

**COSMIC CERTIFICATION ANALYSIS:
WORLD RESULTS - 2016-17
&
MEXICAN RESULTS - 2017-18**

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PRESENTATION OBJECTIVES

To present:

1. An analysis of the answers to the exam questions in 2016 (worldwide).
2. Results of the certification in Mexico for 2017-18 (till end of July 2018).
3. The preliminary results of an analysis of the questions of the Mexican certification for 2017-18.

COSMIC CERTIFICATION EXAM

- Proof of proficiency or training can be demonstrated, independently through a third party, by a certification exam.
 - In other words, the certification exam should demonstrate that a person who passes the certification exam has a basic knowledge of the COSMIC rules.
- In some countries, government authorities are mandating such proof in contracts based on Function Points measurement.

'HISTORY' OF THE COSMIC CERTIFICATION EXAM

The COSMIC certification exam was designed in early 2006 and the first exam was held in April 2006.

- 932 persons are actually certified in 2018 (till July 2018) from 24 countries.
- Each year hundreds persons apply to pass the COSMIC certification exam.
- The 10 countries with the largest number of COSMIC certifications are: Brazil, Canada, China, India, Italy, Netherlands, Mexico, Poland, Spain and Turkey (alphabetical order).

THE CERTIFICATION QUESTIONNAIRE

- A database of + 300 questions available for the COSMIC certification process including an inventory of:
 - true/false questions
 - multiple-choice questions.
- For each certification exam, 100 questions are selected randomly from the database: 86 from the true/false and 16 multiple-choice questions.
- The maximum duration for a COSMIC exam is 90 minutes -
 - with an additional 30 minutes granted to the persons taking the test online in another language than their native language.
- Note: examinees have access to a hard copy of the Measurement Manual during the exam.

TECHNOLOGY USED & LANGUAGES

- The online certification exam uses the Test Maker software application <https://www.easytestmaker.com>
- This application accepts different types of questions in different languages (6), including the types used in the COSMIC certification exam (true/false and multiple-choice).
- Once the online exam is completed, the application provides an overall certification result to the individual,
 - ✓ while recording detailed answers to each question, that could be analyzed by the COSMIC certification exam administrator.

DESCRIPTIVE DATA

- Dataset: 133 exams taken online in 2016 in six languages (Chinese, English, Italian Polish, Portuguese and Spanish).
- Out of the 257 true/false questions available in the database, 246 were selected in 2016, leaving 11 true/false questions without data for that year.
- Out of the 60 multiple-choice questions available, only 3 were not selected over the same period.
- For analysis purposes, the data collected were grouped according to the sections of the COSMIC Measurement Manual addressed by the questions.

PRIMARY DATA
PERCENTAGE OF WRONG ANSWERS TO TRUE/FALSE
QUESTIONS (N = 133 EXAMINEES)

Measurement Manual section	% wrong answers
1- Foreword	19%
2- Introduction	20%
3- Measurement Strategy Phase	17%
4- Mapping Phase	23%
5- Measurement Phase	30%
6- Measurement reporting	11%
References	17%
All sections – average of wrong answers	21%

- Section 4 (Mapping Phase) has the greatest percentage (40%) of all questions, but only 23% wrong answers.
 - In particular, two subsections have 20% and 26% of wrong answers, respectively within this section 4.
- Section 5 (Measurement Phase) has 30% of the wrong answers to True-False questions.

PRIMARY DATA
PERCENTAGE OF WRONG ANSWERS MULTIPLE CHOICES
(N = 133 EXAMINEES)

Measurement Manual section	% wrong answers
1- Foreword	0%
2- Introduction	35%
3- Measurement Strategy Phase	32%
4- Mapping Phase	16%
5- Measurement Phase	22%
6- Measurement reporting	0%
References	85%
All sections – average of wrong answers	22%

- Multiple Choice questions related to section 2 (Introduction) have the highest number (83) and percentage (35%) of wrong answers.
 - The highest number of wrong answers is in the subsection 'Identifying the functional users and persistent storage' (2.3).
- The second highest percentage of wrong answers is in section 3 (Measurement Strategy Phase) at 32%.

ANALYSIS OF THE QUESTIONS

DISTRIBUTION OF DIFFICULTY RANGES OF DIFFICULTIES

Type of question	Difficulty level	0-39%	40-59%	60-79%	80-99%	100%	Total
		Very difficult	Difficult	Fair	Easy	Too easy	
True/false	Number	7	21	45	145	28	246
	Percentage	3%	9%	18%	59%	11%	100%
Multiple-choice	Number	4	8	13	18	10	53
	Percentage	8%	15%	25%	34%	19%	100%

- There is a relatively high percentage of questions testing basic knowledge of the rules, many of which are relatively simple and easy to understand (70%);
- Only a minority of rules refer to a large number of criteria and are therefore more complex (12%).

