6.15 Aggregation/Diversification

Q209

Q209 Section 6.15.3.1 Is the structure of the correlation matrices used for 2016 Field Testing appropriate? If “no”, please provide specific alternative suggestions and evidence on why this approach would be more appropriate.

Organisation	Jurisdiction	Role	Confidential	Answer	Answer Comments
Bermuda Monetary Authority (BMA)	Bermuda	IAIS Member	No	Yes	
China Insurance Regulatory Commission	China	IAIS Member	No	Yes	
EIOPA	EIOPA	IAIS Member	No	Yes	
BaFin	Germany	IAIS Member	No	Yes	

Financial Supervisory Service	Korea	IAIS Member	No	Yes	
National Association of Insurance Commissioners	USA	IAIS Member	No	Yes	These appear appropriate but we are open to arguments, supported by evidence, that different structures should be used.
Ageas	Belgium	Other	No	Yes	
Canadian Institute of Actuaries	Canada	Other	No	Yes	
Ping An Insurance (Group) Company of China Ltd.	China	Other	No	Yes	
Institut des Actuaires	France	Other	No	Yes	
Allianz	Germany	Other	No	Yes	
GDV - Gesamtverband der Deutschen Versicherungswirtschaft	Germany	Other	No	Yes	
Munich Re	Germany	Other	No	Yes	
AIA Group	Hong Kong	Other	No	Yes	
International Actuarial Association	International	Other	No	No	The IAA is supportive of the general manner in which the correlation matrices have been designed. However, there are some aspects of those matrices which are not

					reflective of the business of insurance in certain major markets. These require rectification in the next version of ICS (see comments to follow in next questions).
General Insurance Association of Japan	Japan	Other	No	No	For IAIGs that own non-life insurers, most Catastrophe risk components are expected to be based on general insurance contracts, such as those of natural disaster and liability insurance. However, the correlation factors between Catastrophe risk and Life risk, and Health risk are set at 25% respectively, which is inconsistent with the above expectation. (Meanwhile, the correlation factors between Non-life risk and Life risk, and Health risk are set at 0% respectively.) Therefore, it is necessary to change Catastrophe risk to sub-risks of Non-life, Life, and Health modules, or to simplify the approach by changing correlation factors between Catastrophe risk and Life risk, and Health risk to 0%.
Great Eastern Holdings Ltd	Singapore	Other	No	Yes	
Swiss Re	Switzerland	Other	No	Yes	
MetLife	United States	Other	No	No	It is difficult to determine how the correlation matrices were derived based on the values included in the table. The correlation matrices should be developed by looking at historical relationships that are updated on a regular basis.
MassMutual Financial Group	USA	Other	No	Yes	

Q210

Q210 Section 6.15.3.2 Should the calibration of the correlation parameters for the ICS standard method include a material degree of judgement since relevant and available data are limited? Please explain. If “no”, please provide rationale, specific suggestions and evidence or references to support an alternative approach.

Organisation	Jurisdiction	Role	Confidential	Answer	Answer Comments
China Insurance Regulatory Commission	China	IAIS Member	No	Yes	The data that can be used to calibrate the correlations may be limited, but the risk profile and diversifation impact could be different across countries, we recommend include supervisory judgement or expert judgement for each country, for example for China, ICS can reference to C-ROSS correlation parametres.
EIOPA	EIOPA	IAIS Member	No	Yes	We support including a material degree of judgment for the reasons explained. This will also allow us to ensure that the prudential objective of the regime is met.
BaFin	Germany	IAIS Member	No	Yes	It is unavoidable to rely to some extent on expert judgements due to limited data to accurately estimate certain correlation parameters. This particularly holds for assessing dependence between different types of insurance risks.
Financial Supervisory Service	Korea	IAIS Member	No	Yes	
KNF - Polish Financial Supervision Authority	Poland	IAIS Member	No	Yes	

