

8.15 EU CAPTCHA (2018.08)

8.15.1 IDENTIFICATION OF THE ACTION

Service in charge	DIGIT.D.3
Associated Services	DIGIT.B.2, DIGIT.B.3

8.15.2 EXECUTIVE SUMMARY

A CAPTCHA is a test intended to distinguish human from machine input. The objective of this action is to offer to the Member States an open source CAPTCHA released under the EUPL (European Union Public License) that is maintained, secure, user friendly and multilingual. It will be delivered as a component that can be operated as a service. A CAPTCHA with such characteristics does not exist on the market. The delivered solution will be published on GitHub so that it can be reviewed and maintained by the open source community.

In addition, the action will conduct a study investigating how to further extend the CAPTCHA with features improving the user experience by replacing scrambled letters and numbers with more innovative and less intrusive approaches (e.g. gesture analysis, animations, images, etc.). The intention will be to implement the conclusions of the study in the following years.

8.15.3 OBJECTIVES

A CAPTCHA is a test intended to distinguish human from machine input in order to thwart spam and automatic submission or extraction of data. The user is typically challenged to solve a puzzle that relies on expected capacities of the human brains but whose resolution is complex to automate.

Users and, in particular, disabled people are known to dislike CAPTCHAs that are perceived as hindrances. However, no better solution was found so far to protect information systems against malicious automated processes.

The characteristics of a good CAPTCHA are:

- Security – The number of non-human users able to solve the puzzle and therefore wrongly identified as being human must be minimised, which implies that the puzzle should be highly complex to automate;
- User friendliness – The number of human users unable to solve the puzzle and therefore wrongly identified as being non-human must be minimised, which implies that the puzzle should be very easy to solve in a short timeframe by any human being.

Several CAPTCHA solutions exist on the market, either provided as components or as services. Unfortunately, they all have one or more of the following shortcomings:

- They provide an insufficient level of security with a high rate of false positives;
- They provide an insufficient level of user friendliness with a high rate of false negatives;
- They are not or insufficiently maintained;

- They do not support internationalisation or multilingualism and, in particular, they do not support all official languages of the European Union;
- They do not support users with disabilities;
- They do not have a licensing model that is compatible with EUPL and, in particular, they cannot be distributed as part of systems provided by public administrations;
- They raise ethical concerns because they collect private data or provide puzzles whose resolution creates commercial value.

The first objective of the action is to provide an open source CAPTCHA that is:

1. released under the EUPL (European Union Public License);
2. available as a component and operable as a service;
3. secure;
4. user friendly;
5. multilingual with support for all official languages from the European Union;
6. accessible by users with disabilities;
7. compliant with data protection rules and best practices;
8. maintained with continuous support for subsequent versions of the Java Virtual Machine.

The CAPTCHA could be based on existing open source initiatives that do not fulfil all requirements. It could either extend them or fork a new solution. The delivered solution will be published on GitHub so that it can be reviewed and maintained by the open source community.

The second objective of the action is to conduct a study investigating how to further extend the CAPTCHA with features improving the user experience by replacing scrambled letters and numbers with more innovative and less intrusive approaches (e.g. gesture analysis, animations, images, etc.). The intention will be to implement the conclusions of the study in the following years.

8.15.4 SCOPE

The CAPTCHA will be based on distorted letters and numbers displayed in an image and spelled in audio files in all supported languages. It will be usable as a component through an API in a JEE application. It will be operable as a service in a JEE application server and will expose a protocol that can be invoked from any programming language.

It is acknowledged that a CAPTCHA based on distorted letters and numbers is sub-optimal in terms of user friendliness. However, it is relatively simple to implement and it allows quickly delivering a working solution. A study will be delivered to explore alternatives.

8.15.5 ACTION PRIORITY

This section is used to assess the priority of the proposal to become a programme's action according to Art. 7 of the ISA² decision⁵⁸.

⁵⁸ DECISION (EU) 2015/2240 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

8.15.5.1 Contribution to the interoperability landscape

The contribution of the action to the interoperability landscape, measured by the importance and necessity of the action to complete the interoperability landscape across the Union

Question	Answer
<p><i>How does the proposal contribute to improving interoperability among public administrations and with their citizens and businesses across borders or policy sectors in Europe? In particular, how does it contribute to the implementation of:</i></p> <ul style="list-style-type: none"> • <i>the new European Interoperability Framework (EIF),</i> • <i>the Interoperability Action Plan and/or</i> • <i>the Connecting European Facility (CEF) Telecom guidelines</i> • <i>any other EU policy/initiative having interoperability requirements?</i> 	<p>A CAPTCHA is an essential component of information systems dealing specifically with human users, such as citizens. Having an open source secure and user friendly CAPTCHA prevents from having to acquire or implement a specific one in several information systems. It allows offering a consistent user experience throughout public services in Europe for a step in administrative processes that is perceived as complicated by many users.</p>
<p><i>Does the proposal fulfil an interoperability need for which no other alternative action/solution is available?</i></p>	<p>The delivered CAPTCHA would solve a common problem in a consistent and cost effective way.</p>

8.15.5.2 Cross-sector

The scope of the action, measured by its horizontal impact, once completed, across the policy sectors concerned.

