KEEPER: CERTIFYING RESEARCH DATA COMBINING SEAFILE AND BLOCKCHAIN TECHNOLOGY

CS3 2023
Rene Ranger & Vlad Makarenko

MAX PLANCK
digital library

KEEPER – SYNC & SHARE AND ARCHIVING

- MPG INSTITUTES

  80+

- ACTIVATED USERS

  5.272

- LIBRARIES / FILES

  17.390 / 75.833.692

- STORAGE USED

  179 TB (CA. 240TB W/ HISTORY)

KEEPER

THE MAX PLANCK DIGITAL LIBRARY – WHAT WE (ALSO) DO

SERVICES FOR THE MAX PLANCK RESEARCHERS

- BASIC PROVISION WITH SCIENTIFIC INFORMATION (JOURNALS, EBOOKS, DATABASES…)

- BASIC PROVISION OF RESEARCH SERVICES (SOFTWARE, TOOLS, INFRASTRUCTURE)

- STRATEGIC SERVICES: CONTRIBUTION TO NATIONAL AND INTERNATIONAL INITIATIVES (OA2020, DEAL, BLOXBERG)

WHERE WE GET IDEAS FOR NEW SERVICES
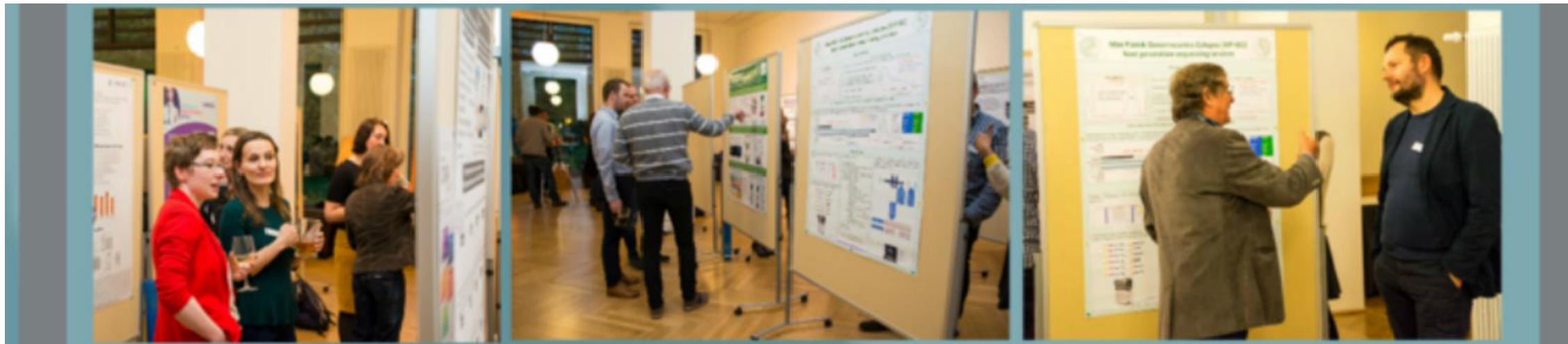
"With a watermark on my research data, I would be much more relaxed and share my results more often!"

"… as a researcher I want to protect my ideas, findings or collected data, as early in the research process as possible, so I don't have to worry about rushing to publish my research data or being scooped…"

WHY PROTECTING INTELLECTUAL PROPERTY MATTERS

CHALLENGES IN SCIENCE:

- HIGH PRESSURE TO PUBLISH FAST

- IP CAN BE STOLEN

- "WHO WAS FIRST?"

Why protecting intellectual property matters

Challenges in science:

- High pressure to publish fast

- IP can be stolen

- "Who was first?"

Our solution:

IP   →   Blockchain

STEP 1: THE GENESIS OF BLOXBERG FEBRUARY 2019

Max Planck Society, Carnegie Mellon University, IT University of Copenhagen, University of Johannesburg, University of Nicosia, Georgia Tech, ETH Zurich, University of Kassel, University of Sarajevo, University College London

Bloxberg Consortium members

50 +

And more…

https://qa-keeper.mpdl.mpg.de/my-libs/

KEEPER
TEST SERVER

New Library   More

Search Files

Files

My Libraries

Shared with me

Shared with groups

Library Details

Tools

Favorites

Activities

Linked Devices

Share Admin

My Libraries

Name	Size	Last Update
My Library	27.6 MB	a minute ago

Project Catalog   Help / Knowledge Base   About

Help

https://qa-keeper.mpdl.mpg.de/library/9dd1b6ad-3b0d-41a6-8814-aaa5e87e84f8/My%20Library/