National Association of Insurance Commissioners	USA	IAIS Member	No	Yes	Yes, limits on data make the use of judgment necessary. This -- and other limitations -- make it clear that the ICS will only notionally be calibrated to a 99.5% VaR (or some other level). As a practical matter, the ICS may end up calibrated higher/lower than other standards that also claim to be at a 99.5% VaR.
Ageas	Belgium	Other	No	No	EIOPA has already performed extensive studies on the correlation between all risk types. We strongly recommend IAIS to use the studies available at EIOPA. Based on these studies, the correlation between Credit and Non Life/Cat should amount to 50%. Furthermore, allowing a material degree of judgement will disrupt the level playing field between insurance groups.
Canadian Institute of Actuaries	Canada	Other	No	Yes	We accept that correlation is not a perfect science and a material degree of judgement will be needed. However, we caution against including significant bias in the correlation parameters. Testing could help to assess the impact of various combinations of correlation parameters and the potential degree of conservatism that the selected parameters embed into the total capital requirement.
Ping An Insurance (Group) Company of China Ltd.	China	Other	No	Yes	The overall framework is reasonable, however, the selected parameters cannot reasonably reflect the actual risk situations of each country for now. We suggest that the correlation coefficients of local regulations can be used if local regulation adopts the similar approach for risk aggregation. The aggregation parameters under C-ROSS are calibrated based on sufficient industry data and could be referred to.
Institut des Actuaires	France	Other	No	Yes	
Allianz	Germany	Other	No	No	As with every sound calibration methodology it should be based as much as possible on underlying data. Introducing a material degree of judgement leaves room for arbitrary correlation settings with the potential of erratic changes from one calibration to another.

GDV - Gesamtverband der Deutschen Versicherungswirtschaft	Germany	Other	No	Yes	
Munich Re	Germany	Other	No	Yes	
AIA Group	Hong Kong	Other	No	Yes	
International Actuarial Association	International	Other	No	Yes	The IAA is supportive of a standard approach for the ICS which leaves limited judgement with insurers. The IAA recognizes that a standard approach aims to deliver a comparable calculation across all IAIG's. In so doing it is not designed to capture the specifics of the risks (including their interactions) of any one insurer. Rather the standard approach aims to reflect industry average risk specifics. The task of building an internal model within an insurer can involve considerable care and complexity with respect to modelling risks and their interactions. This work requires considerable expertise and expert judgement due to the lack of suitable data in the tails of the distributions. The IAA therefore recognizes that the calibration of the ICS standard approach, including the correlation parameters, will require the use of expert judgement by the IAIS team. While the ICS approach to allowing for diversification credit enables a comparable industry-wide approach to be applied to insurers and insurance groups, risk dependencies and their behaviour can vary considerably from one insurer's circumstances to another. Consequently, it is very important that insurers model and stress test their risk dependencies on a routine basis. Such modelling and testing should be an important element of insurer and insurance group (including at the head of the group) ERM and capital management. ORSA is a useful tool for reporting the results of such testing. The actuarial function is a vital source of advice on these matters to both insurers and insurance groups.

General Insurance Association of Japan	Japan	Other	No	Yes	Calibration of correlation parameters should not be based on limited data only. Even if relevant data is available, it will be necessary to judge whether the parameter derived from the data analysis appropriately reflects correlation in tail events, and in cases where it is deemed inappropriate, to make adjustments.
Great Eastern Holdings Ltd	Singapore	Other	No	No	If all the IAIGs are domiciled in the same jurisdiction and share a similar supervisor, it might make sense to include some judgement because the supervisor could serve as the independent moderator for the judgement made. However, for the purpose of the ICS, comparability seems to be the more important factor and IAIGs do not share a single supervisor. Hence, wherever possible, allowance for judgement should be minimised.
Swiss Re	Switzerland	Other	No	Yes	This seems reasonable and unavoidable for a standard approach
MetLife	United States	Other	No	No	Please see our response to Q. 216 below.
MassMutual Financial Group	USA	Other	No	Yes	

Q211

Q211 Section 6.15.3.2 and diversification?	How could the IAIS combine data and judgement in the calibration of correlation parameters for aggregation

Organisation	Jurisdiction	Role	Confidential	Answer
China Insurance Regulatory Commission	China	IAIS Member	No	ICS has set up a standard risk framework and risk structure for IAIGs, which to a certain extent ensure the consistency. IAIS can provide high level rules and guidance to local supervisor for calibrations.
EIOPA	EIOPA	IAIS Member	No	Evidence and data should be seen as an indication, to be interpreted by experts. Relevant market risk data should be more available than insurance risk data: it is expected that expert judgment will play a more significant role for insurance risks. The process to determine the correlations should consider pair of risks, but we should also be aware of the total impact of diversification on the final capital requirements. Correlations that would lead to a diversification greater than one third / one fourth of the gross capital requirements would not be reasonable.
BaFin	Germany	IAIS Member	No	A staggered approach could be followed. A reasonable approximate relative maximum amount of diversification could be fixed in the first stage. In the second stage all correlation paramters with availbale data (e.g market correlations) could be estimated. In the third stage (different) expert judgements could be applied to all non-quantifiable correlations under the condition that the maximum relative total diversification is not breached.
Ageas	Belgium	Other	No	Please refer to our answer to the previous question.

