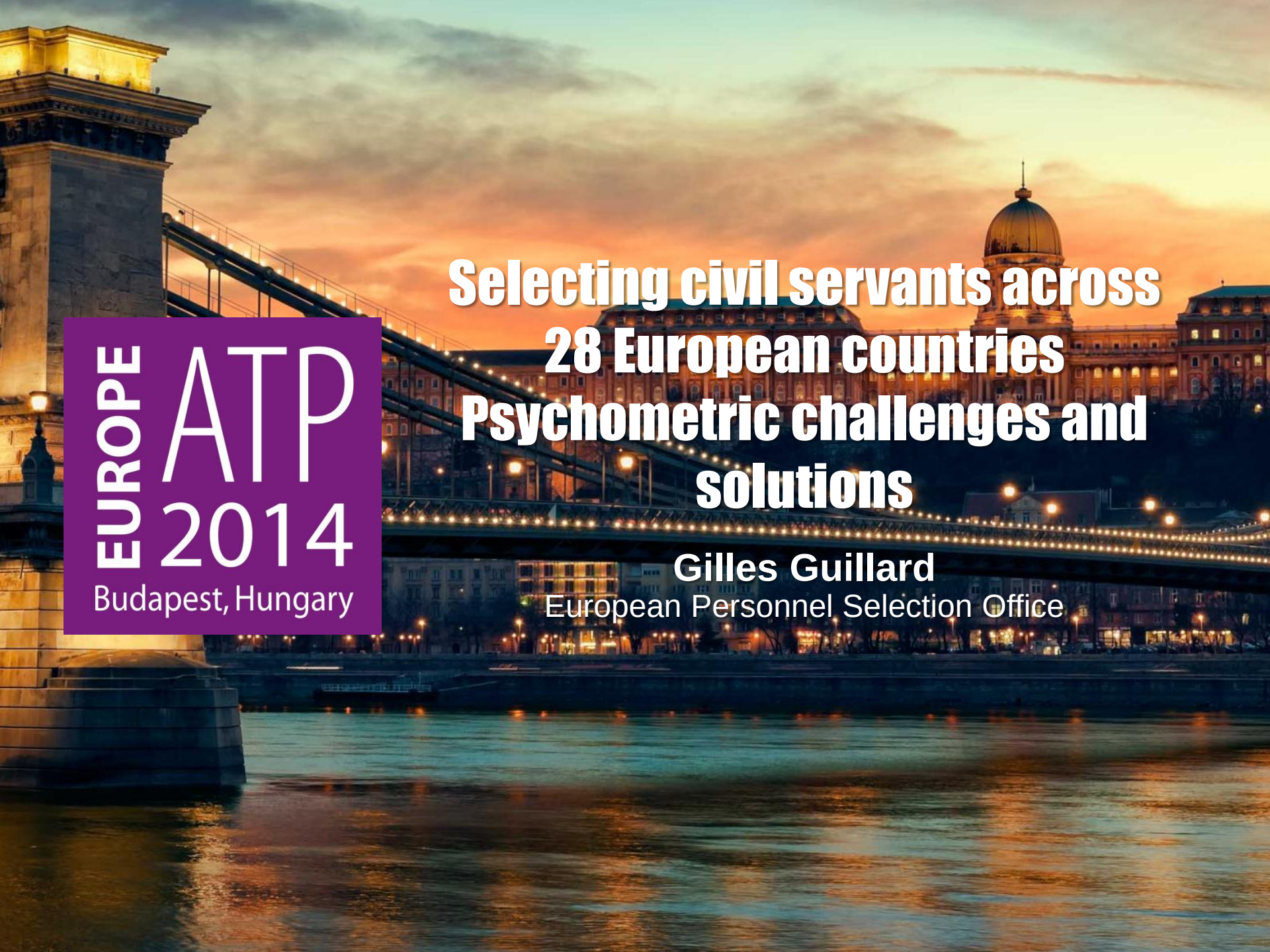


Selecting civil servants across 28 European countries Psychometric challenges and solutions

Gilles Guillard
European Personnel Selection Office

The European Union

EUROPE ATP 2014 Budapest, Hungary

Commission

CONSILIUM
Council

Parliament

CVRIA
Court of Justice

CURIA RATIONIUM
Court of Auditors

Source: Wikipedia

Economic & Social Committee

Committee of the Regions

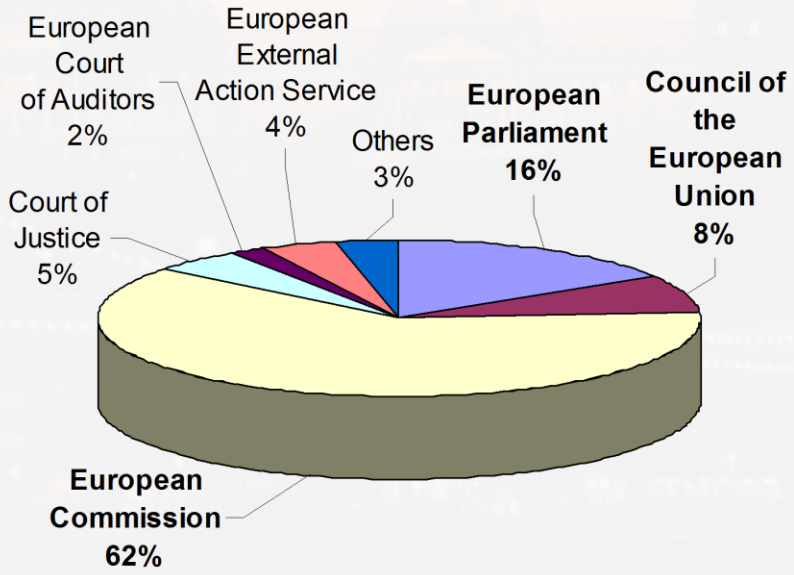
Ombudsman

Data Protection Supervisor

The EU Institutions

EUROPE ATP 2014 Budapest, Hungary

	Posts in 2012
European Parliament	6655
Council of the European Union	3153
European Commission	25478
Court of Justice	1952
European Court of Auditors	887
European Economic and Social Committee	724
Committee of the Regions	531
European Ombudsman	66
European Data Protection Supervisor	43
European External Action Service	1670
Total	41159



