

Material Third Party Reporting (MTP) Template – Summary of the changes to the MTP Reporting template post-consultation

ID PS	ID CP	Data Field – PS	Data Field – CP	Brief Description (please see relevant template and guidance document for detailed guidance)	Summary of changes made and rationale
1.01	1.03	Reporting date	Reporting date	<p>MTP Notification: Please enter date when notification submission was made.</p> <p>MTP Register: This field is pre-populated with the reporting period end date in YYYY-MM-DD format (e.g. 2025 MTP register will be 2025-12-31)</p>	<p>Changes to the data field description reflect the MTP Notification and MTP Register template separation.</p> <p>For Register only: This field will be pre-populated for the MTP Register template and will not require any action from firms.</p>
1.02	1.06	Submission ID	Submission ID	Integer from 1, each resubmission should increase the Submission ID by 1 so that the Submission ID for the second submission would be 2 and so on.	No change apart from Field ID
1.03	1.02 1.04 FCA 3.08 PRA 3.10	Submission type	<ul style="list-style-type: none"> - Risk type - Submission period type (e.g. Annual, Ad-hoc) - Is this a new contract or contract renewal? 	<p>MTP Notification: Please specify submission type by choosing an option from the given dropdown</p> <p>MTP Register: This field is pre-populated as 'Annual Material Third Party Register' – no action required by firms</p>	<p>Data fields in consultation paper 'Risk type', 'Submission period type' and 'Is this a new contract or contract renewal?' have been merged to create this field.</p> <p>Changes to the data field description reflect MTP Notification and MTP Register template separation.</p> <p>For Register only: The 'Submission type' field will be pre-populated for the MTP Register template and will not require any action from firms.</p>
1.04	2.01	Firm name	Firm name	Please provide your firm name as recorded in the FCA Financial Services Register.	No change apart from Field ID

1.05	2.02	FRN	FRN	Please provide your Firm Reference Number (FRN) as recorded in the FCA Financial Services Register	No change apart from Field ID
1.06	2.03	FRN of group holding company (if applicable)	FRN of group holding company (if applicable)	Please provide the FRN of the group holding company if the firm is registered or authorised with the FCA to provide financial services. If your firm is already the holding company, please enter "N/A".	No change apart from Field ID
1.07	FCA-3.09 PRA-3.11	If contract renewal, please provide details of significant changes made (if any)	If renewal, please provide details of any significant changes made (if any)	If you choose 'Contract renewal' for 'Submission type', please provide a short description of the changes made to the contract. We expect a renewal notification only if there is a significant change in the contractual arrangement.	This data field is in the MTP Notifications template only, it does not feature in the MTP Register template
2.01	3.01	Contractual Arrangement Reference Number	Contract Reference Number	Identify the contractual arrangement between the financial entity or, in case of a group, the group subsidiary and the direct third-party service provider. The contractual arrangement reference number is the internal reference number of the contractual arrangement assigned by the financial entity. The contractual arrangement reference number shall be unique and consistent over time at entity, sub-consolidated and consolidated level, where applicable.	The data field name has been amended to reflect consultation paper CP feedback that a contract may have more than one arrangement associated with it.
2.02	4.01	Legal name of service provider	Name of service provider	Please specify the legal name of the service provider stated in your contract and use it consistently throughout the submission.	The data field name and description has been amended to clarify information required and drive data validation.

2.03	4.03	Legal Entity Identifier	Legal Entity Identifier (LEI) of the service provider	Please specify the Legal Entity Identifier (LEI) of the service provider. Where the Service Provider has no LEI, please enter "N/A".	No change apart from Field ID
2.04	3.03	Is the MTP contractual arrangement outsourcing or non-outsourcing?	Is the arrangement considered outsourcing or non-outsourcing?	Please specify whether the contractual arrangement is Material Third Party (MTP) outsourcing or non-outsourcing by choosing from the given dropdown.	The data field name and description have been amended to reference 'contractual arrangements', in light of consultation feedback that a contract may have more than one arrangement associated with it
2.05	FCA 7.01 PRA 3.04	Type of Service Provided	Type of Service	Please specify the type of service provided by choosing from the given dropdown. If more than one option applies, please refer to the guidelines Section 'Multiple Responses'.	The data field name and description have been amended to clarify information required and differentiate between the service provided and the firm services it supports the delivery of.
2.06	FCA 7.02 PRA 3.05	If the contractual arrangement is on cloud, please state the cloud deployment model	If cloud, please state which type of product	Please specify the cloud model by choosing from the given dropdown.	The data field name has been amended to clarify information required. This data field is now Required as the taxonomy has been expanded to include 'Non-cloud'. This allows the regulators to drive better data validation.
2.07	FCA 3.12 PRA 3.14	Short description of product/service provided	Short description of the externally provided function	Please provide a short description of the product/service provided	The data field name and description have been amended to clarify information required
2.08	5.01	Supply Chain Ranking	Supply Chain Ranking	Where the service is provided through an intragroup arrangement, that intragroup arrangement should be denoted as supply chain ranking 0.	The data field description has been expanded to include examples of information required.