Ping An Insurance (Group) Company of China Ltd.	China	Other	No	We propose that the regulator of each country set the parameters of correlation coefficient matrix based on the unified principles provided by IAIS and its own industry data.
International Actuarial Association	International	Other	No	The IAA suggests that the IAIS focus on ensuring that correlation parameters reflect insurance business realities in key markets, at least directionally. Key relationships that are not recognized or are poorly recognized in the parameters should be fixed. We do not intend that relationships important to a jurisdiction which constitutes a small percentage (say, less than 5%) of the global market need be incorporated. However, if 40% of the global market experiences risk correlations not reflected in the ICS, then these need to be fixed. The IAA further suggests that it is the direction of the correlation that is important, whether it is on-sided or two-sided and also the broad strength of the correlation.
General Insurance Association of Japan	Japan	Other	No	Calibration of correlation parameters should not be based on limited data only. Even if relevant data is available, it will be necessary to judge whether the parameter derived from the data analysis appropriately reflects correlation in tail events, and in cases where it is deemed inappropriate, to make adjustments.
Great Eastern Holdings Ltd	Singapore	Other	No	Reduce judgement to the minimum.
Swiss Re	Switzerland	Other	No	Aggregation and diversification can only be assessed with the help of an internal model.
MassMutual Financial Group	USA	Other	No	For market risks, such as interest rates, credit spreads, and equity, historical data is widely available. It should be utilized to determine the respective correlation amongst these items. The relationship between market risks and insurance risk is more challenging, as there is a limited amount of data on the latter. Hence for correlation factors amongst market and insurance risks, and risks amongst insurance risk, a greater amount of judgement will be needed in establishing a correlation table.

Q212

Q212 Section 6.15.3.2 Are there available data that would be relevant for the calibration of the correlation parameters of the ICS standard method? Please explain.

Organisation	Jurisdiction	Role	Confidential	Answer	Answer Comments
China Insurance Regulatory Commission	China	IAIS Member	No	No	The data that can be used to calibrate the correlations may be limited, but the risk profile and diversifation impact could be different across countries, we recommend include supervisory judgement or expert judgement for each country, for example for China, ICS can reference to C-ROSS correlation parametres.
EIOPA	EIOPA	IAIS Member	No	Yes	Financial market data should be available. Another source of data to consider is the correlation parameters calibrated in internal models: most often, the aggregation methodology is similar than the one ICS proposed. In particular for insurance risks, this could be a source of inspiration
BaFin	Germany	IAIS Member	No	Yes	Data from internal models could be used as a proxy for insurance risks.
Financial Supervisory Service	Korea	IAIS Member	No	No	
Ageas	Belgium	Other	No	Yes	Please refer to the answer to question 210.

Ping An Insurance (Group) Company of China Ltd.	China	Other	No	Yes	Please refer to Q210.
GDV - Gesamtverband der Deutschen Versicherungswirtschaft	Germany	Other	No	Yes	Data for calibration should be available at the local supervisors.
Munich Re	Germany	Other	No	Yes	Data for calibration should be available at the local supervisors.
International Actuarial Association	International	Other	No	Yes	For some types of correlations there may be considerable knowledge that has resulted from the past experience of insurers (e.g. impact of selective lapsation on remaining insured lives; impact of market risks on financial options in the hands of policyholders etc.). Modeling and scenario testing of insurer portfolios can help in the understanding of the capital impact. The IAA volunteers its assistance and experience on these matters.
General Insurance Association of Japan	Japan	Other	No	Yes	In the calibration of the correlation parameters, existing data sources should be maximised. For example, abundant data is available with regard to Market risk.
Great Eastern Holdings Ltd	Singapore	Other	No	No	NA
Swiss Re	Switzerland	Other	No	No	
MassMutual Financial Group	USA	Other	No	Yes	For market risks, such as interest rates, credit spreads, and equity, historical aggregate data is widely available. It should be utilized to determine the respective correlation amongst these items. Unfortunately for other risks, such as insurance risk, there is currently no such thing as global data set. The amount of applicable data is not consistent across the risk spectrum.