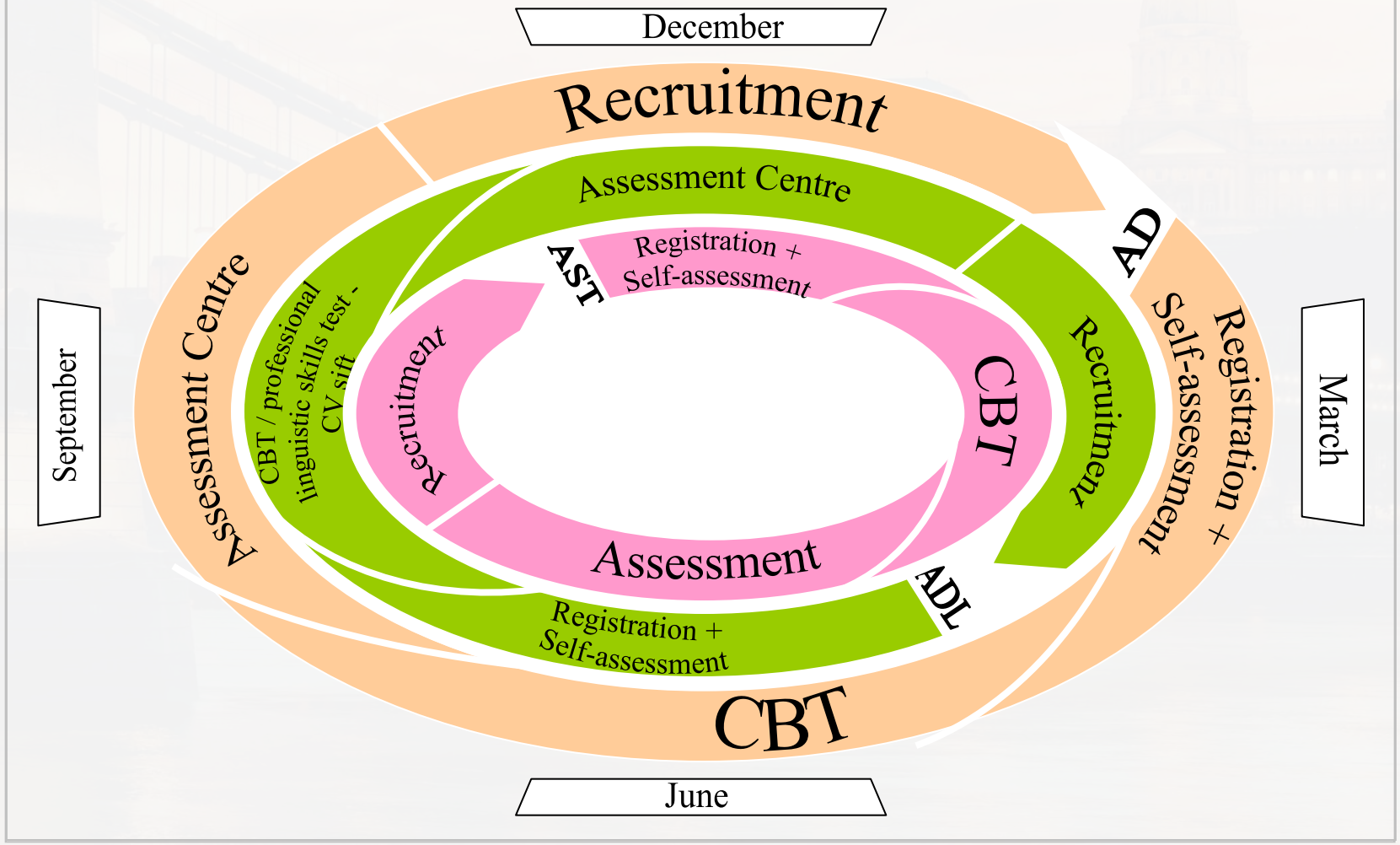
24 Languages

EUROPE ATP 2014
Budapest, Hungary

1) български
2) čeština
3) dansk
4) Deutsch
5) eesti keel
6) ελληνικά
7) English
8) español
9) français
10) Gaeilge
11) hrvatski
12) italiano
13) latviešu valoda
14) lietuvių kalba
15) magyar
16) Malti
17) Nederlands
18) polski
19) português
20) română
21) slovenčina
22) slovenščina
23) suomi
24) svenska