Question	Answer
<p><i>Will the proposal, once completed be useful, from the interoperability point of view and utilised in two (2) or more EU policy sectors? Detail your answer for each of the concerned sectors.</i></p>	<p>Having to distinguish human from non-human users is a common problem that is not related to any particular sector.</p>
<p><i>For proposals completely or largely already in</i></p>	

operational phase , indicate whether and how they have been utilised in two (2) or more EU policy sectors.	
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8.15.5.3 Cross-border

The geographical reach of the action, measured by the number of Member States and of European public administrations involved.

Question	Answer
Will the proposal, once completed , be useful from the interoperability point of view and used by public administrations of three (3) or more EU Members States? Detail your answer for each of the concerned Member State.	Having to distinguish human from non-human users is a common problem that is not related to any particular EU Member State.
For proposals completely or largely already in operational phase , indicate whether and how they have been utilised by public administrations of three (3) or more EU Members States.	

8.15.5.4 Urgency

The urgency of the action, measured by its potential impact, taking into account the lack of other funding sources

Question	Answer
Is your action urgent? Is its implementation foreseen in an EU policy as priority, or in EU legislation?	A CAPTCHA is a component that is consistently and repeatedly required. As long as a common open source CAPTCHA is not available, suboptimal existing solutions will have to be used and paid for.
How does the ISA ² scope and financial capacity better fit for the implementation of the proposal as opposed to other identified and currently	ISA allows constraining the implemented CAPTCHA to run on any platform instead of focusing on a specific one.

available sources?	
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8.15.5.5 Reusability of action's outputs

The re-usability of the action, measured by the extent to which its results can be re-used.

Name of reusable solution to be produced (for new proposals) or produced (for existing actions)	EU CAPTCHA
Description	A CAPTCHA is a technical component that is used whenever a user submits data to an information system if there is a need to assert that the user is human. It is commonly used in registration workflows, particularly when creating accounts for personalisation or security. EU CAPTCHA will be reused in EU Login - the authentication service for information systems of European institutions and bodies - and in ECI/OCS - a system funded by ISA that allows citizens to support initiatives as per Regulation (EU) No 211/2011 of the European Parliament and of the Council of 16 February 2011 on the citizens' initiative (ECI Regulation).
Reference	
Target release date / Status	Q4/2018
Critical part of target user base	EU CAPTCHA will be delivered as open source under the EUPL and usable by any information system. In particular, it will be available to public administrations (Member States and European institutions and bodies), non-governmental organisations, etc.
For solutions already in operational phase - actual reuse level (as compared to the defined critical part)	

8.15.5.6 Level of reuse of existing solutions

The re-use by the action (following this proposal) of existing common frameworks and interoperability solutions.

Question	Answer
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<p><i>Does the proposal intend to make use of any ISA², ISA or other relevant interoperability solution(s)? Which ones?</i></p>	<p>This is not applicable. A CAPTCHA is a standalone technical component that does not implement any business.</p> <p>However, from a technical perspective, the CAPTCHA could be based on existing open source initiatives that do not fulfil all requirements. It could either extend them or fork a new solution. The delivered CAPTCHA will be published on GitHub with its source code and documentation freely available.</p>
<p><i>For proposals completely or largely already in operational phase: has the action reused existing interoperability solutions? If yes, which ones and how?</i></p>	

8.15.5.7 Interlinked

Question	Answer
<p><i>Does the proposal directly contribute to at least one of the Union's high political priorities such as the DSM? If yes, which ones? What is the level of contribution?</i></p>	<p>A CAPTCHA is a building block used in many information systems. Having to implement or acquire a CAPTCHA represents a cost and a technical challenge that can become a barrier for digitalisation. In addition, a common CAPTCHA helps homogenising the user experience and therefore removes technical barriers for non-digital natives. The CAPTCHA aims at being secure and will not store personal data. It therefore contributes to Pillar 2 (reinforcing trust and security in digital services and in the handling of personal data).</p> <p>The CAPTCHA will provide support for users with disabilities and therefore contributes to Pillar 3 (support an inclusive digital society).</p>

8.15.6 PROBLEM STATEMENT

The problem of	discriminating non-human users from human users
affects	many information systems provided by public administrations in Europe
the impact of which is	the multiplication of ad-hoc costly or suboptimal local solutions
a successful solution would be	to share a common CAPTCHA implementation.

