MMS Golden Rules for calculating metrics from AAM Panel data

2021-05-06

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1. Components

1.1 The virtual panel

The AAM virtual panel is based on the combination of two main data sources:

- The Census traffic measurement where each individual impression is measured at a detailed level but does not give information about the audience behind the traffic.
- The Online panel where 5000 panelists are measured across their digital devices. This data provides insights of the behavior within different socio-demographic target groups but could not on its own handle the long-tail of fragmented viewing.

The aim of AAM model is to combine the strengths from each data set into one single data source to be used for calculations of all different audience metrics.

This data source is a user-centric dataset consisting of ca 46 000 virtual panelists and their viewing across all platforms and Sites measured in the Census measurement. This dataset gives the ability to calculate audience metrics (including reach and frequency) in a similar way as a traditional panel-based measurement as for example MMS TV Audience measurement.

The boosted panel size gives much better long-tail coverage and ability to analyze also smaller programs that would not be covered by the Online panel on its own.

The plan for up-coming development is also to combine the current AAM-panel with the TAM-measurement to have a virtual panel that cover all available platforms and where total video ratings can be calculated.

The process behind the virtual panel includes several different modelling steps like imputation of missing panel-devices, "cloning" of panelists to boost sample size, cookie deletion model, calibration against census and weighting of panelists.

In addition, there are extra modelling steps to integrate two areas which currently are not covered in the Online panel, the kids target group (age 3-14) and the Big Screen platform. Additional data sources are needed in this part of the process:

- TAM viewing data for kids age 3-14.
- A survey about the online panelists streaming behavior in the big screen.

A description of all parts involved in the modelling process will be published at mms.se.

1.2 AAM Data

The AAM data delivery consists of four datasets: AAM Panelist file, AAM viewing file, AAM metadata file and AAM site summary file. MMS will in addition to these file deliveries also publish universe figures for the different target group components on mms.se.

All these components are needed to calculate the metrics as described in this document.

- The panelist file contains all possible panel viewers, their weights, and sociodemographic variables.
- The viewing file contains viewing statements for Online video content at a panelist level, which allows for calculations of several different metrics including reach metrics.
- The metadata file contains information about the titlecodes included in the viewing file, such as title name, date of publication, program length etc.
- The site summary file contains aggregated total number of starts and duration from census measurement per SiteID and Date, to be used according to the description in section 3.
- The universe figures contain the number of individuals in Swedish population per each target module (gender and age group). To be used for calculating relative audience and as an input parameter in the Reach and Frequency population.

Data will initially be delivered weekly, with the viewing file containing all viewing statements for a complete week (Monday to Sunday). The aim is daily deliveries with one file per each viewing day, but this process requires further development at MMS and will be launched at a later stage.

The AAM data should only be used according to the rules as described in this document.

1.3 Objects of measurement

The smallest object of measurement is the titlecode which is a unique ID referring to a specific episode or clip within a Site. Calculations can be made over an aggregation of multiple titlecodes, for example a complete series.

The combination of SiteID and Titlecode is the unique key between the viewing file and metadata file.

Please note that different metrics require different approaches when performing calculations across multiple titlecodes or viewing days. This will be described per each metric separately in section (2).

1.4 Calibration

The AAM model uses a calibration step to ensure that the number of contacts and total sum of viewing time calculated by the panel is equal to the result coming directly from the Census traffic measurement. This calculation is performed by the combination of SiteID, titlecode, and viewing day.

Please observe that only objects (titlecodes) that are observed in the AAM panel can be calibrated against the census measurement. The object behind the AAM method is to create a big panel with great long-tail coverage, but there can still exist very small titles that consequently have a small probability of being observed in the panel. For objects too small to be captured by the panel, there will be a discrepancy in comparison with the census traffic measurement.

Calculations of total number of starts or viewing time for a Site should always be done according to the rules in section 3 to avoid discrepancies between census measurement and AAM data due to titles not being watched by any panelist.

1.5 Report types

The AAM data can be used for two different reporting types:

Viewing day reports – A viewing day is the day when the viewing took place. In this type of report the metrics are calculated and reported per each viewing day in the selected time frame, regardless of when the content originally was published.

