

Price per trace:

$$OK_traces = TPR_target * video_minutes$$

$$NOK-severe_traces = TRP_target * video_minutes * 50\%$$

Price per work package:

$$Work\ package\ deliveries = (OK_traces + NOK-severe_traces) * QualityCoef$$

Total amount to be invoiced:

$$Total\ invoiced\ amount = (sum\ of\ all\ WP\ deliveries * delivery\ coefficient) + valid\ idle\ hours$$

Note: Billing is only possible based on approved timesheet.

Change requests and complains

Contractor can request change of the price according to the following criteria:

1. WP complexity doesn't reflect the complexity of actual data (TPR targets). This point must be proven over the significant statistical sample and confirmed by Valeo.
2. Valeo requests increased Contractor inefficient hours significantly over defined inefficiency buffer.

From past experience additional inefficiency was caused by Valeo due to following issues:

- Frequent change of annotation rules
- Project jumping (frequent switching between projects confuse workers)
- Idle time between batches (workers forget annotation rules)

Note: Introduction of new version of the rules is different from clarification of the rules by annotation site.

Issue	Annotation rules	Project jumping	Idle between batches
Complain trigger	Version change of baseline rules which requires more than 4 hours to be trained.	Annotators are required to switch between more than two projects.	More than two weeks between annotation.
Complain solution	Introduce implementation period.	Increase TPR for the given period to reflect number of influenced workers (10% per worker)	Increase TPR (specific number depends on project complexity)
Price of delivery	Reduce processing capacity to reflect hours needed for implementation.	Reflected in TPR	Reflected in TPR
Price of quality	During implementation period accept both versions of the rules as OK.	Reflected in TPR	Reflected in TPR
Price of performance	Implementation hours are paid by standard hourly rate. Reflect new changes in TPR targets if needed.	Reflected in TPR	Reflected in TPR

Reports and data sources

Valeo provides templates for all reports to ensure standardized approach. Contractor is responsible for filling provided reports on a daily basis with accurate data. In case the data won't match received output Valeo reserves the right to withhold payment for affected traces until contractor corrects the reported data.

Naming conventions for files and logistic processes must be followed according to Valeo specification. Valeo reserves right for reparation in case of lost files or any problems caused by not following the specified procedures.