Selection in Cycles

EUROPE ATP 2014
Budapest, Hungary



Results AD cycle 2012

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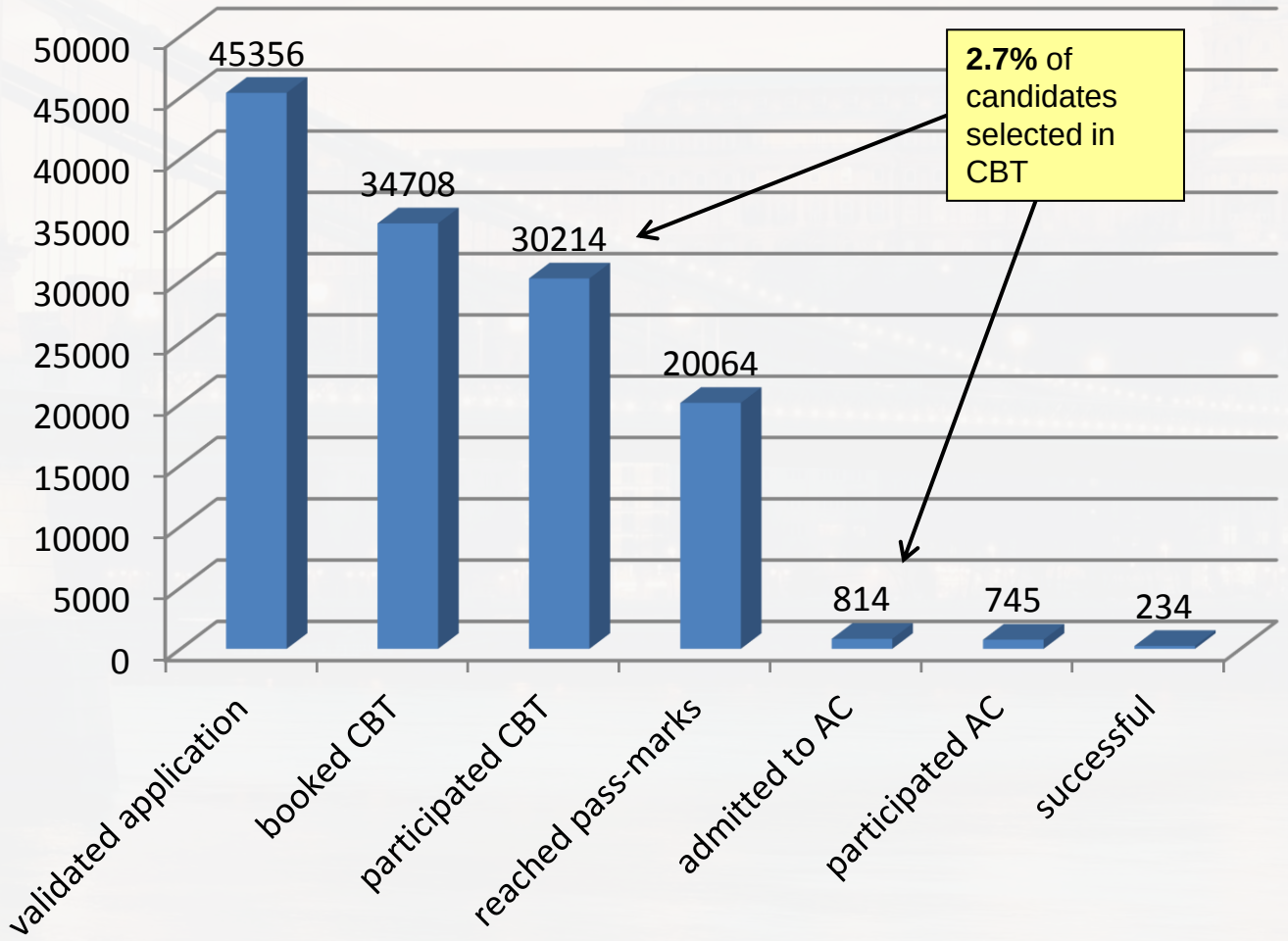
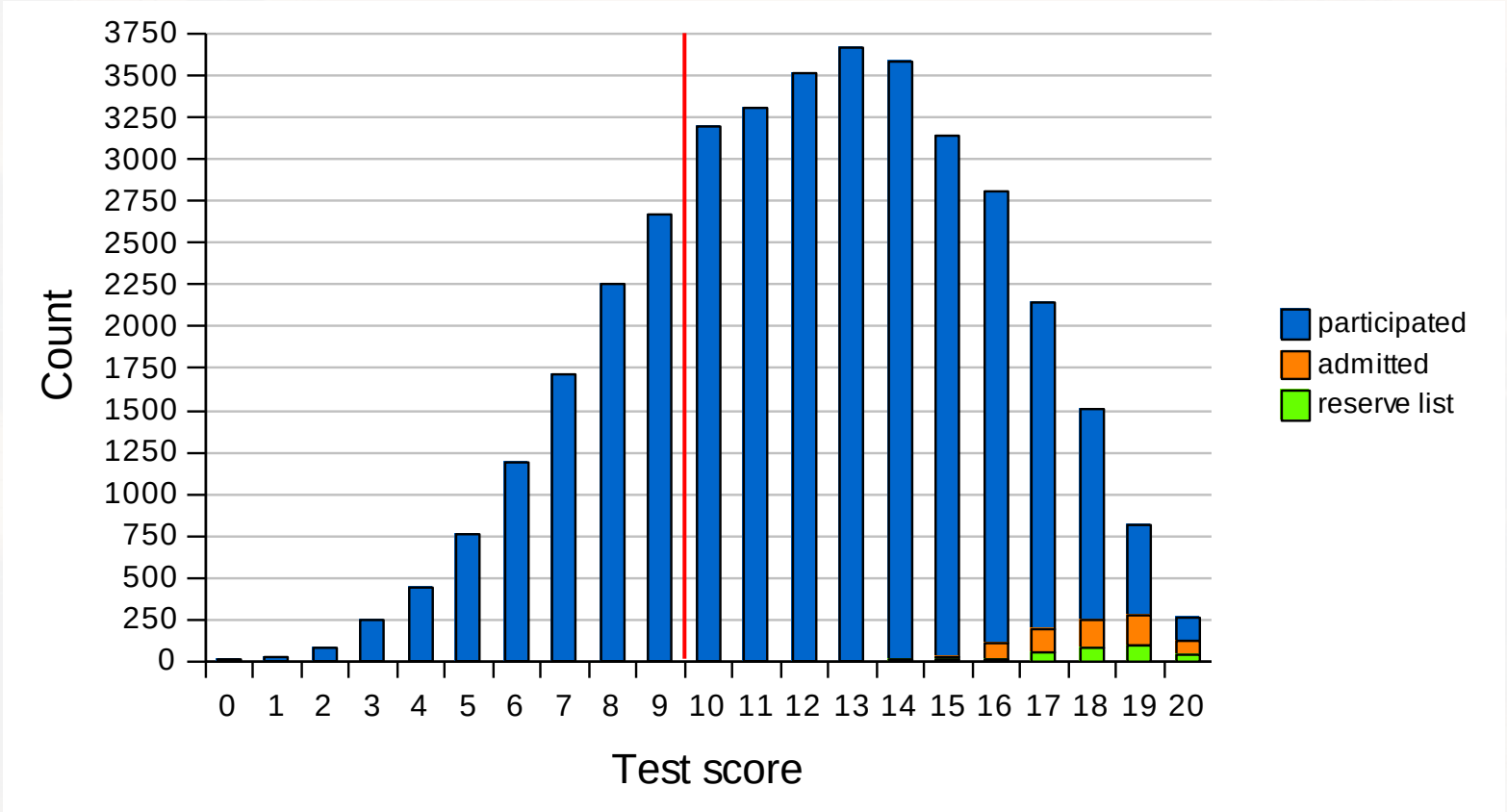
Budapest, Hungary