				<p>Where the Service Provider has a direct relationship with the firm, and is considered to be the first external Service Provider, please denote its ranking as 1.</p> <p>Where the Service Provider supports the delivery of a service through another Service Provider, i.e. a 4th party, please denote its ranking as 2. Similarly a 5th party would be denoted as a ranking of 3, and so on.</p>	The taxonomy has been removed from this field to allow firms to fully map the critical elements of their supply chain as needed.
2.09	FCA 3.04 PRA 3.06	Date of commencement of the contractual arrangement	Date of contract commencement	Please enter the start date of the contractual arrangement as stipulated in the contract. Please enter in the format of YYYY-MM-DD.	The data field name and description have been amended to accommodate instances where a contract may have more than one arrangement associated with it.
2.10	FCA 3.05 PRA 3.07	Date of service commencement	Date of service commencement	<p>Please enter the date the service started in the format of YYYY-MM-DD.</p> <p>For MTP Notifications only: Where this is a new contract, please enter the date that the service is expected to start, in the format of YYYY-MM-DD. A start date may for example include when actual customer data is used in a test environment.</p>	<p>Based on consultation paper feedback this data field is now Optional.</p> <p>For Notifications only: The MTP Notification template data field description has been expanded to include examples of information required.</p>
2.11	FCA 3.10 PRA 3.12	Next contract renewal date or end date	Next contract renewal date or end date	<p>Please enter the renewal or end date as stipulated in the contract, in the format of YYYY-MM-DD.</p> <p>If the contract is continuous and has no end date (i.e. evergreen), please enter "9999-12-31".</p>	<p>The data field description has been amended to acknowledge evergreen contracts, based on feedback.</p> <p>For Notifications only: This data field is now Optional as we have separated the MTP Register and Notification templates.</p>
2.12	FCA 3.06	Notice period for the service provider	Notice period for the service provider	Please enter the shortest notice period for terminating the contractual arrangement by	The data field description has been expanded to clarify information required.

	PRA 3.08			<p>the direct third-party service provider in a business-as-usual case.</p> <p>The notice period should be expressed as number of (calendar) days from the date the request is received by the counterparty to terminate the third-party service.</p> <p>Please provide a numeric value only. If there is no notice period, or if it is with immediate effect, please enter "0".</p>	
2.13	FCA 3.07 PRA 3.09	Notice period for the firm	Notice period for the institution	<p>Please enter the shortest notice period for terminating the contractual arrangement by the firm in a business-as-usual case. The notice period should be expressed as number of (calendar) days from the date the request is received by the counterparty to terminate the third-party service.</p> <p>Please provide a numeric value only. If there is no notice period, or if it is with immediate effect, please enter "0".</p>	<p>The data field name has been amended from 'institution' to 'firm' for consistency of terminology.</p> <p>The description has been expanded to clarify information required.</p>
2.14	FCA 3.25 PRA 3.07	The governing law of the contractual arrangement	The governing law of the contractual arrangement	<p>Please specify the jurisdiction whose laws apply to the contractual arrangement by choosing an option from the given dropdown.</p> <p>If more than one option applies, please refer to the guidelines Section 'Multiple Responses'.</p>	No change apart from Field ID
3.01	FCA 3.11 PRA 3.13	Reason for materiality	Reason for materiality	Please specify why the contract is assessed as material by choosing from the given dropdown.	The taxonomy has been expanded to include 'All of the above'. The data field description has been amended to reference this.