Q213

Q213 Section 6.15.3.2 Are the correlation factors being used between ICS risks appropriate for the ICS standard method? Please explain. If “no”, please provide rationale and alternative suggestions supported by evidence.

Organisation	Jurisdiction	Role	Confidential	Answer	Answer Comments
Bermuda Monetary Authority (BMA)	Bermuda	IAIS Member	No	Yes	
China Insurance Regulatory Commission	China	IAIS Member	No	No	The data that can be used to calibrate the correlations may be limited, but the risk profile and diversifation impact could be different across countries, we recommend include supervisory judgement or expert judgement for each country, for example for China, ICS can reference to C-ROSS correlation parametres.
EIOPA	EIOPA	IAIS Member	No	No	Correlation factor between non-life and credit should be set to 0.5: given the lines of business such as marine, aviation, transport, credit, suretyship, all reinsurance lines of business, it is not prudent to have only 0.25. The correlation factor between market and credit risk seems to us low. If we look at data in the queue of distributions, a correlation factor of 0.5 would be more prudent, in particular in light of combined equity and spread movements.
BaFin	Germany	IAIS Member	No	No	The correlation between market and credit risk should be higher since a significant part of credit risk is market dependent (as the sensitivity towards credit spreads or a deterioration in the ratings).

Financial Supervisory Service	Korea	IAIS Member	No	Yes	
Ageas	Belgium	Other	No	No	We would expect correlations in line with SII. Therefore, the correlation between Credit and Non Life/Cat should amount to 50%.
Canadian Institute of Actuaries	Canada	Other	No	Yes	
Ping An Insurance (Group) Company of China Ltd.	China	Other	No	No	Please refer to Q210.
Actuarial Association of Europe	European Union	Other	No	No	There are several inconsistencies in the suggested factors
Institut des Actuaires	France	Other	No	Yes	
Allianz	Germany	Other	No	No	Market risk aggregation: A 100% correlation assumption between upward/downward and flattening scenarios is not appropriate as those scenarios would not happen at the same time and are also not reflecting the independence assumption underlying the PCA (see also Q168). Generally, life risks are not correlated to market or credit risks; interdependencies exist for lapse but should be covered by dynamic lapse already NL type risks: Correlation assumptions of 50% between ICS.NL. Categories are considered to be too high. It is not clear why e.g. property like and liability like lines should have so strong common drivers. In addition the aggregation to the categories does not allow for diversification between LoBs. Correlations between premium and reserves seem to be rather high. We believe that the correlation used for EU and US is appropriate. However, the factors used for all other countries should be lower.

GDV - Gesamtverband der Deutschen Versicherungswirtschaft	Germany	Other	No	Yes	
Munich Re	Germany	Other	No	Yes	
AIA Group	Hong Kong	Other	No	No	Currently a correlation factor of 25% between life/health risk and market risk has been tested and this factor looks too high. We have two concern on this (i) market risk and certain components of life/health risk e.g. mortality and morbidity should have zero or very low correlation and (ii) where there is correlation e.g. market risk and lapse risk it is only a one-way correlation i.e. while market volatility may cause lapses but lapse does not cause market volatility.
International Actuarial Association	International	Other	No	Yes	
General Insurance Association of Japan	Japan	Other	No	No	For IAIGs that own non-life insurers, most Catastrophe risk components are expected to be based on general insurance contracts, such as those of natural disaster and liability insurance. However, the correlation factors between Catastrophe risk and Life risk, and Health risk are set at 25% respectively, which is inconsistent with the above expectation. (Meanwhile, the correlation factors between Non-life risk and Life risk, and Health risk are set at 0% respectively.) Therefore, it is necessary to change Catastrophe risk to sub-risks of Non-life, Life, and Health modules, or to simplify the approach by changing the correlation factors between Catastrophe risk and Life risk, and Health risk to 0%.
Great Eastern Holdings Ltd	Singapore	Other	No	Yes	NA

Swiss Re	Switzerland	Other	No	Yes	This seems reasonable for a standard approach. A more sophisticated approach would be to allow for the use of regulatory approved internal models.
Institute and Faculty of Actuaries	UK	Other	No	No	There are some inconsistencies in the factors selected: Catastrophe risk, for instance, has a 25% correlation factor with all other risks. But it could be argued that this would be more strongly related to credit risk (both from an exposure and a probability-of-default perspective), than non-catastrophe insurance risk (health, life and non-catastrophe). Arguably, catastrophe risk should have a 0% factor with all categories except credit risk (50% or perhaps 75% factor). Similarly, it could be argued that market risk has a stronger relationship with life insurance risk than non-life insurance risk. Potentially market risk should have a 0% factor with non-life and catastrophe risk, but 50% with life risk.
MassMutual Financial Group	USA	Other	No	Yes	

Q214

Q214 Section 6.15.3.2 Are the correlation factors being used for Life risks appropriate for the ICS standard method? If “no”, please provide rationale and alternative suggestions supported by evidence.