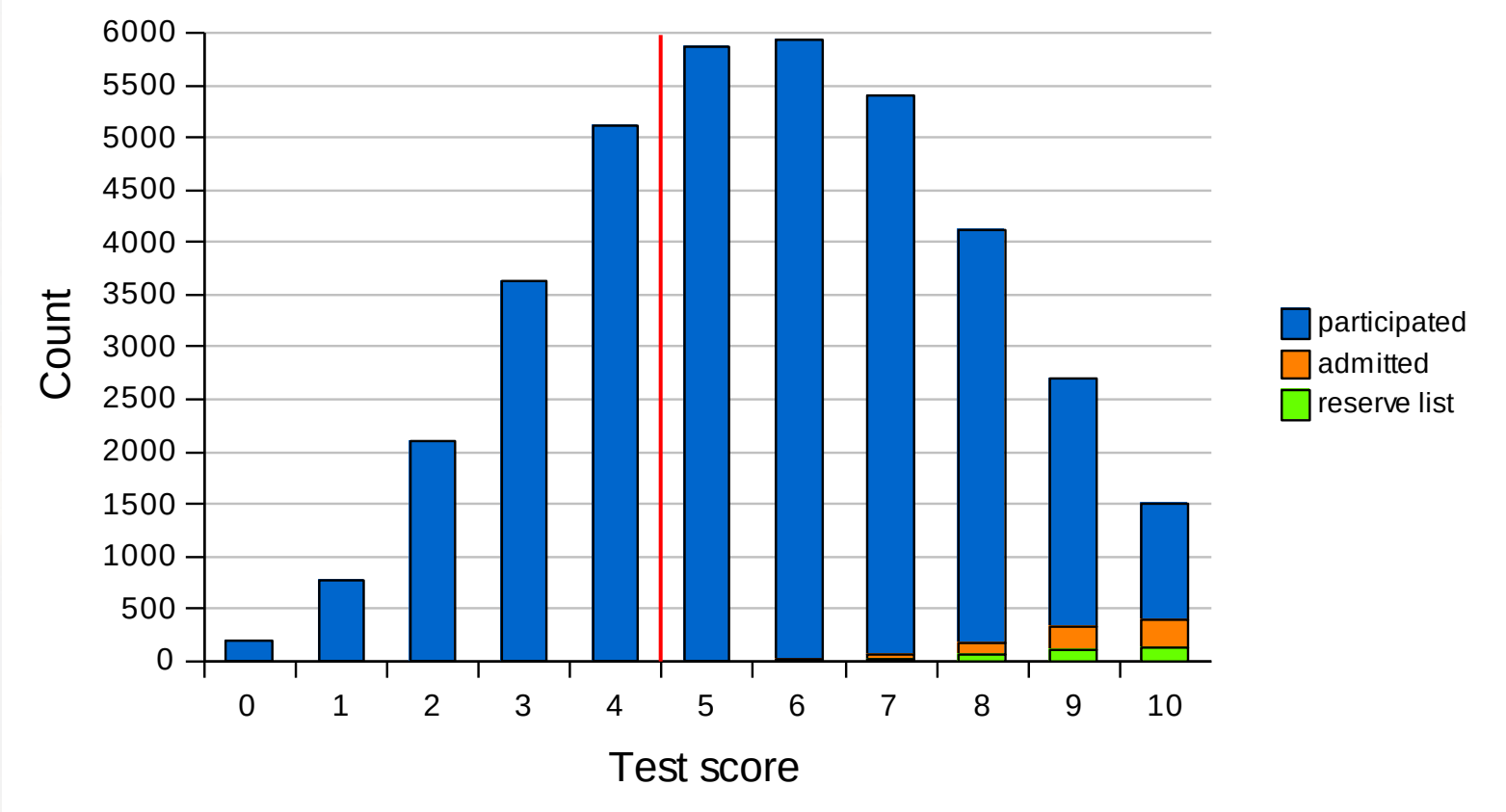
Score Distribution - VR

EUROPE ATP 2014
Budapest, Hungary

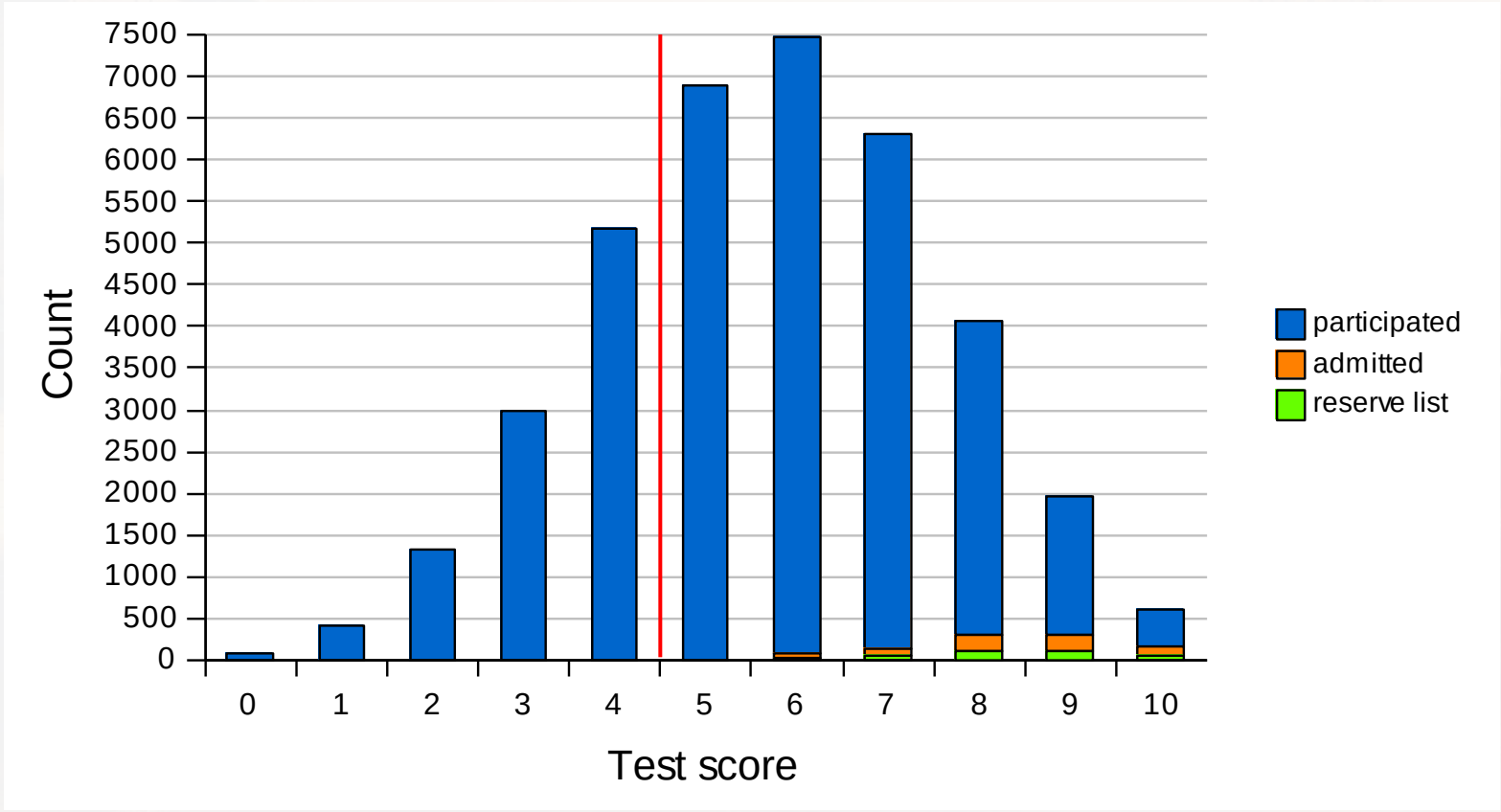


Score Distribution - NR

EUROPE ATP 2014
Budapest, Hungary



Score Distribution - AR



Situational Judgement