Files

My Libraries

Shared with me

Shared with groups

Library Details

Tools

Favorites

Activities

Linked Devices

Share Admin

Libraries / My Library

	Name	Size	Last Update
	Emails		3 hours ago
	ZoomInstaller.exe	14.2 MB	3 hours ago
	bloxberg blockchain.pptx	7.7 MB	3 hours ago
	Keeper_Storage_Estimation.xlsx	487.4 KB	3 hours ago
	cared-data-certificate_1176.pdf	201.2 KB	3 hours ago
	api2_tokenv2.csv	169.0 KB	3 hours ago
	testautomation.pdf	134.6 KB	3 hours ago
	Image Pasted at 2022-11-8 14-28.png	32.0 KB	3 hours ago
	Begründung.docx	13.7 KB	3 hours ago
	archive-metadata.md	1.5 KB	3 hours ago

Search files in this library

Project Catalog   Help / Knowledge Base   About

Opens up Help

https://qa-keeper.mpdl.mpg.de/library/9dd1b6ad-3b0d-41a6-8814-aaa5e87e84f8/My%20Library/

KEEPER
TEST SERVER

Upload   New   Share   Archive   Certify   Metadata

Search files in this library

Files

My Libraries

Shared with me

Shared with groups

Library Details

Tools

Favorites

Activities

Linked Devices

Share Admin

Libraries / My Library

			Name	Size	Last Update
☐		📁	Emails		22 minutes ago
☐	☆	📄	ZoomInstaller.exe	14.2 MB	24 minutes ago
☐	☆		bloxberg blockchain.pptx	7.7 MB	24 minutes ago
☐	☆		Keeper_Storage_Estimation.xlsx	487.4 KB	23 minutes ago
☐	☆		cared-data-certificate_1176.pdf	201.2 KB	22 minutes ago
☐	☆		api2_tokenv2.csv	169.0 KB	23 minutes ago
☐	☆		testautomation.pdf	134.6 KB	24 minutes ago
☐	☆		Image Pasted at 2022-11-8 14-28.png	32.0 KB	24 minutes ago
☐	☆		Begründung.docx	13.7 KB	23 minutes ago
☐	☆		archive-metadata.md	1.5 KB	22 minutes ago

Certify your file via the bloxberg blockchain.

Project Catalog   Help / Knowledge Base   About

Help

https://qa-keeper.mpdl.mpg.de/library/9dd1b6ad-3b0d-41a6-8814-aaa5e87e84f8/My%20Library/

Upload   New   Share   Archive   Certify   Metadata

Search files in this library

Files

My Libraries

Shared with me

Shared with groups

Library Details

Tools

Favorites

Activities

Linked Devices

Share Admin

Libraries

Edit Metadata for My Library library

Title:

This is a test

Author: First Name: Last Name:

Rene   Ranger

Affiliation:

Publisher:

MPDL Keeper Service, Max-Planck-Gesellschaft zur Förderung der Wissenschaften e. V.

Description:

Test certification to showcase bloxberg cert

Year: 2023

Institute: Institute name: Department:

Max Planck Digital Library   DL

Size   Last Update

2 minutes ago

14.2 MB   3 minutes ago

7.7 MB   4 minutes ago

487.4 KB 2 minutes ago

201.2 KB a minute ago

169.0 KB 3 minutes ago

134.6 KB 4 minutes ago

32.0 KB   4 minutes ago

13.7 KB   2 minutes ago

1.5 KB   a minute ago

Help

https://qa-keeper.mpdl.mpg.de/library/9dd1b6ad-3b0d-41a6-8814-aaa5e87e84f8/My%20Library/

Upload New Share Archive Certify Metadata

Search files in this library

Files

- My Libraries
- Shared with me
- Shared with groups
- Library Details

Tools

- Favorites
- Activities
- Linked Devices
- Share Admin

Libraries / My Library

		Name		Size	Last Update
☐	☆	📁	Emails		2 minutes ago
☐	☆	📄	ZoomInstaller.exe	14.2 MB	3 minutes ago
☐	☆	📊	bloxberg blockchain.pptx	7.7 MB	4 minutes ago
☐	☆	📊	Keeper_Storage_Estimation.xlsx	487.4 KB	2 minutes ago
☐	☆	📕	cared-data-certificate_1176.pdf	201.2 KB	a minute ago
☐	☆	📄	api2_tokenv2.csv	169.0 KB	3 minutes ago
☐	☆	📕	testautomation.pdf	134.6 KB	4 minutes ago
☐	☆	🖼	Image Pasted at 2022-11-8 14-28.png	32.0 KB	4 minutes ago
☐	☆	📄	Begründung.docx	13.7 KB	2 minutes ago
☐	☆	📄	archive-metadata.md	1.5 KB	a minute ago