Consolidated reports- The base for consolidated reports is the publication day for when the specific content was published and hence made available for viewing. The metrics are then accumulated over the X number of viewing days following the date of publication.

The three standard consolidation periods are:

- *KO8-* Publication day + the 7 following viewing days.
- *KO28-*Publication day + the following 27 viewing days.
- *SoFar-* Publication day + all following viewing days so far available in the measurement.

Consolidated reports are best used to for example analyze the sociodemographic profiles of the complete audience for a program, or to compare different programs based on an equivalent number of measured days.

1.6 Target modules

The sociodemographic information available today are combinations of gender and age brackets. There is currently a total of 18 possible target modules that can be combined into desired target group constellations.

1.7 Universes

The AAM panel is weighted with respect to gender, age groups and cross-device access, for each panelist to represent the correct number of device users in the Swedish population.

The universe figures are being derived from the establishment survey (MMS Basundersökning). They will be published on mms website mms.se and updated twice a year.

The universe numbers to use in the calculations of relative audience are the total sum of individuals in Swedish population per each target module.

2. Calculation of metrics on content level

2.1 Number of contacts

Number of contacts is defined as the total number of non-unique contacts made during a specific period. The calculation can be made for a specific titlecode or aggregated over a selection of multiple titlecodes. The results can also be aggregated freely over a longer time period.

Per the viewing days (d) and Titlecodes (t) that matches the selection, the number of contacts is calculated according to the formula:

$$Number\ of\ contacts_{d,t} = \sum_{v=1}^{V}(c_v * w_p * cf_v)$$

Where:
V= Total number of relevant viewing statements v in AAM viewing file.
c= Number of uncalibrated contacts for viewing statement v.
w= Weight for panelist p belonging to viewing statement v.
cf= Contacts calibration factor for viewing statement v.

Calculation across multiple titlecodes

The results per each combination of titlecode and viewing day separately can be summarized into the desired aggregation of multiple titlecodes.

Viewing days d1-d11

	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11
t1	1000	888	23	0	13	556	33	22	21	2	57
t2			2987	456	1028	332	35	276	18	100	224

Titlecodes t1 & t2

The total number of contacts on viewing day d3 for t1+t2= 3010

Calculation across multiple viewing days

A viewing report can contain the aggregated number of contacts for a longer *viewing period* by summarizing the results from each viewing day.

Viewing days d1-d11

	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11
t1	1000	888	23	0	13	556	33	22	21	2	57
t2			2987	456	1028	332	35	276	18	100	224

Titlecodes t1 & t2

The total number of contacts for t1+t2 during viewing period (d3-d7)=5463

Consolidated results

The consolidated number of contacts equals the aggregated number of contacts for the publication date and the X following viewing days (the 7 following viewing days for KO8).

Assume d1 and d3 as publication dates for t1 and t2 respectively in the below example:

Viewing days d1-d11

	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11
t1	1000	888	23	0	13	556	33	22	21	2	57
t2			2987	456	1028	332	35	276	18	100	224

Titlecodes t1 & t2

The consolidated number of contacts for t1+t2 consists of the aggregated number of contacts for viewing days d1-d8 for titlecode t1 and d3-d10 for titlecode t2.

2.2 Total viewing-time

Total viewing time is defined as the total aggregated duration of all contacts. The calculation can be made for a specific titlecode or aggregated over a selection of multiple titlecodes. The results can also be aggregated freely over a longer time period.

$$Total\ viewing\ time_{D,t} = \sum_{v=1}^{V}(d_v * w_p * df_v)$$

Where:
V= Total number of viewing statements *v* in AAM viewing file.
d= Viewing time duration for viewing statement *v*.
w= Weight for panelist *p* belonging to viewing statement *v*.
df= Duration calibration factor for viewing statement *v*.

The formula above calculates the total viewing time in seconds. When reporting total viewing-time, the result should be rounded to number of hours.

Viewing days d1-d11

	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11
t1	48000	41820	1020	0	420	14799	1320	780	600	60	2820
t2			75510	20700	44955	10936	855	5355	270	3915	6930

Titlecodes t1 & t2

Total viewing-time in seconds for titlecode 2 on viewing day d3 is 75510. This gives 21 hours.

Calculation across multiple titlecodes

The results per each combination of titlecode and viewing day separately can be summarized into the desired aggregation of multiple titlecodes.