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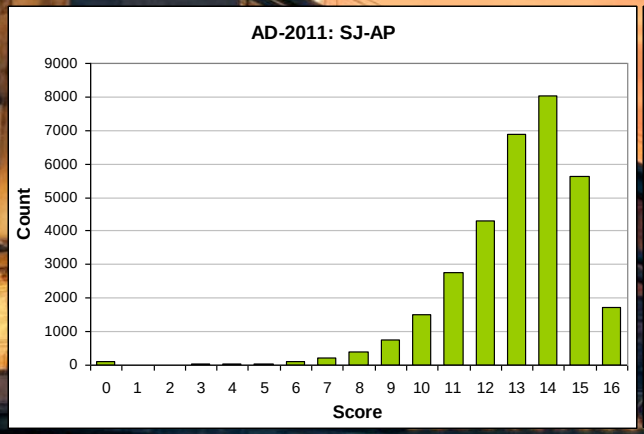
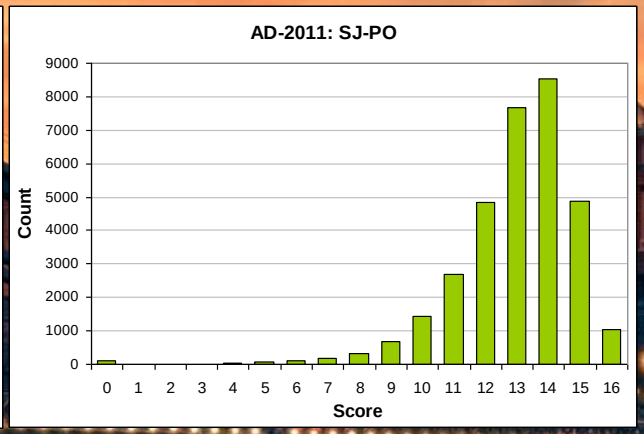
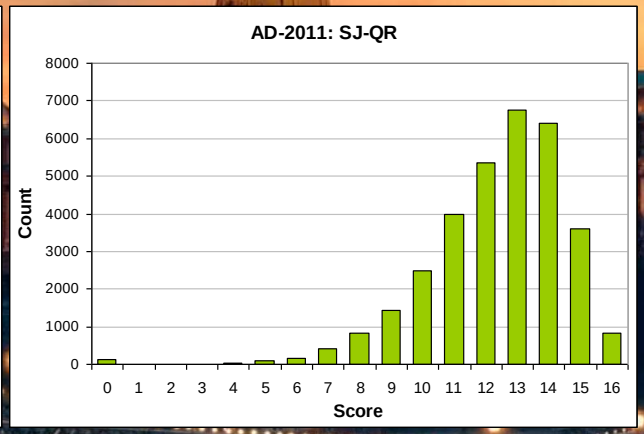
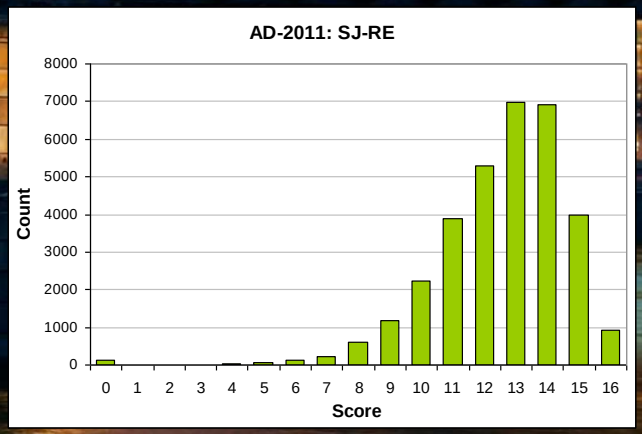
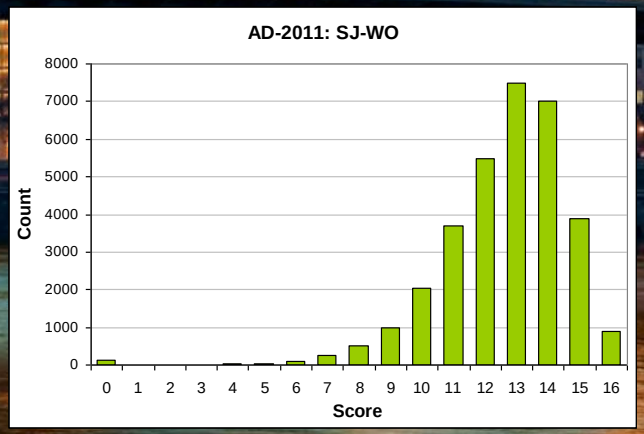
Budapest, Hungary