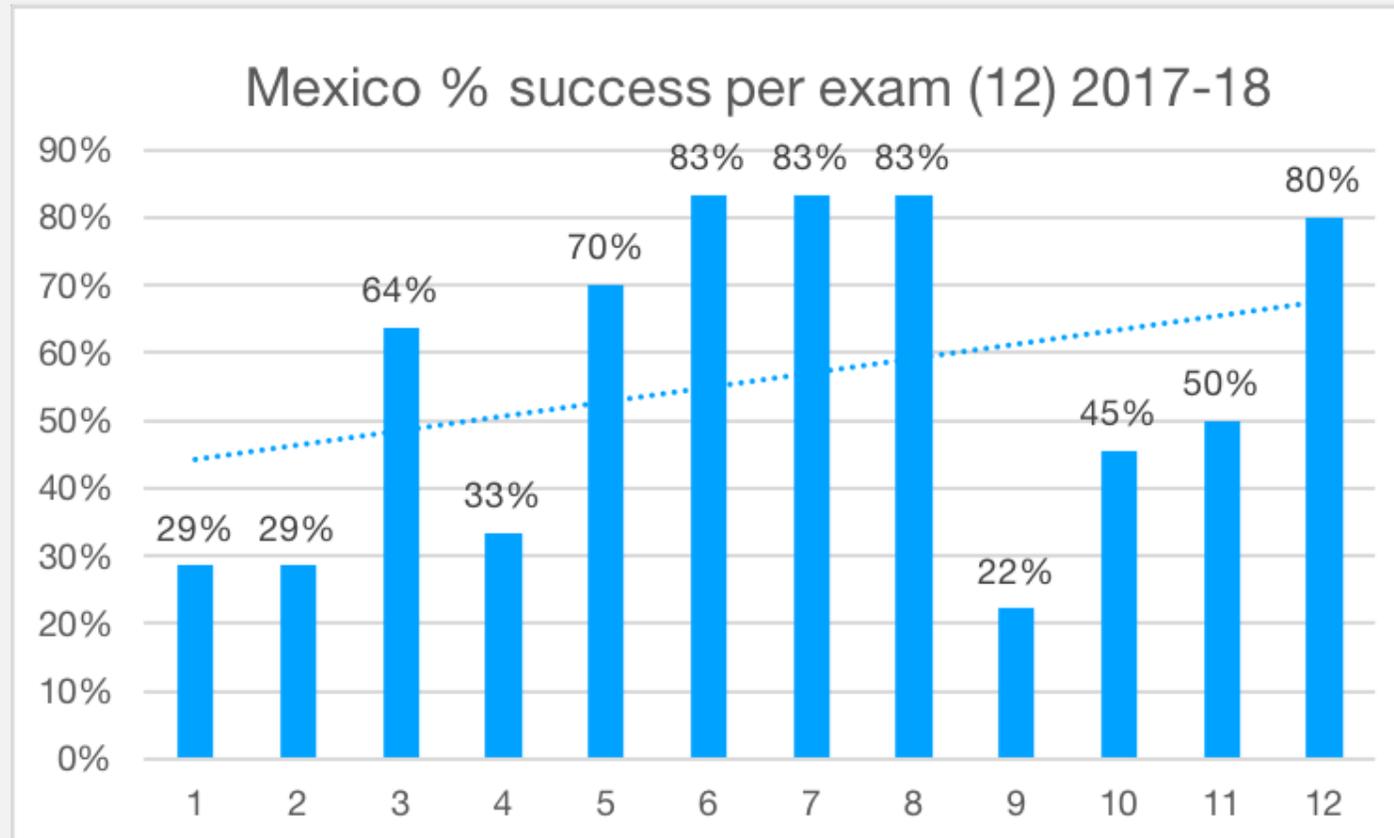
SUMMARY

- Coverage of the various sections of the COSMIC Measurement Manual is relatively good.
- Some additional multiple choices questions could be added for a more comprehensive coverage of the Measurement Reporting phase.
- For the multiple-choices questions, the highest percentages of wrong answers are mainly in section 2 (Introduction) and 3 (Measurement Strategy Phase).

MEXICAN CERTIFICATION (STATISTICS)

- In 2017-18 (October 2017 to July 2018): 56 persons in Mexico got their COSMIC certification diploma
 - For the same period 91 persons applied for the certification: The success rate was 59%.
- There was a general improvement from the last month of 2017 and the first months of 2018 even with a low score in March 2018 (Figure in the next slide)

% OF SUCCESS PER EXAM SESSION (12) IN 2017-2018



- Average % of success = 49% in the last months of 2017.
- It is 60% for 2018 (till end of July)

**PRIMARY DATA
PERCENTAGE OF WRONG ANSWERS (1)**

Phases	Number of wrong answers	% of Wrong answers	Number of pages	% of Number of Pages	Relative percent (2)
Foreword, introduction	14	27%	19	23%	36%
Measurement Strategy	17	33%	18	22%	39%
Mapping	16	31%	34	41%	15%
Measurement	2	4%	7	9%	5%
Measurement Reporting	3	6%	3	4%	5%
Reference	0	0%	1	1%	0
Total	52	100%	82	100%	100%
(1) Only the last 4 certification exams were analyzed in this study.					
(2) Assuming that the number of pages implies a greater number of questions, therefore greater probability of errors.					

PRIMARY DATA
HOW THE DATA DIFFER IN THE LAST EXAM
COMPARE TO THE THREE PREVIOUS ONES

Phases	Nb wrong answers	Wrong answers %
Foreword, introduction	4	36%
Measurement Strategy	4	36%
Mapping	2	18%
Measurement	0	0%
Measurement Reporting	1	9%
Reference	0	0%
Total	11	100%

Improvement in the Mapping and Measurement phases but not in the Introduction and Measurement Strategy.

SUMMARY

- Questions relative to scope, layers, measurement strategy (the first chapters) had the highest percentage of errors.
- The greatest improvement between low score exams and the higher score exam is for the mapping phase.
- There is no relative change for the other phases.
- Compare with our 2016 analysis there are few wrong answers for the Measurement phase.
- Warning: this is only a preliminary analysis. Because the sample is relatively low there is no distinction between True/False and Multiple choices.
- We also consider that it was not useful to make a distinction between easy questions and hard questions.
- From my subjective observation, a number of questions are hard or ambiguous (English version). This summer there was a revision of the questions and we eliminated or added precision for a number of questions (English version). This was done by English speaking people (Charles Symon and Arlan Lesterhuis)