Organisation	Jurisdiction	Role	Confidential	Answer	Answer Comments
Bermuda Monetary Authority (BMA)	Bermuda	IAIS Member	No	No	Correlation between the mortality and longevity (-0.25) appears to be over calibrated and underestimating natural hedges. A correlation factor of -0.5 seems to be more reasonable.
China Insurance Regulatory Commission	China	IAIS Member	No	No	The data that can be used to calibrate the correlations may be limited, but the risk profile and diversifation impact could be different across countries, we recommend include supervisory judgement or expert judgement for each country, for example for China, ICS can reference to C-ROSS correlation parametres.
EIOPA	EIOPA	IAIS Member	No	Yes	
BaFin	Germany	IAIS Member	No	Yes	
Financial Supervisory Service	Korea	IAIS Member	No	No	The correlation between Mortality and Longevity is relatively low. -50% (a correlation in an internal model of a European insurance company) or -75% (a correlation in Canada regulation) instead of -25% is suggested because mortality and longevity usually show high negative interdependency in a large liability portfolio.

Ageas	Belgium	Other	No	Yes	
Canadian Institute of Actuaries	Canada	Other	No	Yes	
Ping An Insurance (Group) Company of China Ltd.	China	Other	No	No	Please refer to Q210.
Institut des Actuaires	France	Other	No	Yes	
Allianz	Germany	Other	No	No	The correlation between mortality and longevity is too low: for longevity, trend is the main risk and trend would also affect mortality risk. Since there could be different portfolios/parts of the population, the two risks are not correlated -100% but -50% we'd expect. The correlations between expenses and the other risks are also very high: per se, there is no correlation. If the correlations are increased because of second-order effects, this should be treated directly (i.e., increase expense assumptions in lapse scenario). Likewise, for the correlations of lapse.
GDV - Gesamtverband der Deutschen Versicherungswirtschaft	Germany	Other	No	Yes	
Munich Re	Germany	Other	No	No	We suggest to avoid negative correlation and therefor replace the -25% Long/Mort correlation by 0% since the risk are usually distributed over regions and don't compensate each other.
AIA Group	Hong Kong	Other	No	Yes	

International Actuarial Association	International	Other	No	No	The IAA believes that 2 aspects of the Life risk correlation factors require fixing. Firstly, the current correlation parameter between mortality and lapse risks is zero. In North American individual life insurance markets, there are several types of life insurance products, constituting significant amounts of the business in-force, which exhibit a strong correlation between lapse and mortality. Please refer to the IAA response to the lapse questions for specifics. There is considerable North American experience with these correlations that will be useful in finding an appropriate fix. Secondly, the current ICS life risk correlation matrix does not include calamity risk and believe it should be included .Both parts of calamity, due to morbidity and mortality, need to be combined (correlation 1). In aggregating this combination with the other risks the following issues are important: - In a reaction to a severe pandemic equities can fall. A high correlation (0.5) will be needed with equity risk. With market risk where equity risk is part, a correlation of 0.25 is advised. - A pandemic can increase the expenses of an insurance company. Still it has to be defined whether this increase is part of operational risk (like in SII) or part of expense risk.
General Insurance Association of Japan	Japan	Other	No	No	The correlation factors between Expense risk and Mortality risk, Longevity risk, and Lapse risk are set at 25%, 25%, and 50% respectively. However, even if these risks manifest, the impact on Expense risk is expected to be very limited. Therefore, all of these correlation factors should be 0%.
Great Eastern Holdings Ltd	Singapore	Other	No	Yes	
Swiss Re	Switzerland	Other	No	No	It seems to use that the standard method is overestimating Life risks, at least for reinsurers. This could be due to overly conservative correlation factors. A more

					sophisticated approach would be to allow for the use of regulatory approved internal models.
American Council of Life Insurers	United States	Other	No	No	Longevity level and trend risks should be considered independent risk factors that have zero correlation. This is standard industry practice for internal models. Likewise, if a mortality trend stress is added, it should be considered independent of the mortality level stress.
MassMutual Financial Group	USA	Other	No	Yes	

Q215

Q215 Section 6.15.3.2 Are the correlation factors being used for Market risks appropriate for the ICS standard method? If “no”, please provide rationale and alternative suggestions supported by evidence.