Psychometric challenges
(focus on CBT stage)

EUROPE ATP 2014
Budapest, Hungary

- **Facts:**
  - Multilingual tests (up to 24 languages with three scripts – Latin, Greek, Cyrillic - for some of the cognitive abilities tests)
  - Multicultural background of testing population (28 EU Member States)
  - High stakes exam with very high selectivity rate
- **How to ensure fairness and reliability of the tests …?**
  - Calibrating items within one language
  - Adjusting item parameters to become comparable across languages
  - Building equal test forms in each language


EUROPE
ATP
2014
Budapest, Hungary
Solution n°1
In-depth item analysis
How EPSO monitors the behaviour of items

Building up a reliable and fair item bank in 24 languages

EUROPE ATP 2014
Budapest, Hungary

- In-house translation by trained translators (some tests created directly into EN/DE/FR)
- Strict quality benchmarks applied (length of stem, localisation, difficulty level across languages, etc…)
- Internal proof-reading sessions
- Reverse translation used for HR items
- Trialling items before deploying them on the field (e.g. SJT trialled on…37.000 test takers in 2011)
- Accept "loss" of several items in different languages (items not respecting benchmarks not translated)

Item Analysis

EUROPE ATP 2014 Budapest, Hungary

- Based on the dicotomous / polytomous **Rasch model**
- Conducted after every major competition
- Calibrate items and monitor their behaviour
- Making psychometrics as vivid as possible

Georg Rasch (1901-1980)

Example:

Cumulative Analysis VR+NR

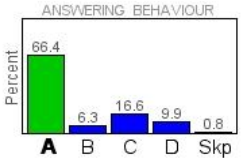
EUROPE ATP 2014 Budapest, Hungary

Test	Responses	Candidates	Items
VR	**2 590 360**	**129 518**	**6 377**
NR	**1 295 180**	**129 518**	**4 500**
Total	**3 885 540**		**10 877**

Oct 2013

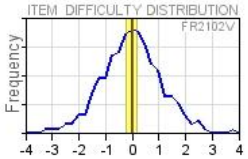
FR2102V Item Profile (VR+NR Cumulative)

Count	957
Valid	949
Correct	635
Avg Duration	107.5



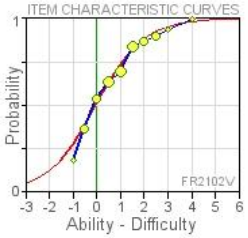
Rasch Model Measures

IPAR (Difficulty)	-0.02
STD Error	0.077
Adjusted IPAR	**-0.04**



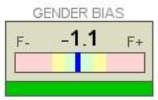
Model Fit Statistics

Infit MSQ	0.99	≈ 1, < 1.5
Outfit MSQ	0.99	≈ 1, < 1.5
r PTME	0.41	≈ 0.40, > 0.25
ObsMatch	72.9%	> 72.3%
Discrim	1.03	≈ 1