				If more than one option applies, please refer to the guidelines Section 'Multiple Responses'. If all options apply, please select 'All of the above'.	
3.02	6.01	Date of the most recent materiality assessment	Date of the most recent materiality assessment	Please specify the date of the most recent materiality assessment in the format of YYYY-MM-DD.	No change apart from Field ID
3.03	FCA 3.16 PRA 3.18	Function Category	Service Category	<p>Please specify the function that the contractual arrangement supports by choosing an option from the dropdown.</p> <p>You may only select 'CF: Enterprise: Most functions or IBSs within the organisation' from the dropdown if 'Type of Service Provided' is 'Security & Identity' or 'Networking & Operations'.</p> <p>Note: CF: Central Function, for example HR or payroll BF: Business Function, for example deposit taking.</p>	<p>The data field name has changed to 'Function Category', based on consultation feedback. This is to clarify information required and differentiate between the service provided and the business function being supported.</p> <p>The taxonomy has been expanded to include 'CF: Enterprise: Most functions or IBSs within the organisation', based on feedback. The data field description has been amended to reference this and expand on acronyms used within the taxonomy.</p>
3.04	FCA 3.13 PRA 3.15	Does the contractual arrangement support an important business service?	Does the arrangement support an important business service?	Please specify whether the contractual arrangement supports an Important Business Service (IBS) by choosing an option from the given dropdown.	The data field name has been amended to accommodate instances where a contract may have more than one arrangement associated with it.
3.05	FCA 3.14 PRA 3.16	If yes, which important business service does the contractual	If yes, then which important business service does the	If you choose 'Yes' for 'Does the contractual arrangement support an Important Business Service?', please state the IBS in a short sentence.	The data field name has been amended to accommodate instances where a contract may have more than one arrangement associated with it.

		arrangement support	arrangement support		
3.06	FCA 3.15 PRA 3.17	Does the service provider support a core element of the Important Business Service?	Does the service provider support a core element of the Important Business Service?	<p>If you choose 'Yes' for 'Does the contractual arrangement support an Important Business Service?', please specify whether the service provider supports a core element of the IBS by choosing an option from the given dropdown.</p> <p>Core support is where a disruption of the MTP leads to a significant disruption in the delivery of the IBS. In contrast, non-core means the IBS would not be significantly impacted, interrupted or damaged; hence, the disruption can be resolved quickly and with minimal impact on the IBS.</p> <p>For example, disruption of the MTP supporting core payment flows could be regarded a core, whilst disruption of a MTP impacting ancillary payment services, such as reporting or statement productions, may not be regarded as core.</p>	Based on consultation paper feedback, we have expanded the data field description to clarify information required and give some examples for the purposes of completing the templates.
3.07	FCA 3.18 PRA 3.20	Impact Tolerance - PRA Safety and Soundness	Impact Tolerance - PRA Safety and Soundness	<p>If you choose 'Yes' for 'Does the contractual arrangement support an Important Business Service?', please enter the impact tolerance in a numeric value in hours (including weekends). If your impact tolerance is less than 1 hour, please use decimals.</p> <p>You should enter "N/A" if you choose 'No' for 'Does the contractual arrangement support an Important Business Service?', and/or if you are not a PRA-regulated firm.</p>	<p>The data field description has been expanded to clarify information required.</p> <p>For Notifications only: The MTP Notification template now contains additional guidance to acknowledge the Impact Tolerance may not yet have been set.</p>

				<p>For MTP Notifications only: If you have not set the impact tolerance, please enter "Not done"</p>	
3.08	FCA 3.19 PRA 3.21	Impact Tolerance - PRA Financial Stability	Impact Tolerance - PRA Financial Stability	<p>If you choose 'Yes' for 'Does the contractual arrangement support an Important Business Service?', please enter the impact tolerance in a numeric value in hours (including weekends). If your impact tolerance is less than 1 hour, please use decimals.</p> <p>You should enter "N/A" if you choose 'No' for 'Does the contractual arrangement support an Important Business Service?', and/or if you are not a PRA-regulated firm.</p> <p>For MTP Notifications only: If you have not set the impact tolerance, please enter "Not done"</p>	<p>The data field description has been expanded to clarify information required.</p> <p>For Notifications only: The MTP Notification template now contains additional guidance to acknowledge the Impact Tolerance may not yet have been set.</p>
3.09	FCA 3.20 PRA 3.22	Impact Tolerance - PRA Policy holder Protection	Impact Tolerance - Policy holder Protection	<p>If you choose 'Yes' for 'Does the contractual arrangement support an Important Business Service?', please enter the impact tolerance in a numeric value in hours (including weekends). If your impact tolerance is less than 1 hour, please use decimals.</p> <p>You should enter "N/A" if you choose 'No' for 'Does the contractual arrangement support an Important Business Service?', and/or if you are not a PRA-regulated firm.</p> <p>For MTP Notifications only: If you have not set the impact tolerance, please enter "Not done"</p>	<p>The data field description has been expanded to clarify information required.</p> <p>For Notifications only: The MTP Notification template now contains additional guidance to acknowledge the Impact Tolerance may not yet have been set.</p>