▲ Project Catalog   Help / Knowledge Base   About

Help

https://qa-keeper.mpdl.mpg.de/library/9dd1b6ad-3b0d-41a6-8814-aaa5e87e84f8/My%20Library/

KEEPER
TEST SERVER

Upload | New | Share | Archive | Certify | Metadata

Search files in this library

Files

- My Libraries
- Shared with me
- Shared with groups
- Library Details

Tools

- Favorites
- Activities
- Linked Devices
- Share Admin

Libraries /

Certify My Library ✕

Certify all files within the library via the bloxberg blockchain. A new entry under "Library Details" on the left sidebar will be created, where you can access the certified version and the file and a proof of certification. Certifying may take some time, depending on the size of the library. Adding metadata is optional, but recommended.

Certify

			Size	Last Update
☐ ☆				2 minutes ago
☐ ☆			14.2 MB	3 minutes ago
☐ ☆			7.7 MB	4 minutes ago
☐ ☆		Keeper_Storage_Estimation.xlsx	487.4 KB	2 minutes ago
☐ ☆		cared-data-certificate_1176.pdf	201.2 KB	a minute ago
☐ ☆		api2_tokenv2.csv	169.0 KB	3 minutes ago
☐ ☆		testautomation.pdf	134.6 KB	4 minutes ago
☐ ☆		Image Pasted at 2022-11-8 14-28.png	32.0 KB	4 minutes ago
☐ ☆		Begründung.docx	13.7 KB	2 minutes ago
☐ ☆		archive-metadata.md	1.5 KB	a minute ago

▲ Project Catalog   Help / Knowledge Base   About

Help

https://qa-keeper.mpdl.mpg.de/library/9dd1b6ad-3b0d-41a6-8814-aaa5e87e84f8/My%20Library/

KEEPER
TEST SERVER

Upload   New   Share   Archive

Search files in this library

Files

- My Libraries
- Shared with me
- Shared with groups
- Library Details

Tools

- Favorites
- Activities
- Linked Devices
- Share Admin

Your files with the library My Library are currently being certified. We will inform you once the task has successfully finished. This may take a while.

Libraries / My Library

		Name	Size	Last Update
☐	☆	Emails		2 minutes ago
☐	☆	ZoomInstaller.exe	14.2 MB	3 minutes ago
☐	☆	bloxberg blockchain.pptx	7.7 MB	4 minutes ago
☐	☆	Keeper_Storage_Estimation.xlsx	487.4 KB	2 minutes ago
☐	☆	cared-data-certificate_1176.pdf	201.2 KB	a minute ago
☐	☆	api2_tokenv2.csv	169.0 KB	3 minutes ago
☐	☆	testautomation.pdf	134.6 KB	4 minutes ago
☐	☆	Image Pasted at 2022-11-8 14-28.png	32.0 KB	4 minutes ago
☐	☆	Begründung.docx	13.7 KB	2 minutes ago
☐	☆	archive-metadata.md	1.5 KB	a minute ago

▲ Project Catalog   Help / Knowledge Base   About

Opens a widget where you can find more information

Help

Files

My Libraries

Shared with me

Shared with groups

Library Details

Tools

Favorites

Activities

Linked Devices

Share Admin

Upload   New   Share   Archive   Certify   Metadata

Libraries / My Library

			Name	Size
	☆	📁	Emails	
	☆	📄	ZoomInstaller.exe	14.2 MB
	☆	📊	bloxberg blockchain.pptx	7.7 MB
	☆	📗	Keeper_Storage_Estimation.xlsx	487.4 KB
	☆	📕	cared-data-certificate_1176.pdf	201.2 KB
	☆	📄	api2_tokenv2.csv	169.0 KB
	☆	📕	testautomation.pdf	134.6 KB
	☆	🖼	Image Pasted at 2022-11-8 14-28.png	32.0 KB
	☆	📄	Begründung.docx	13.7 KB
	☆	📄	archive-metadata.md	1.5 KB	3 hours ago

Notifications

This notice verifies that testranger3 certified the files within the library My Library via the bloxberg blockchain. Additional information like the files and the corresponding certificates can be found at My Library.

a few seconds ago

Your files with the library My Library are currently being certified. We will inform you once the task has successfully finished.

Project Catalog   Help / Knowledge Base   About

Help

https://qa-keeper.mpdl.mpg.de/library/9dd1b6ad-3b0d-41a6-8814-aaa5e87e84f8/My Library/#

This is a test

Test certification to showcase bloxberg cert

Author(s): Ranger, R.