Organisation	Jurisdiction	Role	Confidential	Answer	Answer Comments
Bermuda Monetary Authority (BMA)	Bermuda	IAIS Member	No	No	Correlation between the interest rate risk upward scenario and equity risk (0.25) appears to be over calibrated there is empirical evidence that these are independent, see e.g. Solvency II calibration. Other correlation factors appear to be reasonable
China Insurance Regulatory Commission	China	IAIS Member	No	No	The data that can be used to calibrate the correlations may be limited, but the risk profile and diversifation impact could be different across countries, we recommend include supervisory judgement or expert judgement for each country, for example for China, ICS can reference to C-ROSS correlation parametres.
EIOPA	EIOPA	IAIS Member	No	No	It is difficult to gather time series long enough to assess the correlation between property and equity. That is why we would favour a more prudent approach and set the correlation parameter to 0.75
BaFin	Germany	IAIS Member	No	Yes	
Financial Supervisory Service	Korea	IAIS Member	No	Yes	

Ageas	Belgium	Other	No	No	Given the interest rate shocks for parallel shifts and flattening should be based on principal component analysis, we would assume a correlation of 0% between parallel and flattening.
Canadian Institute of Actuaries	Canada	Other	No	No	The 6x6 matrix excluding assets concentration is not a correlation matrix since it has two negative eigenvalues—this needs to be replaced with an appropriate positive definite matrix.
Ping An Insurance (Group) Company of China Ltd.	China	Other	No	No	Please refer to Q210.
Institut des Actuaires	France	Other	No	Yes	
Allianz	Germany	Other	No	No	See Q 209
GDV - Gesamtverband der Deutschen Versicherungswirtschaft	Germany	Other	No	No	We suggest a more detailed approach to reflect the correlation of positions more appropriate.
Munich Re	Germany	Other	No	No	We suggest a more detailed approach to reflect the correlation of positions more appropriate.
AIA Group	Hong Kong	Other	No	Yes	
International Actuarial Association	International	Other	No	Yes	

Great Eastern Holdings Ltd	Singapore	Other	No	Yes	
Swiss Re	Switzerland	Other	No	No	It seems to use that the standard method is underestimating Market risks. This could be due to overly optimistic correlation factors. A more sophisticated approach would be to allow for the use of regulatory approved internal models.
American Council of Life Insurers	United States	Other	No	No	Life risks and market risks should be considered independent variables and have zero correlation between them. The current ICS proposal assumes 25% correlation. There is no evidence that changes to mortality levels or longevity trend/level impacts equity markets, interest rates or credit spreads/defaults. There may be rationale that a mortality shock (pandemic) impacts market risks, but this is a one-sided correlation (i.e. poor markets do not cause pandemics). The current correlation between catastrophe and market risks is 25% and this seems reasonable. But other Life risks such as mortality, longevity and lapse should be considered uncorrelated with market and credits risks.
MassMutual Financial Group	USA	Other	No	Yes	

Q216

Q216 Section 6.15.4 Are there any further comments on Aggregation and Diversification that the IAIS should consider in the development of ICS Version 1.0? If “yes”, please explain with sufficient detail and rationale.

Organisation	Jurisdiction	Role	Confidential	Answer	Answer Comments
China Insurance Regulatory Commission	China	IAIS Member	No	No	
BaFin	Germany	IAIS Member	No	Yes	When setting the correlation parameters the effects of potentially time-varying stochastic correlations should be considered. In particular, some market risk correlations (e.g equity and interest rates) tend to differ in times of crises with regard to severity and sign. Where little data and “expert experience” is available to determine a correlation parameter, and there is thus a high degree of uncertainty in the estimation, some additional prudence should be reflected in the correlation parameter estimate (particularly for insurance risks).
Financial Supervisory Service	Korea	IAIS Member	No	No	
National Association of Insurance Commissioners	USA	IAIS Member	No	Yes	Some difficulties in establishing correlations may come from dissimilar risks being grouped together within the ICS. Some examples: (i) pandemic risk bears a closer relationship to mortality than other catastrophe risks; (ii) credit risk on reinsurance recoverables bears closer relationship to other insurance (particularly non-life and cat) risk than to credit risk on other exposures; and (iii) latent liability risk is much more closely related to premium/claims risk on long-tailed lines of business than to natural catastrophe risk.

