



# TESTMASTER

Software and organizational solution  
for testing candidates



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*In words and numbers*

# What is TestMaster?

TestMaster is a software and organizational solution for testing candidates

TestMaster is a solution developed at the Faculty of Organizational Sciences. It provides digitalization and support to all stages of the testing process:

1. Creation of database and classification of questions
2. Selection of questions and creation of unique tests
3. Design of tests and test forms
4. Organization of test packaging and distribution
5. Organization of testing
6. Organization of test collection and scanning
7. Organization of test reviewing
8. Evaluation of tests
9. Release of correct answers and inspection of digitalized tests
10. Creation of reports

**20+**

ENTRANCE TESTS FOR UNDERGRADUATE  
AND MASTER ACADEMIC STUDIES

**3**

FINAL EXAMS AT THE END  
OF PRIMARY EDUCATION

**100+**

REALIZED COLLOQUIA AND  
EXAMS AT THE UNIVERSITY



The application of the TestMaster solution significantly improves candidate testing, primarily by increasing the objectivity and reliability of the entire system and organization, as well as by standardizing the conditions in which candidates take the tests.

A software and organizational solution which, through digitalization:

- Increases efficiency** by rationalizing resource use
- Eliminates errors** resulting from human factors
- Provides transparency** through insight into reviewed tests
- Enables results analysis** for improvent purposes

## What have we achieved with TestMaster?

| Final exam at the end of primary education in 2021/2022

### Software solution

- Preparation of tests in Serbian and national minority languages
- Testing **63.000** students in mathematics, native language and through a combined test
- Designing **54** different tests
- Integration with the My High School public portal
- Real-time process monitoring
- Improving and simplifying the work of all participants in the process of exam implementation

## Organizational solution

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- Established network and computer infrastructure
- Installed apps for test design, packaging, receipt and scanning, as well as the work of directors and reviewers
- Established **15** scanning centers in **15** local self-government units and trained approximately **180** operators for test scanning
- Supported design, prepress and automated test processing operations
- Created distribution plan and storage of tests – nearly **4.500** security bags with tests at **1.000** testing locations, through more than **35** points for receiving materials
- Received and scanned over **500.000** test pages and test envelopes in A3 and A4 formats
- Reviewed approximately **500.000** open-ended and more than **3.700.000** closed-ended questions
- Engaged **12.000** reviewers, by subjects and languages
- Enabled test and result inspection, complaint submission and appeal resolution electronically

**Author-angle & User-angle**

## Why is TestMaster important?

We developed TestMaster in response to technological and organizational challenges faced during candidate testing. The first major application of TestMaster was the realization of the final exam students take at the end of their eighth grade of primary education.

We developed the solution in cooperation with representatives of the Government of the Republic of Serbia, the Ministry of Education, and the Office for Information Technologies and eGovernment.

Guided by the idea that digitalization is one of the ways to improve education in Serbia and that strengthening trust in the testing process is important, the team from the Faculty of Organizational Sciences developed a unique software and organizational solution for the implementation of candidate testing.

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***Marko Petrović, PhD, Project Manager***



Digitalization and education are key priorities in the work of the Government of the Republic of Serbia. By digitalizing education processes, we want to ensure transparency and resource rationalization, but also to improve the experience of citizens in using services.

By applying the TestMaster solution, we ensured equal conditions for all students taking the final exam and excluded room for review errors or possible bias. Parents and students were finally able to focus solely on results which, for the first time, they could access online instead of going to school.

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*Jovana Cilić Radonjić, Education Advisor  
in the Cabinet of the Prime Minister of Serbia*



TestMaster has increased and ensured the transparency and accuracy of processes, excluded possible occurrences of accidental test replacement, reduced the number of engaged persons, ensured the impartiality of reviews, reduced the possibility of error, and consequently, the number of complaints.

The application of the TestMaster solution is the result of cooperation between the Ministry of Education, the Faculty of Organizational Sciences and the Office for Information Technologies and eGovernment, initiated by the Government of the Republic of Serbia. This is another way of strengthening trust in the final exam and the state education system.