Calculation across multiple viewing days

A viewing report can contain the aggregated total viewing time for a longer *viewing period* by summarizing the results from each separate viewing day.

Consolidated results

The consolidated number of contacts equals the aggregated total viewing time for the publication date and the X following viewing days (the 7 following viewing days for KO8).

The logic for calculating total viewing time across multiple titlecodes and/or viewing days is equivalent to the approach for number of contacts. See section (2.1) for more detailed illustration of the scenarios.

2.3 Onlinerating

Onlinerating is defined as the average number of viewers per second during the length of a program. Onlinerating is a non-unique measure of the program's audience size, where the intensity of viewing time has been considered.

The onlinerating per each combination of titlecode(t) and viewing day (d) is calculated as:

$$Onlinerating_{d,t} = \frac{\sum_{v=1}^{V}(d_v * w_p * df_v)}{L_t} = \frac{Total\ viewing\ time_{d,t}}{L_t}$$

Where:
L = Program length for titlecode t.

The numerator of the formula above equals the calculation of total viewing time in section (2.2).

Viewing days d1-d11

	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11
t1	48000	41820	1020	0	420	14799	1320	780	600	60	2820
t2			75510	20700	44955	10936	855	5355	270	3915	6930

Titlecodes t1 & t2

The base for the calculation of onlinerating is the total viewing time calculated exactly as in (2.2).

Assume program length 60 seconds and 45 seconds for titlecodes t1 and t2 respectively in below example:

Viewing days d1-d11

	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11
t1	800	697	17	0	7	245	22	13	10	1	47
t2			1678	697	999	243	19	119	6	87	154

Titlecodes t1 & t2

The onlinerating for t2 on viewing day d3 will be: (75510/45)=1678.

Consolidated Onlinerating

To calculate the consolidated onlinerating, the total viewing time in seconds needs to be calculated according to (2.2) for each viewing day included in the consolidation period. Then the aggregated total viewing time across the consolidation period should be divided with the length of the program (displayed in seconds).

$$Onlinerating_{(d1+d2+...+dD),t} = \frac{\sum_{d=1}^{D}(Total\ viewing\ time_{d,t})}{L_t}$$

Where:
D= Number of days included in the consolidation period.
L= Program length (in seconds) for titlecode t.

Viewing days d1-d11

		d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11
Titlecodes t1 & t2	t1	48000	41820	1020	0	420	14799	1320	780	600	60	2820
	t2			75510	20700	44955	10936	855	5355	270	3915	6930

The consolidated (KO8) onlinerating for titlecode is
t2=(75510+20700+44955+10936+855+5355+270+3915)/45=3197

The rating can also be displayed in relative figures, where the absolute rating is divided by the universe size of the selected target-module(-s):

$$Relative\ onlinerating\ = \frac{Onlinerating_{(d1+d2+...+dD),t}}{U_M}$$

Where:
U= The aggregation of universe sizes for all relevant target-modules M.

Onlinerating across multiple titlecodes

The calculated onlinerating for specific titlecodes are not aggregable across multiple titlecodes. Calculation needs to be done once on the total selection of titles.
The onlinerating across multiple titlecodes are being done by summing the total viewing time for all selected titlecodes according to formula (2.2), and dividing it by sum of each individual titlecodes program length (in seconds):

$$Onlinerating_{d,(t1+t2...+tT)} = \frac{\sum_{t=1}^{T}(Total\ viewing\ time_{d,t})}{L_{t1} + L_{t2}+...+L_{tT}}$$

Where:
L= Program length (in seconds) for titlecode t.

The onlinerating can also be calculated as an average across multiple titlecodes. In this case, the onlinerating for each titlecode are first calculated specifically. Then the sum of ratings should be divided by the number of unique titlecodes in the selection:

The onlinerating for multiple titlecodes, for example a complete series, should instead be calculated as the average onlinerating across the selected titlecodes:

$$Average\ onlinerating_{D,(t1+t2...+tT)} = \frac{\sum_{t=1}^{T}(Onlinerating_{D,t})}{T}$$

Where:
T= Number of unique titlecodes included in the selection.