3.10	FCA 3.21 PRA 3.23	Impact Tolerance - FCA - Client harm	Impact Tolerance - FCA - Client harm	<p>If you choose 'Yes' for 'Does the contractual arrangement support an Important Business Service?', please enter the impact tolerance in a numeric value in hours (including weekends). If your impact tolerance is less than 1 hour, please use decimals.</p> <p>You should enter "N/A" if you choose 'No' for 'Does the contractual arrangement support an Important Business Service?', and/or if you are not an FCA-regulated firm.</p> <p>For MTP Notifications only: If you have not set the impact tolerance, please enter "Not done"</p>	<p>The data field description has been expanded to clarify information required.</p> <p>For Notifications only: The MTP Notification template now contains additional guidance to acknowledge the Impact Tolerance may not yet have been set.</p>
3.11	FCA 3.22 PRA 3.24	Impact Tolerance - FCA - Market integrity	Impact Tolerance - FCA - Market integrity	<p>If you choose 'Yes' for 'Does the contractual arrangement support an Important Business Service?', please enter the impact tolerance in a numeric value in hours (including weekends). If your impact tolerance is less than 1 hour, please use decimals.</p> <p>You should enter "N/A" if you choose 'No' for 'Does the contractual arrangement support an Important Business Service?', and/or if you are not an FCA-regulated firm.</p> <p>For MTP Notifications only: If you have not set the impact tolerance, please enter "Not done"</p>	<p>The data field description has been expanded to clarify information required.</p> <p>For Notifications only: The MTP Notification template now contains additional guidance to acknowledge the Impact Tolerance may not yet have been set.</p>
3.12	-	Impact Tolerance - Bank as FMI Regulator		<p>If you choose 'Yes' for 'Does the contractual arrangement support an Important Business Service?', please enter the impact tolerance in a numeric value in hours (including</p>	<p>This data field has been introduced post-consultation to record impact tolerance for FMIs.</p>

				<p>weekends). If your impact tolerance is less than 1 hour, please use decimals.</p> <p>You should enter "N/A" if you choose 'No' for 'Does the contractual arrangement support an Important Business Service?', and/or if you are not an FMI.</p> <p>For MTP Notifications only: If you have not set the impact tolerance, please enter "Not done"</p>	
3.13	FCA 3.23 PRA 3.25	Country where the data is stored	Country where the data is stored	<p>Please select the country where data is stored at rest from the dropdown menu.</p> <p>If multiple countries apply, limit your selection to those with the greatest impact on the firm's operations under this contract—typically the 5 to 10 most significant countries.</p> <p>If more than one option applies, please refer to the guidelines Section 'Multiple Responses'.</p>	The data field description has been expanded to clarify the information required
3.14	FCA 3.24 PRA 3.26	Country where the service is delivered from	Country where the service is delivered	<p>Please select the country where the service is delivered from, from the dropdown menu.</p> <p>If multiple countries apply, limit your selection to those with the greatest impact on the firm's operations under this contract—typically the 5 to 10 most significant countries.</p> <p>If more than one option applies, please refer to the guidelines Section 'Multiple Responses'.</p>	The data field description has been expanded to clarify the information required