Year: 2023

bloxberg Transactions

Name	Date	Link
My Library	2023-02-07 11:38:05	Link to certificates
cared-data-certificate_1176.pdf	2023-02-07 11:37:24	Link to certificate

Contact: testranger3@gmail.com

https://qa-keeper.mpdl.mpg.de/bloxberg-cert/transaction/0x8aba22101f153a811301fcf5dfff4005ca2babe72e63627e880098f7c3490817/

KEEPER
TEST SERVER

Search Files

My Library **Snapshot** (2023-02-07 08:59:14)

Added "cared-data-certificate_1176.pdf" | keeper 2 hours ago

Current path: My Library

Name	Size		
Emails			
api2_tokenv2.csv	169.0 KB	Download Certificate	Download File
archive-metadata.md	1.5 KB		
Begründung.docx	13.7 KB		
bloxberg blockchain.pptx	7.7 MB		
cared-data-certificate_1176.pdf	201.2 KB		
Image Pasted at 2022-11-8 14-28.png	32.0 KB		
Keeper_Storage_Estimation.xlsx	487.4 KB		
testautomation.pdf	134.6 KB		
ZoomInstaller.exe	14.2 MB		

https://qa-keeper.mpdl.mpg.de/api2/bloxberg-pdf/0x8aba22101f153a811301fcf5dfff4005ca2babe72e63627e880098f7c3490817/b8ac51bb26abb81eb80038a9b433f73c26d9231f879ca029dd779518a91ec0c8/?p=%2Fapi2_tokenv2.csv

https://qa-keeper.mpdl.mpg.de/bloxberg-cert/transaction/0x853b62c795c5699b0a35a84110b5810cc26de66940419d00e8aade7ac966daec/54a...

KEEPER
TEST SERVER

This is a test

Test certification to showcase bloxberg cert

Author(s): Ranger, R.

Year: 2023

Transaction: 0x853b62c795c5699b0a35a84110b5810cc26de66940419d00e8aade7ac966daec

Download File

Download Certificate

bloXberg

Issued on Feb 7, 2023 by mpdl.berg
Certified by the bloxberg Consortium

View Recipient

✓ **Verified**
This is a valid bloxberg certificate.

Verify again

bloXberg

bloXberg
Issued on Feb 7, 2023 by mpdl.berg
Certified by the bloxberg Consortium

✓ **Format validation**
4 Items ▲

✓ **Hash comparison**
3 Items ▲

✓ **Verified**
This is a valid bloxberg certificate.
View transaction link

This certificate has been verified on the bloxberg blockchain.

bloXberg

Research

Certifi

This bloxberg certificate serves as a proof of existence
identifier were transacted on the bloxbe

Cryptographic Identifier
54a463f8700e7624e73db4b1ad7cbd6af323a72e846b554abc2efc0b39b500ae

Transaction ID
0x853b62c795c5699b0a35a84110b5810cc26de66940419d00e8aade7ac966daec

Timestamp
2023-02-07T10:37:30.362714

Merkle Root
ec573a99852d0e5c6f38386e60851bc85db442752e07ce86d89a51597fd0f4b9

KEEPER
TEST SERVER

This is a test

Test certification to showcase bloxberg cert

Author(s): Ranger, R.

Year: 2023

Transaction: 0x853b62c795c5699b0a35a84110b5810cc26de66940419d00e8aade7ac966daec

Download File

Download Certificate

bloxberg

Issued on Feb 7, 2023 by mpdl.berg
Certified by the bloxberg Consortium

View Recipient ›

✓ **Verified**

This is a valid bloxberg certificate.

Verify again

Verify another record   bloxberg

---

bloxberg

Research Object
Certificate

This bloxberg certificate serves as a proof of existence that the data corresponding to the cryptographic
identifier were transacted on the **bloxberg** blockchain at the issued time.