Viewing days d1-d11

	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11
t1	800	697	17	0	7	245	22	13	10	1	47
t2			1678	345	999	243	19	119	6	87	154

Titlecodes t1 & t2

The average onlinerating for the two titlecodes t1+t2 on viewing day d3 is (17+1678)/2=847,5 (848).

2.4 Reach within a single viewing day

This metric calculates the number of unique individuals viewing a title or groups of titles each day. The object of measurement can be a specific titlecode, or a group of titlecodes belonging to for example a series or a complete Site.

For a titlecode (*t*) or a group of selected titlecodes (*T*) the absolute reach per each viewing-day (*d*) are to be calculated as:

$$Absoulte\ reach\ (single\ day)_{d,(t1,t2...tT)} = \sum_{p=1}^{P} w_p * D_{p,v}$$

$$D_{p,v} = \begin{cases} 1, & \text{if first matching } v \text{ for panelist } p \\ 0, & \text{else} \end{cases}$$

Where:
P= Total number of panel-members in selected target-module(-s).
w= Weight for panelist *p.*
v= Viewing statement for panelist *p* that matches the selection criteria.
D= A 'dummy'-variable that indicates if the panel-members viewing statement *v* should be considered in the reach calculation or not. Each individual panelist should only be counted once, regardless the number of times the panelist has viewed any titlecode in the selection.

The accumulated sum of weights of unique panel-members could then to be divided with the universe size of the current target-module(-s) in order to calculate the relative reach:

$$Relative\ reach\ (single\ day)_{M,d,T} = \frac{Absolute\ reach\ (single\ day)_{M,d,T}}{U_M}$$

Where:

U= The aggregation of universe sizes for all relevant target-modules **M**.

Reach criterion
The reach calculation can be combined with a reach criterion stating that the panelist needs to have been viewing for at least X continuous seconds/minutes to be included. The reach criterion should be based on the column Duration in the viewing file. For the absolute reach formula in 2.3 this means that the 'dummy'-varible D should be set to 1 only for the first viewing statement of each panelist p where the duration is equal to or longer than the specified reach criterion.

Calculation across multiple titlecodes
Reaches for separate titlecodes cannot be aggregated with each other. The reach calculation should always be performed directly on the complete selection of unique titlecodes.

Calculation across multiple viewing days
For calculating reach across a period of multiple viewing days, see section (2.6).

Consolidated results
Calculation of consolidated reach requires a reach calculation across several viewing days, which will be further specified in section (2.6).

2.5 Average viewing-time per start
Average viewing-time per start is a calculation of the time spent on average per start of the content measured. Average viewing-time is calculated by dividing total viewing-time (2.2) with total number of contacts (2.1) for the specific selection of titles and time period.

$$Average\ viewing\ time\ per\ start\ = \frac{Total\ viewing\ time}{Number\ of\ contacts}$$

2.6 Average viewing-time per viewer
This metric calculates the average viewing-time per the number of unique individuals who have watched the content measured. Average viewing-time per viewer is calculated by dividing total viewing-time (2.2) with the absolute reach of unique individuals (2.3)

$$Average\ viewing\ time\ per\ viewer\ = \frac{Total\ viewing\ time}{Absolute\ reach}$$

2.7 Average viewing-time in population
The average viewing-time can also be calculated in relation to the size of the population (as a whole or as a specific target-group). This definition is equivalent to the one used for calculating average viewing time in MMS TV audience measurement. When

comparing average viewing-time between online video and broadcast TV, this is the definition to be used.

$$Average\ viewing\ time\ in\ population\ = \frac{Total\ viewing\ time}{U_M}$$

Where:

U= The aggregation of universe sizes for all relevant target-modules **M**.

2.8 Reach and frequency across multiple viewing days

This section refers to calculation of unique viewers over a period covering several different TV-days. The calculation can be performed on a selection of multiple titlecodes combined.

Panel-day

In this kind of calculation, a certain *panel-day* should be used. The official recommendation is to use the first day of the selected period as the panel-day. The panel-day used for a specific analysis should always be shown in the final report of the results.

Example: The selected period for the analysis is 20210101-20210107. In this case 20210101 will be used as the panel-day.

The base for the calculation is the set of all possible panelists, including their weights, from the AAM panelist-file belonging to the panel-day. Only this set of panelists and their viewing during the selected viewing-period are to be considered in the reach calculation. Any viewing made by a panelist not belonging to the panel-day should not be included in the calculation.