3.15	FCA 3.26 PRA 3.28	Annual Contract Value	The estimated annual budget cost	<p>Please specify the annual cost or budget in GBP for the use of the services under the contractual arrangement. This is different from the total cost or budget.</p> <p>For example, if the total budget for the contract is £1 billion over 5 years, this should be apportioned over the 5 years by dividing by 5, equalling 200 million. Please enter "200000000" in this case.</p> <p>If your contractual arrangement spans across multiple rows, please enter the Annual Contract Value again on each row.</p>	The data field description has been expanded to clarify that values should be reported in GBP, and give examples of information required.
4.01	6.02	Date of the most recent risk assessment	Date of the most recent risk assessment	<p>Please provide the date of the most recent risk assessment in the format of YYYY-MM-DD.</p> <p>If you choose 'Ongoing' for 'Outcome of the most recent risk assessment', please enter the date that the assessment started. If you choose 'Not done', please enter "9999-01-01".</p>	The data field description has been expanded to acknowledge that assessments may not have completed
4.02	6.03	Outcome of the most recent risk assessment	Outcome of the most recent risk assessment	<p>Please specify the outcome of the most recent risk assessment by choosing an option from the given dropdown.</p> <p>The outcome of the risk assessments should align with the risk presented to your own governance forums.</p>	<p>The data field description has been expanded to clarify information required.</p> <p>The taxonomy has been expanded to include 'Ongoing', in line with other assessment data fields.</p>
4.03	6.04	Commentary box for risk assessment	Commentary box for risk assessment	Please highlight any key areas where the risk assessment of the contractual arrangement is 'Non-satisfactory' or any other relevant remarks	The data field description has been amended to clarify information required

4.04	6.05	Date of the most recent audit	Date of the most recent audit	<p>Please specify the date of the most recent audit in the format of YYYY-MM-DD.</p> <p>Audits include any appropriate method (for example, internal, external, pooled audits, etc) that enables firms to meet their legal, regulatory, operational resilience, and risk management obligations, amongst others.</p> <p>If you choose 'Ongoing' for 'Outcome of the most recent audit', please enter the date that the audit started. If you choose 'Not Done', please enter "9999-01-01".</p>	The data field description has been expanded to give examples of information required and acknowledge that audits may not have completed.
4.05	6.06	Outcome of the most recent audit	Outcome of the most recent audit	Please specify the outcome of the most recent audit by choosing an option from the given dropdown.	The taxonomy has been expanded to include 'Ongoing', in line with other assessment data fields.
4.06	6.07	Date of financial due diligence	Date of financial due diligence	<p>Please provide the date of the most recent financial due diligence.</p> <p>If you choose 'Ongoing' for 'Outcome of financial due diligence', please enter the date that the assessment started. If you choose 'Not done', please enter "9999-01-01".</p>	The data field description has been expanded to clarify information required and acknowledge that assessments may not have completed.
4.07	6.08	Outcome of financial due diligence	Outcome of financial due diligence	Please provide the outcome of the financial due diligence by choosing an option from the given dropdown.	The taxonomy has been expanded to include 'Ongoing', in line with other assessment data fields.
4.08	6.09	Date of cyber risk due diligence	Date of cyber risk due diligence	<p>Please provide the date of the most recent cyber risk (including information security) due diligence.</p> <p>If you choose 'Ongoing' for 'Outcome of cyber risk due diligence', please enter the date that the assessment started. If you</p>	The data field description has been expanded to clarify information required and acknowledge that assessments may not have completed.

				choose 'Not done', please enter "9999-01-01".	
4.09	6.10	Outcome of cyber risk (including information security) due diligence	Outcome of cyber risk (including information security) due diligence	Please provide the outcome of the cyber risk (including information security) due diligence by choosing an option from the given dropdown.	The taxonomy has been expanded to include 'Ongoing', in line with other assessment data fields.
4.10	6.11	Does the contractual arrangement comply with the relevant rules and requirements (e.g. FCA rules such as PS21/3, PRA rules such as SS2/21 and FMI rules etc.)	Does the contract comply with the relevant rules and requirements (e.g. FCA rules such as PS21/3, PRA rules such as SS2/21 etc.)	<p>Please specify whether the contractual arrangement complies with the relevant Regulatory rules and expectations as of the reporting date.</p> <p>The expectations include but are not limited to: the FCA Principles of Business; FCA PS21/3 Building Operational Resilience; PRA Fundamental Rules; the Outsourcing Parts and Operational Resilience Parts of the PRA Rulebook; and the expectations set out in the PRA SS2/21 Outsourcing and third party risk management.</p>	<p>The data field name has been expanded to reference FMIs and the description now gives examples of information required.</p> <p>For Notifications only: The taxonomy has been expanded to include 'Ongoing'.</p>
4.11	6.12	Please summarise how the assurance is obtained and if any gaps are identified, please specify when and how these will be resolved.	Please summarise how the assurance is obtained and if any gaps are identified, please specify when and how these will be resolved.	If you choose 'No' for 'Does the contractual arrangement comply with the relevant rules and requirements', please provide a short description of how any compliance gaps will be resolved, or any necessary remarks.	The data field description has been amended to clarify information required