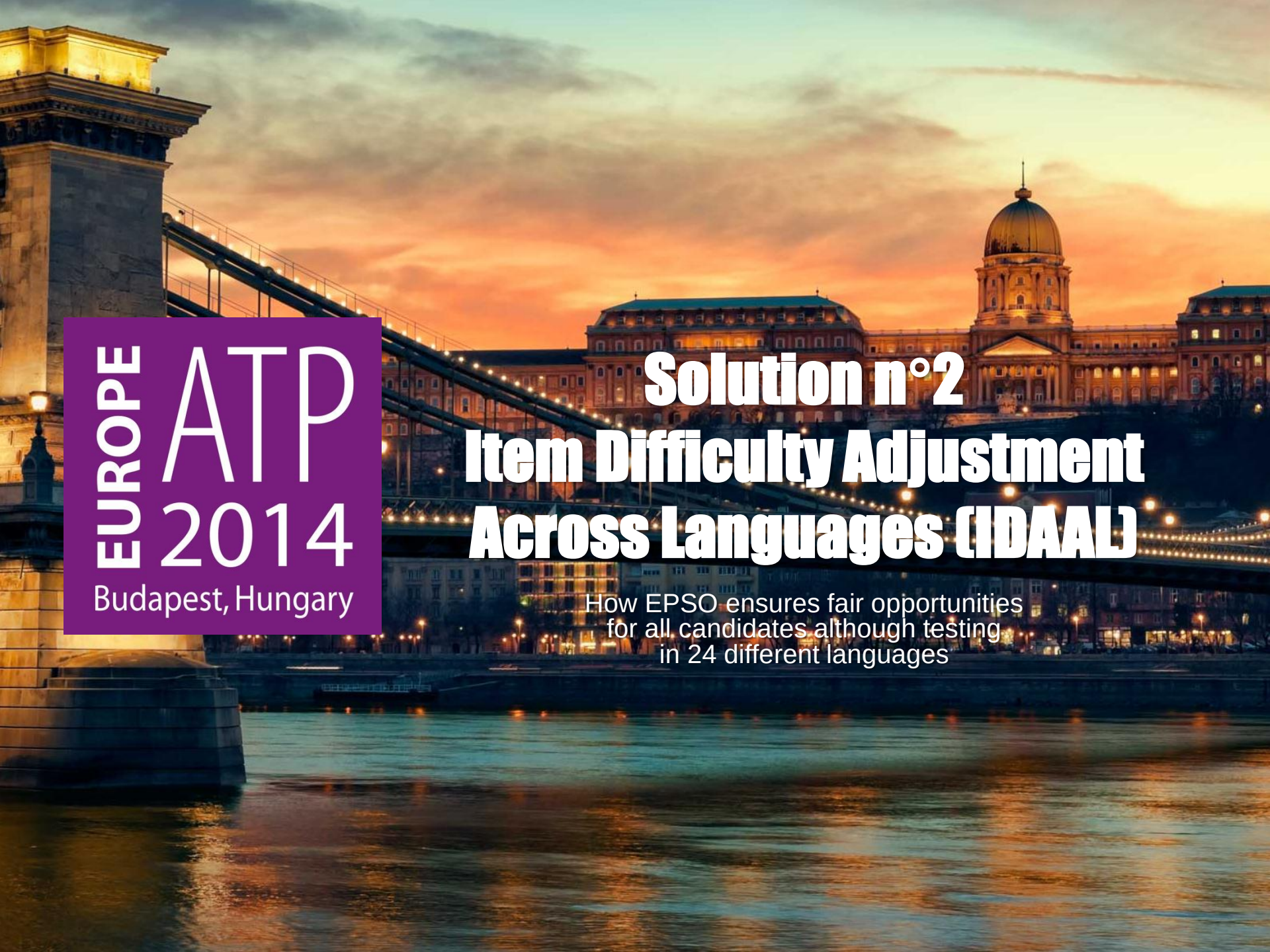
Homogeneity (DIF)

Gender	0.411	> 0.01
Age	0.896	> 0.01
Proximity	0.561	> 0.01
Nationality	0.956	> 0.01



[BG] [CS] [DE] [EL] [EN] [ET] [FI] [FR] [HU] [LT] [LV] [NL] [PL] [PT] [SK] [SL] [SV]

EUROPE ATP 2014
Budapest, Hungary



Solution n°2
Item Difficulty Adjustment Across Languages (IDAAL)

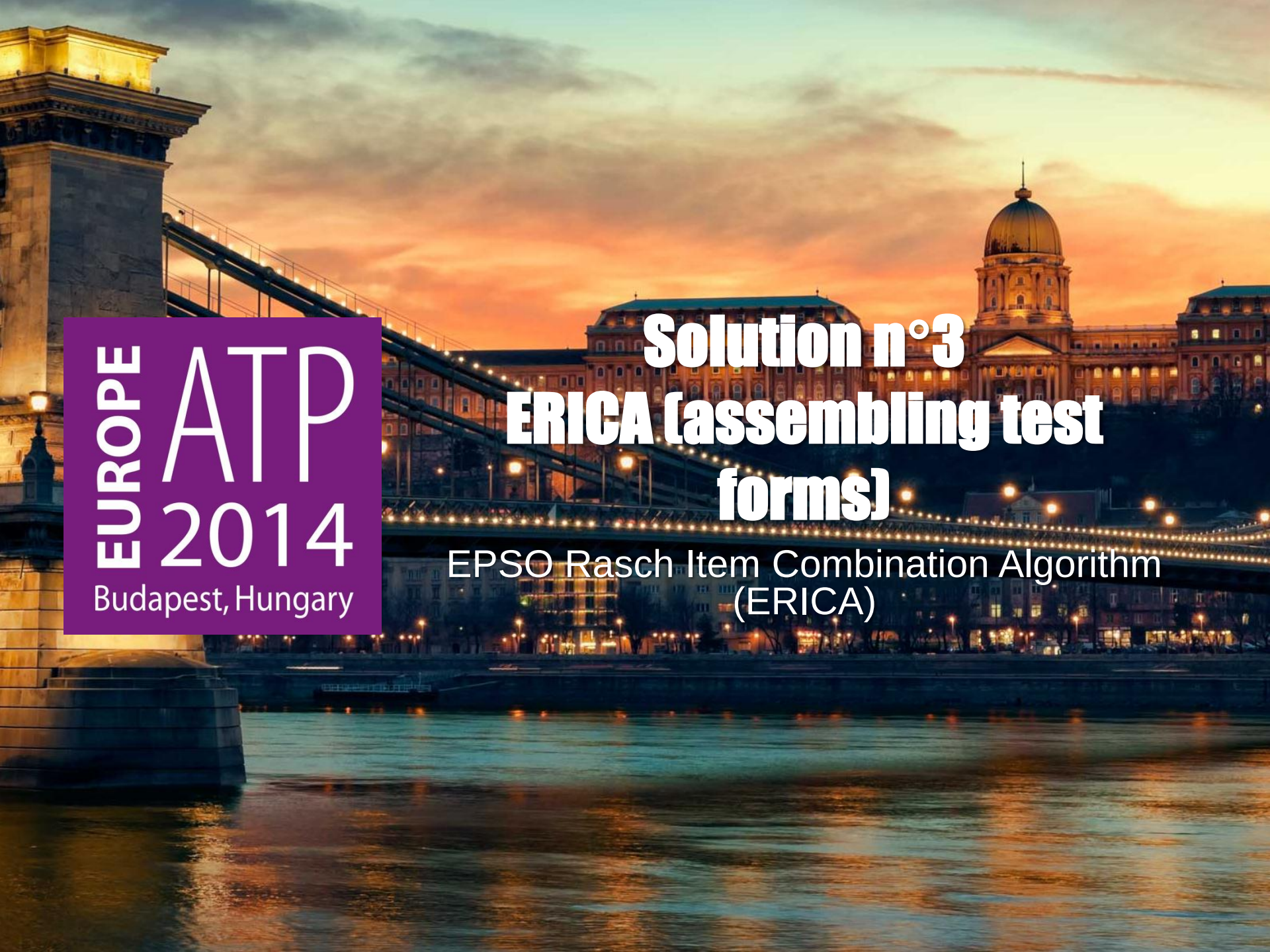
How EPSO ensures fair opportunities
for all candidates although testing
in 24 different languages