To correct for differences between the reporting samples for each specific day and the used sample belonging to the panel-day, MMS will use the negative binomial distribution (NBD) to model the final frequency distribution. This is the same method as used for Reach and Frequency in the TV currency.

MMS official recommendation is to not perform reach and frequency calculations for periods longer than 28 days.

Reach criterion

The calculation of reach across multiple days can be combined with a reach criterion in a similar way as for reach within a single day (2.3).
The calculation of the below described input parameters *True, Raw* and the frequency distribution F_i should then be limited to the set of viewing statements where the *Duration* is equal to or longer than the specified reach criterion.

Calculation of input parameters

The first step is to calculate the input parameters needed for the NBD modelling:

- "True" number of contacts

- "Raw" number of contacts

- "Raw" frequency vector of the number of individuals who have viewed exactly 1 viewing-day, exactly 2 viewing-day…exactly n viewing-days during the selected period.

1. The true number of contacts are basically the total sum of contacts for the selection of T titlecodes and complete period of D viewing-days.

$$True_{D,T} = \sum_{v=1}^{V} (c_v * w_p * cf_v)$$

Where:
V = Total number of relevant viewing statements v in AAM viewing file.
c = Number of uncalibrated contacts for viewing statement v.
w = Weight for panelist p belonging to viewing statement v.
cf = Contacts calibration factor for viewing statement v.

2. The *raw* number of contacts are calculated in a similar way, but with one important difference. Only the viewing statements belonging to panelists included in the reporting sample of the chosen panel-day are to be considered. Also, the panelists weights from the panel-day should be used.

The raw number of contacts for the selection of T titlecodes and D viewing-days are then calculated as:

$$Raw_{D,T} = \sum_{v=1}^{V} (c_v * pw_p * cf_v)$$

Where:
V = Total number of relevant viewing statements v in AAM viewing file, belonging to panelists that are included in the panel-day sample.
c = Number of uncalibrated contacts for viewing statement v.
pw = Weight for panelist p on the panel-day, according to AAM panelist file.
cf = Contacts calibration factor for viewing statement v.

3. For each panelist belonging to the panel-day, all viewing statements (fulfilling the reach criterion) for all viewing-days in the selected period should be used to count the number of active viewing-days within the period.

By then summarizing the weights for the panelists who have viewed exactly 1 viewing-day, exactly 2 viewing-days…exactly n viewing-days

$$F_i = \sum_{p=1}^{P} pw_p$$

for $i = 1,2,3,\ldots,n$

Where:
P = Total number of possible panelists belonging to the panel-day, according to the AAM Panelist file.
pw = Weight for panelist p at the panel-day, according to the AAM Panelist file.
i = Number of days viewed within the period

The "raw" frequency distribution will be adjusted by fitting the negative binomial distribution to it as described in the following section.

1. Calculate the relative frequency distribution by dividing each element of the input frequency vector with the universe size of the selected target-module(-s):

$$Fr_i = \frac{F_i}{U_M}$$

$$for\ i = 1,2,3,\dots,n$$

2. Calculate the share of individuals watching exactly 0 days of the period by summarizing all elements of the frequency vector calculated in the previous step, and subtract this from 1:

$$Fr_0 = 1 - \sum_{i=1}^{n} Fr_i$$

Special case: In case $\sum_{i=1}^{n} Fr_i > 1$, let element $Fr_0 = 0$.

3. Add element Fr_0 to the frequency vector Fr to make it cover $i = 0,1,2,\dots,n$ number of active viewing days.

Special case: In case Fr begins with one or more elements where $Fr_i = 0$, these elements should be removed from the frequency vector before applying the probability model in the following steps.

Example: Assume the following relative frequency distribution:
Exactly 0 days: 0
Exactly 1 day: 0
Exactly 2 days: 0.5
Exactly 3 days: 0.4
Exactly 4 days: 0
Exactly 5 days: 0.1

Since the distribution begins with two elements with value 0, these two elements should be removed from the frequency vector. The remaining Fr_i will then cover the counts $i = 2,3,4,5$.