Cryptographic Identifier

54a463f8700e7624e73db4b1ad7cbd6af323a72e846b554abc2efc0b39b500ae

Transaction ID

0x853b62c795c5699b0a35a84110b5810cc26de66940419d00e8aade7ac966daec

Timestamp

2023-02-07T10:37:30.362714

Merkle Root

ec573a99852d0e5c6f38386e60851bc85db442752e07ce86d89a51597fd0f4b9

https://blockexplorer.bloxberg.org/tx/0x853b62c795c5699b0a35a84110b5810cc26de66940419d00e8aade7ac966daec

bloXberg

BLOCKS ▾   TRANSACTIONS ▾   TOKENS ▾   APIS ▾   • bloxberg ▾

Transaction Details

ⓘ Transaction Hash	0x853b62c795c5699b0a35a84110b5810cc26de66940419d00e8aade7ac966daec 📋
ⓘ Result	✓ Success
ⓘ Status	Confirmed Confirmed by 47 blocks
ⓘ Block	19132901
ⓘ Timestamp	🕐 5 minutes ago	February-07-2023 11:37:30 AM +1 UTC	Confirmed within <= 6.364 seconds
ⓘ From	0xd748bf41264b9060934609923169643f45bdbc32e 📋
ⓘ Interacted With (To)	0x3fb704dfdb72fc06860d9f09124c30919488f13c 📋

ⓘ Tokens Minted		
	From	0x0000000000000000000000000000000000000000 📋
	To	0x1EC2f66dFdA438B9F8523EcFc7676f192DDBBb27 📋
	For	TokenID [15220] ROC

ⓘ Value	0 Berg
ⓘ Transaction Fee	0.000240897 Berg
ⓘ Gas Price	1 Gwei

ⓘ Gas Limit	700,000
ⓘ Gas Used by Transaction	240,897	34.41%
ⓘ Nonce Position	16467 0
ⓘ Raw Input	Hex (Default) ▾

0xf0e36115000000000000000000000000001ec2f66dfda438b9f8523ecfc7676f192ddbbb27000000000000000000000000000000000000000000000000000000000000006000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000a000000000000000000000000000000000000000000000000000000000000001468747470733a2f2f626c6f636b6578706c6f726572652e6f6f72670000000000000000000000000000

https://blockexplorer.bloxberg.org/token/0x3fb704dfdb72fc06860d9f09124c30919488f13c/instance/15220/token-transfers

blo**X**berg

BLOCKS ▾　　**TRANSACTIONS** ▾　　**TOKENS** ▾　　**APIS** ▾　　● bloxberg ▾

ResearchObjectCertification

Token ID: 15220

ERC-721　　1 Transfers

Token Transfers

Page 1

Token Minting	0x853b62c795c5699b0a35a84110b5810cc26de66940419d00e8aade7ac966daec 0x0000000000000000000000000000000000000000 → 0x1EC2f66dFdA438B9F8523EcFc7676f192DDBBb27 TokenID [15220] ROC	Block #19132901 5 minutes ago

Page 1

---

blo**X**berg

© 2023 Blockexplorer version 2.1.2 based on Blockscout 4.1.3

bloxberg

Research Object
Certificate

This bloxberg certificate serves as a proof of existence that the data corresponding to the cryptographic identifier were transacted on the **bloxberg** blockchain at the issued time.

Cryptographic Identifier

54a463f8700e7624e73db4b1ad7cbd6af323a72e846b554abc2efc0b39b500ae

Transaction ID

0x853b62c795c5699b0a35a84110b5810cc26de66940419d00e8aade7ac966daec

Timestamp

2023-02-07T10:37:30.362714

Merkle Root

ec573a99852d0e5c6f38386e60851bc85db442752e07ce86d89a51597fd0f4b9

View the transaction at https://blockexplorer.bloxberg.org

Verify the certificate at https://certify.bloxberg.org/verify

Research Object Certification 0.4.0 OAS3

/openapi.json

Authorize 🔓

certificate Creates, transacts, and signs a research object certificate on the bloxberg blockchain. Hashes must be generated client side for each desired file and provided in an array. Each hash corresponds to one research object certificate returned in a JSON object array. ⌃

| POST | /createBloxbergCertificate Createbloxbergcertificate | ⌄ 🔒 |

pdf Accepts as input the response from the createBloxbergCertificate endpoint, for example a research object JSON array. ⌃

| POST | /generatePDF Generatepdf | ⌄ 🔒 |

research_object_v1 Returns Context JSON schema for Version 1 of Research Object Certificate ⌃

| GET | /research_object_certificate_v1 Research Object Certificate V1 | ⌄ |

_auth ⌃

| GET | /auth/new Get New Api Key | ⌄ 🔒 |

| GET | /auth/revoke Revoke Api Key | ⌄ 🔒 |

| GET | /auth/renew Renew Api Key | ⌄ 🔒 |

| GET | /auth/logs Get Api Key Usage Logs | ⌄ 🔒 |

THANK YOU FOR YOUR ATTENTION

get in touch:

bloxberg.org
keeper.mpdl.mpg.de / keeper@mpdl.mpg.de

Max Planck Digital Library

E-Mail: ranger@mpdl.mpg.de
Internet: www.mpdl.mpg.de