Ageas	Belgium	Other	No	Yes	We recommend to follow the same structure as in Solvency II , in particular for having the CAT risks being aggregated first at the level of the business to which they are attached, i.e. Life, Non-Life or Health . This would facilitate decision-making done at the level of the business.
Canadian Institute of Actuaries	Canada	Other	No	Yes	One should recognize that the whole process of combining capital charges based on the assumption of variables jointly having a multivariate normal distribution is problematic, and may result in a significant misstatement of overall VAR 99.5%.
Ping An Insurance (Group) Company of China Ltd.	China	Other	No	No	
Insurance Europe	Europe	Other	No	Yes	An appropriate recognition of aggregation and diversification in the ICS standard method is very challenging and can in fact only by addressed by an internal model approach, that would be able to reflect the specificities of an insurer's business. For example: • The correlation between the market risk and like risk will differ between an insurer that writes business mainly exposed to longevity risk and an insurer mainly exposed to lapse risk. • Non-linear interactions and tail dependencies between risks are also not recognised, which can lead to an undue loss of diversification. • The low correlation between operational risk and other risks is not recognised in the standard method.
GDV - Gesamtverband der Deutschen Versicherungswirtschaft	Germany	Other	No	No	

Global Federation of Insurance Associations	Global	Other	No	Yes	The proposed diversification benefits are quite limited. For example, there is no allowance for geographical diversification within the EU or the US. Similarly on lines of business, these are grouped at quite a high level, and a more granular approach would more appropriately reflect the economic reality of a diversified portfolio.
AIA Group	Hong Kong	Other	No	No	
International Actuarial Association	International	Other	No	Yes	The challenges in designing into the ICS a structure for providing diversification credit are many and may include the following: - Diversification benefits vary significantly based on the specifics of the risks of the insurer and insurance group yet the standard approach (by necessity) applies one approach to all IAIGs. - Diversification benefits tend to require significant expert judgement as there tends to be little real data - Due to the nature of the ICS, the focus is on diversification in the tails of the combined distributions, again where data is sparse. - The shape of loss distributions can vary significantly, especially in their tails. This makes the task of designing a standard approach for diversification very difficult. - A diversification structure designed and calibrated for one jurisdiction may not suit the needs of all jurisdictions as their risks and behaviors may be different (ie an extension of the first bullet. Regardless of these significant complexities, there is little doubt that some level diversification credit is appropriate in the ICS. It would also seem prudent to leverage off an existing diversification structure for which there has been extensive calibration and industry input. The SII structure on which the ICS diversification structure appears to be built is a logical starting point. A key IAA issue is whether this structure is suitable for all major insurance markets including North America, growing markets in Asia as well as the EU. If the proposed ICS structure fails to recognize (even to a limited degree) some key risk dependencies in a major market then the ICS risks producing inappropriate

					(perhaps low; perhaps high) capital requirements for these markets. As noted above, the IAA recommends that the IAIS correct the following notable gap in the current ICS diversification/dependency structure: - Lapse/mortality dependency Beyond this gap, the IAA is supportive of the overall framework for diversification/dependency proposed in the ICS along with the following observations: - While the ICS approach to allowing for diversification credit enables a comparable industry-wide approach to be applied to insurers and insurance groups, risk dependencies and their behaviour can vary considerably from one insurer's circumstances to another. Consequently, it is very important that insurers model and stress test their risk dependencies on a routine basis. Such modelling and testing should be an important element of insurer and insurance group (including at the head of the group) ERM and capital management. ORSA is a useful tool for reporting the results of such testing. The actuarial function is a vital source of advice on these matters to both insurers and insurance groups (including at the head of the group). - Much care is needed when considering dependency relationships. For example, one aspect of diversification discussed within the IAA was the degree to which risks might be correlated across countries. In the case of non-life risks, the common IAA view is that there is little correlation of these risks across countries although there may be considerable correlation for such risks within a country. In the case of life risks such as mortality there may be some degree of correlation across countries which share similar trends affecting mortality (e.g. health care, diet, prosperity etc.). The IAA has several specific comments on the dependency/aggregation material presented in the ICS in a number of sections. Please refer to those sections for our responses in these areas.
General Insurance Association of Japan	Japan	Other	No	No	