4. Before being able to apply the model, it is necessary to estimate the needed NBD parameters. The first step is to estimate the parameter k:

$$k = abs\left[-\frac{RawR * ln(Fr_0)}{ln(Fr_0) - RawR * W_{-1}\left[\frac{Fr_0^{\left(\frac{1}{RawR}\right)} * ln(Fr_0)}{RawR}\right]}\right]$$

Where:

RawR= The relative version of the input parameter *Raw*, where it is divided by the universe size of the relevant target-module(-s):

$$RawR = \frac{Raw}{U_M}$$

Fr$_0$ = The value of the 0-element in the frequency vector, as calculated in step 2.
W$_{-1}$[ ]= The Lambert W function, using the secondary branch.

Special case: In case $k > 120$, let $k = 120$.

5. After estimating the value of k, the parameters a and b can be calculated as:

$$a = \frac{\frac{Raw}{k}}{U_M}$$

Where:

Raw: The input parameter of raw number of contacts
U: The aggregation of universe sizes for all relevant target-modules M.

$$b = a * \frac{True}{Raw}$$

Where:

True: The input parameter of "true" number of contacts.
Raw: The input parameter of "raw" number of contacts.

6. With the values of a and b, the NBD probabilities of p_raw and p_true can be calculated as:

$$p\_raw = \frac{a}{(a + 1)}$$

$$p\_true = \frac{b}{(b + 1)}$$

7. With all needed parameters, each element of the frequency distribution Fr will be adjust by using the function of the negative binomial distribution:

$$\widehat{Fr}_i = \frac{\Gamma(k + i)}{i!\,\Gamma(k)}[(p\_true)^i(1 - p\_true)^k - (p\_raw)^i(1 - p\_raw)^k] + Fr_i$$

Where:

$\Gamma(\;)$= Gamma function.
i= The number of $i = 0,1,2,\dots,n$ active viewing days as remaining after step (3.).

Final adjustments and reach calculation

1. The next step is to adjust the sum of the frequency shares to make it equal to 1 (=100% of the population).

In case the sum of $\widehat{Fr} \neq 1$, the difference should be added by adjusting the last, n^{th}, element of the frequency distribution as:

$$\widehat{Fr}_n = \widehat{Fr}_n + \left(1 - \sum_{i=0}^{n} \widehat{Fr}_i\right)$$

Special case: In case any elements of the frequency distribution where removed due to the special case rule in step (3.), these should now be included again (with their values of 0) to make the full adjusted frequency distribution $\widehat{Fr}_i$ cover the complete number of $i = 0,1,2,\dots,n$ number of active viewing days.

2. The relative reach across the selected period can now be calculated as the sum of elements $i = 1,2,\dots,n$, i.e the share of individuals who have watched during at least one of the viewing-days within the period:

$$Relative\ reach\ (across\ multiple\ days) = \sum_{i=1}^{n} \widehat{Fr}_i$$

Calculate the absolute frequency counts by factor all elements of the relative frequency distribution $\widehat{Fr}$ with the universe size of the relevant target-modules(-s):

$$\widehat{F}_i = \widehat{Fr}_i * U_M$$

The sum of the absolute frequency distribution $\widehat{F}$ gives the absolute number of reached individuals during the selected period:

$$Absolute\ reach\ (multiple\ days) = \sum_{i=1}^{n} \widehat{F}_i$$

Cumulative reach over time

The reach calculation can be used to display the growth of additional reached individuals day by day for a selection of Titlecode(s) and viewing period.

All above steps including calculation of input parameters, fitting the probability model and final reach calculation needs to be done in an iterative way adding each day within the period one at a time for d1, d1+d2, d1+d2+d3 etc up until the complete D days of the selected period.

The panel-day, d1=20210101, is chosen based on the complete selected period and should be used for each specific iteration within the period.

	$\widehat{F}_1$	$\widehat{F}_2$	$\widehat{F}_3$	$\widehat{F}_4$	$\widehat{F}_5$	Absolute Reach+1
d1=20210101	100 000					100 000
d2=20210102	80 000	30 000				110 000
d3=20210103	75 000	27 000	8 000			110 000
d4=20210104	70 000	32 000	4 000	4 000		110 000
d5=20210105	65 000	35 000	10 000	2 000	1 000	113 000

Consolidated results

Consolidated reach is per definition a calculation of reach across multiple viewing days and should always follow the rules described in this section.
The consolidated reach (KO8) for a TitleCode covers a period of 8 viewing days (Publication day+ the 7 following viewing days). The panel-day for consolidated reach will always equal the Publication day as it is the first day of the period.