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*Milan Pašić, PhD, Assistant Minister of Preschool  
and Primary Education, the Ministry of Education*

Digitalization of the testing process

## What does TestMaster enable?

### Stages of realization

- ☒ Apps have been created for each stage of testing realization



**TESTMASTER**  
solutions

1 Designing and generating unique tests

2 Packaging, distribution and receipt of materials

3 Test scanning and automatic processing

4 Reviewing, result release and resolution of complaints

5 Analytics and reporting

## ***TestMaster Core***

The central component of the system which manages the process of conducting tests and synchronizes the work of all other components, connecting them into a fully functional unit

## **Apps and portals**



App for designing and generating unique tests



Test packaging and distribution app



Test scanning app



Test review app



Real-time reporting app



Administrative portal for testing organizers



Public portal for candidates

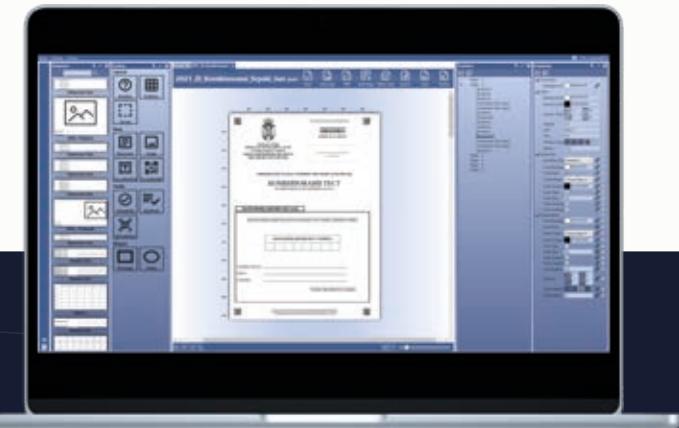
All apps and portals include detailed written and video instructions, as well as continuous customer support



# App for designing and generating unique tests

- ☒ The app enables designing tests in different formats:

-  Designing open-ended and closed-ended questions, as well as fill in the blanks questions
-  Adding visual elements - images, tables, formulas and templates
-  Defining scoring and review methods and correct answers determination
-  Generating a set number of unique tests for each candidate
-  Automatic prepress of generated tests



The app enables:

- Simple addition of new functionalities, in accordance with testing requirements
- Automatic document structure conversion into paper or electronic form - mobile or web





## Test packaging and distribution app

The app enables:



automatic distribution plan generation



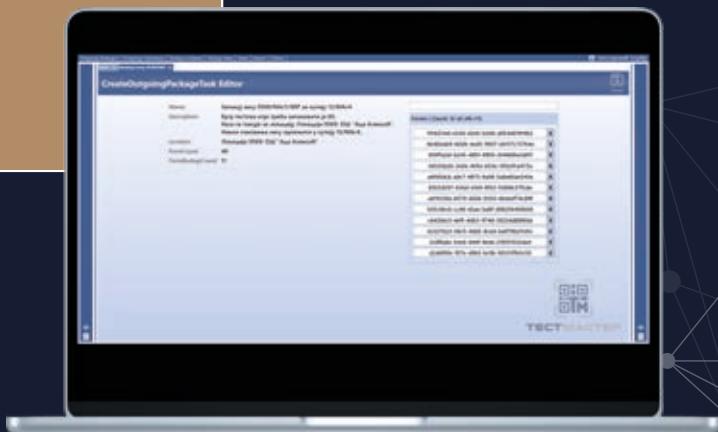
packaging and keeping record of tests in accordance with the distribution plan



automatic generation of necessary supporting documentation - stickers, records



keeping record of incoming material



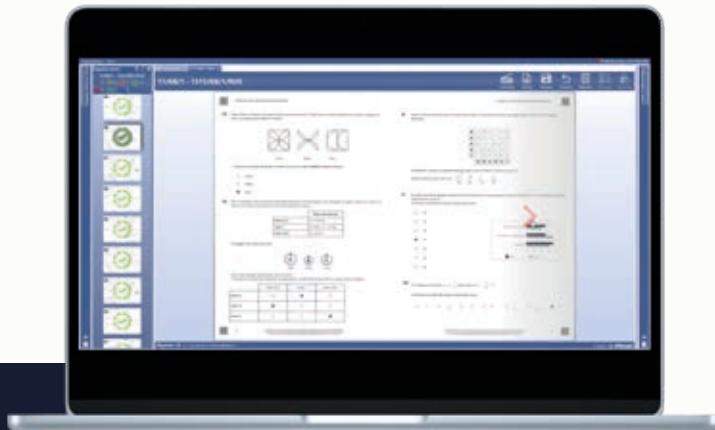
The app enables:

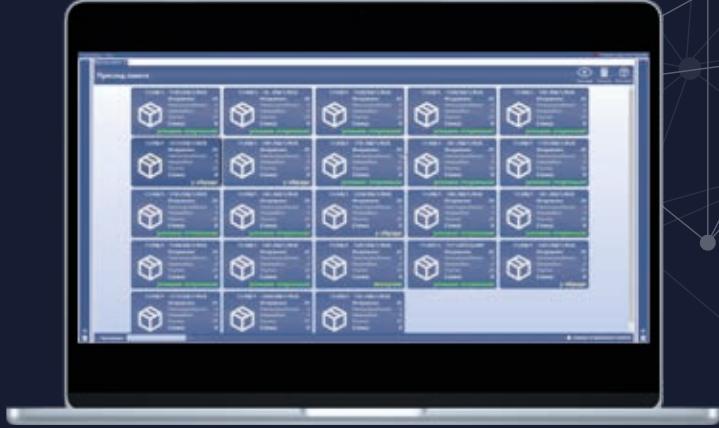
- Establishing different organization models of the process of packaging exam material and supporting documentation
- Automation of printing activities through integration and synchronization of various devices



## Test scanning app

- The app enables digitization, validation and records of incoming test material - tests and accompanying documentation





The app enables:

- Continuous monitoring, support and training of scanning centers operators and coordinators
- Integration with different scanner models for a more efficient and easier scanning process





## Test review app

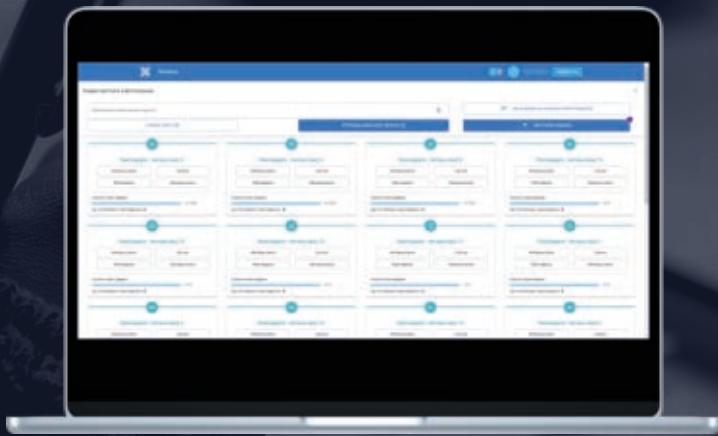
- The app enables defining in what way and how many times each answer for each question will be reviewed. Answers to closed-ended questions are automatically reviewed and graded, while answers to open-ended questions are assigned to reviewers.

At any time, reviewers can see their performance, as well as statistics on the total number of tasks in the system.

## Review reliability

In cases of multiple reviewers reviewing the same task or test, the app automatically:

- compares results
- conducts potential additional uniformization
- enables complaint resolution



- The app recognizes unanswered questions, which shortens test review time
- Various algorithms for the question distribution by reviewers are supported in real time – depending on the current number of reviewers, their assigned competences and the number of unreviewed questions
- The app enables determining the order of reviewing question categories in accordance with the reviewer's preferences



## Real-time reporting app

- The app enables monitoring and control of various system processes implementation in real time





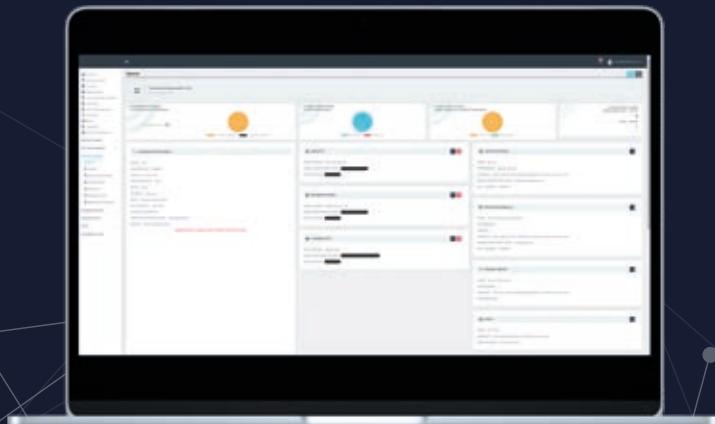
- Key parameters are monitored, from system status and performance to process control indicators

Type	Measurement	Unit	Value	Status	A1	A2	A3	A4	A5
1	Chlorine	mg/l	100	OK	1	2	3	4	5
2	Chloroform	mg/l	100	OK	1	2	3	4	5
3	HClO2	mg/l	100	OK	1	2	3	4	5
4	Alkalinity	mg/l	100	OK	1	2	3	4	5
5	BOD5	mg/l	100	OK	1	2	3	4	5
6	Chloramine	mg/l	100	OK	1	2	3	4	5
7	Chloride	mg/l	100	OK	1	2	3	4	5
8	HClO3	mg/l	100	OK	1	2	3	4	5
9	Ammonium	mg/l	100	OK	1	2	3	4	5
10	Ammonium	mg/l	100	OK	1	2	3	4	5