Great Eastern Holdings Ltd	Singapore	Other	No	No	
Swiss Re	Switzerland	Other	No	No	
Institute and Faculty of Actuaries	UK	Other	No	Yes	The table in the ICS guidance is labelled as 'Correlation matrix': These are factors used in a calculation, not correlation coefficients. The text should be amended to reflect this to avoid giving the impression that these values represent correlation coefficients.
Association of British Insurers	United Kingdom	Other	No	Yes	We consider that diversification and interactions between risks are very difficult to capture using a standard approach when applied to IAIGs with different exposure profiles to jurisdictions, products and investments. In particular: o We consider the current 'two step' structure to be too simplistic. For example, for an annuity writer with large exposure to longevity risk, the correlation between the market and life risk modules will differ to another insurer where the main life risk relates to lapses. o The standard approach does not make any allowance for non-linear interaction between risks (e.g. between lapses and interest rates), which can result in a material misstatement of the diversified capital requirement. o The standard method is also unable to appropriately capture tail dependencies between risks and increasing correlations to account for this affects the whole total loss distribution, leading to an undue loss of diversification. o There is no allowance for diversification between operational risk and other risks, which is clearly inappropriate as operational risks are not fully correlated with any generic risk profile. All these points represent areas of error in the aggregation of capital requirements and inhibit insurers from adopting best practice in risk management within their business. We believe that the best way to address these shortcomings so that the capital aggregation process fully reflects the risk of each individual insurer would be

					through the use of internal models. Furthermore, we note that the proposed diversification benefits are quite limited. For example, there is no allowance for geographical diversification within the EU. Similarly on lines of business, these are grouped at quite a high level, and a more granular approach would more appropriately reflect the economic reality of a diversified portfolio.
MetLife	United States	Other	No	Yes	Diversification: One of the main aims of the ICS is to create a consistent risk-based capital measure for globally active insurers. Hence, it is imperative that the ICS standard method reflects the risk profile of most IAIGs and allows for appropriate diversification benefits. IAIGs carrying out business in different countries across the world reduce their concentration of risks, and benefit from geographical and product diversification than if they were operating only in one country or region. We have major concerns about the lack of diversification credit, especially within each risk type, in the current form of the ICS standard method tested in the 2016 Field Testing exercise. IAIGs with a diversified portfolio will be seriously penalised by the non-recognition of geographical diversification and this means that the standard method is not an appropriate approach for calculating a risk-based capital measure. Within equity risk, there is no recognition for diversification between equity indices around the globe, and between listed equity and other types of equity (hybrid debt, preference shares, joint ventures, hedge funds etc). Additionally, it is assumed that the equity level shock and equity volatility shock is 100% correlated. However, these two shocks are likely to be only 60%-75% correlated. Similarly, within interest rate risk, there is no recognition for diversification effect across currencies. As mentioned above in response to Q 172, there is no

					recognition for diversification effect across currencies. Assuming all currencies suffer a downward shock concurrently is unrealistic as market data suggests that interest rate movements between different currencies are not 100% correlated even in extreme market conditions. IAIGs operating across different markets benefit from geographical diversification. This is an important feature that needs to be taken into consideration when designing and calibrating the interest rate risk module. With regard to insurance risk, there is no allowance for diversification across products, countries or regions. For example, we would not expect to see a 40% decrease in lapse rates for all lapse supported products around the globe simultaneously. We suggest that the IAIS should consider more granular aggregation approach that takes into account a realistic level of intra-risk geographical diversification as well as diversification across different risk types (for example, there should be very little correlation between insurance risk and market risk).
RAA	United States and many other jurisdicitons	Other	No	Yes	The proposed diversification benefits appear quite limited, particular when considering that there is no geographical diversification within the U.S. or EU. With respect to lines of business a more granular approach seems more appropriate to measure correlation/diversification
Prudential Financial, Inc.	United States of America	Other	No	Yes	Within the Life Type Risk correlation matrix, Prudential believes the -25% correlation between mortality and longevity understates the natural hedge between these risks. When measuring risk we are concerned about distribution tails. In these stress scenarios, mortality/longevity will be highly correlated across age groups and businesses as they are influenced by major events or trends (ex. A cure for cancer will benefit all). Since the tail mortality scenarios determine the risk level, mortality/longevity netting is disproportionately affected by these highly correlated scenarios.

MassMutual Financial Group	USA	Other	No	No	

End of Section 6.15