Item Difficulty Adjustment Across Languages (IDAAL)

EUROPE ATP 2014
Budapest, Hungary

After calibrating items within the languages the zero points have to be aligned in order to make difficulty parameters comparable across languages. For this alignment following three methods are used:

- **Aligned Averages Algorithm (AAA):** does pair-wise comparisons between EN and other languages
- **Minimum Meansquare Method (MMM):** minimizes differences in item difficulties across languages
- **Person Parameter Contrast Measure (PPCM):** analyses the person parameter in order to detect any systematic translation bias



Solution n°3
ERICA (assembling test forms)

EPSO Rasch Item Combination Algorithm (ERICA)

Framework

Candidated have to be treated equally:

- Same number of items
- Same difficulty of test form

⇨ Adaptive testing is legally not possible

EPSO has developed an algorithm involving two steps:

1. Set up a "master test form"
2. Create test forms corresponding to master test form across all languages

Target (quality criteria)

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Budapest, Hungary

- Actual test forms correspond to master test form
- Limited overlap between test forms
- No over-exposed items
- Further improving gender balance

Using MTF definition tool

- EPSO has created a tool to facilitate the decision process of the Selection Board on the master test form.
- A single difficulty parameter needs to be entered in order to create a master test form.
- Based on multi-competition reference group the expected test score distribution can be calculated and displayed.

MTF definition tool

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Test form difficulty: 5 (0...10)

Item difficulties from -2.5 to 2.5

Reference group: AST3_2012_5406

Calculate

Defining the master test form

- Master test form difficulty: **5**

- Master test form difficulty: **8**

- Master test form difficulty: **2**

Expected Score Distribution

Score	Count	Graph
0	1	1
1	11	11
2	27	27
3	86	86
4	161	161
5	379	379
6	624	624
7	955	955
8	1457	1457
9	2015	2015
10	2526	2526
11	3157	3157
12	3549	3549
13	3577	3577
14	3399	3399
15	3183	3183
16	2356	2356
17	1542	1542
18	796	796
19	317	317
20	45	45

Expected Score Distribution

Score	Count	Graph
0	4	4
1	33	33
2	159	159
3	469	469
4	971	971
5	1599	1599
6	2306	2306
7	2946	2946
8	3307	3307
9	3556	3556
10	3302	3302
11	3045	3045
12	2648	2648
13	1962	1962
14	1522	1522
15	1023	1023
16	608	608
17	390	390
18	210	210
19	97	97
20	6	6

Expected Score Distribution

Score	Count	Graph
0	1	1
1	5	5
2	7	7
3	19	19
4	42	42
5	84	84
6	135	135
7	293	293
8	430	430
9	713	713
10	1085	1085
11	1651	1651
12	2229	2229
13	3191	3191
14	3808	3808
15	4437	4437
16	4551	4551
17	4079	4079
18	2402	2402
19	907	907
20	94	94

Sample Test Form

EUROPE ATP 2014 Budapest, Hungary

Target	Item	Actual
-1.00	EN1626VEN	-1.001
-0.56	EN1555V	-0.550
-0.22	EN1170V	-0.227
0.06	EN1063V	0.062
0.30	EN2361V	0.295
0.51	EN1003VEN	0.517
0.71	EN1686V	0.703
0.89	EN2089V	0.891
1.06	EN2041VEN	1.064
1.22	EN2133V	1.211
1.38	EN2191V	1.394
1.54	EN2261V	1.532
1.69	EN2260VEN	1.684
1.84	EN2180VEN	1.811
2.00	EN2196VEN	2.032
2.16	EN2264V	2.198
2.33	EN2142V	2.333
2.51	EN1578VEN	2.451
2.73	EN1292VEN	2.809
3.00	EN2371V	2.941
Sum SqDev:		0.9

ERICA works in a compensatory way

	Target	AdjTarget	Actual	Difference
Item 1	-1.50	-1.50	-1.48	-0.02
Item 2	-1.20	-1.22	-1.23	0.01
Item 3	-0.80	-0.79	…	…

$$SumSqDev = \frac{\sum (ActDiff - TgtDiff)^2}{NumItms} \cdot 1000$$

Advantages of ERICA

EUROPE ATP 2014 Budapest, Hungary

- Increased fairness for candidates:
  - Improved difficulty management
  - Improved gender balance
  - Ascending order of item difficulty
- Improved ownership of SB:
  - Possibility to simulate expected score distribution
  - Prior knowledge of actual test forms which will be delivered to candidates
- Use of broader range of questions / improved diversity of test content


EUROPE
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2014
Budapest, Hungary
Thank you very much for your attention!
Any questions?