4.12	6.13	Has this contractual arrangement been reviewed and signed off by an SMF holder or an accountable person of an FMI?	Has this arrangement been reviewed and signed off by an SMF holder?	Please specify whether an SMF or an accountable person - either a board member and/or senior executive of an FMI - has reviewed and signed off on the contractual arrangement by choosing an option from the given dropdown.	The data field name and description have been amended to reference FMIs and accommodate instances where a contract may have more than one arrangement associated with it.
4.13	6.14	If not, which governance committee reviewed it?	If not, which governance committee reviewed it?	If you choose 'No' for 'Has this contractual arrangement been reviewed and signed off by an SMF holder or an accountable person of an FMI?', please specify which governance committee or body has reviewed the contractual arrangement.	No change apart from Field ID
4.14	6.15	Date of Governance Approval	Date of Governance Approval	Please specify the date that the contractual arrangement was approved in the format of YYYY-MM-DD.	No change apart from Field ID
5.01	6.16	Substitutability of the service provider	Assessment of the service provider's (3rd party) substitutability	<p>Please specify your firm's ability to substitute the service provider by choosing an option from the given dropdown.</p> <p>The chosen value should be as per the firm's own process and rating methods.</p> <p>This should be assessed independently of the response to the assessment of the product or service's reintegration and the impact of discontinuing the contractual arrangement.</p>	The data field name and description have been amended to clarify information required. The taxonomy has been updated to remove 'Medium complexity in terms of substitutability', to better align with other assessment data fields
5.02	6.17	Ability of reintegration of the service	Possibility of reintegrating the arrangement	Please specify the firm's ability to reintegrate the product or service provided back in-house, or within another entity in the	The data field name and description have been amended to clarify information required

			into the institution	<p>Group, by choosing an option from the given dropdown.</p> <p>The chosen value should be as per the firm's own process and rating methods.</p> <p>This should be assessed independently of the response to the assessment of the service provider's substitutability and the impact of discontinuing the contractual arrangement.</p>	
5.03	6.18	Impact of discontinuing the contractual arrangement	The impact of discontinuing the arrangement	<p>Please specify the impact on the firm if the contracted product or service is discontinued.</p> <p>The chosen value should be as per the firm's own process and rating methods.</p> <p>This should be assessed independently of the response to the assessment of the service provider's substitutability and service reintegration.</p>	The data field name and description have been amended to clarify information required and to accommodate instances where a contract may have more than one arrangement associated with it.

ID PS	ID CP	Data Field - PS	Data Field - CP	Brief Description (please see relevant template and guidance document for detailed guidance)	Changes made and rationale
The following data fields have been deleted from the MTP reporting template					
-	1.01	-	Analysis period		Deleted – this was previously required for MTP Register only and will now be system generated
-	1.05	-	Reporting currency		Deleted - reporting currency has been standardised to GBP and this guidance has been included in the description of the 'Annual Contract Value' field
-	1.07	-	Previous ID		Deleted - this can be derived from other data fields
-	2.04	-	LEI of the reporting entity (if applicable)		Deleted - this can be derived from other data fields
-	2.05	-	FRN of the firm receiving the service		Deleted - this can be derived from other data fields
-	3.02	-	Arrangement Reference Number (where applicable)		Deleted – data is collected at the contractual arrangement level, based on consultation paper feedback
-	3.17	-	FCA Permission		Deleted - information can be derived from other data fields
-	4.02	-	Registered Address of the service provider		Deleted - information can be derived from other data fields

-	5.02	-	LEI of the recipient of sub-contracted service		Deleted - information can be derived from other data fields
-	6.19	-	Name of alternative service provider		Deleted – field no longer required for data analysis
-	6.20	-	LEI of the alternative service provider		Deleted – field no longer required for data analysis