8.15.7 IMPACT OF THE ACTION

8.15.7.1 Main impact list

Impact	Why will this impact occur?	By when?	Beneficiaries
(+) Cost savings	The cost of implementing or acquiring a CAPTCHA will be eliminated.	2018	Member States European Bodies Private Sector Everyone
(+) Security	Implementing a secure CAPTCHA is technically challenging. Mutualising the effort will yield better results than multiplying ad-hoc custom solutions.	2018	Member States European Bodies Private Sector Everyone
(+) User experience	CAPTCHAs are disliked by many users who find them complicated. With a unified experience, users will only have to learn once how to use it. In addition, the CAPTCHA will be provided in all official languages of the European Union and users with disabilities will be supported.	2018	Users
(+) Remove Digital Barriers	Implementing or acquiring a CAPTCHA incurs a costs and technical difficulties. Removing these barriers will promote digitalisation.	2018	Member States European Bodies Private Sector Everyone
(+) Market	CAPTCHA providers might not	2018	Everyone

	appreciate competition with an open source product provided by the European Union but it would stimulate them to propose better offerings.		
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8.15.7.2 User-centricity

The implemented CAPTCHA will aim at providing a unified user experience in all languages supported by the European Union. It will support users with disabilities. The intent is to minimise the number of human users failing to solve the puzzle and therefore wrongly identified as non-humans. This allows information systems to trust that users are human and users to trust that information systems are properly protected against hacking attempts.

8.15.8 EXPECTED MAJOR OUTPUTS

Output name	Impact on the market
Description	A maintained, secure, user friendly and multilingual open source CAPTCHA would likely impact the market. Existing CAPTCHA providers will have to improve their offering.
Reference	
Target release date / Status	

Output name	Improved support for user with disabilities and for multilingualism
Description	The existence of EU CAPTCHA will guarantee that a solution supporting users with disabilities and supporting all languages from the European Union exists on the market.
Reference	
Target release date / Status	

8.15.9 ORGANISATIONAL APPROACH

8.15.9.1 Expected stakeholders and their representatives

Stakeholders	Representatives	Involvement in the action
European Bodies	CII	Provide requirements

Member States	ISA ² Coordination Group	Provide requirements

8.15.9.2 Identified user groups

The CAPTCHA would be delivered as an open source component and will be operable as a service. Any party implementing an information system that needs to discriminate humans from non-humans is a potential user: European institutions and bodies, Member States, private companies, open source community, etc.

8.15.9.3 Communication and dissemination plan

Dissemination will happen via GitHub and via CAPTCHA itself that will advertise its own existence and provide a link to GitHub where it will be available for download.

8.15.9.4 Key Performance indicators

KPI are hard to obtain for an open source component that is freely available. A single download by an entity that operates the CAPTCHA as a service for a big user population would demonstrate more success than several downloads for having a look at the code. It will unfortunately not be possible to count the number of information systems using the implemented CAPTCHA.

Description of the KPI	Target to achieve	Expected time for target
Number of downloads of the package	50	2019

The study to further extend the CAPTCHA will be published in GitHub.

8.15.9.5 Governance approach

The action is mostly technical as it consists in implementing a CAPTCHA based on distorted letters and numbers that fulfils the following requirements:

- It can be used as a component or operated as a service;
- It is secure;
- It is user friendly;
- It supports all official languages from the European Union;
- It supports users with disabilities;
- It does not collect private data.

Additional requirements will be collected via the CII and the ISA² Coordination Group. The technical project will be managed by DIGIT.D.3.

A study will further explore alternatives to using distorted letters and numbers in order to improve the user experience. The list of options to evaluate and the list of interested parties will be established with the ISA² Coordination Group. DIGIT.D.3 will then perform an analysis and iteratively share results with interested parties during two or three webinars. Final conclusions will be presented to the ISA² Coordination Group.

8.15.10 TECHNICAL APPROACH AND CURRENT STATUS

The CAPTCHA will be based on distorted letters and number for the visual side and on letters and numbers spelled in different languages for the audio side. It will be implemented in Java and will be usable as a component via an API or operable as a service and accessible via a protocol. Recent versions of most JEE application servers will be supported, such as Tomcat, Weblogic, JBoss and Websphere. Most recent browsers, such as Internet Explorer, Edge, Firefox, Chrome and Safari will be supported on the client side.

8.15.11 COSTS AND MILESTONES

8.15.11.1 Breakdown of anticipated costs and related milestones

Phase: Initiation Planning Execution Closing/Final evaluation	Description of milestones reached or to be reached	Anticipat ed Allocatio ns (KEUR)	Budget line ISA/ others (specify)	Start date (QX/YYYY)	End date (QX/YYYY)
Initiation	Requirements	10	ISA	Q1/2018	Q1/2018
Execution	Implemented CAPTCHA	150	ISA	Q2/2018	Q4/2018
Execution	Study for alternatives	50	ISA	Q2/2018	Q4/2018
	Total	210	ISA	Q1/2018	Q4/2018

8.15.11.2 Breakdown of ISA² funding per budget year

Budget Year	Phase	Anticipated allocations (in KEUR)	Executed budget (in KEUR)
2016			
2017			
2018	All	210	210

2019			
2020			