Calculation across multiple titlecodes

Reaches for separate titlecodes cannot be aggregated with each other, since possible individuals who have watched more than one of the titlecodes will be duplicated. The reach and frequency calculation should always be performed directly on the complete selection of unique titlecodes.

3. Calculation of metrics on total Site level

3.1 Total number of contacts

To calculate the total number of contacts per Site, both the AAM viewing file and the site summary file is needed. The reason behind this is to also include the contacts on small titlecodes that are present in census measurement but have not been covered by the AAM panel, while applying the target-group distribution as learned from the AAM panel.

Step 1 is to calculate the share of contacts belonging to target-module *m* out of the total number of contacts across all target-modules (*M*), according to the calculation described in section 2.1.

The calculation should be done across *all* available titlecodes in AAM viewing file for the selected SiteID (*S*) and period.

$$Share\ of\ contacts_{m,S} = \frac{Number\ of\ contacts_{m,S}}{Number\ of\ contacts_{M,S}}$$

The calculated share in each target-module *m* is then applied to the sum of *TotalStarts* from the site summary file for the corresponding SiteID and period:

$$Total\ number\ of\ contacts_{m,S} = Share\ of\ contacts_{m,S} * TotalStarts_{S}$$

By summarizing the total number of contacts in each target-module we will get the total number of contacts for the complete Site. This number will equal the *TotalStarts* already given by the total consumption file, but with the ability of breaking down the results at target group level.

$$Total\ number\ of\ contacts_{M,S} = \sum_{m=1}^{M}(Total\ number\ of\ contacts_{m,S})$$

Example:

The *TotalStarts* for a specific SiteID and Date is 3 000 000 starts according to the site summary file.

The Number of contacts M,S calculated from the viewing file equals 2 835 000 due to the loss of small titlecodes not being covered by the panel during the selected Date.

By factoring the TotalStarts with the share of contacts within each target-module, we will adjust the total number of contacts per Site to reflect the complete census measurement while also being able to use the Sites target-group profile as learned from the panel:

		Number of contacts	Share of contacts	Total number of contacts
female	age14	30000	0,011	31746
female	age19	75000	0,026	79365
female	age24	200000	0,071	211640
female	age29	150000	0,053	158730
female	age44	185000	0,065	195767
female	age49	200000	0,071	211640
female	age59	300000	0,106	317460
female	age64	100000	0,035	105820
female	age99	90000	0,032	95238
male	age14	40000	0,014	42328
male	age19	100000	0,035	105820
male	age24	350000	0,123	370370
male	age29	370000	0,131	391534
male	age44	225000	0,079	238095
male	age49	100000	0,035	105820
male	age59	150000	0,053	158730
male	age64	90000	0,032	95238
male	age99	80000	0,028	84656
		2835000	**1,000**	**3000000**

3.2 Total amount of viewing-time

The total amount of viewing time for a complete Site are calculated in the same procedure as described in 3.1

Summarize the amount of viewing time in each target-module m and divide it by the amount of viewing time across all target-modules (M). This is being done according to the calculation described in section 2.2, across the selection of *all* available titlecodes in AAM viewing file for the selected SiteID (S) and period.

$$Share\ of\ viewing\ time_{m,S} = \frac{Amount\ of\ viewing\ time_{m,S}}{Amount\ of\ viewing\ time_{M,S}}$$

The calculated share in each target-module m is then applied to the sum of *TotalDuration* from the site summary for the corresponding SiteID and period:

$$Total\ amount\ of\ viewing\ time_{m,S} = Share\ of\ viewing\ time_{m,S} * TotalDuration_S$$

And the sum of all individual target-modules will equal the total amount of viewing time for the Site:

$$Total\ amount\ of\ viewing\ time_{M,S} = \sum_{m=1}^{M}(Total\ amount\ of\ viewing\ time_{m,S})$$

3.4 Total reach

Total reaches across one or several Sites are calculated from the AAM panel exactly as described in section 2.3 (for reach within a single viewing day) and 2.8 (for reach across multiple viewing days).