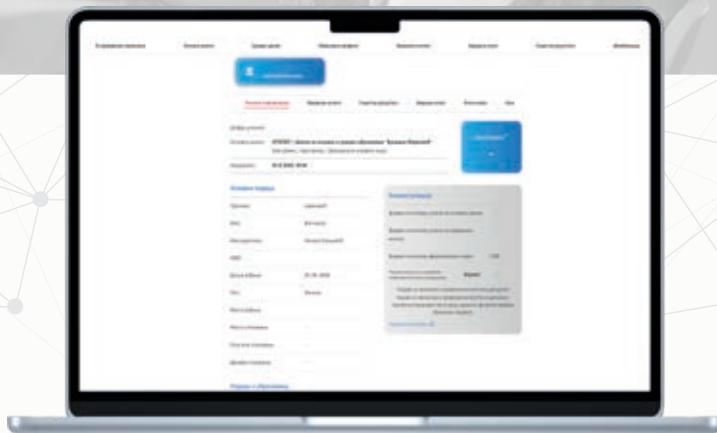
# Administrative portal for testing organizers

- The portal is intended for test organizers
- In addition to administration, managing the process of conducting testing in all its phases is enabled, as well as monitoring its implementation in real time
- The portal supports different channels of notification of and communication with all process participants - portal, e-mail, phone





## Public portal for candidates



- The portal is intended for candidates participating in the testing
- In addition to getting information, candidates are enabled to:
  - get insight into and control of recorded data
  - submit applications for testing
  - inspect achieved results - by tests and questions
  - download digitalized tests
  - submit test result complaints
  - monitor the status of complaint processing

## Where can TestMaster be applied?

### Realized projects



**Entrance exams** – **20+** entrance exams for undergraduate and master studies, Faculty of Organizational Sciences



**Student testing** – **100+** colloquia and exams, Faculty of Organizational Sciences



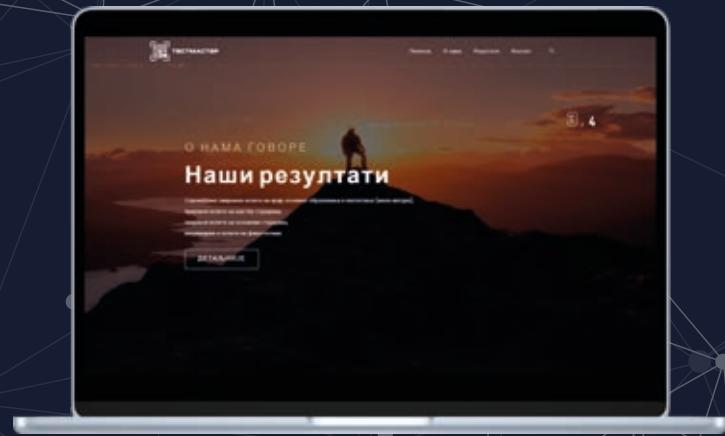
**Evaluation of service user satisfaction** – **3 years**, Faculty of Organizational Sciences



**Application and enrollment of students in high school** – **2 years**, Republic of Serbia



**Final exam at the end of primary education** – **4 years**, Republic of Serbia



Visit the official web presentation of the TestMaster solution: [testmastersolutions.com](http://testmastersolutions.com)

## Further development plan

Complete testing digitalization - transition to "paperless" testing

*The team that developed and implemented the solution*

## Who are TestMaster authors?



Marko Petrović, PhD  
Project manager



Miloš Jevtić, PhD  
Solution development  
team



Filip Furtula  
Solution development  
team



Miloš Ljubisavljević  
Solution development  
team



Nenad Aničić, PhD  
Solution development  
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Đorđe Nestorović  
Solution development  
team



Vladimir Belča  
Solution development  
team



Nina Turajlić, PhD  
Solution development  
team

- The TestMaster team consists of professors and associates from the Faculty of Organizational Sciences who work in the fields of software solutions design and business systems organization

The multidisciplinary combination of knowledge and skills led to the development and successful implementation of this unique software and organizational solution for candidate testing



Svetlana Jovanović  
Solution development team



Aleksandra Furtula  
Solution development team



Olga Jejić  
Solution development team



Vladimir Vujin, PhD  
System engineers team



Goran Militarov  
System engineers team



Slavica Cicvarić Kostić, PhD  
Marketing and communications team



Milan Okanović, PhD  
Marketing and communications team

- Solution development and implementation supported by **Milan Martić, PhD** and **Milija Suknović, PhD**



**TESTMASTER**  
solutions



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